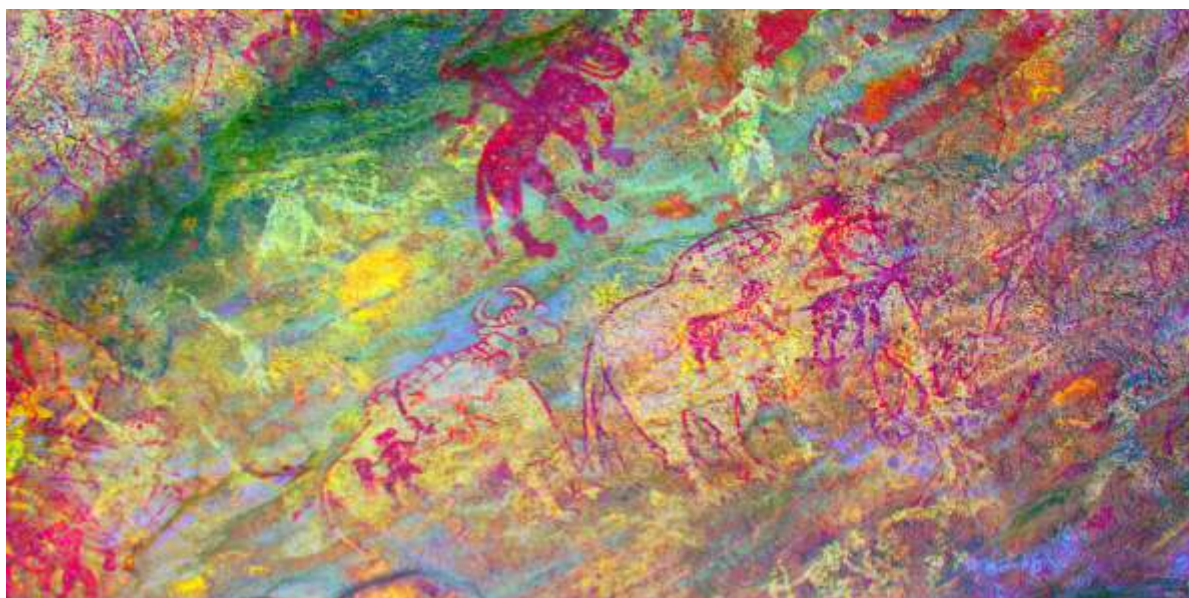
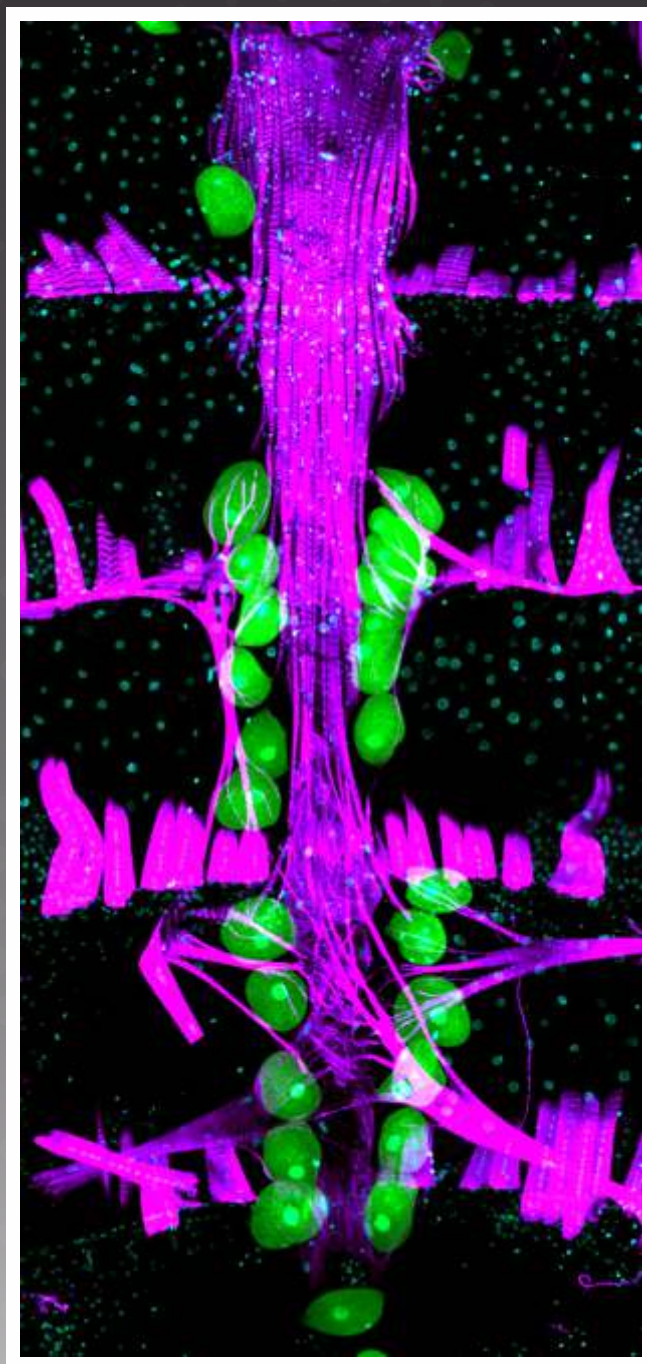


ANNUAL REPORT 2023-24



Indian Institute of Science Education and Research Mohali

In pursuit of knowledge



Front cover image information and credits:

The Paleoanthropology and Archaeology Lab studied this multi-cultural painted rock art panel (located at Mandikho, M.P.) using D-Stretch software. This visual enhancement aided in the comprehensive counting of all individual figures, interpreting patterns of superimposition to aid in relative chronology, and identifying possible scenes. Additional work involved extensive digital photography and surveys and documentation of other rock art sites in the central Narmada Valley. The project was funded by IISER Mohali and a STARS (MoE) project grant.

Image courtesy: Rajesh Poojari, Dr. Parth R. Chauhan's Group

Inner front page image information and credits:

An image of the *Drosophila* adult heart with adjacent pericardial cells and alary muscles.

Image courtesy: Prof. Sudip Mandal's Group

TABLE OF CONTENTS

SR. NO.	TOPICS	PAGE NO.
01.	GOVERNORS	04
02.	SENATE	07
03.	RESEARCH ADVISORY COMMITTEE	10
04.	ADMINISTRATION	12
05.	FACULTY	16
06.	EVENTS AND ACTIVITIES 2023-24	23
07.	SCIENTIFIC MEETINGS/CONFERENCES/WORKSHOPS	39
08.	RESEARCH ACTIVITIES	46
	DEPARTMENT OF BIOLOGICAL SCIENCES	47
	DEPARTMENT OF CHEMICAL SCIENCES	67
	DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES	102
	DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES	114
	DEPARTMENT OF MATHEMATICAL SCIENCES	122
	DEPARTMENT OF PHYSICAL SCIENCES	137
09.	AWARDS & HONOURS	166
10.	MAJOR FACILITIES PROCURED	174
11.	SANCTIONED PROJECTS 2023-24	179
12.	ACADEMIC PROGRAMS	183
13.	INSTITUTE LIBRARY	185
14.	COMPUTER CENTER	192
15.	NIRF RANKING	194
16.	TECHNOLOGY BUSINESS INCUBATOR	196
17.	LECTURES BY VISITORS	202
18.	POSTDOCTORAL FELLOWS	210
19.	GRADUATES OF 2023	213
20.	LIST OF PUBLICATIONS	228
21.	PATENTS	263

DIRECTOR'S REPORT



It is my first opportunity to have the pleasure and privilege of presenting the annual report of IISER Mohali for the year 2023-24. Below, I briefly describe the key achievements of the faculty and students in the six departments of Mathematical Sciences, Physical Sciences, Biological Sciences, Chemical Sciences, Earth & Environmental Sciences and Humanities and Social Sciences of IISER Mohali. The achievements are further elaborated elsewhere in the annual report.

The Department of Mathematical Sciences has contributed to the Institute's growth with contribution to the teaching, research and administration. Research articles from the Department have appeared in highly reputed journals of Mathematics such as the Math Annalen, Proceedings of the Edinburgh Mathematical Society, Forum Mathematicum, International Journal of Mathematics, Bulletin des Sciences Mathematiques, Journal of Algebra, Journal of Pure and Applied Algebra, Linear Algebra and its Applications, Journal of Fourier Analysis, Applications etc. The Department has also received several grants from funding agencies such as SERB and NBHM. A high-end computing facility using the DST-FIST grant has been inaugurated.

Professor Krishnendu Gongopadhyay has been elected as a Fellow of the National Academy of Sciences, India, and was awarded the Simon Visiting Professorship by Oberwolfach Research Institute for Mathematics. Dr. Mahender Singh the Fulbright-Nehru Academic and Professional Excellence Fellowship during May-July 2023 and Dr Ratna Pal received the INSA Young Associate Award 2024, respectively. Dr. Mahender Singh served on the editorial board of the Proceedings: Mathematical Sciences of the Indian Academy of Sciences and the Mathematics Newsletter of the Ramanujan Mathematical Society while Professor Krishnendu Gongopadhyay did so for the Bulletin of the Indian Mathematics Consortium. Professor Kapil Paranjape served as a convener of the Sectional committee of the Indian National Science Academy, and as a council member of both the Indian Association for Cultivation of Sciences and the Indian Statistical Institute, Kolkata.

The graduated BS-MS students of MS07 to MS11 batches of the department are now serving as faculty members in IITs and Universities in India and Abroad. Some of the names are Anuj Jakhar, Tanya Kaushal Srivastava, Keshav Aggarwal, Debanjana Kundu, Sumit Mishra, Hitesh Gakhar, Parul Gupta, Jagdeep Singh. Some of the PhD students are also getting placements in reputed Institutes across India. Recently, Dr. Pinka Dey has joined NIT Calicut as an assistant professor and Dr. Priya Rani has joined DRDO as Scientist-B.

The Department is also actively contributing to Mathematics education and outreach activities. The contribution of Professor Amit Kulshrestha in designing a unique Mathematics gallery at the Pushpa Gujral Science City at Kapurthala, Punjab and Professor Krishnendu Gongopadhyay serving in the curriculum development at the Sikkim University, and at the DST-Centre for Interdisciplinary Mathematical Sciences of the Banaras Hindu University (BHU) are some of the examples. The department has included Mathematics Education as a minor in its curriculum.

Additionally, the department hosted several visitors for delivering lectures and organized Young Mathematician's Symposium (YoMaths-2024) and National Mathematics Day on December 22, 2023. To promote inclusivity several meetings were organized for gender sensitization and celebration of women in mathematics.

Several faculty members of the Department of Physical Sciences published in high-impact journals. Notably, Dr Abhishek Chaudhary published a paper in Nature Communications, Professor Sudeshna Sinha published two papers in Chaos Solitons Fractals and Prof Jasjeet Bagla's group published in MNRAS.

Several faculty members were inducted in national science academies and bagged prestigious awards. Professor Arvind and Professor Kamal P Singh were elected fellow of NASI, and Associate fellow of INSA, respectively. Dr Harvinder Kaur Jassal was elected to the executive council of the Indian Association for General Relativity and gravitation. Professor Jasjeet Bagla was appointed SOC Chairperson for the IAGRG (Indian Association for General Relativity and Gravitation) annual meeting to be held at BITS Pilani in January 2025 while Professor Sudeshna Sinha was appointed as a member of the International Science Council (India) for International Union of Pure and Applied Physics (IUPAP). Professor Kamal P Singh, and Dr Tripta Bhatia received funding from DAAD-DST International travel grant, respectively. Professor Yogesh Singh and Dr Kinjalk received funding from SERB.

Professor Sudeshna Sinha was appointed to the Editorial Board of Proceedings of the Royal Society A: Mathematical, Physical & Engineering Sciences (Royal Society, UK) while Dr. Tripta Bhatia served as the guest editor for an issue of European Physical Journal - Special Topics. Dr. Tripta was also a Program Committee member for the International Conference on Nanomaterials in Biology, held in Nov. 2023 at IIT Gandhinagar.

The faculty members namely Professor Yogesh Singh, Dr Abhishek Chaudhuri, Dr Kinjalk Lochan, Dr Vishal Bhardwaj, Dr Tripta Bhatia have organized several conferences and scientific meetings either online or in physical mode and some of them were aimed at enhancing inclusivity in the overall research landscape.

Several students of the department of physical sciences have taken up scientific positions in India and elsewhere to further enhance their scientific career. These include Amit Vashist, Chandrakala Meena, Ranbir Sharma, Aditya Pavan Saikia, Abineet Parichha, Arshdeep Sharma, Sumit Mishra, Dileep Singh, Akshay Gaikward, Vaishali Gulati, Gayatri Singh, Krishna Shende, James Watt, Pravita Hallur, Komal Bali, Simranjit Kaur, Sauraj Bharti, etc

Continuing their prowess in scientific publications, the faculty members of the Department of Biological Sciences have published several research articles in highly reputed journals such as the EMBO Journal, Nature Communications, and Molecular Microbiology. Faculty members of the DBS have received many recognitions including the Tata Transformation Prize and the JC Bose fellowship by Professor Purnananda Guptasarma and Professor Samrat Mukhopadhyay, respectively. Professor Samrat Mukhopadhyay and Professor Lolitika Mandal were elected as fellows, Dr Mahak Sharma as an associate fellow and Dr Jogender Singh as young associate of the Indian National Science Academy. Dr. Indranil Banerjee was awarded the high-level visiting fellowship from the Embassy of France in India to visit ENS Paris. He also received significant funding from Indian Council of Medical Research to establish a Centre for Advanced Research in host-directed antiviral development. Dr. Santosh Satbhai Co-edited a book entitled "Plant Phosphorus Nutrition" published by the CRC Press. Dr. Sadhan Das was appointed as member of the editorial board of Arteriosclerosis, Thrombosis, and Vascular Biology (American Heart Association).

Many graduate students of the Department of Biological Sciences have attended several national and international conferences and some have received travel awards or the recognition during these conferences. A non-exclusive list of these students includes Samriti Mankotia, Mahender Singh, Swati Singh, Sugata Chaudhuri, Amjadudheen V, Riya Maddan, Arpita Sharma, Gaganpreet Kaur, Nirmal Kumar, Shalini Rawat, Deep Shikha, Roopali Khanna.

Several students of the department have bagged prestigious positions for advancing their scientific pursuit in renowned institutes around the globe. Some of them are Mirudula, Riya Madan, Shalini Rawat, Anupa T Anil and Rakesh, Samriti Mankotia, Sandeep Kumar Rai, Sudhakar Singh, Surbhi Dahiya.

Several faculty members of the Department of Chemical Sciences published their research in impactful journals. Dr. Subhabrata Maiti and Dr. Sabyasachi Rakshit's group published their work in Nature Communications. Other notable publications from the departments include Dr. Priyakumari in Physical Chemistry Chemical Physics, Dr. Sanchita Sengupta's group in ACS Applied Optical Materials, Chemistry - A European Journal, ChemCatChem and Photochemistry and Photobiology, Professor S. K. Pal's group in Small, Professor Ramesh Ramachandran's group in Physical Chemistry Chemical Physics and The Journal of Chemical Physics, Dr. Kuduva R. Vignesh's group in Chemistry - A European Journal and Dalton Transactions and Prof. Ramasastry group's in Chemical Sciences, Organic Letters and Chemical Communications. Dr. Subhabrata Maiti has been inducted as an editorial advisory board member of the Wiley-VCH journal ChemSystemsChem and Dr Sanchita Sen Gupta served as early career advisor board member on the RSC journal Organic Chemistry Frontiers.

Dr. Sabyasachi Rakshit organized the national conference on Force Spectroscopy and Microscopy, Raman and Fluorescence Spectroscopy and the FCS satellite meetings. She also organized the International Conference on Emergent Trends in Photodynamics and Photochemistry. Prof. R. Vijaya Anand has been selected to receive the prestigious Chirantan Rasayan Sanstha (CRS) Silver Medal 2024. Dr. Subhabrata Maiti has been inducted as a Member to Royal Society of Chemistry while Professor Ramasastry has been inducted as the council member of the National Organic Symposium Trust (NOST) for 2023-26. Dr. Kuduva R. Vignesh and Professor Ramasastry received International Travel Support from SERB to attend scientific conferences. Dr. Kuduva R. Vignesh also received research funding from SERB.

Two Ph.D graduates Indu Bala and Akshi Deshwal of the departments have started their professional career as assistant professor at IIT Mandi and Punjab Engineering College, Chandigarh, respectively. Several students have joined post-doctoral positions abroad to further advance their scientific pursuit. These are Ekta Shandilya, Nisha Arora, Sushil Sharma, Joydip De. Dr De also received the prestigious Humboldt Research Fellowship to carry out postdoctoral research at University of Wurzburg.

Many students of the department participated in several national and international scientific conferences and have won best presentation awards. These included Pritam Saha, Soma Sil, Ritobrata De, Anshika Baghla, Vidushi Gupta, Sushil Sharma, Anita Kumari, Imon J. Dutta, Jay Prakash. Priyanka, Veerpal Kaur and Pritam Saha received travel grants for attending international conferences. Neetu received the PMRF fellowship.

Faculty members and students of the Department of Earth and Environmental Sciences have secured significant research funding and published more than 60 peer-reviewed articles in the past year. Notably, Dr. Chandrakant Ojha co-authored a paper in the prestigious journal Nature and Dr. V. Sinha and B. Sinha co-authored papers in the prestigious journals PNAS and One Earth. Several faculty members of the department received research funding. Dr. Raju Attada and Dr. Yunus Ali Pulpadan received ISRO-DMSP grants, Dr Sunil A. Patil secured a BIRAC grant, Dr. Anoop Ambili received grant from SERB. Dr Sunil Patil, along with his students, featured in the top 7 winners of the Carbon Zero Challenge organized by IIT Madras.

Prof. Vinayak Sinha has been appointed as a member of INSA-Future Earth National Committee of India and as Deputy Editor of the international peer-reviewed journal, Global Sustainability published by the Cambridge University Press. He was also appointed as member of IISER TVM National Curriculum Committee responsible for designing new BS-MS Majors program in Atmospheric Sciences, Geology and Environmental Sciences. He organized a workshop with American Chemical Society on Environmental Science at IISER Mohali. Dr. Ojha was the primary convener and session chair of a session in the Asia Oceania Geosciences Society (AOGS)- symposium. Dr. R. Attada and Dr. B. Sinha were appointed to the Editorial Board of Discover Atmosphere, a Springer Nature publication. Dr. Ojha was appointed session chair of a session in the Asia Oceania Geosciences Society (AOGS)- symposium – July 2023, Singapore and the India Geoscience and Remote Sensing Symposium (InGARSS). He was also selected as the session chair of an invited session in the India Geoscience and Remote Sensing Symposium (InGARSS) 2023, Bangalore (India).

Alumni of the department, Rohit Giri, Chinmoy Sarkar and Vinod Kumar started their independent positions at the National Institute of Technology Raipur, the California Air Resources Board, California, USA, and at EUMETSAT, Germany. Dr. P. Chiranjeevi joined as a Head, R&D at Astam Diagnostics Pvt. Ltd., Alwar.

Several students of the department have participated in national and international scientific meetings and many have received travel grants. Sahil Kaushal and Arpit Awasti were awarded the prestigious Prime Minister Research Fellowship. Nishal Sharma received the Dr. S.K. Ghosh Memorial Young Scientist Award-2024 by IMS Kolkata. Many students have joined positions to advance their scientific career in foreign universities/institutes.

Several faculty members of the Department of Humanities and Social Sciences received funding from different agencies. Prof. Anu Sabhlok, Dr. Ritajyoti Bandyopadhyay and Dr Debdulal Saha received the Scheme for Promotion of Academic and Research Collaboration (SPARC) grant. Prof. Anu Sabhlok also received a grant from Open Philanthropy for research on air pollution. Dr. Ritajyoti Bandyopadhyay was awarded a German Ministry of Education funded visiting professorship at the Centre for Modern Indian Studies, University of Goettingen, Germany. Dr. Parth R. Chauhan was awarded a travel grant to attend INQUA Congress in Rome, Italy.

Prof. Anu Sabhlok published a co-edited book (with Yaffa Truelove) entitled Gendered Infrastructures: Space, Scale, and Identity. 2024. West Virginia University Press and Dr. Ritajyoti Bandyopadhyay published several papers on Labour issues. Several workshops and conferences were organized in which Dr. Debdulal Saha served as a co-convener for a 2-day workshop on 'New Approaches to Economy and Society: Exploring Popular Economy as a Research Agenda' in collaboration with School of Humanities and Social Sciences, IIT Mandi. Dr. Saha also organised a 5-day Winter Graduate School (WGS) 2024 on 'Research Methodology and Academic Writing' at IISER Mohali. Dr. Parth R. Chauhan became a member of the advisory committee for a luminescence dating laboratory. Madhya Pradesh Council of Science & Technology. Bhopal. Dr. Chauhan became a co-leader (along with Dr. Pallavee Gokhale and Dr. C.V. Sharada) in establishing an Indian chapter for Computer Applications in Archaeology (CAA)

Several students of the department have participated in meetings and conferences and also received travel awards/bursaries. Nilkantha Pal was awarded the Mark Samuels Lasner Fellowship in Printing History 2024 by the American Printing History Association for his ongoing doctoral research project and a minor research grant by the Bibliographical Society, London for his field research in Bangladesh. Swapnil Chaudhary has been awarded The Bursary by the Society for Social History of Medicine (SSHM) to participate in SSHM 2024 conference at the University of Strathclyde, Glasgow. Shashi Mehra and Vivek Singh, the alumni of the department, have joined post doc or faculty positions, respectively.

I hope that the activities and achievements of the different departments and sections of IISER Mohali detailed in this Annual Report will give you a reflection of the purpose and impact of IISER Mohali with reference to the science education landscape of the country and the multiple ways in which IISER Mohali is contributing for the society, the nation and the science at its global level.

Warm greetings and regards,
Anil Kumar Tripathi

1 GOVERNORS

Chairperson

Members

Secretary

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Torrent Group of Companies, Ahmedabad

Prof (Dr.) J.S. Yadav (w.e.f. 25.08.2023)

Director (Research), Indrashil University,
Gujrat

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Ms Saumya Gupta

JS(TE), Ministry of Education Department
of Higher Education Shastri Bhawan,
New Delhi-110001.

Sh. Sanjog Kapoor

JS & FA, Ministry of Education, Department
of Higher Education, Technical Section- VII,
Shastri Bhawan, New Delhi-110001.

The Chief Secretary or Nominee (Ex-officio)

Govt. of Punjab, Room No. 28, 6th Floor,
Punjab Civil Secretariat, Chandigarh-160001.

Prof. Rajeev Ahuja

Director, IIT Ropar, Rupnagar, Punjab 140001

Prof. Govindan Rangrajan (Ex-officio)

Director, Indian Institute of Science,
Bangalore-560012.

The Secretary

Department of Industrial Policy and
Promotion, Udyog Bhawan, New Delhi.

The Secretary

Department of Agricultural Research &
Education Krishi Anusandhan Bhawan, Pusa,
New Delhi - 110012.

Prof. Samrat Mukhopadhyay

Professor, IISER Mohali.

Prof. N.G. Prasad

Professor, IISER Mohali.

Dr. Alka Rao

Advisor (Regulation, Science & Standards)
on deputation at Food Safety and Standard
Authority of India, New Delhi-110002

Prof. J Gowrishankar (Ex-officio)

Principal Scientist, CSIR Institute of
Microbial Technology, Chandigarh-160036

Director, IISER Mohali
(Till 01.03.2024)

Prof. Purnananda Guptasarma (Ex-officio)

Director, IISER Mohali
(From 02.03.2023 to 29.04.2024 (f/n))

SECRETARY

Prof. Jagdeep Singh (Ex-Officio)

Registrar, IISER Mohali



2

SENATE



LECTURE HALL COMPLEX

Chairperson

Members

Secretary

SENATE

CHAIRPERSON

Professor J Gowrishankar
(Ex-officio)

Director, IISER Mohali
(Till 01.03.2024)

Professor Purnananda Guptasarma
(Ex-officio)

Director (Temporary Charge), IISER Mohali
(From 02.03.2023 to 29.04.2024 (f/n))

MEMBERS

Professor Rajeev Ahuja
Director, IIT Ropar

Professor S. Anantha Ramakrishna
Director, CSIO Chandigarh

Professor Rajesh Gill
Professor, Dept. of Sociology Panjab
University, Chandigarh

Professor A.K. Bachhawat
(Till 30.09.23)
IISER Mohali

Professor Kapil Hari Paranjape
IISER Mohali

Professor Sudeshna Sinha
IISER Mohali

Professor J. S. Bagla
IISER Mohali

Professor Purnananda Guptasarma
IISER Mohali

Professor Sanjay Mandal
IISER Mohali

Professor Kavita Dorai
IISER Mohali

Professor Ramandeep Singh Johal
IISER Mohali

Professor Chanchal Kumar
IISER Mohali

Professor Kausik Chattopadhyay
IISER Mohali

Professor N. G. Prasad
IISER Mohali

Professor Samrat Mukhopadhyay
IISER Mohali

Professor Sanjay Singh
IISER Mohali

Professor S. A. Babu
IISER Mohali

Professor Arunika Mukhopadhyay
IISER Mohali

Professor Anu Sabhlok
IISER Mohali

Professor Kamal P. Singh
IISER Mohali

Professor R. Vijaya Anand
IISER Mohali

Professor Krishnendu Gongopadhyay
IISER Mohali

Professor Vinayak Sinha
IISER Mohali

Professor Sanjeev Kumar
IISER Mohali

Professor Santanu K Pal
IISER Mohali

Professor Yogesh Singh
IISER Mohali

Dr. V. Rajesh
(Till 09.01.24)
IISER Mohali

Dr. Parth Chauhan

(From 10.01.24)
IISER Mohali

Professor Amit Kulshrestha

IISER Mohali

Dr. Baerbel Sinha

IISER Mohali

Dr. Sharvan Sehrawat

IISER Mohali

Dr. Sugumar Venkataramani

IISER Mohali

Dr. Dipanjan Chakraborty

IISER Mohali

Dr. Chandrakant Aribam

IISER Mohali

Dr. Sharvan Kumar Mishra

IISER Mohali

Professor Lolitika Mandal

IISER Mohali

Professor Ramesh Ramachandran

IISER Mohali

Professor Sudip Mandal

IISER Mohali

Professor Rajeev Kapri

IISER Mohali

Professor Samarjit Bhattacharya

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Professor S. V. Ramasastry

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Dr. Mahender Singh

IISER Mohali

Dr. P. Visakhi

IISER Mohali

Dr. Raju Attada

IISER Mohali

Dr. Adrene Freeda D'cruz

IISER Mohali

Dr. Ambresh Shivaji

(From 20.07.23)

SECRETARY

Professor Jagdeep Singh

Registrar, IISER Mohali

3

RESEARCH ADVISORY COMMITTEE



RESEARCH ADVISORY COMMITTEE

Professor Arun K. Grover

Chairperson,
Retd. Vice-Chancellor, Panjab University,
Chandigarh

Professor Ram Ramasamy

Member, IIT Delhi

Professor Prasad Bharatam

Member, National Institute of Pharmaceutical
Education and Research, Mohali

Dr. Sanjeev Khosla

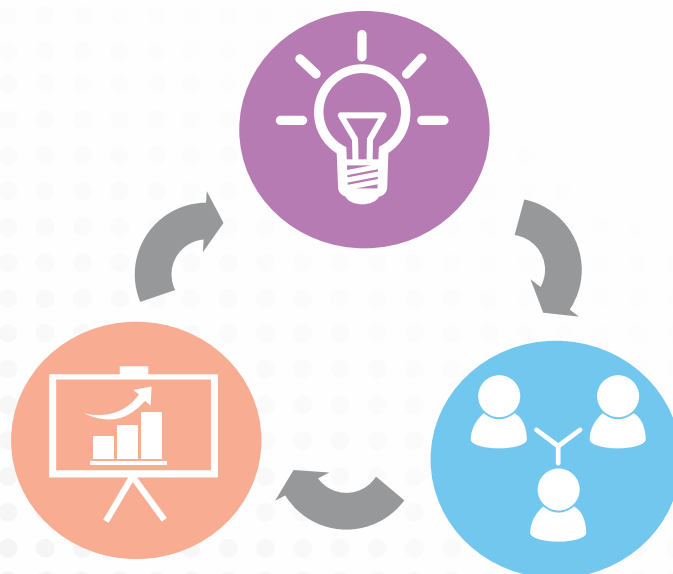
Member, Director, IMTECH, Chandigarh

Professor T. Ramadas

Member, CMI, Chennai

Dean (R&D) & Associate Dean (R&D)

Convener, IISER Mohali



4 ADMINISTRATION

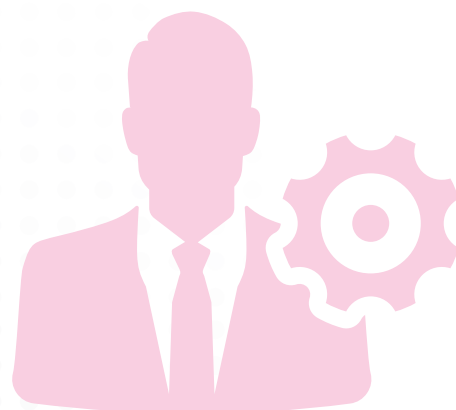


ADMINISTRATION

Director	Professor J. Gowrishankar Director (Till 01.03.2024)
	Professor Purnananda Guptasarma [04.03.2024- 29.04.2024(F/N)]
Registrar	Professor Jagdeep Singh
Dean Faculty	Professor J. Gowrishankar (till 10.07.2023) Professor Purnananda Guptasarma (w.e.f. 11.07.2023)
Dean Academics	Professor Jasjeet Singh Bagla (till 27.06.2023) Professor S A Babu (w.e.f. 28.06.2023)
Associate Dean Academics	Professor Vinayak Sinha (till 27.06.2023) Dr. Sugumar Venkataramani Dr. Shravan Kumar Mishra (w.e.f. 28.06.2023)
Dean Students	Dr. Dipanjan Chakraborty
Associate Dean Students	Dr. Chandrakant S. Aribam
Dean R&D	Professor R. Vijaya Anand
Associate Dean R&D	Dr. Sharvan Sehwat
Dean International Relations and Outreach	Professor Amit Kulshrestha
Librarian	Dr. P. Visakhi
Chief Medical Officer	Dr. Gurpreet Singh
Deputy Registrar	Sh. Gautam Sharma
Superintending Engineer	Sh. Praveen Kumar Srivastava
Sr. Technical Officer (IT/Lab.)	Ms. Garima Kaushik

Wardens	Dr. Adrene Freeda D' cruz Dr. Santhosh Kumar Pamula Dr. Ambresh Shivaji Dr. Raju Attada Dr. Subhabrata Maity Dr. Vidya Devi Negi
Assistant Registrars	Sh. Sandeep Ahlawat Sh. Mukesh Kumar (on lien till 22.12.2023) Ms. Nancy Gupta Sh. Sanjeev Kumar Yadav Ms. Amandeep Saini Sh. Mansa Ram
Technical Officer (IT/Lab.)	Dr. Paramdeep Singh Chandi
Veterinarian (Animal House)	Dr. Chander Shekhar
Assistant Librarian	Sh. Sonam Rigzin
Medical Officer	Dr. Harshdeep Kaur
Assistant Engineer (Electrical)	Sh. Atul Kadwal
Assistant Engineer (Civil)	Sh. Rajiv Kumar
Technical Officer (IT/Lab.)	Dr. Sumit Chhangani
P.S.(Director's Office)	Ms. Yashoda
Staff Nurse	Sh. C. Periyasamy
Senior Technical Assistant	Sh. Anupam Pandey Sh. Triveni Shanker Verma Ms. Sangeetha Gurusamy Dr. Avtar Singh Ms. Bindiya Ms. Manuj Thakur Sh. Rohit Sharma Sh. Rahul Kirti
Security Officer	Shri Kamal Jeet
Superintendent	Ms. Poonam Rani Sh. Sachin Jain Sh. Arup Kumar Saha Ms. Neena Kumari Sh. Gourav Bansal Sh. Rahul Sharma Sh. Siddharth Dixit Sh. Sanjay Kumar

	Ms. Deepika Sh. Japneet Singh
Technical Assistant	Sh. Rakesh Kumar Sh. Ramesh Kumar Sh. Mangat Ram Sh. Bhavin Kansara Sh. Jayaraju Battula Sh. Balbir Singh Dr. Amit Lochab Sh. Harpreet Singh Sh. Prahlad Singh
Junior Library Superintendent	Sh. Peeyush Dwivedi
Office Assistants	Sh. Tarandip Singh Sh. Charanjit Singh Ms. Kavita Pandey Sh. Shubham Pusadkar Sh. Mohit Arora Sh. Vishal Verma Ms. Bhupali Sharma Ms. Ekta Dhull Sh. Deshraj Sh. Dev Dutt
Junior Technical Assistant	Sh. Avtar Singh Ms. Deepika Ms. Reetu Chaudhary Sh. Virpartap Singh Sh. Deepak Kumar Dr. Ashoke Maity Dr. S K Taheruddin Ahamed Dr. Pankaj Kumar Maurya Sh. Avtar Singh Sh. Sadiq Imam Rizvi
Attendant	Sh. Bhopal Singh Sh. Amandeep Singh



5 FACULTY



Faculty Members

Honorary Faculty

Visiting Faculty

Adjunct Faculty

Emeritus Faculty

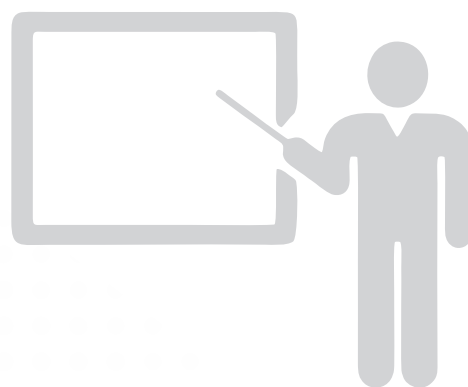
INSPIRE Faculty Fellows

FACULTY

FACULTY MEMBERS

1. **Debashis Adhikari** (Associate Professor, Chemistry)
Catalysis, Small Molecule Activation, M-L Multiple Bonding
2. **Anoop Ambili** (Associate Professor, Earth & Environmental Sciences)
Paleoclimate and Geochemistry
3. **R. Vijaya Anand** (Professor, Chemistry)
Synthetic organic chemistry
4. **Chandrakant S. Aribam** (Associate Professor, Mathematics)
Number theory
5. **Arvind** (Professor, Physics)
Quantum information theory, Quantum optics
6. **Raju Attada** (Assistant Professor, Earth & Environmental Sciences)
Weather and Climate Modelling; Monsoon Dynamics
7. **S. Arulananda Babu** (Professor, Chemistry)
Synthetic organic chemistry
8. **Jasjeet Singh Bagla** (Professor, Physics)
Cosmology, Astrophysics
9. **P. Balanarayan** (Associate Professor, Chemistry)
Computational & Theoretical Chemistry
10. **Chetan T. Balwe** (Associate Professor, Mathematics)
Applications of Homotopical Algebra to Algebraic Geometry
11. **Ritajyoti Bandyopadhyay** (Associate Professor, Humanities and Social Sciences)
Urban History, Informal Economy and Infrastructure Studies
12. **Indranil Banerjee** (Associate Professor, Biology)
Cellular Infectiology of Human Pathogenic Viruses
13. **Suman Kumar Barman** (Assistant Professor, Chemistry)
Bio-Inorganic Chemistry, Catalysis
14. **Vishal Bhardwaj** (Assistant Professor, Physics)
Experimental High Energy Physics: Exotic particles, Beauty and Charm physics
15. **Manabendra Nath Bera** (Assistant Professor, Physics)
Quantum Information and Quantum Physics
16. **Tripta Bhatia** (Assistant Professor, Physics)
Soft Matter & Biological Physics, Synthetic Biology
17. **Sourabh Bhattacharya** (Assistant Professor, Earth & Environmental Sciences)
Economic Geology, Granite metallogeny, Crustal fluids, Fluid inclusions
18. **Samarjit Bhattacharyya** (Professor, Biology)
Neurobiology
19. **Samir Kumar Biswas** (Assistant Professor, Physics)
Bio-NanoPhotonics and BioPhysics

20. **Rachna Chaba** (Associate Professor, Biology)
Bacterial Genetics and Physiology
21. **Dipanjan Chakraborty** (Associate Professor, Physics)
Soft Condensed Matter, Statistical Physics
22. **Kausik Chattopadhyay** (Professor, Biology)
Structure-Function Studies on Pore-Forming Protein Toxins
23. **Abhishek Chaudhuri** (Associate, Physics)
Soft condensed matter physics
24. **Parth R. Chauhan** (Associate Professor, Humanities and Social Sciences)
Paleoanthropology & Archaeology
25. **Rhitoban Ray Choudhury** (Associate Professor, Biology)
Evolution, Genetics and Genomics
26. **Angshuman Roy Choudhury** (Assistant Professor, Chemistry)
X-ray Crystallography
27. **Sadhan Das** (Assistant Professor, Biology)
Epigenetic Mechanisms in Diabetic Vascular Complications
28. **Prasenjit Das** (Assistant Professor, Physics)
Theoretical soft condensed matter physics, statistical mechanics and computational physics.
29. **Anil Dasana** (Assistant Professor, Physics)
Soft and Biological matter physics, Computational Biology
30. **Adrene F. D'cruz** (Assistant Professor, Humanities and Social Sciences)
English Literature
31. **Arijit Kumar De** (Associate Professor, Chemistry)
Ultrafast non-linear spectroscopy and fluorescence microscopy
32. **Kavita Dorai** (Professor, Physics)
Biomolecular NMR, Quantum computing
33. **Shane D'mello** (Assistant Professor, Mathematics)
Topology of Real Algebraic Varieties
34. **Abhik Ganguli** (Assistant Professor, Mathematics)
Number Theory
35. **Jino George** (Associate Professor, Chemistry)
Molecular Strong Coupling
36. **Krishnendu Gongopadhyay** (Professor, Mathematics)
Groups, Geometry & Dynamics
37. **Samrat Ghosh** (Assistant Professor, Chemistry)
Materials chemistry
38. **Ujjal K. Gautam** (Associate Professor, Chemistry)
Functional nanomaterials and applications
39. **Sandeep K. Goyal** (Associate Professor, Physics)
Quantum optics and quantum information theory
40. **J. Gowrishankar** (Professor, Biology) (Resigned w.e.f 01-03-2024)
41. **Purnananda Guptasarma** (Professor, Biology)
Protein Engineering & Structural Biochemistry
42. **Manjari Jain** (Associate Professor, Biology)
Behavioural Ecology & Evolutionary Biology
43. **Anosh Joseph** (Assistant Professor, Physics) (Resigned w.e.f 15-06-2023)
Theoretical High Energy Physics
44. **Harvinder Kaur Jassal** (Associate Professor, Physics)
General Relativity and Cosmology



45. **Satyajit Jena** (Associate Professor, Physics)
Experimental High Energy Particle and Nuclear Physics
46. **Ramandeep Singh Johal** (Professor, Physics)
Statistical Physics, Thermodynamics and Quantum Theory
47. **Rajeev Kapri** (Professor, Physics)
Statistical Mechanics and Soft Condensed Matter Physics
48. **Jotsaroop Kaur** (Assistant Professor, Mathematics)
Fourier Analysis
49. **TanusreeKhandai** (Assistant Professor, Mathematics)
Lie Algebras and Representation Theory
50. **Amit Kulshrestha** (Professor, Mathematics)
Quadratic forms, Central simple algebras and related structures
51. **Chanchal Kumar** (Professor, Mathematics)
Algebraic Geometry and Combinatorial Commutative Algebra
52. **Pankaj Kushwaha** (Assistant Professor, Physics)
High Energy Astrophysics and its interface with Cosmology,
Astro-particle physics, and Cosmic
rays, Physics of Relativistic jets, Gamma-ray Astronomy
53. **Sanjeev Kumar** (Professor, Physics)
Condensed Matter Theory: Correlated electron systems, disordered systems
54. **Priya Kumari CP** (Assistant Professor, Chemistry)
Theoretical and computational chemistry
55. **Kinjalk Lochan** (Associate Professor, Physics)
56. **Soma Maity** (Assistant Professor, Mathematics)
Riemannian geometry
57. **Alok Kumar Maharana** (Assistant Professor, Mathematics)
Algebraic Geometry
58. **Subhabrata Maiti** (Assistant Professor, Chemistry)
Bio-organic Chemistry, Molecular Self-assembly and Systems Chemistry
59. **Lolitika Mandal** (Professor, Biology)
Hematopoiesis, Cardiogenesis and Molecular pathways in stem and
progenitor cell development in *Drosophila*
60. **Sanjay Mandal** (Professor, Chemistry)
Organometallic Chemistry, Nanomaterials, and X-ray Diffractometry
61. **Sudip Mandal** (Professor, Biology)
Mitochondrial regulation of cellular function
62. **Hasan Mohammad** (Assistant Professor, Biology)
Neural circuits and Behavior
63. **Pritam Mondal** (Assistant Professor, Chemistry)
Bioinspired Inorganic Chemistry
64. **Shravan Kumar Mishra** (Associate Professor, Biology)
RNA Splicing
65. **Arunika Mukhopadhyaya** (Professor, Biology)
Immunology
66. **Samrat Mukhopadhyay** (Professor, Biology/Chemistry)
Protein folding, Misfolding, Prion & Amyloid biology
67. **Vidya Devi Negi** (Assistant Professor, Biology)
Infection biology and host-pathogen interaction
68. **Chandrakanta Ojha** (Assistant Professor, Earth &
Environmental Sciences) Microwave Remote Sensing,
Satellite radar interferometry, Crustal deformation,
Groundwater, Parallel computing



69. **Santanu Kumar Pal** (Professor, Chemistry)
Liquid Crystals, Interfacial Phenomena, Colloid and Gel Chemistry,
Chemical and Biological Sensing, Nanoscale Science and Engineering
70. **Ratna Pal** (Assistant Professor, Mathematics)
Several Complex Variables
71. **Yunus Ali Pulpadan** (Assistant Professor, Earth & Environmental Sciences)
Geomorphology, Remote Sensing and GIS, Disaster Mitigation
72. **Santhosh Kumar Pamula** (Assistant Professor, Mathematics)
Operator Theory, Functional Analysis
73. **Yashonidhi Pandey** (Assistant Professor, Mathematics)
Algebraic Geometry
74. **Shashi Bhushan Pandit** (Associate Professor, Biology)
Computational structural and systems biology, protein-ligand
interactions, metabolomics
75. **Kapil Hari Paranjape** (Professor, Mathematics)
Geometry
76. **Sunil Anil Patil** (Associate Professor, Earth & Environmental Science)
Environmental Microbiology and Biotechnology
77. **N. G. Prasad** (Professor, Biology)
Evolutionary genetics
78. **V. Rajesh** (Associate Professor, Humanities and Social Sciences) History
79. **Vignesh Kuduva Radhakrishnan** (Assistant Professor, Chemistry)
Heterogeneous Catalysis
80. **Sabyasachi Rakshit** (Associate Professor, Chemistry)
Single Molecule Manipulation & Imaging and Nano biology
81. **Rajesh Ramachandran** (Associate Professor, Biology)
Cellular basis of tissue regeneration
82. **Ramesh Ramachandran** (Professor, Chemistry)
Development of Solid-state NMR methods, Quantum mechanics
83. **Raj Kumar Roy** (Assistant Professor, Chemistry)
Polymer Chemistry
84. **Anu Sabhlok** (Professor, Humanities and Social Sciences)
Feminist geography, Political-economy of contemporary India, Globalization, Identity
(Gender and nation), Participatory Action Research, Ethnography
85. **Debdulal Saha** (Assistant Professor, Humanities and Social Sciences)
Labour Economics, Development Economics, Informal Economy, Public Policy
86. **Neeraja Sahasrabudhe** (Assistant Professor, Mathematics)
Theoretical and Applied Probability
87. **Lingaraj Sahu** (Associate Professor, Mathematics)
Operator Theory, Operator Algebras
88. **Kuljeet Singh Sandhu** (Associate Professor, Biology)
Systems Biology of Gene Regulation
89. **Pranab Sardar** (Associate Professor, Mathematics)
Geometric Group Theory
90. **Santosh B. Satbhai** (Assistant Professor, Biology)
Plant genetics, plant stress physiology
91. **Arvind Kumar Sakya** (Assistant Professor, Earth & Environmental Sciences)
Water/wastewater treatment and reuse
92. **Sharvan Sehrawat** (Associate Professor, Biology)
Immunology and immunopathology

93. **K. R. Shamasundar** (Assistant Professor, Chemistry)
Quantum Chemistry
94. **Sanchita Sengupta** (Associate Professor, Chemistry)
Functional Organic Material
95. **Mahak Sharma** (Associate Professor, Biology)
Cell Biology
96. **Goutam Sheet** (Associate Professor, Physics)
Condensed Matter Physics and Scanning Probe Microscopy
97. **Ambresh Shivaji** (Assistant Professor, Physics)
Particle Physics
98. **Kamal P. Singh** (Professor, Physics)
Ultrafast Quantum Dynamics and Stochastic nonlinear dynamics
99. **Mahender Singh** (Associate Professor, Mathematics)
Topology and Groups
100. **Mandip Singh** (Associate Professor, Physics)
Quantum Optics and Bose Einstein Condensation
101. **Sanjay Singh** (Professor, Chemistry)
Synthetic Inorganic and Organometallic Chemistry
102. **Yogesh Singh** (Professor, Physics)
Experimental Condensed Matter Physics
103. **Jogender Singh** (Assistant Professor, Biology)
Cellular stress biology, innate immunity, C. elegans genetics
104. **Sunny Kumar** (Assistant Professor, Humanities and Social Sciences)
History of Politics and Political Thought; Global Conceptual and Intellectual History;
Legal History and Jurisprudence; History of Colonial Punjab.
105. **Baerbel Sinha** (Associate Professor, Earth & Environmental Sciences)
Environmental Science
106. **Sudeshna Sinha** (Professor, Physics)
Nonlinear Dynamics, Chaos, Complex Systems, Networks, Computation
107. **Vinayak Sinha** (Professor, Earth & Environmental Sciences)
Environmental Science: Atmospheric Chemistry Field Experiments
108. **Varadharaj R. Srinivasan** (Associate Professor, Mathematics)
Differential Algebra
109. **Sripada S. V. Rama Sastry** (Professor, Chemistry)
Synthetic Organic Chemistry
110. **Vaibhav Vaish** (Assistant Professor, Mathematics)
Algebraic Geometry
111. **Sugumar Venkataramani** (Associate Professor, Chemistry)
Physical Organic Chemistry
112. **Ananth Venkatesan** (Associate Professor, Physics)
Mesoscopic Electronic & Electromechanical systems
113. **Ram Kishor Yadav** (Associate Professor, Biology)
Plant Developmental Genetics
114. **K. P. Yogendran** (Assistant Professor, Physics)
Quantum Aspects of Gravity



HONORARY FACULTY

1. **N. Sathyamurthy** (Professor, Chemistry)

VISITING FACULTY

1. **Kulinder Pal Singh**, Physics & INSA Senior Scientist
2. **Sudesh Kaur Khanduja** (Professor, Mathematics & INSA Honorary Scientist)
3. **T V Venkateswaran** Visiting Faculty, Humanities and Social Sciences
4. **Shashi Kant Raichand Dugad** Visiting Faculty, Physics

ADJUNCT FACULTY

1. **Amitabha Joshi** (Biology)
2. **Pinaki Majumdar** (Physics)
3. **A. Pati** (Physics)
4. **Sarabjot Singh Anand** (Physics)
5. **Hriday Kant Dewan** (Physics)
6. **M Ram Murthy** (Mathematics)
7. **Valeriy G Bardakov** (Mathematics)
8. **Jaikumar Radhakrishnan** (Mathematics)
9. **C.S Rajan** (Mathematics)
10. **Madan Rao** (Physics)
11. **Sadhna Saxena** (Humanities and Social Sciences)

EMERITUS FACULTY

1. **Charanjit Singh Aulakh** (Physics)
2. **Anand Kumar Bachhawat** (Biology)

INSPIRE FACULTY FELLOWS

1. **Dr Harsha Dhiman** (EES)



6 EVENTS AND ACTIVITIES 2023-24



Meetings of Institute Bodies

Convocation 2023

Foundation Day 2023

Independence Day 2023

Republic Day 2024

Outreach Activities

Teachers' Day 2023

Student Activities

EVENTS AND ACTIVITIES

2023-24

Meetings of Institute Bodies

During 2023–24, various administrative bodies of the Institute met for deliberations.

Board of Governors Meetings	52 nd Meeting of the BOG	20.05.2023
	53 rd Meeting of the BOG	06.10.2023
	54 th Meeting of the BOG	29.12.2023
	55 th Meeting of the BOG	23.02.2024
Finance Committee Meetings	43 rd Meeting of the Finance Committee	20.05.2023
	44 th Meeting of the Finance Committee	06.10.2023
	45 th Meeting of the Finance Committee	23.02.2024
Academic Senate Meetings	55 th Meeting of the Academic Senate	23.05.2023
	56 th Meeting of the Academic Senate	03.08.2023
	57 th Meeting of the Academic Senate	22.12.2023

Convocation 2023

The twelfth convocation of the Institute was held on Thursday, June 22, 2023. A total of 315 degrees were conferred, including 185 BS-MS, 7 MS, 5 BS, and 118 PhDs across diverse fields such as Physics, Chemistry, Biology, Mathematics, Earth and Environmental Sciences, and Humanities and Social Sciences. Among the 106 PhD graduates, 12 were enrolled in the Institute's Integrated PhD program and received both their MS and PhD degrees.

The Chief Guest for the occasion was Dr. Madhavan Nair Rajeevan, former Secretary to the Government of India in the Ministry of Earth Sciences. Currently, he is a distinguished Scientist at the National Centre for Earth Science Studies, Thiruvananthapuram, Kerala, and an atmospheric physicist and meteorologist.

The convocation was presided over by Shri Sudhir Uttamlal Mehta, Chairperson of the Board of Governors of the Institute and Chairperson of Torrent Group of Companies, Ahmedabad.

Mr. Akshay Shankar, a graduating BS-MS student majoring in Physics, was awarded the President's Gold Medal for the best academic performance. Ms. Smriti Chibber and Mr. Mayukh Chakraborty were awarded the Professor SN Kaul Medal for the best all-round performance. Smriti graduated with a major in Physics and a minor in Data Science, while Mayukh graduated with a major in Mathematics and a minor in Science and Society Studies. The minor degree is an innovative aspect of the IISER Mohali curriculum, allowing students to pursue elective courses from carefully curated baskets, leading to a minor in areas such as Data Science, Science Education, Science and Society Studies, Astronomy, Earth Sciences, and various branches of Chemistry.

Academic Excellence Prizes were awarded to Ms. Ananya Natarajan in Biology, Ms. Aastha in Chemistry, Mr. Mayukh Chakraborty in Mathematics, and Mr. Akshay Shankar in Physics for their outstanding performance in their respective disciplines.

In his Director's report, Professor J. Gowrishankar welcomed all the guests and highlighted the Institute's achievements over the past year.

In his address to the students, Dr. Madhavan Nair Rajeevan emphasized the critical role of science in addressing global challenges such as waste management, disaster management, environmental conservation, clean energy, water scarcity, and climate change. He expressed concern that only 0.8% of India's GDP is currently spent on research and development and hoped for an increase to 2% in the near future. Dr. Rajeevan also highlighted recent advancements in science, technology, and

innovation, citing four ambitious mega-science projects: LIGO, the quantum mission, the deep ocean mission, and the green hydrogen mission. He motivated the graduating students to keep these challenges in mind and to be proactive in seeking solutions.

Foundation Day 2023

The 17th Foundation Day Lecture of IISER Mohali was celebrated on September 27, 2023. The Chief Guest Professor Uday Maitra from IISc Bangalore delivered the Foundation Day Lecture on "Ethics and Academic Integrity". His talk highlighted the importance of adherence to ethical guidelines and upholding academic integrity in Education and Research, particularly with the proliferation of online information. He highlighted instances of plagiarism, fabrication, and data falsification at various scientific knowledge-sharing platforms. This lecture underscored the imperative of maintaining ethical standards and academic integrity across all educational and research endeavors, accompanied by an analysis of pertinent case studies.

The IISER Mohali students organized various engaging activities for school children from the tricity region. The activities include scientific demonstrations, where students can witness real-time experiments and understand complex scientific concepts in an interactive manner. Quiz programs were also held, encouraging students to test their knowledge and compete in a fun, educational environment. Additionally, several other activities were organized to provide a comprehensive and enriching experience, fostering curiosity and a love for learning among the budding science enthusiasts.



Independence Day 2023

Independence Day 2023 was celebrated at IISER Mohali Campus. The National Flag was hoisted by the Director, Professor J. Cowrishankar. CNR Rao foundation award and Academic Excellence awards were presented to the students by the Director on this occasion.

CNR Rao Foundation Prize

Reg. No	Name
MS22185	Mihir Udayan Deshmukh

Reg. No	Name
MS22018	Krishna Kailash Chhabra

Certificate of Academic Excellence for the Best performing students (2nd, 3rd & 4th year of BS-MS) in the 2022-23, 2nd semester

MS 21

Reg. No	Name
MS21038	Mansi Pitaliya
MS21143	Sreedev M
MS21145	Hassaan Ahmad Khan
MS21176	Deb Prabhat Sahoo
MS21248	Ratnojit Bhattacharjee

MS 20 Biology

Reg. No	Name
MS20118	Dhanuush B
MS20183	Aditya Sharma

MS 20 Chemistry

Reg. No	Name
MS20070	Anubhav Rajyan

MS 20 Mathematics

Reg. No	Name
MS20006	Joshua J Abraham

MS 20 Physics

Reg. No	Name
MS20024	Rabsan Galib Ahmed
MS20175	Aprameyan Desikan

MS 19 Biology

Reg. No	Name
MS19137	Ompal Singh
MS19154	Akanksha Singh

MS 19 Chemistry

Reg. No	Name
MS19114	Soumyadev Das

MS 19 Mathematics

Reg. No	Name
MS19044	Abhijatya Mishra

MS 19 Physics

Reg. No	Name
MS19117	James Watt

Certificate of Academic Excellence for the Best Performing Students (first & second year of Integrated PhD program) in the second semester of the academic session 2022-23

MP 22 Physics

Reg. No	Name
MP22009	Vansh Narang

MP 21 Chemistry

Reg. No	Name
MP21011	Ramanpreet Kaur

MP 21 Biology

Reg. No	Name
MP21003	Riya Madan

Republic Day 2024

Republic Day 2024 was celebrated in the Institute on 26th January 2024. Director Prof. J. Gowrishankar hoisted the flag and gave away prizes for the best academic performances in various academic programs. The following students received the awards.

CNR Rao Foundation Prize for the Best Performance to the 1st Year Students of the BS-MS Programme (2023-24, 2nd Semester)

Reg. No

Name

MS23019

Siddhi Mathur

MS23029

Manu A Sankaran

MS23108

Anubhav Sharma

MS23216

Harshita Garg

Certificate of Academic Excellence for the Best Performing students (2nd, 3rd and 4th Year BS-MS students) in (2023-24, 1st Semester)

MS 22

Reg. No

Name

MS22140

Akanksha Vasant

MS22182

Somesh Sharma

MS22185

Mihir Udayan Deshmukh

MS21175

Pushkar Shrikant Sane

MS21176

Deb Prabhat Sahoo

MS21177

Afrin Navas

MS21187

Ganiv Kaur

MS21214

Pratishtha Grover

MS21229

Siddharth T

MS 21

Reg. No

Name

MS21009

Kunal Rajput

MS21036

Pahul Arora

MS21038

Mansi Pitaliya

MS21076

Amitesh Gupta

MS21087

Abin Mathew

MS21088

Kaustubh Purohit

MS21124

Nikita

MS21142

Sujata Khan Bhaduri

MS21146

Pratik Anant Kulkarni

MS21149

Nandana K K

MS 20

Reg. No

Name

MS20006

Joshua J Abraham

MS20024

Rabsan GalibAhmed

MS20054

Aastha

MS20153

Neville S Vempeny

MS20175

Aprameyan Desikan

MS20025

Aman Saini

MS20216

Varun

Certificate of Academic Excellence for the Best Performing Students (first & second year of Integrated PhD program) in the first semester of the academic session 2023-24

Chemistry

Reg. No

Name

MP22001

Himanshi Mittal

MP22003

Rahul Kumar

MP22004

Indira Sarkar

MP22006

Sumedha Rana

Mathematics

Reg. No

Name

MP23018

Manan Jain

Physics

Reg. No

Name

MP22009

Vansh Narang

Outreach Activities

IISER Mohali undertook extensive outreach activities to promote science education. IISER, Mohali took the initiative to spread science awareness, viz., through the school Principals and school teachers to wider geographical reach, and simultaneously, we interact with students directly in different sets of programs like day visits, science competitions, and 2 months of internship program.

In May 2023, we partnered with the CBSE Board to conduct a two-day (May 19-20, 2023) exposure visit for over 50 principals from various parts of the country. The visit exposed them to the scientific opportunities and latest technologies so as to identify mutual goals of possible further collaboration to nurture scientific temperament.



Left picture showed a group photograph of all the participants along with IISER faculty, Principals were engaged in discussion.



Professor J. Gowrishankar former Director IISER Mohali interacting with the team.

Several Vigyan Pratibha workshops sponsored by the Department of Atomic Energy were also held for teachers from Kendriya Vidyalayas, Jawahar Navodaya Vidyalayas, and Atomic Schools. In this program teachers do collective activity in a workshop and produce learning units at IISER Mohali, and then execute it in their schools.

Summer Research Program 2023 was conducted to provide an enriching environment to research methodology and foster science to motivated students. This exposure to different scientific fields was expected to inspire students to take up careers in science. About 90 students at undergraduate and postgraduate levels participated in our Summer Research Program, gaining valuable research experience. A welcome and orientation session for these students took place on May 22, 2023. This program is designed to provide students with a valuable opportunity to engage in cutting-edge research projects under the guidance of esteemed faculty members. This initiative aims to inspire young minds to pursue careers in science and to enhance their understanding of research methodologies within a stimulating academic environment.

Our Foundation Day (Sep 27, 2023) celebration saw over 1700 school children from the region engaging in demonstrations and science competitions organized by IISER Mohali students. Throughout the year, many schools and colleges visited us, including more than 3500 students from 65 schools from Punjab Board during the months of January and February. These visits allowed students to interact with our faculty and that inspired many to pursue science. These outreach activities reflect our commitment to fostering a strong scientific community and inspiring future scientists.



College students and school students took a tour in lab facilities of IISERM.



School students were engaged in the scientific demonstration, school students were interacting with IISER faculty on different visits, and Prof. Uday Maitra from IISc Bangalore while delivering a talk on the 17th foundation day 2023.

IISER Mohali has also strengthened its regional collaborations through Memoranda of Support with the Uttarakhand Science Education and Research Center (USERC) and Government College Mohali. In December 2023, about 25 teachers from USERC visited us. Students from Government College Mohali frequently visited our research labs. The institute has established MoUs with Plaksha University, the Indian School of Business, and the Punjab Remote Sensing Center to further regional cooperation.



The MoU was signed by Rudra Pratap, founding vice chancellor, Plaksha University and Prof. J. Gowrishankar, director, IISER Mohali.



The MoU was exchanged by Professor J Gowrishankar, Director, IISER Mohali and Professor Madan Pillutla, Dean, ISB and few faculty members of IISER Mohali and ISB were present on the occasion.



MoU was signed between Punjab Remote Sensing Centre (PRSC) and IISER Mohali in 2023.

On the international front, IISER Mohali joined the BIOSANTEXC Consortium to execute a joint ENS-IISER project. This collaboration has benefited many of our students, who have visited various research labs in France, gaining significant international research experience.



The BIOSANTEXC project is a Franco-Indian campus in health sciences. Led by ENS de Lyon and IISER Pune, it is composed of the four Écoles normales supérieures, six Indian Institutes of Science, Education and Research and four Indian research institutes.

Teachers' Day 2023

The Best Teacher Award of IISER Mohali for the year 2023 was awarded to Dr. Ambresh Shivaji (Dept. of Physical) & Dr. Neeraja Sahasrabudhe (Dept. of Mathematics) on Teachers Day, September 5, 2023 for their contributions to teaching. Prof. J. Cowrishankar, Director IISER Mohali presided over the function.

Student Activities

Participation in the All India University Games

North Zone Inter University Kho-Kho Men's Championship 2023-24 at LPU, Jalandhar, Punjab. from 15-01.2024 to 18.01.2024



International Yoga Day 2023

Inter Batch Sports Tournament 2023

Every year the sports department of IISER Mohali organises Inter Batch Sports Tournament. This tournament consisted of 16 different games, and approximately 1000 students participated in the tournament. After completion of the tournament, the overall team champion is declared on the basis of points scored by each batch.



*Prize Distribution ceremony of Inter Batch Sports Tournament 2022-2023
at Inter Hostel Tournament 2023*

Inter IISER Sports Meet 2023

IISM 2023 was conducted in IISER Thiruvananthapuram from 23rd - 29th December 2023, and IISER Mohali had 129 students participate in all sporting events. We are pleased to inform you that the students of IISER Mohali have won several prizes. Please join me in congratulating all the winners and every other student who has shown great enthusiasm to participate.

Gold - Women's Kho-Kho (Kajal, Shirisha.P, Shruti G. Garthe, Krishna, Ritika, Anuja, Akshita, Ananya, Natasha, Prerna, Tanishka Tawar and Tashvi)

Runner Up - Men's Volleyball (Muluk, Kunal, Raunak, Alok, Navraj, Anshul, Bhupal, Sahil Kaushal and Shivendra)

Silver - CHESS (Pruthu Deshpande, Nishant Raj, Vyshnav P T, Satyam Modi, and Ashutosh Banerjee)

Silver - Women's BADMINTON (Sneha Bisht, Charanpreet Kaur, Rishita, Kritika and Rukmini)

Fourth - Mixed Doubles Badminton (Sneha Bishat and Danson Jeroshe. J)

Fourth - Women's Volleyball (Teena, Aditi Bhatt, Shagun, Shrishti, Maheshwari, Anjali, Shubhi, Vidushi Chauhan and Riya)

Fourth - Men's BASKETBALL (Arun Negi, Vinayak, Kshitiji, Vaibhav, Arun Dhiman, Sujal, Niranjana, Varnan, Raman, Ajay Kumar, Sahil Kaushal and Pratyush)

Fourth - Men's KABBADI (Hinamshu Panth, Kshitiz Tomar, Akhilesh Meena, Anshul Negi, Sujal, Aman, Rituraj Meena, Aryan Diwadi, Ravi Kumar Yadav and Muneshwar Sharma)

Fourth - Men's Lawn Tennis (Nishant Kumar P B, Subhajit Pal and Vedant)

Fourth - Women's Table Tennis (Anshika Kumari, Rishita and Vishakha)

Athletics Winners:

Discuss Throw (M)- Silver- Bhupal Singh

Discuss Throw (W)- Silver- Aarju Parashar

Javelin Throw (M)- Silver - Bhupal Singh

400m (M)- Bronz - Mayur Kadu

400m (W)- Bronz- Shruti Swaminathan

800m (M) - Fourth - Vaibhav Jadhav

1500m (M)- Fourth - Vaibhav Jadhav



Inter IISER Sports Meet 2023 Participants from IISER Mohali

Basketball Team Participation in Sports Festival of IIT Ropar

The Basketball Team of our institute participated in the Sports Festival of IIT Ropar on the 15th and 16th of March 2024.



IISER Mohali is running units of the National Service Scheme and The Bharat Scouts & Guides. These units often participate in and organize many events within the institute and outside of the institute. Events celebrated at IISER Mohali as per the instructions from the Ministry of Education: -

OTHER EVENTS/ ACTIVITIES

World Bicycle Day celebrated on 03.06.2023 @ IISER Mohali



Plantation Drive during Rozgar Mela 2023 @ IISER Mohali

Rozgar mela 2023 took place at IISER Mohali on 28.08.2023. Our NSS volunteers participated in the plantation drive by Shri Anurag Singh Thakur, Hon'ble Union Cabinet Minister for the Ministry of Information & Broadcasting and Youth Affairs & Sports.





The Bharat Scouts & Guide Camp at Taradevi, Shimla, HP.

Our 7 BS/MS students of IISER Mohali have attended the Rover Testing Camp with Rover Captain Mr. Amandeep Singh (PEI) of IISER Mohali's BSG Unit. The Scouts & Guides training center in Taradevi, Shimla, is at a height of 7200 feet from sea level. Our students have put the IISER Mohali flag at a height of 7200 feet.



Meri Maati Mera Desh

"Meri Maati Mera Desh" envisions a unified celebration of India's soil and valor, commemorating the nation's journey of freedom and progress. By connecting with the land and honoring our culture, this program has instilled a sense of national pride and has inspired future generations to protect India's cherished heritage.

This event conducted by the NSS unit of the Indian Institute of Science Education and Research, Mohali (IISER-M) on October 12, 2023, was attended by volunteers and faculty members. Students marched from the hostel area to the sports complex carrying 'Maati' in hand.

The event was conducted to emphasize the importance of 'Maati' or soil on which we all depend for our survival and sustenance. The occasion was celebrated by putting maati into the pot or 'Kalash' to display our commitment to sustainable growth and our surroundings. It is believed that it represents life around us and indicates how we need to be empathetic towards our Motherland and Maati with the spirit of "Not me, but you."





Run For Unity

The Rashtriya Ekta Diwas National Unity Day is observed on 31st October every year to commemorate the birth anniversary of Sardar Vallabhbhai Patel. To mark the 147th birth anniversary of the Iron Man of India, the NSS unit of IISER Mohali organized a Unity Run inside the college premises on the morning of 31st October 2023 under a dedicated banner.

NSS volunteers and many students who participated showed enthusiasm and a sense of appreciation and togetherness during the event.

Plantation Drive

Everyone needs oxygen for their life, and trees are the foremost source of oxygen as well as trees help to reduce the level of CO_2 . As we all know, the whole world is facing the problem of global warming, and to recover from this problem, planting trees has become one of the most important aspects of today.

The NSS Unit of IISER Mohali organized the "Plantation Drive" on October 12, 2023, at the open space near the sports complex of the institute. It was attended by Chief Guest **Ms. Harinder Kaur (Regional Director of NSS, Chandigarh and Punjab region)** and student volunteers.

NSS volunteers, along with the faculty, planted more than 40 trees. The students also placed bricks as barricades, and each student took the responsibility to nourish and maintain the allocated plant.

Cleanliness Drive at Adopted Village Chilla, Mohali.

Cleanliness Drive organized by the NSS volunteers under the scheme Swachata Da Pakhwada 2023 aims to promote the values of cleanliness, discipline, and respect for the environment in the students and educate and sensitize them about the importance of cleanliness for a healthy, socially responsible, economically dynamic, and progressive nation.

Under this event, NSS volunteers, along with a few interested students, visited Govt. Primary School, Village Chilla, SAS Nagar, Mohali on Sunday 01 October 2023. They cleaned the school premises, painted the pots, planted plants etc. Each volunteer worked hard with utmost dedication to make the premises clean and beautiful.





Cyclothon

The BSG & NSS Units of IISER Mohali, on 24 February 2024, organized CYCLOTHON, a cycle rally to create awareness of fitness and daily exercise. Volunteers explained the importance of cycling to maintain a healthy lifestyle. In the morning volunteers started cycling from the sports complex of the institute and cycled 20 km before returning back. A total of 30 students participated, making the event a success.

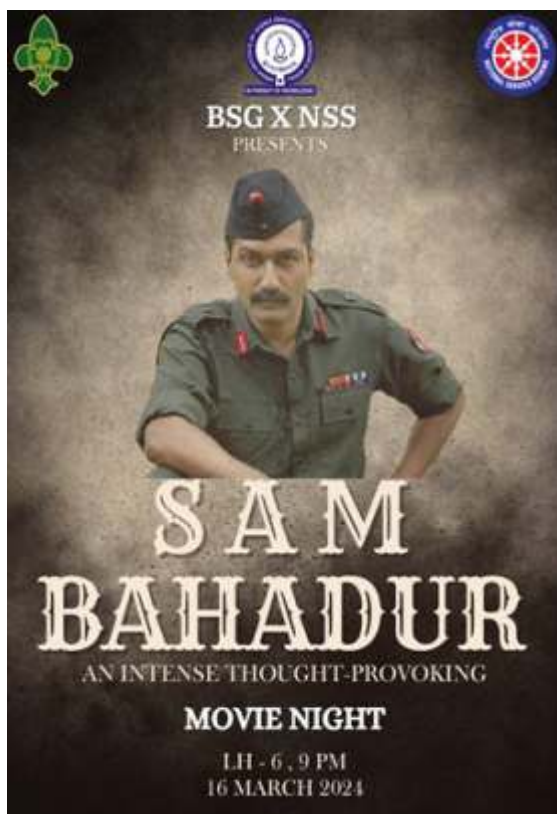


Nature Walk

It was planned by the institute to take the students to Sukhna Lake Wildlife Sanctuary for educational and adventurous purposes. But due to the unfortunate circumstances of a tiger being on the loose, we were directed to a Nature Walk near Sukhna Lake. The aim of this event was to connect the students of science to nature, making them real.

Movie Screening

The BSG and NSS unit organized the movie screening of "SAM BAHADUR," a biopic of Field Marshal Sam Manekshaw, on 16th March 2024. The aim of the event was to ignite the feeling of patriotism in the cadets and to inspire them to serve their country in every possible manner. More than 50 cadets and NSS volunteers attended the event.



Treasure Hunt

The BSG treasure hunt: Race against time was organized by the unit members on 5th April 2024. The event took off at 9.30 pm where the scouts and guides had to race against time to track down the clues to a mysterious track laid down by our volunteers and continued tirelessly the entire night. A total of 35 participants were divided into squadrons of 4 or 5, with each having a designated troop name. The event aimed at challenging the navigation, teamwork, and investigation skills of the participants and encouraged the scouts and guides to decipher cryptic messages and endure physical activities fostering collaboration and communication.



In house NSS and BSG Camp

Our volunteers from NSS & BSG also conducted and participated in the cooking camp with great enthusiasm. They make all the preparations and arrangements for preparing dinner for approx 50+ students of NSS and BSG volunteers.



Participation in Independence Day 2023 and Republic Day 2024 celebration.

IISER Mohali NSS and The Bharat Scout & Guide units have participated in the Independence Day 2023 & Republic Day 2024 celebration.



7

SCIENTIFIC MEETINGS/ CONFERENCES/ WORKSHOPS



SCIENTIFIC MEETINGS/ CONFERENCES/ WORKSHOPS

Sadhan Das

Title: DBS Seminar Day 2024

Name of the Organizers: DBS, IISER-Mohali

Brief description of the meeting: DBS day usually dedicated to showcase our departments' PhD and postdoctoral students work either in the form of a short talk or posters. One external speaker is also invited for the event.

Kuljeet Singh Sandhu & Shashi Bhushan Pandit

Title: R-for Biologists

Name of the Organizers: Drs. Kuljeet Singh Sandhu and Shashi Bhushan Pandit

Brief description of the meeting: We conducted workshop on "R for Biologists" from July 26-28, 2023 under DBT-BIC project with an objective to educate teachers/students about R programming language. It was aimed primarily for college lectures and graduate students. The workshop was attended by 25 participants from various Institutions. The workshop was conducted successfully and it covered basics of using R and protein network analyses.

Angshuman Roy Choudhury

Title: 50th National seminar on chemical crystallography

Name of the Organizers: IMTECH, Chandigarh (Dr. S. Karthikeyan and his colleagues; Dr. Angshuman Roy Choudhury from IISER Mohali)

Brief description of the meeting: National seminar on crystallography is an annual meeting of the crystallographers of the country. This conference is organised by a selected institute in coordination with the Indian Crystallographic Association. In 2023, this meeting was organized at IMTECH, Chandigarh wherein Dr. S. Karthikeyan was the convener and Dr. Angshuman Roy Choudhury (IISER Mohali) was one of the local organizing committee members. This meeting was attended by ~250 participants including faculty, students and industry representatives. The conference was highly successful in bringing together the crystallography research groups working in both small and macro molecular crystallography areas.

Arijit K. De

Title: National Workshop on Fluorescence And Raman Spectroscopy (FCS XIV), 09 to 15 December 2023.

Name of the Organizers: Convenors: Dr. Arijit K. De, Dr. Jino George, Dr. Sabyasachi Rakshit, Dr. Tapasi Sen, Dr. Kamal P Singh

Organizing Committee: Dr. Jyotishman Dasgupta, Dr. Anindya datta, Dr. Sudipta Maiti, Dr. Shivprasad Patil, Dr. Sobhan Sen

Brief description of the meeting: FCSXIV, the 14th National Workshop on Fluorescence and Raman Spectroscopy, was jointly organized by the Indian Institute of Science Education and Research Mohali (IISER Mohali) and the Institute of Nanoscience and Technology (INST) from December 9 to December 14, 2023, in Mohali, Punjab, India. The workshop had two components: Firstly, a teaching workshop was conducted from December 9 to 11, 2023, aimed at training research students and young faculty colleagues in advanced techniques of Fluorescence Correlation Spectroscopy, Raman spectroscopy, Super-resolution microscopy, Time-Resolved Fluorescence Spectroscopy, and Ultrafast Techniques. This part included hands-on sessions where participants acquired real data using the techniques they learned. The second component was a conference held from December 12 to 14, 2023, showcasing the science performed with the help of these techniques. Experts in the related areas were invited to deliver research talks.

Title: Emerging Trends in Photodynamics and Photochemistry (ETPP), 26-28 March 2024.

Name of the Organizers: Convenors: Dr. Ujjal K. Gautam, Dr. Jino George, Dr. Sugumar Venkataramani, Dr. Arijit K. De, Dr. Sanchita Sengupta

Brief description of the meeting: ETPP, the conference on Emerging Trends in Photodynamics and Photochemistry (ETPP 2024), was organized by the Department of Chemical Sciences at IISER Mohali, Punjab, India, from 26th to 28th March 2024. The meeting aimed to bring together researchers and experts from all over the country, as well as from abroad, to discuss the latest research and advancements in the field of photochemistry. The conference covered a wide range of topics, including photochemical reactions, photoinduced electron transfer, and photophysics. It was of great interest to both fundamental and applied studies, encompassing chemistry, physics, and biology. The conference served as a platform for many interesting

discussions, encouraging researchers from various backgrounds to contribute towards interdisciplinary research.

Jino George

Title: 14th National Workshop on Fluorescence and Raman Spectroscopy (FCSXIV)

Name of the Organizers: Sabyasachi Rakshit Jino George, Arijit K. De, and Tapasi Sen (Conveners, FCSXIV) & Jyotishman Dasgupta, Sobhan Sen, Shivprasad Patil, Anindya Datta, and Sudipta Maiti (Office bearers, Fluorescence Society)

Brief description of the meeting: This annual workshop has started in 2009 and has been happening every year ever since across India. This is the 14 th meeting and is organized jointly by the Indian Institute of Science Education and Research Mohali (IISER Mohali) and Institute of Nanoscience and Technology (INST) from December 9 to December 15, 2023 at Mohali, Punjab, India. This workshop has two components: First, a teaching workshop to train research students and young faculty on advanced techniques in the field (Dec 9-12, 2023). This part also includes hands-on sessions, where participants acquire real data using the techniques they learn. The second component is a conference that showcases the science performed with the help of these techniques (Dec 12 - 15, 2023).

Title: Emerging trends in photodynamics and photocatalysis

Name of the Organizers: Ujjal K. Gautam, Jino George, Sanchita Sengupta, Arijit K. De, and Sugumar V.

Brief description of the meeting: The utilization of limitless solar energy in catalysis (photocatalysis) can greatly contribute to addressing the challenges of fossil fuel shortage, global warming, and industrial sustainability in the future. However, the success of such emerging light-mediated approaches requires the identification and solving of several scientific challenges and thus, complementary expertise in the field of photodynamics and photocatalysis. The motto of this conference is to offer a vibrant platform for researchers to discuss such challenges, knowledge sharing, and networking on the specific theme of photocatalysis and photodynamics.

P. Balanarayan

Title: Theoretical Chemistry and Biology, a CRICKC symposium

Name of the Organizers: P. V Bharatam (NIPER), T. J. Dhilip Kumar (IIT Ropar), P. Balanarayan (IISER Mohali) and K. R. Shamasundar (IISER Mohali)

Brief description of the meeting: This was a one-day meeting of theoretical chemists and theoretical biologists from in and around the area of Chandigarh, Delhi, Mohali and Ropar. It aimed to bring together all eminent researchers as well as budding minds in the fields of theoretical chemistry, computational chemistry, computational biology, and biophysics.

Sabyasachi Rakshit

Title: National Workshop on Fluorescence and Raman Spectroscopy (FCSXIV)

Name of the Organizers: Dr. Sabyasachi Rakshit, Dr. Jino George, Dr. Arijit Kumar De

Brief description of the meeting: The FCS series of workshops were conceived as a unique way to teach the most complex modern instrumentation in the areas of Fluorescence and Raman Spectroscopy to practising scientists and Ph.D. students in India. These workshops cover several advanced techniques, including Fluorescence Correlation Spectroscopy, Raman Spectroscopy, Super-resolution Microscopy, Time-Resolved Fluorescence Spectroscopy, and Ultra fast Techniques. Additionally, the conference includes hands-on sessions where participants can acquire real data using the techniques they learn.

Title: National Conference on Force Spectroscopy and Microscopy (CONFORCE)

Name of the Organizers: Dr. Sabyasachi Rakshit (IISER Mohali), Shivprasad Patil (IISER, Pune) **Brief description of the meeting:** This conference aims to unite diverse groups of researchers who use force spectroscopy and microscopy measurements in their research work. From biological materials such as lipids, cells, proteins, and tissues to materials and tribology research, force measurements at the scale of pN to nN have become indispensable. The conference will discuss various scientific and technical advances at this frontier of science.

Sanchita Sengupta

Title: International Conference on Emergent Trends in Photodynamics and Photochemistry (ETPP), IISER Mohali, Mar 26-28, 2024 (Dr. Sanchita Sengupta was one of the five Co-Organizer).

Name of the Organizers: Dr. Ujjal K. Gautam (Convenor)

Ujjal K. Gautam

Title: An international Conference entitled "Emerging trends in photodynamics and photocatalysis" (ETPP-2024, spotlight on photocatalysis for this year) which was held on March 26-28, 2024 at the IISER Mohali campus.

Name of the Organizers: Dr. Ujjal K. Gautam and Dr. Jino George

Brief description of the meeting: The utilization of limitless solar energy in catalysis can greatly contribute to addressing the challenges of fossil fuel shortage, global warming, and industrial sustainability. However, the success of such emerging light-

mediated approaches requires the identification and solving of several scientific challenges and thus, complementary expertise in the field of photodynamics and photocatalysis. The motto of this international conference was to offer a vibrant platform for researchers to discuss such challenges, knowledge sharing, and networking on the specific theme of photocatalysis and photodynamics. This conference was partially supported by the American Chemical Society and the Royal Society of Chemistry, London.

Chandrakant S Aribam

Title: Rational Points on Modular Curves, International Center for Theoretical Sciences, Bangalore

Name of the Organizers: Chandrakant Aribam (IISER Mohali, India), Shaunak Deo (IISc, India), Narasimha Kumar (IIT Hyderabad, India), Pierre Parent (Institute Mathematics De Bordeaux, France)

Brief description of the meeting: Elliptic curves, modular forms and modular curves are central objects in arithmetic geometry. The objective of this program is to understand the theoretical and computational aspects of determining K-rational points on modular curves. We give an advanced introduction to the theory of rational points on modular curves, under both theoretical and computational aspects, as well as the geometry of modular curves, their rational points, classical and non-abelian Chabauty methods, and computational aspects. In the discussion meeting, there were many experts across the world in the area of arithmetic geometry who shared their ideas and the current state of research.

Krishnendu Gongopadhyay

Title: Teacher's Enrichment Workshop: Groups and Geometry, Date: June 5-10, 2023.

Name of the Organizers: Krishnendu Gongopadhyay and Pabitra Debnath

Brief description of the meeting: Teacher's Enrichment Workshops (TEW) are conducted by NCM with the financial support from Advancement of Arts and Sciences from India, which is known as ARSI. The workshop presents interesting connections with other fields of mathematics or novel ways to teach a topic from the syllabus. The trained teachers may then deliver these lectures to some of the better students in their classes.

Title: Young Mathematician's Symposium-2023. Date: May 8-9, 2023.

Name of the organizers: Department of Mathematical Sciences. On behalf of the Department: Dr. Ratna Pal, Dr. Chandan Maity, Dr. Neeraj K. Dhanwani.

Brief Description of the meeting: The goal of this event was to give a platform to our Ph.D. and postdoctoral students to present their work and learn from their peers. Like every year, we had a couple of plenary talks by invited speakers along with contributed talks by students of the department.

Title: May 12 Day – Celebrating Women in Mathematics, Date: May 18, 2023.

Name of the organizers: Department of Mathematical Sciences. On behalf of the Department: Dr. Jotsaroop Kaur, Dr. Gurleen Kaur, Ms Shruti Rastogoi.

Cultural Event:

Title: "Maharaja E Ki Saaje" – Celebration of Tagore's Birthday, Date: May 13, 2023.

Organizers: Krishnendu Gongopadhyay, Samarjit Bhattacharyya

Description: This was a cultural meet funded, organised, choreographed and performed by family members (including children) of some faculty and admin colleagues following the cultural heritage of Rabindranath Tagore.

Abhishek Chaudhuri

Title: Physics of Life: Active and Living Matter

Name of the Organizers: Abhishek Chaudhuri (IISER Mohali) and Debasish Chaudhuri (IOP Bhubaneswar).

Brief description of the meeting: The workshop was organized jointly by IOP Bhubaneswar as part of their golden jubilee celebrations and by IISER Mohali. Research in active systems, both natural and artificial, is developing quickly. In order to comprehend and address biological issues, fundamental physics principles have been used, and artificial active systems have opened up new possibilities for emergent phenomena. New experimental findings question the early theories, and novel theoretical ideas illuminate various collective processes. The workshop was aimed to provide an environment where theorists and experimentalists can interact and share their viewpoints on active systems. The meeting concentrated on exchanging ideas involving novel experiments, models, and emergent states. The workshop helped to bring together a diverse and active group of scientists to exchange ideas.

Ambresh Shivaji

Title: Vigyan Pratibha Workshop (July 3-7, 2023)

Name of the Organizers: Ambresh Shivaji, Amit Kulashretha

Brief description of the meeting: A total of 61 TGT teachers, nominated by the KVS, JNV and AECS school systems from the region of Chandigarh, Haryana, Himachal Pradesh, J&K, Rajasthan and Uttar Pradesh attended the 5day training workshop. The teachers participated in the sessions on Science and Mathematics learning units developed under the Vigyan Pratibha

Arvind

Title: Second Workshop on Quantum Information Technologies and Photonic Devices, DST Quest Theme I Workshop

Name of the Organizers: Arvind (National Coordinator)

Brief description of the meeting: I have been coordinating the 24 projects under the Quantum Enabled Science and Technology initiative of DST from IISER Mohali since 2019 as the national coordinator for Theme I. This workshop was organized during May 13-14, 2024 at Palampur where project investigators interacted and presented their work.

Title: Fourth Workshop on Quantum Information Technologies and Photonic Devices, DST Quest Theme I Workshop

Name of the Organizers: Arvind (National Coordinator)

Brief description of the meeting: The final workshop of QUEST theme I, Quantum Information Technologies and Photonic Devices was organized by me as the national coordinator during March 16-17, 2024 at Punjabi University Patiala.

K. P. Yogendran

Title: 9th Shivalik HEPCATS Meeting, Jan 27-28, 2024, IISER Mohali.

Name of the Organizers: Ambresh Shivaji, Harvinder Kaur Jassal, Jasjeet Singh Bagla, K. P. Yogendran, Kinjalk Lochan, Pankaj Kushwaha, Satyajit Jena, Vishal Bhardwaj

Brief description of the meeting: This is a regional conference for the High Energy Physics, Cosmology, Astronomy: Theory and Simulations (HEPCATS) community. IISER Mohali initiated this series in December 2019 and we transitioned to online meetings during the pandemic. Later events have been hosted by IIT Ropar, IIT Mandi, CU Himachal Pradesh, NIT Jalandhar. This brings together researchers from about ten institutions in the region and is starting to foster an understanding of work being done by different groups. It is our expectation that in coming years this will also lead to regional collaborations.

Kinjalk Lochan

Title: 9th Shivalik HEPCATS meet (27-28 January 2024)

Name of the Organizers: Kinjalk Lochan and Dr. Vishal Bhardwaj, Co-organizers: Jasjeet S. Bagla, Harvinder K. Jassal, K. P. Yogendran, Ambresh Shivaji, Pankaj Kushwaha

Brief description of the meeting: This is a regional conference for the High Energy Physics, Cosmology, Astronomy: Theory and Simulations (HEPCATS) community. IISER Mohali initiated this series in December 2019 and we transitioned to online meetings during the pandemic. Later events have been hosted by IIT Ropar, IIT Mandi, CU Himachal Pradesh, NIT Jalandhar. This brings together researchers from about ten institutions in the region and is starting to foster an understanding of work being done by different groups. In the 9th version nearly 60 researchers from around 15 institutions in this region participated. There was also a dedicated session on the work of A.K. Raychaudhuri, a renowned Indian relativist whose birth centenary was celebrated this year. This session was addressed by renowned scientists elaborating the life and work of A.K. Raychaudhuri.

Sandeep K. Goyal

Title: Quantum Information Technologies with Photonic Devices

Name of the Organizers: Kavita Dorai, Sandeep K. Goyal, Arvind

Brief description of the meeting: This workshop/ meeting was the 2nd group monitoring workshop on QuEST theme-1 at CSK Himachal Pradesh Agricultural University, Palampur on May 12-16, 2023.

Satyajit Jena

Title: Heavy Quarkonium QWG-2024 from 26 Feb to 1st March 2024

Name of the Organizers: Dr. Vishal Bhardwaj, Dr. Satyajit Jena

Brief description of the meeting: This is the 16th edition of the international workshop on Heavy Quarkonium, QWG-2024. This workshop marks the first time it will be hosted in India, a testament to our standing in the field. The QWG workshop is a premier opportunity for experimentalists and theorists alike to convene and engage in discussions on cutting-edge topics in this field.

Tripta Bhatia

International Conference on Nanomaterials in Biology (ICNB)

Member of the Program Committee for International Conference on Nanomaterials in Biology. The 3rd edition of the International Conference on Nanomaterials in Biology (ICNB 2023) was held on November 19 hosted by IIT Gandhinagar in association with SMRS, Jaipur. The inaugural ceremony for ICNB 2023 took place at Jibaben Patel Memorial Auditorium, IIT Gandhinagar. On the very first day, eminent invited speakers, participants and delegates from different nations joined the conference. The participants and guests were then addressed by honorable Guests Prof. Radha Rangarajan, Director CSIR-CDRI Lucknow India, Prof. Young Ho Kim, Director India Korea Center for Research and Innovation New Delhi, Prof. N. P. Padhy, Director, Malaviya National Institute of Technology Jaipur and Prof. Amit Prashant, Dean of Research and Development, IIT

Gandhinagar. The conference chairs Dr. Anjali Awasthi, Dr. Dhiraj Bhatia and Dr. Mukesh Dhanka proposed a formal vote of thanks to all the dignitaries, speakers and participants.

This four days conference had various plenary lectures, invited talks, contributed talk and flask talks on various research areas of nanomaterials in biology including 3D Bioprinting, Big Data in Nanosciences, Bioinspired and Biomimetic Materials, Biological Nanodevices and Sensors, Engineered Nanomaterials, Nanomaterials and Environmental Effects, Nanomaterials for Bioenergy Applications, Nanomaterials for Sustainable Agriculture and Food Science, Nanomaterials in Biological Uptake and Nanotoxicology, Nanomaterials in Gene and Drug Delivery, Nanomaterials in Tissue Engineering and Medicine, Polymer Supramolecular Chemistry and Applications and Scaffold design and fabrication.

8th International conference on women in Physics.

Member of the Gender in Physics Working Group (GIPWG). The 8th conference in this series was held virtually during 10-14 July 2023 with India as the host country and it was jointly organised by the Gender in Physics Working Group (GIPWG) of Indian Physics Association (IPA) and the Tata Institute of Fundamental Research (TIFR). The conference was hosted by the Homi Bhabha Centre for Science Education (HBCSE) - a national centre of TIFR, strongly focused on promoting quality and equity in Science & Mathematics education from primary school to introductory college levels.

Vishal Bhardwaj

Title: 16th International Workshop on Heavy Quarkonium (QWG 2024), February 26-March 1, 2024 at IISER Mohali

Name of the Organizers: Vishal Bhardwaj, Ambresh Shivaji, Satyajit Jena

Brief description of the meeting: The QWG workshop is the premier opportunity for experimentalists and theorists to gather to discuss topics related to quarkonium physics. The scientific program included topics related to heavy quarkonium in particle and nuclear physics as well as those in related fields. People from India and all over the world participated in the event.

Yogesh Singh

Title: International Conference on "Highly Frustrated Magnetism"

Name of the Organizers: Y. Iqbal (IIT Madras), S. Bhattacharjee (ICTS Bangalore), Yogesh Singh (IISER Mohali), A. Aggarwala (IIT Kanpur), S. Singh (IISER Pune), R. Narayanan (IMSc Chennai)

Brief description of the meeting: Frustration, i.e., the intertwining of competing physical state formation tendencies, is a ubiquitous theme in contemporary condensed matter physics. The perspective of frustration applied to correlated magnetic systems promises to deepen and elevate understanding of a broad set of principles such as competing orders, quantum state entanglement, and criticality. The international conference on "Highly Frustrated Magnetism" held at IIT Madras between 9th to 13th Jan. 2024, aims at bringing together a diverse community of condensed matter researchers to push the state of the art and extend understanding towards a synergetic foundation of frustration phenomena in magnets. The conferences main goal was to bring experts together to present the state of the art in this field for the benefit of researchers and students from India, and to intensify the dialogue between theoretical conceptualization and experimental realization.

Sunil A. Patil

Title: 3rd Annual Online India-Dalhousie Student Research Symposium: Addressing Common Challenges via Research & Innovation, 3-4 April 2024

Name of the Organizers: Dr. Sunil A. Patil (Coordinator)

Brief description of the meeting: IISER Mohali was engaged as a partner institution in this virtual knowledge-sharing event for the first time. The thematic areas for this year's symposium were Precision Agriculture, Management, Medicine, Energy, and Water Science & Technology. The program consisted of a keynote talk and 51 student presentations, which were selected by the expert faculty panel from different partner institutions. IISER Mohali was represented by six select student presentations spanning energy, water science & technology, and medicine research themes. The symposium provided and served as a promising platform for networking between Dalhousie and Indian partner universities while showcasing high-quality student research in key thematic areas.

Vinayak Sinha

Title: IISER Mohali and American Chemical Society workshop for outreach in Environmental Sciences

Name of the Organizers: Prof. Vinayak Sinha and Dr. Maggie Mills American Chemical Society

Brief description of the meeting: A workshop was organized at IISER Mohali by EES department (co-ordinator Prof. Vinayak Sinha and ACS, India) and on Nov 8, 2023 for early career researchers and faculty and colleagues from Punjab and Chandigarh region. Professor Bryan Brooks, the Editor-in-Chief, ES&T Letters from Baylor University, United States and Dr. Maggie dwelt on cutting-edge scientific discoveries, valuable networking opportunities and scientific publishing in environmental sciences. The program also covered skill-building sessions covering scholarly publishing, peer review, ethics and plagiarism, science communication, and career development. The mission of the workshops was to cultivate communities of researchers who can work together to develop scientific solutions for the benefit of both humanity and the environment.

Anu Sabhlok

Title: Assembling the City: research initiation workshop conducted on Jan 19, 2024

Name of the Organizers: Anu Sabhlok and Ritajyoti Bandyopadhyay

Brief description of the meeting: The objective of the workshop was to investigate how projects of infrastructural development in Chandigarh and Shimla incorporate practices intended to reach out to marginal groups and what bottlenecks limit such efforts. In order to fully comprehend, infrastructure as a system and as contributing to lived realities we discussed infrastructural assemblages at multiple scales: regional, urban, household and embodied scales. Workshop participants included international and Indian scholars (faculty and doctoral students), Government officials, civil society representatives from Chandigarh and Shimla.

Debdulal Saha

Title: Winter Graduate School (WGS) 2024 on 'Research Methodology and Academic Writing'

Name of the Organizers: Dr. Debdulal Saha, Department of Humanities and Social Sciences (HSS), Indian Institute of Science Education and Research (IISER) Mohali

Brief description of the meeting: A 5-day inter-IISERs winter graduate school on 'Research Methodology and Academic Writing' was organised by the department of Humanities and Social Sciences (HSS) held on 18-22 March 2024 at IISER Mohali. Doctoral scholars from all the departments of HSS from IISERs (Mohali, Pune, Bhopal, Kolkata) and NISER Bhubaneswar participated in the winter school. The workshop was organised around four sub-themes, namely, (1) natural sciences and social sciences in dialogue; (2) ideas, methods and field insights; and (3) feminist research methods and (4) academic writing. The resource persons who delivered special lectures were: Prof. Meera Nanda (independent scholar) and Prof. Rajeev Patnaik (PU) for the first session, Dr. Rahul Govind (University of Delhi), Prof. Chirashree Das Gupta (JNU, New Delhi) and Dr. Manish Kumar (Delhi School of Economics, University of Delhi) for second session, Prof. Anu Sabhlok (IISER Mohali) and Prof. Rukmini Sen (AUD, New Delhi) for the third session, and Dr. Kanika Singh (Ahsoka University) and Dr. Ashima Sood (Anant National University, Ahmedabad) for the session on academic writing. Forteen doctoral scholars across IISERs and NISER Bhubaneswar presented their research work in the graduate school. A field trip to Kasauli, Himachal Pradesh was organised.

Sunny Kumar

Co-organiser of the workshop on "Writing Global History: Global South Perspectives, "held on 8-9th March 2024 at the University of Delhi.

Brief description: The workshop focussed on new perspectives on the a cute economic, political and climate crisis which have further accentuated the global a symmetries. The aim was to approach these issues from the vantage point of the Global South and imagine new, creative approaches.

8

RESEARCH ACTIVITIES



DEPARTMENT OF BIOLOGICAL SCIENCES

SUMMARY OF RESEARCH WORK

Anand Kumar Bachhawat

The research group of Dr. Anand Kumar Bachhawat has been interested in investigating how gamma-glutamyl dipeptides are transported in *Saccharomyces cerevisiae*. Interestingly, the sole peptide transporter of *S. cerevisiae*, Ptr2p, does not appear to have a role. When they examined gamma-glu-cys, a glutathione precursor, they observed that this gamma-glu dipeptide could be transported through the glutathione transporter Hgt1p (or Opt1p). However, the dipeptide gamma -Glu-met, although efficiently utilized as a sulfur source in the growth medium of the sulfur auxotrophic strain, met15⁻, could not be transported by either Ptr2p or Hgt1p. Thus, it appears that the transport of gamma-Glu-met may be carried out by a hitherto uncharacterized transporter. The utilization of gamma-Glu-met as a sulfur source was also investigated and seemed to require both the Dug2/Dug3 and the ECM38 pathways. However, the transporter did not seem to involve known transporters since even the methionine transporters Mup1 and Mup3 failed to transport gamma-Glu-met. His laboratory is now actively investigating the transporter responsible for gamma-Glu-met uptake. Transcriptomic analyses on met15⁻ cells grown on methionine vs. gamma -Glu-met as sulfur sources revealed several up regulated transporters in gamma -Glu-met grown conditions. They have systematically investigated these by evaluating their disruptions in a met15⁻ background. One of these transporters, Seo1p, appeared to be defective in gamma-Glu-met transport. They are now investigating Seo1p, a transporter with hitherto undefined function for its role in gamma-Glu-met. The involvement of other analogs that this transporter might transport is also being investigated. In the absence of radioactive gamma-Glu-met, they have confirmed uptake using mass spec experiments.

Arunika Mukhopadhyaya

Dr. Arunika Mukhopadhyaya's laboratory is interested in looking at the mechanism of inflammation and innate receptor coordination. Moreover, her lab is also interested in looking at the mechanism of host-cell death. Towards that, they use enteric-bacterial ligands, such as outer-membrane proteins and toxins, to study the modulation of host cellular responses, such as inflammatory signaling and cell death.

Between 1st April 2023 and 31st March 2023, her group majorly looked at how outer membrane protein OmpU of human pathogen *Vibrio vulnificus* and *Vibrio cholerae* can modulate inflammatory responses in innate immune cells. They have also examined how 'thermostable direct haemolysin' or TDH, an exotoxin secreted by the human pathogen *Vibrio parahaemolyticus* can induce host cell death.

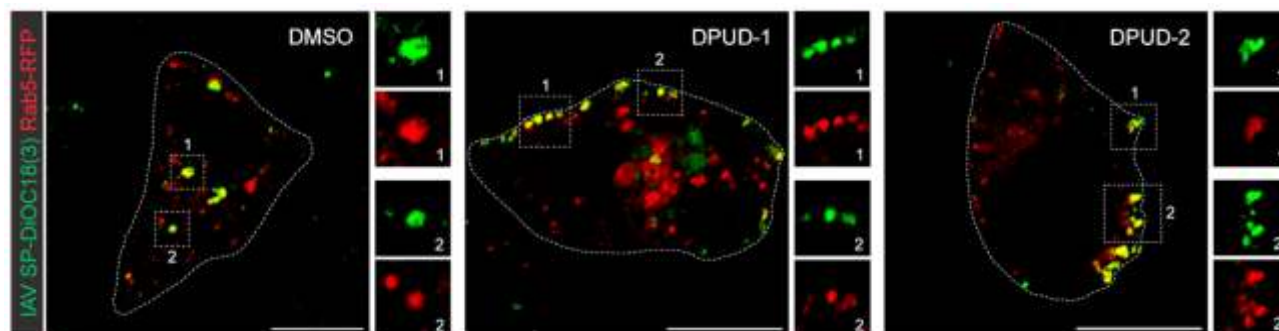
Hasan Mohammad

Animals adapt their behaviors in response to different environments and stimuli. Dr. Hasan Mohammad's group studies how these adaptive behaviors are encoded in brain circuits. The current focus of his laboratory is to fundamentally understand the neural basis of adaptive behaviors such as motivation, decision-making, and control. The dysfunction of these behaviors can result in craving, bingeing, and compulsivity that underlies addiction. Recent literature has revealed significant neurobehavioral similarities between food and drug addiction. For instance, the conditioned environment cues can promote food and drug-seeking behaviors in animal models. His laboratory compares the brain's response to palatable foods and drugs to delineate the underlying similarities and distinctions in the brain. They aim to identify key brain circuits involved and test if targeting them has therapeutic benefits against both food addiction-like behavior and drug addiction. The Systems Neuroscience lab of Dr. Hasan came into existence in November 2023 with funding support provided by the Institute to establish the state-of-the-art neural circuits and behavior lab at IISER Mohali.

Indranil Banerjee

The laboratory of Dr. Indranil Banerjee aims to advance their understanding of the infection mechanisms of medically important viruses such as influenza A virus, SARS-CoV-2, and dengue. They employ various techniques, including cell and molecular biology, high-content, confocal and super-resolution imaging, RNAi, biochemistry, CRISPR/Cas9-based genome editing, etc., to investigate the molecular underpinnings of viral infection processes in the host cells. In their current research, they have identified a new class of broad-spectrum antiviral agents, i.e., 1,3-diphenylurea derivatives (DPUDs), through high-content screening of small molecules against influenza A virus (IAV) and SARS-CoV-2 infections. Next, they synthesized 22 additional DPUD-1 analogs and tested them against IAV and SARS-CoV-2. In addition to DPUD-1, they found four more DPUDs (DPUD-2, -16, -20, and -23) that blocked IAV and SARS-CoV-2 infections by 95-99% without inducing cytotoxicity. Of the five DPUDs, three showed potent inhibition against all the tested strains of IAV (X-31, WSN, Udorn, and NYMC) and SARS-CoV-2 (D614G, Delta, and Omicron), highlighting broad-spectrum antiviral activity. They also confirmed the anti-influenza and anti-

SARS-CoV-2 activity of the DPUDs in animal models. Using IAV entry assays and pseudotyped SARS-CoV-2 (harboring the S proteins of D614G, Delta, and Omicron strains), they found that DPUDs blocked cellular entry of both the viruses. Further, they addressed whether DPUDs target host endocytic processes, which would consequently inhibit virus entry. His research group found that DPUDs perturbed endocytic uptake of general cargoes such as EGF, transferrin, and cholera toxin B and blocked vesicular acidification. Cell biological analyses revealed that DPUD treatment caused the dispersal of late endosomes/lysosomes and upregulated the early endosome marker protein, EEA1, suggestive of dysfunction in endocytic machinery. Their in vitro experiments with large unilamellar vesicles showed that DPUDs transported chloride ions across the lipid membrane. This indicated that the observed endocytic defects in the DPUD-treated cells could be due to altered ion homeostasis, which plays a critical role in vesicular trafficking. In addition to targeting virus entry, which majorly accounted for the inhibition of infection by DPUDs, their study showed that the compounds also blocked viral replication/transcription. This indicates that although DPUDs primarily block virus entry, they can further restrict the virus at post-entry steps,



Novel endocytic inhibitors (DPUDs) robustly block cellular entry of IAV. Microscopy images of lung cells infected with IAV. The IAV particles were labelled with SP-DiOC18(3) (green) and were allowed to enter the lung cells expressing Rab5-RFP (red) in presence of DMSO (control) or DPUD-1 or DPUD-2 for 25–30 min, following which, images were acquired. Yellow signal indicates colocalization of the virus (green) and Rab5-positive early endosome (red). Cell boundary is shown with dotted line. While the virus particles reached the cell interior in the DMSO-treated cells, they failed to enter the cell and remained stuck at the cell membrane in the cells treated with DPUD-1 or DPUD-2.

inhibiting the infection process at multiple stages. Taken together, this research highlights the potential of DPUDs as a new class of host-directed antiviral agents that can efficiently suppress infection by acting at various steps and provide protection against a broad range of existing and emerging viruses. In addition to antiviral discovery, they also investigated the role of several host factors in IAV infection. They found several key factors that facilitate the intracellular trafficking of the virus and its nucleocapsid uncoating at the late endosome.

J. Gowrishankar

In many bacteria, the essential factors Rho and NusG mediate the termination of synthesis of nascent transcripts (including antisense RNAs), which are not being simultaneously translated. It has been proposed that in Rho's absence, toxic RNA-DNA hybrids (R-loops) may be generated from nascent untranslated transcripts, and genome-wide mapping studies in *Escherichia coli* have identified putative loci of R-loop formation from more than 100 endogenous antisense transcripts that are synthesized only in a Rho-deficient strain. In work completed this year, evidence was provided that engineered expression in wild-type *E. coli* of several such individual antisense regions on a plasmid or the chromosome generates R-loops that, in an RNase H-modulated manner, serve to disrupt genome integrity. Rho inhibition was associated with an increased prevalence of antisense R-loops also in *Xanthomonas oryzae* and *Caulobacter crescentus*. These results confirm the essential role of Rho in several bacterial genera for preventing toxic R-loops from pervasive yet cryptic endogenous antisense transcripts. Engineered antisense R-looped regions may be useful for studies on both site-specific impediments to bacterial chromosomal replication and the mechanisms of their resolution.

The essential homo-tetrameric endoribonuclease RNase E of *Escherichia coli* participates in global RNA turnover and stable RNA maturation. The protomer's N-terminal half (residues 1–529) bears the catalytic, allosteric, and tetramerization domains, including the critical active site residues D303 and D346. The C-terminal half (CTH, residues 530–1061) is dispensable for viability. Studies from Dr. J Gowrishankar's laboratory have previously described a phenomenon of recessive resurrection in RNase E that requires the CTH, wherein the wild-type homo-tetramer displays identical activity in vivo as a hetero-tetramer comprised of three catalytically dead subunits (with D303A/D346A substitutions) and one wild-type subunit. In the present study, it was shown that recessive resurrection is exhibited even in dimeric RNase E with the CTH and that it is majorly dependent on the presence of the membrane-targeting-sequence motif (residues 565–582). A single F575E substitution also abrogated recessive resurrection, whereas other CTH motifs (such as those for binding of RNA or of partner proteins) were dispensable. The phenomenon was independent of RNA 5'-monophosphate sensing by the enzyme. The hypothesis being proposed is that membrane-anchoring of RNase E renders it uniquely processive for endoribonucleolytic action and that recessive resurrection and dominant negativity are alternative and mutually exclusive manifestations of, respectively, processive and distributive catalytic mechanisms in a homo-oligomeric enzyme.

Jogender Singh

The laboratory of Dr. Jogender Singh focuses on two broad areas of research: (i) the characterization of signal transduction mechanisms of novel cellular stress responses and (ii) the effects of microbiota on host stress responses, metabolism, and lifespan. Recently, they have been studying the physiological impact of thiol-mediated reductive stress using the model organism *Caenorhabditis elegans*. Thiol antioxidants disrupt the oxidative protein folding environment in the endoplasmic reticulum (ER), resulting in protein misfolding and ER stress. They discovered that vitamin B12 obtained from the microbial diet can alleviate thiol toxicity. Genetic screens revealed that thiol antioxidants modulate the methionine-homocysteine cycle by upregulating an S-adenosylmethionine-dependent methyltransferase, *rips-1* (PMID: 35438636). Using forward genetic screens in *C. elegans*, they found that thiol reductive stress enhances *rips-1* expression via the hypoxia response pathway. They demonstrated that thiol reductive stress activates the hypoxia response pathway, which intriguingly protects against thiol reductive stress. This activation of the hypoxia response pathway by thiol reductive stress is conserved in human cells (PMID: 37902464). These studies reveal intriguing interactions between thiol-mediated reductive stress and the hypoxia response pathway.

His group is also interested in identifying microbial components that modulate host metabolism and stress responses in ways that lead to increased lifespan. Specifically, they are conducting a screen using the *E. coli* Keio collection to identify bacterial mutants that modulate *C. elegans* FAT-7 levels. The activity of FAT-7, a stearyl-CoA $\Delta 9$ desaturase, is associated with aging in *C. elegans*. They identified 26 *E. coli* mutants that modulate FAT-7 expression and increase *C. elegans* lifespan. Studies are underway to determine how these bacterial mutants increase *C. elegans* lifespan.

Kausik Chattopadhyay

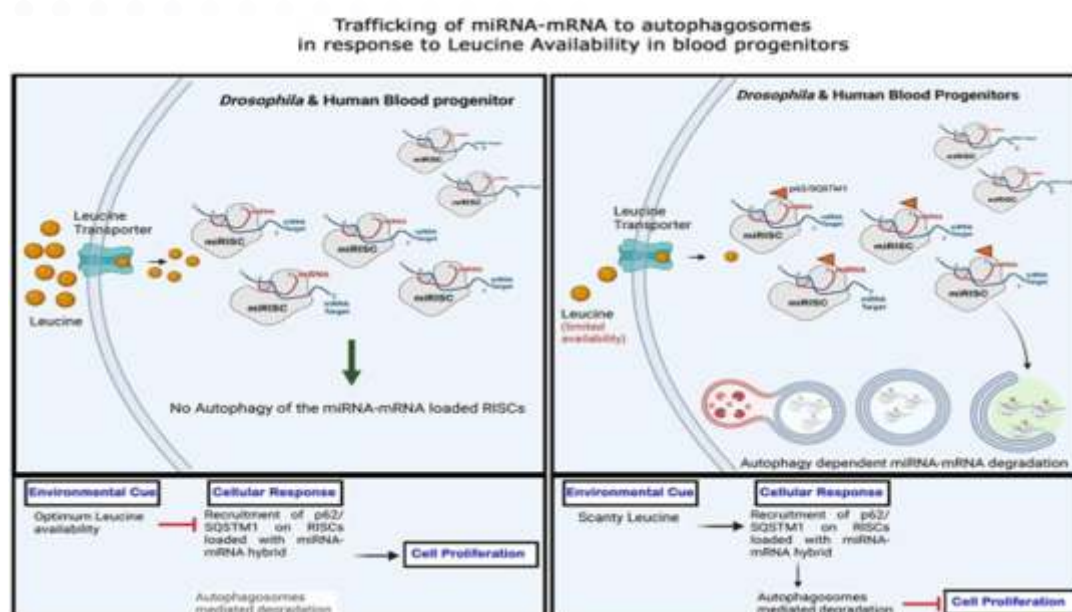
Pore-forming toxins (PFTs) are a unique class of membrane-damaging proteins implicated in diverse biological processes ranging from bacterial pathogenesis to the execution of immune functions. PFTs are documented in diverse life forms, and they share an overall general mode of action. PFTs kill their target cells by forming oligomeric pores in the plasma membranes. Oligomeric pore-formation processes of the diverse PFTs display distinct regulatory mechanisms that remain obscure in most cases. For the past fifteen years, Dr. Kausik Chattopadhyay's laboratory has been studying the structure-function mechanisms of distinct classes of bacterial PFTs. In the past year, they continued their research in the same direction. Their studies elucidated some of the unique mechanistic aspects of the mode of action of some of the prominent bacterial PFTs that include *Vibrio cholerae* cytolysin, *Vibrio parahaemolyticus* Thermostable Direct Hemolysin, and Listeriolysin O from *Listeria monocytogenes*. Regarding the mode of action of *Vibrio cholerae* cytolysin, they continued their work towards exploring the implications of distinct structural motifs in the toxin in regulating its membrane-damaging action. They have also investigated the mechanism of the interaction of the toxin with the innate immune cells in generating pro-inflammatory responses. In a separate study, they have elucidated the cell death mechanism of *Vibrio parahaemolyticus* Thermostable Direct Hemolysin. In another study, they examined the implications of the membrane dynamics in the mode of action of Listeriolysin O.

Kuljeet Singh Sandhu

Dr. Kuljeet Sandhu's group has recently been engaged in inferring the genomic basis of regressive evolution in cavefish, studying the role of non-coding elements in cancer susceptibility, and understanding the adaptive significance of genomic rearrangements and gene length variations.

Lolitika Mandal

Dr. Lolitika Mandal's research group has been working on miRNA and its role in hematopoiesis. Their efforts led to elucidating a conserved nutrient-responsive axis that mediates autophagic degradation of miRNA-mRNA hybrids in blood cell progenitors.



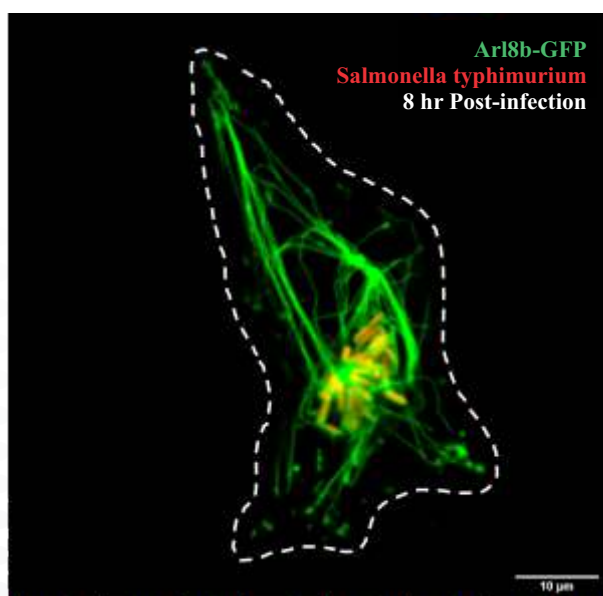
In animals, microRNAs are amongst the primary non-coding RNAs involved in regulating the gene expression of a cell. Most mRNAs in a cell are targeted by one or many miRNAs. Although several mechanisms can be attributed to the degradation of miRNA and mRNA within a cell, the involvement of autophagy in the clearance of miRNA and its target mRNA is not known. They have discovered a leucine-responsive axis in blood cell progenitors that can mediate an autophagy-directed degradation of miRNA-bound mRNA in *Drosophila melanogaster* and *Homo sapiens*. This previously unknown miRNA clearance axis is activated upon amino acid deprivation that can traffic miRNA-mRNA-loaded argonaute for autophagic degradation in a p62-dependent manner.

Thus, the outcome of their research not only reports a novel axis that can address the turnover of a catalytically active miRISC but also elucidates a slicer-independent mechanism through which autophagy can selectively initiate the clearance of target mRNA. The Leucine-miRISC-autophagy axis depicts the existence of several yet-to-be-identified cellular cues for regulating a catalytically active miRNA-mRNA turnover. This work is published in *Nucleic Acid Research* (Jan 2024).

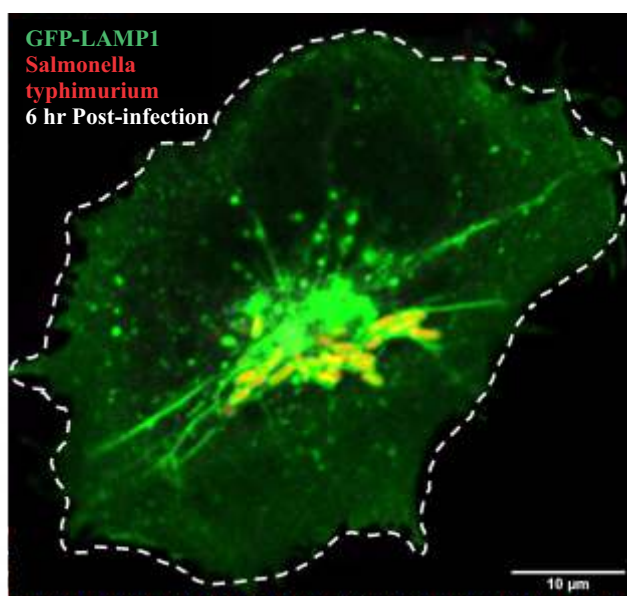
Mahak Sharma

Lysosomes are subcellular organelles that receive and degrade cellular cargo, including receptor-ligand complexes endocytosed at the plasma membrane, bacterial pathogens engulfed in phagosomes or worn-out organelles, and cytosolic cargo entrapped in autophagosomes. Lysosomes play a vital role in maintaining cellular homeostasis, as reflected by several lysosomal storage disorders and neurodegenerative disorders, which result from impaired degradation of lysosomal substrates. The endolysosomal pathway is also targeted by intracellular bacterial and viral pathogens for their own growth and survival in host cells. The research group of Dr. Mahak Sharma aims to understand the mechanisms of lysosome biogenesis and fusion with other compartments. They also aim to understand how the bacterial pathogen *Salmonella typhimurium*, which causes self-limiting gastroenteritis in the human host and typhoid-like disease in mice, builds its replicative niche in host cells.

Small GTP-binding (G) proteins of the Ras superfamily, i.e., Rabs, Arfs, and Arls (Arf-like), localize to specific intracellular membranes and act as master regulators of vesicular transport to and from these membranes. The primary focus of research in Dr. Mahak Sharma's laboratory has been to elucidate mechanisms regulating cargo delivery to lysosomes, with a particular focus on the role of small G proteins and their effectors in this pathway. The small G protein Arl8b and its interaction partners, particularly a tethering factor known as the HOPS complex, mediate the fusion of endosomes and autophagosomes with lysosomes. They have identified a new role for Arl8b in delivering newly synthesized hydrolases to lysosomes. This study published in January 2023 in the *Journal of Cell Biology* has identified Arl8b and its partner RUFY1 as regulators of hydrolase



Representative confocal micrograph of a HeLa cell infected with *Salmonella typhimurium*, showing lysosomal marker (Arl8b) recruited on Salmonella-Containing Vacuole, i.e., (SCV) and on tubular membranes called as Salmonella Induced Filaments (SIFs). *Salmonella* utilizes host endocytic fusion machinery for building its replicative niche in host cells.



Representative confocal micrograph of a HeLa cell infected with *Salmonella typhimurium*, showing lysosomal marker (LAMP1) recruited on Salmonella-Containing Vacuole i.e. (SCV) and on tubular membranes called as Salmonella Induced Filaments (SIFs). *Salmonella* utilizes host endocytic fusion machinery for building its replicative niche in host cells.

receptor trafficking from endosomes towards the trans-Golgi network (Rawat S et al., *J Cell Biol.* 2023). Lysosome hydrolase trafficking is crucial for protein degradation, and several human disorders result from an impairment in the cargo degradative capacity of lysosomes. In a collaborative work with Dr. Amit Tuli's group at CSIR-IMTECH (Chandigarh), they have identified that ORF3a, a virulence factor of SARS-CoV-2, the causative agent of COVID-19, interacts with, and blocks the GTP hydrolysis of a late endosomal small G protein Rab7. ORF3a blocks late endosome fusion with lysosomes and abrogates Rab7-dependent recycling of the lysosomal hydrolase receptor. This, in turn, impairs the hydrolase delivery to lysosomes, and lysosome function in cargo degradation (Walia K et al., *Nat Commun.* 2024).

Her group is in the process of preparing a manuscript on the function of an autophagy regulatory protein known as Tectonin-propeller repeat-containing protein 2 (TECPR2). Mutations in TECPR2 result in hereditary sensory and autonomic neuropathy (HSAN) disorder, characterized by the progressive loss of autonomic and sensory peripheral nervous system function. Their findings show that TECPR2 is a Rab5 effector on early endosomes that regulates receptor recycling back to the plasma membrane. They are currently exploring the role of TECPR2 interaction with the multisubunit tethering factor HOPS complex in lysosome biogenesis. Further, the findings from this project have also formed the basis of the DBT grant proposal that she submitted this year in March.

Manjari Jain

In the last decade, Dr. Manjari Jain's research group has been working towards understanding acoustic communication in Jungle Babblers and the ecological factors that drive social behavior in this cooperatively breeding species. In relation to this, in the past year, they have been tracking Jungle babbler groups in their natural habitat specifically to understand their nesting behavior, anti-predator strategies, and acoustic communication between adult and young ones. Their findings suggest that Jungle Babblers co-ordinate provisioning of the young ones by synchronizing nest visits, possibly to minimize the risk of nest predation. They also found that larger groups did not have higher rates of provisioning during nesting, as observed in some other cooperatively breeding birds. Further, they discovered that Jungle Babbler chicks in the nest use a combination of tactile and acoustic signals to modulate begging behavior. Their findings indicate an ontogenic pattern in their begging response to acoustic and tactile stimuli.

N. G. Prasad

Evolutionary Ecology of Immune Response:

One of the works of Dr. N G Prasad's laboratory aims to provide a comprehensive view of the mechanisms driving immune system evolution and the critical role immunity plays in the survival and fitness of *Drosophila melanogaster*. They investigate how genetic and genomic factors are influenced in the evolved populations and how gene expressions affect the overall immune competence of the flies. Additionally, they examine various environmental factors that impact their survival and immunocompetence.

Their research focuses broadly on studying the immune response in *Drosophila* sp. Currently, they are setting up hemiclinal flies in the laboratory to investigate additive genetic variation and genetic correlations across different families within the same population. These flies represent a snapshot of their LH population, which exhibits significant genetic diversity among individuals.

In their research, they explore the single host-multiple pathogen system. They want to determine the virulence of two different bacteria (gram +ve & gram -ve bacteria) and see how it affects the survivorship of the host and also the growth dynamics of two different pathogens (gram +ve & gram -ve bacteria) inside the host (*Drosophila melanogaster*) after infection over various time periods.

Adaptation Stress:

Dr. Prasad's research group also explores the impact of larval crowding on reproductive traits of *Drosophila melanogaster* and how reproductive traits such as sperm length in males, seminal receptacle (SR), and male mate choice evolve in larval crowding adapted population.

Their research also involves the evolution of reproductive traits in population selection for extreme thermal stress in *Drosophila melanogaster*. They also explore the evolution of thermal fertility limits in males and females adapted to cold shock. They are eager to understand the genetic mechanisms underlying the evolution of extreme thermal stress.

Sexual Conflict:

Another research work in his laboratory focuses on elucidating sexual conflict dynamics in *Drosophila melanogaster*, with an emphasis on understanding the coevolutionary processes between males and females. Additionally, their work extends to probe the effects of dietary protein restriction on intersexual conflict.

Life-History Evolution:

It is widely acknowledged that our dietary choices sculpt our beings. Therefore, Dr. Prasad's research group seeks to explore evolutionary responses to dietary shifts, focusing on the high-fat diet using *Drosophila melanogaster* as a model organism. Specifically, they aim to investigate how a high-fat diet affects survival, reproductive fitness, metabolic adaptations, and genetic changes in *Drosophila*.



Purnananda Guptasarma

During the year, work in Dr. Purnananda Guptasarma's laboratory continued on several fronts, as reported below. (1) In the area of their work on DNA-binding proteins, they discovered that HU, which was previously reported by them to undergo liquid-liquid phase separation with DNA and to bind to lipopolysaccharide, also undergoes phase separation with lipopolysaccharide, a component of the outer membranes of bacteria. This completes the picture in terms of HU causing phase separation both within bacteria (in the genomic nucleoid) and outside bacteria, in biofilms, along with extracellular DNA and lipopolysaccharide shed by bacteria, with the latter determining the liquidity of the phase-separated biofilm. (2) In the area of their work on the degradation of plastic by enzymes, they designed new protein-engineered multi-dentate thermophilic cutinase enzymes for more efficient degradation and also new rationally-engineered cutinases. His group also showed that reducing the affinity of a cutinase for solid PET leads to increased overall activity because the fraction of enzyme left in solution helps degrade PET degradation intermediates to terephthalic acid. (3) In the area of their work on amylases/glucanotransferases, they made significant strides in understanding the functional mechanism of a thermophilic enzyme first shown by them to work as both an exo-amylase and as a glucanotransferase. Using site-directed mutations, construction of domain-swapped chimeras of the enzyme with an ortholog, and some bioinformatic analyses, they worked out the entire mechanism of coupling of a glucose-excising activity from a glucose-transferring activity at a proximal site. (4) In the area of their work on protein-protein interactions that help in the assembly of cellulosomes in thermophile microbes, they have made two important discoveries during the year. The first was that a short and unstructured/flexible inter-domain linker could be more resistant to proteolysis than a rigid linker of the same length, owing to its facilitation of the motions of its flanking domains that sterically prevent protease access. The second was that the affinities and modes of binding of 'dockerin' elements to a non-redundant (and minimalistic) set of 'cohesin' domains in cellulosomes are different for different dockerin-cohesin pairs, suggesting that there are preferences for certain dockerins for certain cohesins. (5) In the area of biomass degradation by thermophilic enzymes, they cloned and characterized multiple cellulases, xylanases, and beta glucosidases from *Clostridium thermocellum*. The beta glucosidases, in particular, appear to be promising for use at high temperatures and high glucose concentrations.

Rachna Chaba

Dr. Rachna Chaba's research laboratory is interested in identifying and characterizing new players and networks in bacterial metabolism, with a particular focus on the metabolism of long-chain fatty acids (LCFAs) and a sugar acid, D-galactonate, carbon sources implicated in host-bacterial interactions.

LCFAs are an energy-rich nutrient source for several bacteria, including pathogens. Although the LCFA metabolic pathway has been extensively studied, especially in *E. coli*, the interconnection of LCFA metabolism with other cellular processes remained unexplored. Dr. Chaba's group previously showed that LCFA degradation generates elevated levels of reactive oxygen species in *E. coli*, and ubiquinone, an electron carrier in the electron transport chain (ETC), is a critical antioxidant that mitigates LCFA-induced oxidative stress. Further, they showed that an increased electron flow in the ETC during LCFA metabolism titrates ubiquinone, limiting its availability for disulfide bond formation in secreted proteins, thereby compromising envelope redox homeostasis. However, the Cpx envelope stress response pathway is activated, which helps restore redox balance. Their work suggested that one of the mechanisms by which Cpx restores cellular homeostasis is by increasing the oxidizing power of ETC; whereas ubiquinone accumulates in LCFA-utilizing cells, this upregulation is prevented in a strain unable to induce Cpx response. They are currently investigating i) the mechanism by which Cpx regulates ubiquinone levels in LCFA-grown cells, ii) the additional mechanisms by which Cpx maintains envelope redox homeostasis, and iii) the molecular signals that activate Cpx response during LCFA metabolism.

E. coli uses a variety of sugar acids (oxidized derivatives of sugar) as carbon and energy sources. Genome-scale studies in the last couple of decades have emphasized the importance of the metabolic pathway of a sugar acid, D-galactonate, in the interaction of enteric bacteria with their host. The transporter and enzymes involved in D-galactonate metabolism, encoded by the dgo operon, are negatively and positively regulated by DgoR and cAMP-CRP, respectively. They established DgoR as a GntR/FadR family transcriptional regulator and identified its promoter, operator, effector, and effector-binding cavity in a laboratory strain of *E. coli*. Dr. Chaba's laboratory is currently investigating i) the allosteric mechanism by which D-galactonate binding affects the DNA-binding ability of DgoR, ii) the influence of genetic variations in DgoR in natural enterobacterial isolates on repressor function, and iii) additional layers of regulation on dgo operon.

Rajesh Ramachandran

Research in the laboratory of Dr. Rajesh Ramachandran is aimed at finding the mechanisms of tissue regeneration in zebrafish and axolotl models. They have explored why mammals do not regenerate damaged organs as effectively as fishes and amphibians. While several possible cellular and molecular events that lead to efficient regeneration in fishes and amphibians are well-characterized, the exact causes of the lack of efficient regeneration in mammals are far from clear. In these lines, they created an environment in which they could cause an enhanced collagen deposit in the post-amputated tissues of the axolotl, debilitating the limb regenerative abilities (Figure 1). In other words, they could render a highly regenerative amphibian tissue similar to a non-regenerative mammal. Conversely, the chemical clearing of excess collagen restores the regenerative ability (Figure 2). These observations lead to speculations on the roles of extracellular matrix proteins, such as collagen, playing important roles in organ regeneration.

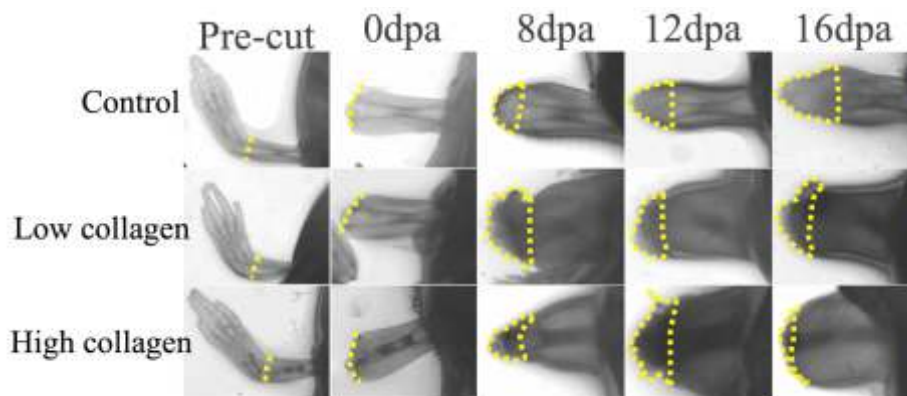


Fig. 1: Enhanced collagen deposition debilitate limb regeneration in axolotl

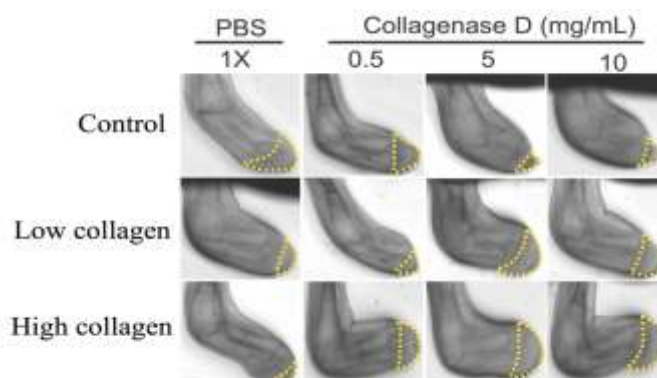
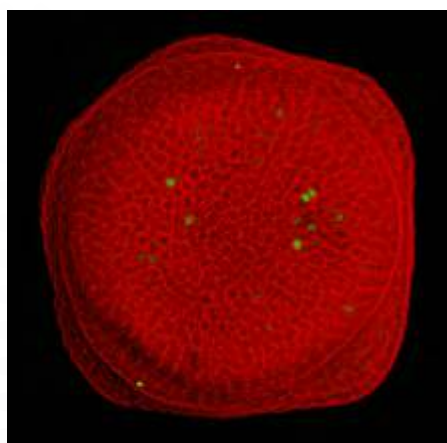


Fig.2: Collagenase treatment restores limb regeneration in axolotl

Ram Yadav

Dr. Ram Yadav's research group is working on hormone biology in plants. The work led by Lekha and Himanshi has confirmed the role of the NAC062 transcription factor in promoting cytokinin signaling. Thus, plants overexpressing the constitutively active form of NAC062 show accelerated regeneration potential in the tissue culture. His group is collaborating with crop scientists to test the potential role of NAC062 in tissue culture regeneration protocols. Himanshi's work shows that an auxin pool maintained in the periphery of the shoot is required for functional stem cell niche maintenance in the shoot.



DR5 expression in pin1-5 mutant shoot

Rhitoban Ray Choudhury

The research group of Dr. Rhitoban Ray Choudhury has now successfully sequenced the genome of the wasp *Nasonia oneida* (paper in review), which they use as their model system. This feat completes the genome sequencing of all four species within the *Nasonia* clade. This work was achieved through a collaboration with the University of Rochester, New York, USA, Auburn University, Alabama, USA, and Dr. Shashi B. Pandit of the Department of Biological Sciences in IISER Mohali. This work was led by the graduate student Anjali Rana.

In his laboratory, Anjali has identified the microbiome of all the *Nasonia* species and has successfully identified the biological causes of its abundance and structure. Taruna Verma, another graduate student, has identified a hitherto unknown behavior

of *Nasonia* males (paper in review) where they can identify females of their species while they are still inside their fly host. Aanchal Panchal, another graduate student, has identified how *Odontotermes* termites keep their fungus gardens free of weeds (paper in review). Renuka Agarwal, a former PhD student of the lab (now at Syracuse University), has a paper accepted in *Communications Biology* where she has shown a complex pattern of interdependence exists in fungus combs between the fungi and bacteria, which can keep weeds at bay.

Sadhan Das

Impaired wound healing in diabetic patients causes severe morbidity and mortality worldwide. Macrophages, a major immune cell type, play a key role in normal and diabetes-induced wound healing. Emerging evidence reveals the role of epigenetic regulators such as long non-coding RNAs (lncRNAs) and enhancers in macrophage function. They modulate cell/tissue type-specific gene expression and play critical roles in promoting altered gene expression in disease conditions. However, little is known about their contribution to impaired wound healing. Dr. Sadhan Das's research group hypothesizes that lncRNAs and enhancers might play essential roles in macrophage polarization. To address this issue, splenic monocytes from diabetic (db/db) and non-diabetic (db/+) mice were isolated and differentiated into uncommitted (M0), pro-inflammatory (M1), and anti-inflammatory (M2) macrophages and RNA-sequencing was performed. The RNA-sequencing analysis identified differentially expressed coding and non-coding genes, including lncRNAs in M1, M2, and M0 macrophages. To identify enhancers, they analyzed publicly available RNA-seq, ChIP-seq, and ATAC-seq datasets of bone-marrow-derived M0 and M1 macrophages from control and diabetic mice. Their transcriptomic analysis revealed several dysregulated novel lncRNAs, amongst which they focused on two M2-specific lncRNAs whose expression was higher in db/db M2 than db/db M1. Moreover, they found dysregulated expression of coding genes *Ccr5* and *Cxcr4* near lncRNAs MSTRG.21350 and MSTRG.708, respectively, suggesting these lncRNAs might be regulated via cis-manner. Moreover, they found similar expression patterns of these lncRNAs and associated genes in the skin wound tissues of normal C57BL/6 mice, suggesting lncRNAs might play an important role in wound healing. Furthermore, they identified 349 differentially-regulated M1-specific enhancers. Interestingly, putative enhancers were identified for *Nos2*, *Pla2g7*, *Ubr4*, and *Slc30a1* genes. Integrations of ChIP-seq with ATAC-seq data revealed the presence of open chromatin regions on the enhancers. Currently, experiments are carried out to elucidate the functional and mechanistic role of these lncRNAs and enhancers in impaired macrophage polarization associated with delayed wound healing in diabetes.



Samarjit Bhattacharyya

Cellular and molecular mechanisms of glutamate receptor trafficking in the central nervous system and its physiological implications

An essential requirement for maintaining homeostasis in any living organism is the ability of cells to sense the external environment and, in the case of multicellular organisms, for cells to communicate with each other via mediators released into the extracellular milieu. In the brain, various neurotransmitters and neuromodulators act on target receptors to activate cellular signaling events, transferring information from one cell to the next. Normal signaling depends on the accurate localization of such receptors in specific regions of the cell, and the process of receptor trafficking plays a critical role in

controlling this localization. Despite the obvious significance of this process, very little is known about the protein machineries that mediate the trafficking of neurotransmitter receptors in the brain, the regulatory events that control these protein machineries, and the functional consequences of these regulatory events. At this point, research in the laboratory of Dr. Samarjit Bhattacharyya is directed to elucidate the cellular and molecular mechanisms that regulate the trafficking of two types of glutamate receptors: (a) ionotropic glutamate receptors and (b) metabotropic glutamate receptors (mGluRs) in the central nervous system and its physiological implications. These trafficking events are thought to be critical for various physiological processes. For example, glutamate receptor trafficking is believed to be involved in virtually all forms of experience-dependent plasticity, including learning and memory. Furthermore, these receptors have been implicated in various neuropsychiatric disorders. To address these questions, his laboratory employs multi-disciplinary approaches ranging from biochemistry and molecular biology to cell biology, imaging, and mouse genetics.

Samrat Mukhopadhyay

Prof. Samrat Mukhopadhyay's work has intensely focused on a fascinating behavior of intrinsically disordered proteins (IDPs), namely, liquid-liquid phase separation resulting in the formation of membrane-less organelles. Cells contain specialized (conventional) membrane-bound organelles that compartmentalize cellular constituents and regulate cellular biochemistry. A growing body of current research reveals an alternate mechanism of intracellular compartmentalization and organization via liquid-liquid phase separation of highly flexible IDPs and nucleic acids into noncanonical membrane-less organelles. This process is akin to oil de-mixing from vinaigrette or atmospheric moisture condensing into dew drops. Highly dynamic intracellular liquid-like condensates act as on-demand organelles that are formed and dissipated depending on the cellular requirements. These functional liquid droplets can undergo aberrant irreversible phase transitions into solid-like amyloid aggregates associated with a range of debilitating neurodegenerative diseases, including Alzheimer's disease, Amyotrophic Lateral Sclerosis (ALS), Frontotemporal Dementia (FTD), and so forth. Using state-of-the-art single-molecule methodologies, his lab has unraveled the crucial molecular events that dictate biological phase separation (published in Nature Communications in November 2023).



Santosh B. Satbhai

Iron (Fe) balance is crucial for plant health, affecting everything from photosynthesis to respiration. In a recent study, we have identified how two plant proteins, ELONGATED HYPOCOTYL 5 (HY5) and POPEYE (PYE), regulate iron transport within plants. Using Arabidopsis as a model, we found that HY5 and PYE both act to repress iron transport genes. Interestingly, HY5 was also observed to bind directly to the promoters of specific iron transport genes. Research work from the group of Dr. Santosh Satbhai showed that these two proteins have both overlapping and distinct roles in controlling how plants respond to iron deficiency, influencing genes and pathways crucial for plant development and nutrient transport.

Sharvan Sehrawat

The focus of research in Dr. Sehrawat's lab is investigating immunity and immunopathology to infectious agents in addition to generating unique antibodies with diagnostic and therapeutic potential by phage display technology. In continuation of the Sehrawat research group's efforts in antibody engineering, they have selected therapeutic single domain antibodies/nanobodies against dengue virus, methicillin-resistant *Staphylococcus aureus* as well as pathogenic *E. coli* bacteria using an in-house constructed phage display library. Their group then characterized and modified these antibodies to assess their biophysical, immunological, and functional activities in vitro as well as in animal model/s. Furthermore, their group discovered Rab8a, a small GTPase, as the key regulator of dysfunctional dendritic cells (DCs) in the aging host and that Rab8a reconstituted DCs regained the lost functions to boost anti-viral immunity. They have also deciphered the role of glucocorticoid signaling in the differentiation of virus-specific memory cytotoxic T lymphocytes.

Shashi Bhushan Pandit

Alternative Splicing (AS) generates variably spliced mRNAs, which are translated, leading to proteome diversity and increasing the functional repertoire of a gene. The significance of AS can be appreciated with the observation that ~95% of human genes are alternatively spliced with at least two variable isoforms. The knowledge of AS events is derived from combined

experimental and computational studies, and these are also documented in databases such as NCBI, Ensembl, and the UCSC genome browser. To address the deluge of information on AS events and enable the systematic study of various organism/lineage-specific preponderance of splicing events and its consequences on protein sequence/structure necessitates uniquely identifying exons and annotating them with protein-associated features. To address these, the research group of Dr. Shashi Bhushan Pandit developed an innovative framework ENACT to annotate exons for their amino acid coding potential, relative position in the gene architectural context, and alternative 5' or/and 3' splice site variations. These are encoded in a six-character long string Exon Unique Identifier (EUID) assigned for each exon, thus making them trackable and manually interpretable. Using ENACT nomenclature, they have annotated genes encoded in five model organisms and documents in the ENACTdb database (www.iscblab.in/enactdb/). The database server provides the usual visualization tool for users to analyze the impact of exon variations (including indels) on protein functions. They analyzed paralogous genes in the Zebrafish genome to explore their isoform diversity with possible differential transcript structures of paralogs. After mapping exons to paralog pairs (Zpars=934 in 467 genes), they compared pairwise isoforms/transcript structures. The analyses showed that 54% of Zpars have variable transcript diversity, whereas 46% displayed variable isoform diversity, accompanied by one of the Zpar paralogs coding for at least one additional transcript or isoform. Considering exon-level mapping, 25% of Zpars have 5' and/or 3' splice site variations in one of the paralogs, 46% consisted of variable exon definitions where some constitutive exons switched to alternative forms, and 34% displayed coding exons gain/loss in at least one of Zpar paralog. Thus, the roles of splice site variations, exon occurrences, and exon gain/loss in generating transcript diversity in paralog pairs are indicated. In another project to explore the conformational basis of enzyme promiscuity, his group has performed 1.5 μ s long explicit water equilibrium Molecular Dynamics (MD) simulations for six promiscuous and specialist enzymes. They clustered the binding site using time-lagged independent component analysis and observed that equilibrium conformational heterogeneity exists in both groups of enzymes, which was also evident from the atomic distances-based functional similarity score. It indicates that both groups of enzymes have conformational variability of binding sites for catalysis and need not necessarily suggest promiscuity.

Shravan Kumar Mishra

Mechanism of alternative splicing via competing 5' splice sites

Spliceosome generates more mRNAs through alternative splicing from competing 5' splice sites (ss) in pre-mRNAs. Dr. Shravan Kumar Mishra's laboratory has studied the mechanism of this alternative splicing form by monitoring the splicing of *Saccharomyces cerevisiae* SRC1/HEH1 pre-mRNA. Its alternative splicing through two alternative 5'ss (referred to as A5SS) produces Src1-S and Src1-L protein isoforms with different nuclear membrane topologies. They find that SRC1 alternative splicing requires a cis-acting RNA motif of sixteen invariant nucleotides at its exon-intron junction (referred to as A5SS motif). Its elements are differentially recognized and processed by trans-acting U5 and U6 snRNAs. The process requires a specific surface of the spliceosomal catalytic core protein, Prp8. SRC1 alternative splicing is further supported by trans-acting proteins of distinct spliceosomal complexes, including proteins of the retention and splicing (RES) and the Prp19-related complexes, and the previously reported ubiquitin-like protein Hub1 and the B-complex splicing factor Snu66. Assays with variants of the cis-motif with altered pairing strengths to U5 and U6 snRNAs show that optimal pairings of the two 5'ss with the trans-acting snRNAs are essential for alternative splicing. Any deviations in the pairing strengths resulted in loss of alternative splicing due to preferential usage of one of the two 5'ss. These observations are supported by converse assays by overexpressing U5 and U6 snRNA variants with altered pairing to the pre-mRNA. They identified an SRC1 variant by recalibrating its pairing with U5 and U6 snRNAs that were alternatively spliced in the absence of the above trans-acting proteins. These data suggested that snRNA interactions with the competing 5'ss are the primary requirement for alternative splicing, and the trans-acting proteins modulate the interactions and splicing in the spliceosome. Thus, alternative splicing from competing 5'ss requires precisely selected sequence motifs at exon-intron junctions of target pre-mRNAs and their decoding by trans-acting snRNAs and a specific set of proteins with modulatory roles for distinct spliceosomal complexes.

Sudip Mandal

The laboratory of Dr. Sudip Mandal aims to understand the metabolic control of fundamental cell biological processes during normal and pathophysiological conditions. They employ advanced genetic and molecular tools available in the model organism *Drosophila melanogaster* to address their questions. In one of the projects, they successfully determined how altered metabolic conditions resulting from diet-induced type 2 diabetic conditions impact the cardiac function and behavior of adult flies. In a separate project, they unraveled the mechanistic basis of an otherwise unknown process by which the metabolic state of the differentiating blood cells defines the hematopoietic niche in the larval lymph gland of *Drosophila*. Currently, they are investigating the molecular genetic basis of the mechanism by which the fat cells play a role in regulating the germ line stem cells (GSCs) in the ovary of adult *Drosophila* under high dietary sugar conditions.

Vidya Devi Negi

Dr. Vidya Devi Negi's research laboratory focuses on Host-pathogen interaction and immune modulation, microbial evolution, and bacterial infection and its impact on host development using *Salmonella* and *Caenorhabditis elegans* as model organisms. After setting up the fully functional lab, they started their research work slowly, and progress is happening.

DEPARTMENT OF BIOLOGICAL SCIENCES

VISITS OF FACULTY MEMBERS

Anand Kumar Bachhawat

- Krea University, October 2024

Arunika Mukhopadhyaya

- ICGEB, New Delhi, 6th October 2023
- Central University of Rajasthan, Kishangarh, Rajasthan, 20-21 March, 2024

Indranil Banerjee

- Indian Institute of Science, Bengaluru
- CSIR-IMTECH, Chandigarh
- ENS Paris, France
- NIPER, Mohali
- IIT Bombay, Mumbai

Manjari Jain

- IISER Kolkata, April 2023, June 2023
- IISc Bangalore, July 2023
- Max Planck Institute of Animal Behaviour and University of Konstanz, October 2023
- University of Zurich, October 2023
- Graphic Era Univ, Dehradun Feb 2024, NSAB:2024

N. G. Prasad

- IISER Trivandrum 6th – 9th December, 2023
- IISER Berhampur 5th -9th March December, 2024
- NISER Bhubaneswar 3th- 4th March, 2024

Rajesh Ramachandran

- CCMB Hyderabad- February 22, 2024
- IMTECH Chandigarh

Ram Yadav

- Attended BIOSANTEXC meeting in IISER Pune, 28-29 May 2023.
- Visited as Member Board of Studies, Department of Botany, Central University Punjab, Bathinda June 8th 2023.

Sadhan Das

- Young Investigators meeting (YIM) at IISER-Bhopal from 11.03.2024 to 13.03.2024
- International Cardiovascular Medicine Summit at Institute of Cell Science and Regenerative medicine in Bengaluru from 03.03.2024 to 05.03.2024
- RGCB, Trivandrum from 24.11.2023 to 28.11.2023.
- Asian forum for Chromosome and Chromatin Biology at JNCASR, Bengaluru from 04.11.2023 to 06.11.2023

Samrat Mukhopadhyay

- TIFR Hyderabad (March 2023)
- Biophysical Society Meeting in Philadelphia, Pennsylvania, USA (February 2024)
- City University of New York, New York, USA (February 2024)
- Radboud University, The Netherlands (January 2024)
- Jawaharlal Nehru University, New Delhi (January 2024)
- Centre for Cellular and Molecular Biology, Hyderabad (December 2023)
- TIFR Mumbai (October 2023)
- Indian Institute of Science, Bangalore (October 2023)
- IIT Jodhpur (October 2023)
- York University, UK (September 2023)
- Bristol University, UK (September 2023)
- IISER Trivandrum (August 2023)
- IIT Bombay (August 2023)
- University of Cambridge, UK (June 2023)

Santosh B. Satbhai

- Santosh B. Satbhai: Visited ENS de Lyon, Lyon France (September 29, -October 5, 2023)
- Santosh Satbhai: Visted Institute of Plant Science, University of Paris Saclay, France (Septermber 25-27, 2023).
- Santosh Satbhai: Visited Institute for Plant Sciences of Montpellier (IPSiM), Montpellier, France (Septmebr 27- 29, 2023)

Sharvan Sehrawat

- Nirma University, Ahmedabad Gujarat, February 22-23, 2024

Shravan Kumar Mishra

- Indian Institute of Management (IIM) Bangalore. For training for the Nurturing Future Leadership Program (NFLP). March 24-30, 2024.

Vidya Devi Negi

- NIT Rourkela, 5-7th October 2023
- IIT Mandi, September 28-30, 2023
- BITS Pilani, Pilani campus, 21st October, 2023
- BITS Pilani, Goa Campus, December 18-20, 2023

DEPARTMENT OF BIOLOGICAL SCIENCES

TALKS DELIVERED

Anand Kumar Bachhawat

- Glutathione Metabolism Revisited Krea University October 2024
- Regulation of one carbon metabolism, JNU, January 2024

Arunika Mukhopadhyaya

Faculty presentation

- Innate receptor co-ordination in modulation of host-cellular responses by ligands from Gram-negative enteric bacteria. Annual meeting of Molecular Immunology Forum 'MIF 2023'. Organized by National Institute of Immunology (NII), New Delhi at Jim Corbett National Park, Nainital, Uttarakhand. 5th to 8th May, 2023
- Modulation of Host Cellular Responses by Gram-negative Enteric Bacterial Ligand *Vibrio cholerae* Outer-membrane protein OmpU. Conference on "Advances in Biochemical Sciences: Basic to Translational Research" at Central University of Rajasthan, Kishangarh, Rajasthan. 20th to 21st March, 2024

Student presentation

- Arpita Sharma. Journey of *Vibrio cholerae* outer membrane protein OmpU to host cell mitochondria. FEMS Congress 2023 at Hamburg, Germany. 9th July to 13th July 2023.
- Dwipjyoti Sarma. Understanding the role of scavenger receptor CD36 in modulation of dendritic cell responses. SIRCON 2023 at Indian Institute of Science (IISc), Bengaluru, India. 16th September to 17th September 2023.

Hasan Mohammad

- Invited talk on "Neural circuit for environment driven food consumption" at online event PRATIBIMB organized by the School of Biotechnology, JNU, New Delhi

Indranil Banerjee

- "Blocking enemy at the gates: novel endocytosis inhibitors broadly restrict SARS-CoV-2 and influenza A virus". NIPER Students' Research Symposium (NSRS). August 10-12, 2023. NIPER Mohali
- "Entry of influenza A virus into host cells – recent progress and remaining challenges". Organelle Biology and Membrane Trafficking, October 9-11, 2023, NBRC Manesar
- "Cracking open a hard nut: How TRIM62 and TXLNA promote influenza A virus capsid uncoating by two distinct mechanisms". 7th Molecular Virology Meeting. September 22-23, IISc Bangalore.
- "Open Sesame: How influenza A virus exploits cellular factors to gain entry into the host cell". ENS Paris, France. November 17, 2023
- "Factoring in the host factors for influenza disease modeling". Indian Academy of Sciences Meeting on Challenges in epidemiological modelling in India. February 18-22, 2024. Coorg, Karnataka.
- "The Great Escape: How influenza A virus escapes lysosomal degradation during entry. 6th Autophagy India Network Conference. February 16-18, 2024. IIT Bombay.

Jogender Singh

- Thiol reductive stress activates the hypoxia response pathway. India C. elegans Pls' meeting, IIT Mandi, September 28-30, 2023.
- Reductive stress by thiol antioxidants activates the hypoxia response pathway. Department of Biology, Ashoka University, Sonapat, Haryana, India on November 17, 2023.
- Reductive stress by thiol antioxidants activates the hypoxia response pathway. National Centre for Biological Sciences (NCBS), Bengaluru, India on March 8, 2024.

Kausik Chattopadhyay

- Kausik Chattopadhyay. Bacterial pore-forming toxins: structural basis of membrane-damaging virulence

mechanism. Advances in Biochemical Sciences: Basic to Translational Research” organized by the Department of Biochemistry at Central University of Rajasthan from 20 to 21 March 2024.

- Kausik Chattopadhyay. Structural basis and functional implications of β -barrel pore-formation mechanism of *Vibrio cholerae* cytolysin. Online Minisymposium on Recent Advances in Pore forming toxins. National Institute of Chemistry, Ljubljana, Slovenia. 29th September, 2023.
- Kausik Chattopadhyay. Curious case of membrane-damaging β -barrel pore-forming toxin: the w(hole) story. Invited talk on the occasion of World Technology Day at CSIR-IMTECH. 11th May, 2023

Kuljeet Singh Sandhu

Name of the presenter: Jui Bhattacharya

Title of the talk: Adaptive significance of genomic rearrangements in mammals

Name of the Conference/Institute: The Evolution of Animal Genomes, Sevilla, Spain

Dates (Preferably in bullet points): Sept. 18-21, 2023

Name of the presenter: Mohan Lal

Title of the talk: Genetic basis of regressed phenotypes in cavefish

Name of the Conference/Institute: The Evolution of Animal Genomes, Sevilla, Spain

Dates (Preferably in bullet points): Sept. 18-21, 2023

Lolitika Mandal

- A conserved nutrient-responsive axis mediates the degradation of miRNA-mRNA hybrids in blood cell progenitors. Invited Talk Asia Pacific *Drosophila* Research Conference 26th July 2023 at Cairns, Australia
- A tale of cellular and metabolic control of blood cell development. Invited Talk. INSA 89th Anniversary General Meeting 2023, 7th November, 2023, CCMB Hyderabad
- A conserved nutrient-responsive axis mediates the degradation of miRNA-mRNA hybrids in blood cell progenitors. InDRC 2023, 9th November, 2023, Invited Talk IISER Thiruvananthapuram.

Mahak Sharma

- Mahak Sharma. Small GTP-binding protein Arl8 regulates lysosome positioning, function and biogenesis. All India Cell Biology Society Annual Conference, ACTREC, India. 10th-12th January 2024
- Yogita. Arl8b recruits the Rab GAP TBC1D9B for regulating lysosomal cargo sorting and lysosome biogenesis. DBS Biology Day, IISER Mohali, India. 06th January 2024
- Neha Dhiman. Mechanisms regulating temporal associations of lysosomal GTPases with SCVs and SIFs upon *Salmonella typhimurium* infection. Gordon Research Conference (Salmonella Biology and Pathogenesis), Italy. 23rd-28th July 2023

Manjari Jain

- Chirping crickets, babbling babblers: the evolution of signal design. EvoBio 2023, IISER Kolkata. April 2023.
- Making sense of animal sounds. Nature for All, Word Commission on Protected Areas. Webinar. May 2023.
- Examining compositionality in the vocalizations of Jungle Babbler. 59th meeting of Association for Tropical Biology and Conservation, Coimbatore. July 2023.
- A sound way of life: making sense of animal sounds. SERB Chemical Ecology, IISc Bangalore. July 2023.
- Plenary Lecture. Syntax and linguistic laws in avian vocalizations. Full-stack Bioacoustics Workshop, MPI-AB and University of Konstanz. October 2023.
- Bigger the better? Benefits of group augmentation in Jungle Babblers. National Symposium on Avian Biology, Dehradun. February 2024.

N. G. Prasad

Name of the presenter: Dr NG Prasad

Title: Does Sexual Selection Increase the Ability of Males to Learn and Remember?

Name of the Institute: IISER Berhampur & IISER Bhubaneswar

Name of the presenter: Dr NG Prasad

Title: Resistance evolves in *Drosophila melanogaster* populations in response to selection for increase post-infection survival

Name of the Institute & Conference: IISER Trivandrum & InDrc

Date: 7th December, 2023

Purnananda Guptasarma

- Bacterial genomes à la HU: Phase separation, biofilm formation, and avoidance of oxidation through the binding of the nucleoid-associated protein, HU. Guha Research Conference 2023 at Swarajdeep Island, Andamans. 6th November, 2023.
- Enzymatic approaches to PET degradation. Indigenous technologies for viksitbharat. Department of Biotechnology, DAV College Chandigarh. 27th February, 2024.
- Short fundamental research stories of medical relevance. 16th Annual Champalimaud Symposium at LVP Eye Institute Hyderabad. 4th February, 2024.
- Newly discovered roles of the DNA-binding protein, HU. 46th Annual Symposium of the Indian Biophysical Society at TIFR Hyderabad. 17th March, 2024.

Rachna Chaba

Invited talks

- Direct repression of D-galactonate metabolism by the stationary phase sigma factor in Escherichia coli. Transcription Assembly Meeting 2023, IISER Bhopal, Bhopal, India. July 24 - 26, 2023
- Identifying and characterizing new players and networks in carbon metabolism in E. coli. Molecular and Systems Microbiology Symposium, Asilomar, CA, USA. July 06 - 09, 2023

Rajesh Ramachandran

- Delivered a lecture at CCMB Hyderabad on February 22, 2024 during Founder's Day celebrations
- Delivered lecture at IMTECH Chandigarh on the use of animal models.

Ram Yadav

- Cellular Stress Responsive Transcription Factor NAC062 Modulates Plant Growth and Development. 45th Annual Plant Tissue Culture Association (India) Meeting and Symposium on Recent Advances in Plant Biotechnology - 2024. 26-28 January 2024. Central University Pondicherry.
- The sunscreen on the skin or the inner beauty protects plants from UV-B stress. ISLS-2023, 22-23 December 2023 Jaipur.

Rhitoban Ray Choudhury

- Aanchal Panchal; Poster; "Understanding behavior 2023"; IISER Kolkata; 2023.
- Taruna Verma; Poster; "Understanding behavior 2023"; IISER Kolkata; 2023.
- Anjali Rana; "Genome Assembly and Annotation of Nasonia ionneida: A valuable addition to the Nasonia Model System"; Nasonia conference, University of Muenster, Germany; 28 - 29 July 2023, Muenster, Germany.

Sadhan Das

- Epigenetic regulators in diabetic cardiovascular complications, International Cardiovascular Medicine Summit, in Stem, Bangalore on 5th March, 2024.
- Epigenetic regulators in vascular complications of diabetes, 8th Meeting of the Asian Forum of Chromosome and Chromatin Biology, JNCASR, Bangalore on 5th November, 2023.

Samarjit Bhattacharyya

Title of the talk: Glutamate receptor trafficking: Ins and Outs

Invited talk at the 41st Annual Meeting of the Indian Academy of Neurosciences and International Conference on 'Brain: Chemistry to Cognition' held at Jiwaji University, Gwalior, India.

Date: 4-6 October, 2023.

Samrat Mukhopadhyay

Prof. Samrat Mukhopadhyay gave a large number of invited talks. Some selected talks are given below.

- Invited lecture at the Indian Biophysical Society meeting, TIFR Hyderabad (March 2023)
- Invited seminar at the City University of New York, New York, USA (February 2024)
- Invited seminar at Radboud University, The Netherlands (January 2024)
- Wednesday Colloquium at TIFR Mumbai (October 2023)
- Invited talk at Bristol University, UK (September 2023)
- Invited seminar at the University of Cambridge, UK (June 2023)

- Invited talk at the Federation of American Societies for Experimental Biology Conference, Malahide, Ireland (June 2023)

Santosh B. Satbhai

- Delivered an invited talk entitled “ An endogenous peptide signal in Arabidopsis modulates components of the iron deficiency response” in International Conference on Development and Regeneration at Shiv Nadar University, Greater Noida, India, February 19-20, 2024.
- Delivered an invited talk entitled : HY5: A Key Regulator of Iron Uptake and Utilization in Plants” in EMBO-ISPP Satellite Meeting 2024 at IISER Bhopal, India, January 15-16, 2024.
- Delivered a invited talk (online) in symposium “BioInsights: Exploring Frontiers in Biology organised by IISER Tirupati students. January 28, 2024.
- Delivered invited talk entitled “ HY5: A Pivotal Regulator of Iron Deficiency Signaling in Plants” at Institute of Plant Science, University of Paris Saclay, France (September 26, 2023).
- Delivered invited talk entitled “ HY5: A Pivotal Regulator of Iron Deficiency Signaling in Plants” at Institute for Plant Sciences of Montpellier (IPSiM), France (September 28, 2023).

Sharvan Sehrawat

- Immunity and immunoapthology to viruses. Continuing Medical Education (CME): Immunology in Health and Diseases at Nirma University, Ahmedabad Gujarat, February 22-23, 2024

Vidya Devi Negi

- Invited talk at BITS Pilani, Pilani Rajasthan, on 21st October, 2023
- Invited speaker at international conference (In Con FIB, 2023) at NIT Rourkela, 5-7th October 2023
- Spoken at 4th Indian worm PI meeting at IIT Mandi, September 28-30, 2023



DEPARTMENT OF BIOLOGICAL SCIENCES

CONFERENCES ATTENDED

Arunika Mukhopadhaya

- Arunika Mukhopadhaya. Innate receptor co-ordination in modulation of host-cellular responses by ligands from Gram-negative enteric bacteria. Annual meeting of Molecular Immunology Forum 'MIF 2023'. 5th to 8th May, 2023 at Jim Corbett National Park, Nainital, Uttarakhand.
- Arunika Mukhopadhaya. Modulation of Host Cellular Responses by Gram-negative Enteric Bacterial Ligand *Vibrio cholerae* Outer-membrane protein OmpU. Conference on "Advances in Biochemical Sciences: Basic to Translational Research" conference. 20th to 21st March, 2024 at Central University of Rajasthan, Kishangarh, Rajasthan.
- Dwipjyoti Sarma. Understanding the role of scavenger receptor CD36 in modulation of dendritic cell responses. SIRCON 2023 at Indian Institute of Science, Bengaluru, India. 16th September to 17th September 2023.
- Aakanksha Chauhan. Elucidating the mechanism of TDH-mediated immunological responses. SIRCON 2023 at Indian Institute of Science, Bengaluru (IISc), India. 16th September to 17th September 2023.
- Sanjeev Routh. LOX-1: An emerging scavenger receptor (SR) in inflammatory signaling in response to pathogen-associated molecular patterns (PAMPs). SIRCON 2023 at Indian Institute of Science (IISc), Bengaluru, India. 16th September to 17th September 2023.
- Dwipjyoti Sarma. Understanding the role of scavenger receptor CD36 in modulation of dendritic cell responses. IMMUNOCON-2023 at All India Institute of Medical Sciences (AIIMS), New Delhi, India. 5th October to 8th October 2023.
- Aakanksha Chauhan. Elucidating the mechanism of TDH-mediated immunological responses. IMMUNOCON-2023 at All India Institute of Medical Sciences (AIIMS), New Delhi, India. 5th October to 8th October 2023.
- Sanjeev Routh. LOX-1: An emerging scavenger receptor (SR) in inflammatory signaling in response to pathogen-associated molecular patterns (PAMPs). IMMUNOCON-2023 at All India Institute of Medical Sciences (AIIMS), New Delhi, India. 5th October to 8th October 2023.
- Sindhoora P. Elucidating the correlation between *Vibrio cholerae* cytolysin-induced cell death and cell survival mechanisms. SBC 2023 at BITS Pilani K K Birla Goa Campus, Goa, India. 18th December to 20th December.

Hasan Mohammad

- Attended inaugural symposium of Centre for High Impact Neuroscience and Translational Applications (CHINTA) at Ramakrishna Mission Institute of Culture, Kolkata, Jan 18-20, 2024

J. Gowrishankar

Name of the presenter: J Gowrishankar

Title of the talk: Pathological R-loops in Bacteria from Endogenous Antisense RNAs whose Synthesis is Ordinarily Curtailed by Rho-dependent Transcription Termination

Name of the Conference: Molecular Genetics of Bacteria and Phages, University of Madison-Wisconsin, USA

Dates: 7-11 August, 2023

Kausik Chattopadhyay

- Kausik Chattopadhyay. Guha Research Conference 2023. 3-6 November, 2023. Havelock. Andaman Islands.
- Mahendra Singh. Specific cradle loop residues regulate the pore-formation mechanism of *Vibrio cholerae* cytolysin, a β -barrel pore-forming toxin. European Biophysical Societies' Association (EBSA) Congress, 2023, Stockholm, Sweden. 31st July to 3rd August, 2023.
- Mahendra Singh. EBSA 2023 Summer Biophysics School, Stockholm, Sweden. 28th July to 31st July, 2023.
- Kusum Lata. The role of cholesterol and membrane dynamics in pore-formation mechanism of Listeriolysin O. European Biophysical Societies' Association (EBSA) Congress, 2023, Stockholm, Sweden. 31st July to 3rd August, 2023.
- Aakanksha Chauhan. Elucidating the mechanism of TDH-mediated immunological responses. IMMUNOCON-2023, AIIMS, New Delhi, India. 5th October to 8th October, 2023.
- Aakanksha Chauhan. Elucidating the mechanism of TDH-mediated immunological responses. Society of Inflammation

Research (SIR) Conference (SIRCON), 2023, IISc Bengaluru, Bengaluru, India. 16th September to 17th September, 2023.

- Sindhoora P. Elucidating the correlation between *Vibrio cholerae* cytolysin-induced cell death and cell survival mechanisms. Society of Biological Chemists (India) Conference, 2023, BITS Pilani K K Birla Goa Campus, Goa, India. 18th to 20th December, 2023.
- Koyel Nandy. Probing the mechanistic details of oligomerization by Listeriolysin O, a β -barrel pore-forming toxin in the cholesterol-dependent cytolysin family. Society of Biological Chemists (India) Conference, 2023, BITS Pilani K K Birla Goa Campus, Goa, India. 18th to 20th December, 2023.

Lolitika Mandal

- A conserved nutrient-responsive axis mediates the degradation of miRNA-mRNA hybrids in blood cell progenitors. Invited Talk Asia Pacific *Drosophila* Research Conference 26th July 2023 at Cairns, Australia
- A tale of cellular and metabolic control of blood cell development. Invited Talk. INSA 89th Anniversary General Meeting 2023, 7th November, 2023, CCMB Hyderabad
- A conserved nutrient-responsive axis mediates the degradation of miRNA-mRNA hybrids in blood cell progenitors. InDRC 2023, 9th November, 2023, Invited Talk IISER Thiruvananthapuram.

Mahak Sharma

- Mahak Sharma. Small GTP-binding protein Arl8 regulates lysosome positioning, function and biogenesis. All India Cell Biology Society Annual Conference, ACTREC, India. 10th–12th January 2024
- Mahak Sharma. TECPR2 localizes to early endosomes and regulates integrin. American Society for Cell Biology Conference, USA. 02nd–06th December 2023
- Neha Dhiman. Mechanisms regulating temporal associations of lysosomal GTPases with SCVs and SIFs upon *Salmonella typhimurium* infection. Gordon Research Conference (Salmonella Biology and Pathogenesis), Italy. 23rd–28th July 2023

Manjari Jain

- Soniya Yambem. Social and vocal complexity in Jungle Babbler, a cooperatively breeding passerine from the paleotropics. 59th meeting of Association for Tropical Biology and Conservation, Coimbatore. July 2023.
- Kanika Rajput. Does group size matter? Examining the relationship between group size and space use in cooperative breeding species, Jungle Babbler. Poster. Understanding Behaviour, IISER Kolkata. June 2023.
- Kanika Rajput. Exploring the concept of home range and territory in an urban-adapted cooperatively breeding species, Jungle Babbler. 59th meeting of Association for Tropical Biology and Conservation, Coimbatore. July 2023.
- Kanika Rajput. Angry birds: the role of chorus vocalization, group size and familiarity in territorial behaviour of Jungle babblers. 28th International Bioacoustic Congress, Hokkaido University, Japan. October 2023.
- Gaurav Singh. The sound of diversity: Passive acoustic monitoring to understand patterns of diversity. Understanding Behaviour, IISER Kolkata. June 2023.
- Gaurav Singh. Utility of acoustic indices to understand patterns of diversity. 59th meeting of Association for Tropical Biology and Conservation, Coimbatore. July 2023 and as a Webinar in Audio Moth Online Conference. September 2023.
- Gaurav Singh. The sound of diversity: Utility of acoustic indices to understand patterns of diversity. 28th International Bioacoustic Congress, Hokkaido University, Japan. October 2023.
- Anway Sarkar. Understanding bird species-level differences with respect to morphology and acoustics. Poster. Understanding Behaviour 2023, IISER Kolkata. June 2023.
- Anway Sarkar and Harish Kumar. Poster. Understanding bird species-level differences with respect to morphology and acoustics. 59th meeting of Association for Tropical Biology and Conservation, Coimbatore. July 2023.
- Anway Sarkar. Intraspecific variation in avian haemosporidian infection in a cooperative passerine, Jungle Babbler. Inter-IISER Ecology Meet, IISER Tirupati. January 2024.
- Harish Kumar. Grooming and allogrooming in Jungle Babbler: two sides of the same coin? Poster. Understanding Behaviour, IISER Kolkata. June 2023.
- Ashish Jha. Stable-isotope analysis for understanding avian community dynamics and ecological niche. 59th meeting of Association for Tropical Biology and Conservation, Coimbatore. July 2023.

N. G. Prasad

Name of the presenter: Tsering Choton

Title: From diet to defence: dietary nutrition and evolutionary history influence *Drosophila melanogaster* tolerance and resistance against bacterial infection.

Name of conference: Indian *Drosophila* conference (InDrc)

Date: 6th-9th December, 2023

Name of the presenter: Harisankar Durga

Title: Exploring the impact of heat shock on male sterility in *Drosophila melanogaster* grown under crowded larval condition

Name of conference: Indian *Drosophila* Research Conference (InDrc)

Date: 6th-9th December, 2023.

Name of conference: Department of Biological Science (DBS) Day

Date: 6th January 2024

Purnananda Guptasarma

- Purnananda Guptasarma. Bacterial genomes à la HU: Phase separation, biofilm formation, and avoidance of oxidation through the binding of the nucleoid-associated protein, HU. Guha Research Conference 2023 at Swarajdeep Island, Andamans. 6th November, 2023.
- Purnananda Guptasarma. Enzymatic approaches to PET degradation. Indigenous technologies for viksitbharat. Department of Biotechnology, DAV College Chandigarh. 27th February, 2024.
- Purnananda Guptasarma. Short fundamental research stories of medical relevance. 16th Annual Champalimaud Symposium at LVP Eye Institute Hyderabad. 4th February, 2024.
- PurnanandaGuptasarma. Newly discovered roles of the DNA-binding protein, HU. 46th Annual Symposium of the Indian Biophysical Society at TIFR Hyderabad. 17th March, 2024.

Rachna Chaba

Conferences attended/Invited talks

- Rachna Chaba. Direct repression of D-galactonate metabolism by the stationary phase sigma factor in *Escherichia coli*. Transcription Assembly Meeting 2023, IISER Bhopal, Bhopal, India. July 24 - 26, 2023
- Rachna Chaba. Identifying and characterizing new players and networks in carbon metabolism in *E. coli*. Molecular and Systems Microbiology Symposium, Asilomar, CA, USA. July 06 - 09, 2023

Conference attended/Poster presentations

- Swati Singh. Investigating allosteric regulation in DgoR, a GntR/FadR family transcriptional repressor of D-galactonate metabolism in *Escherichia coli*. Transcription Assembly Meeting 2023, IISER Bhopal, Bhopal, India. July 24 - 26, 2023
- Megha. Cpx envelope stress response pathway regulates long-chain fatty acid metabolism to maintain envelope redox homeostasis in *Escherichia coli*. Transcription Assembly Meeting 2023, IISER Bhopal, Bhopal, India. July 24 - 26, 2023
- Chetna Gola. Cellular factors that regulate σ (rpoS) impact D-galactonate metabolism. Transcription Assembly Meeting 2023, IISER Bhopal, Bhopal, India. July 24 - 26, 2023

Conference attended

- Manmehar Kaur, Transcription Assembly Meeting 2023, IISER Bhopal, Bhopal, India. July 24 - 26, 2023

Ram Yadav

- Cellular Stress Responsive Transcription Factor NAC062 Modulates Plant Growth and Development. 45th Annual Plant Tissue Culture Association (India) Meeting and Symposium on Recent Advances in Plant Biotechnology - 2024. 26-28 January 2024. Central University Pondicherry.
- The sunscreen on the skin or the inner beauty protects plants from UV-B stress. ISLS-2023, 22-23 December 2023 Jaipur.

Sadhan Das

- Sadhan Das, Understanding the role of the non-coding portion of the genome in diabetic wound-healing" (Presented Poster). YIM-2024, Bhopal on 11-13th March, 2024.
- Ankita Priyadarshini and Riya Madan attended 3rd Subhash Mukhopadhyay Symposium at IISC from 13-15th Jan, 2024

Samarjit Bhattacharyya

- Title of the talk: Glutamate receptor trafficking: Ins and Outs
Invited talk at the 41st Annual Meeting of the Indian Academy of Neurosciences and International Conference on 'Brain: Chemistry to Cognition' held at Jiwaji University, Gwalior, India. Date: 4 - 6 October, 2023.

Samrat Mukhopadhyay

- Indian Biophysical Society meeting, TIFR Hyderabad (March 2023)

- Biophysical Society Meeting in Philadelphia, Pennsylvania, USA (February 2024)
- Federation of American Societies for Experimental Biology Conference, Malahide, Ireland (June 2023)

Santosh B. Satbhai

- Santosh Satbhai: Delivered an invited talk entitled "An endogenous peptide signal in Arabidopsis modulates components of the iron deficiency response" in International Conference on Development and Regeneration at Shiv Nadar University, Greater Noida, India, February 19-20, 2024.
- Deep Shikha: Poster presentation in the 7th International Conference on Plant Genetics and Genomics on the theme "GM and Genome Edited Crops: Promoting Agrobiodiversity Use for Sustainable Agricultural Development" at New Delhi, India (February 16-17, 2024)
- Santosh Satbhai: Delivered an invited talk entitled : HY5: A Key Regulator of Iron Uptake and Utilization in Plants" in EMBO-ISPP Satellite Meeting 2024 at IISER Bhopal, India, January 15-16, 2024.
- Pooja Jakhar: participated in "Deep Bioinformatics Boot camp - A workshop" organized by CSIR-IBHT Palampur, India. (August 28-30, 2023)
- Samriti Mankotia presented a poster entitled "Elongated Hypocotyl 5 (HY5) is required to maintain iron homeostasis in Arabidopsis thaliana" in The 10th International Symposium on Root Development at VIB-Ghent, Belgium. May 15-18, 2023.

Sharvan Sehrawat

- Continuing Medical Education (CME): Immunology in Health and Diseases at Nirma University, Ahmedabad Gujarat, February 22-23, 2024

Shashi Bhushan Pandit

- Dr. Shashi Bhushan Pandit, An innovative method to uniquely annotate exon with attributes to understand isoform, EMBO Workshop Computational structural biology, 06 - 09 December 2023 in Heidelberg, Germany
- Ms. Deepanshi Awasthi, Exploring Isoform Diversity in Zebrafish Paralogs Through Exon-Level Insights: Implications for Functional Evolution, EMBO Workshop Computational structural biology, 06 - 09 December 2023 in Heidelberg, Germany

Shravan Kumar Mishra

- Shravan Kumar Mishra; Intron-specific pre-mRNA splicing forms a Golgi-localised deubiquitinating enzyme (DUB) module; DBT/Wellcome India Alliance Annual Conclave, Hyderabad, July 13-15, 2023
- Ankita Banyal; Mechanism of Usage of SRC1 overlapping 5' splice site in Saccharomyces cerevisiae; 28th Annual Meeting of RNA Society 2023, Singapore; May 30-June 4, 2023

Vidya Devi Negi

- Poster presentation at "2023 Salmonella Biology and Pathogenesis", a GRC at Renaissance, Tuscany II Italy, July 23-28, 2023
- Poster presentation at 92nd SBC meeting at BITS Goa campus, December 18-20, 2023
- Poster presentation by three of group students at CHESCON 2023 at PU

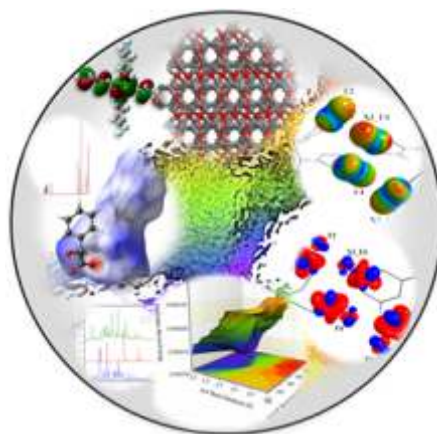


DEPARTMENT OF CHEMICAL SCIENCES

SUMMARY OF RESEARCH WORK

Angshuman Roy Choudhury

Ms. Vandana Vishwakarma, a Ph.D. student in the laboratory of Dr. Angshuman Roy, is working on the synthesis of various multi-carboxylic acid linkers and their utilization to synthesize various metal-organic frameworks. They synthesized some tri, tetra, hexa, and octa-carboxylic acid linkers by utilizing the sonogashira coupling reaction. They also generated one MOF of copper with tricarboxylic acid linker. They also synthesised some trimeric mixed linkers and their coordination polymer with various transition metal complexes. They also synthesized some imine-based dicarboxylic acid MOFs and studied their application as dye degradation agents. Another Ph. D. student (Ms. Sakshi) is working on the experimental and theoretical charge density analysis to understand the nature of weak interactions offered by organic fluorine in various organic molecules. Their studies glorified the significance of fluorine-mediated interactions in the solid state of small organic molecules, drugs and pharmaceuticals etc. This analysis is based on the aspherical modeling of charge density using the XD package. All the intermolecular interactions involving halogen and weak hydrogen bonds have been quantitatively studied using topological analyses. Ms. Sunanda (Ph. D. student) is working on the applications of crystal engineering in the dimerization of C=N bond by using the Topochemical principle. This principle has been used for the past many years for C=C bond only. Dr. Roy Choudhury's group is interested in studying this principle for C=N bond and forming diazetidines. The low reactivity or low stability of the C=N bond perturbed the



photodimerization or diazetidines (cyclized form of C=N bond) of compounds containing C=N bond. In this quest, they became fascinated to explore the photodimerization of compounds that contain C=N bond by using the Topochemical Principle. The constructed compounds would be utilized in various applications such as in catalysis, metal organic framework (MOFs), Polymer industries (optical permeability, viscoelasticity, and etc.), coatings and encapsulations etc. Ms. Bhavna is working on the synthesis of novel organic ligands and their impact on the development of Metal-Organic Frameworks. They have successfully synthesized some of the novel organic ligands. These molecules act as building blocks for creating metal-organic frameworks (MOFs). By synthesizing various ligands, they aim to create a diverse library of MOFs with potential applications in areas like photocatalysis, sensing, drug delivery, gas storage, etc.



Arijit Kumar De

The central theme of research in the laboratory of Dr. Arijit Kumar De is to explore, through a combination of theory and experiments, a wide range of problems in condensed phase dynamics with applications in chemistry, biophysics and condensed matter physics. For this, the group has developed some cutting-edge spectroscopic tools and his group is the first (and so far, the only group) in India to develop and implement these novel techniques (for example, sub-20 fs broadband pump-probe spectroscopy, two-dimensional electronic spectroscopy, time-resolved impulsive stimulated Raman spectroscopy, multimodal optical tweezers, etc).

More specifically, during the one year, the main focus of the group has been to investigate energy and charge (electron or proton) transfer dynamics, covering a wide range of timescales (few tens of femtoseconds to few tens of nanoseconds), within a variety of systems and the effect of local environment (for example, solvation, nanoscale confinement, etc) on it:



- 1) Molecular aggregates: Excitation energy transfer within multichromophoric light-harvesting systems
- 2) Photovoltaic systems: Exciton/charge (electron and hole) transfer within quantum dots and perovskites
- 3) Fluorescent proteins: Photocycle, photoconversion and photoswitching in fluorescent proteins
- 4) Structural dynamics: Structural evolution of chromophores in ground and excited electronic states
- 5) Solvation dynamics: Initial regime of polar solvation in bulk and confined medium



They extensively use ultrafast (<20 femtosecond resolution) broadband (400 nm to 1 μ m) pump-probe (transient absorption) spectroscopy. They constructed a two-dimensional electronic spectroscopy (2DES) set-up using an acousto-optic programmable dispersive filter (AOPDF) pulse shaper for exquisite phase stability. Quite recently, they have also started working on pump-dump-probe spectroscopy to capture dynamics involving transient ground states and built a time-resolved impulsive stimulated Raman spectroscopy (TR-ISRS) set-up to further explore structural dynamics in electronic excited state.

The group also pioneered in deciphering the nature of Nonlinear force in femtosecond optical trapping.

For this, they designed and built a versatile optical tweezer (OT) set-up having multimodal detection capabilities to explore non-linear optical effects in laser trapping under femtosecond pulsed excitation; for this, they have also developed analytic theoretical models to numerically simulate force/potential. Quite interestingly, the Nobel Prize in Physics in 2018 was awarded "for groundbreaking inventions in the field of laser physics" with one half for "optical tweezers and their application to biological systems", the other half for "method of generating high-intensity, ultra-short optical pulses." Dr De's group made the very first attempt to build a bridge between these two different areas. Recently, they have integrated laser beam shaping (using a 2D LC-SLM) to build a holographic optical tweezer (HOT) set-up for exploring long-range interaction between trapped particles in an array leading to emergence of collective phenomena.

Debashis Adhikari

The research in Dr. Adhikari's group focuses on advancing synthetic inorganic, organic, and organometallic chemistry with a strong emphasis on small molecule activation and catalysis. The group aims to develop new ligand architectures supporting transition metals for unconventional transformations crucial to energy and environmental applications. A primary goal is the use of abundant, non-toxic base metals instead of their heavier counterparts along with using small photoactive molecules to do various valuable organic transformations.

Key innovations in the stipulated time period include:

1. Photocatalytic Dehydrogenation: Designing benzothiazole azo **B**-naphthol as a photocatalyst for mild dehydrogenation reactions, enabling synthesis of 2-substituted quinazolinones under aerobic conditions. This approach outperformed traditional transition metal catalysis, operating at lower temperatures in regular aerobic atmospheres. Mechanistic studies confirmed its efficiency in hydrogen atom transfer reactions.
2. Extreme Reducing Power: Utilizing benzo[b]phenothiazine anion as a potent reductant under visible light excitation, we have shown extreme reductive power that cleaved aryl chlorides to form isoindolinones and oxindoles. This molecule's

unique properties stem from its highly reducing excited state and antiaromatic ground state, influencing its reactivity via single electron transfers.

3. Organocatalytic Oxidative Dehydrogenation: An iminoquinone molecule for oxidative dehydrogenation of saturated – heterocycles under mild conditions was introduced, promoting the synthesis of unsaturated analogs like indoles and quinolines. The process operates through radical intermediates distinct from traditional cofactor-driven methods.
4. Pincer Ligand Catalysis: A redox-active NNN-pincer ligand-coordinated nickel complex was used to facilitate C-C cross-coupling reactions. The ligand's radical nature plays a pivotal role in catalysis, facilitating Kumada coupling from aryl halides under mild conditions, supported by mechanistic studies and computational analysis.
5. Dehydrogenative Coupling with 3d Metals: 3d-metal, manganese complex was discovered for synthesizing alkenyl boronate esters via dehydrogenative coupling of styrenes and pinacolborane. The method generates hydrogen gas as the sole byproduct, demonstrating selectivity for aromatic alkenes and applicability in pharmaceutical synthesis.
6. Radical-Promoted Oxidation Methodology: Pyrenedione was introduced as a photocatalyst for dehydrogenative coupling of alcohols and amines to form amides under mild aerobic conditions. This radical-driven process represents a significant improvement over high-temperature transition metal catalysis, specially that deals directly with alcohols.
7. Deprotonated DPTU as Photocatalyst: Demonstrated diphenyl thiourea (DPTU) in its deprotonated state as a strong photocatalyst for reductive bond cleavage in aryl bromides. The molecule's ability to generate aryl radicals under blue light enabled diverse synthetic pathways including C-C cross-coupling and heterocycle formation.
8. Radical-Promoted Olefinic Hydrogenation: Investigating nickel-catalyzed α -alkylation of ketones with secondary alcohols via radical-promoted olefinic hydrogenation. This approach bypasses traditional metal hydride mechanisms, showcasing radical intermediates' role in efficient hydrogenation.
9. Redox-Active Pincer Ligands: Exploring trianionic NNN-pincer ligands for C-C cross-coupling and heterocycle formation through C-H functionalization without metal coordination. These ligands exhibit strong reducing abilities under visible light, supporting catalytic transformations via electron transfer processes.

JINO GEORGE

The MSC lab of Dr. Jino George is an interdisciplinary space with a focus on spectroscopy combined with molecules and materials. Recently, they started a new area that deals with the preparation of photodiodes and phototransistors based on strong light-matter coupling. Here, the newly formed polaritonic states are responsible for electron transport and are quantized due to strong coupling. In other words, the polaritonic states are quantized states that show both the properties of light and matter. The electron transport through these states is quantized in terms of energy, momentum, and polarization. This developing area is known as polaritronics (= polariton+optoelectronics). Their first attempt to prepare such a device was executed using 2D-materials such as MoS₂, and is well known in the semiconductor industry. A typical quantum phototransistor is shown in Figure 1. Here, the configuration used for the fabrication is a Fabry-Perot equivalent geometry on a metal-oxide-semiconductor field effect transistor (MOSFET). Such a device is shown to have long-range energy transport through the polaritonic states- one of the properties of the strongly coupled systems. They hope that the prototype shown here will be useful for better quantum transport and sensing in the future.

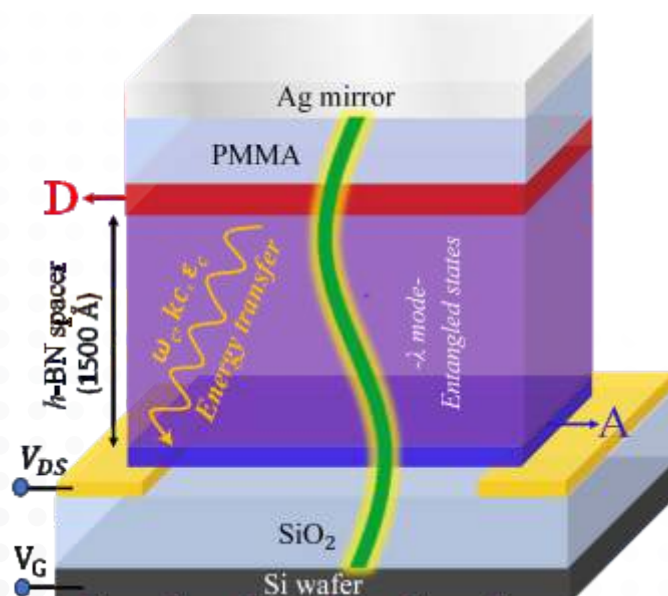


Figure 1: A quantum phototransistor on MOSFET configuration using polaritons formed from 2D-materials at room temperature.



K.R.Shamasundar

During this period, Dr. K R Shamsundar's research group published a collaborative computational study on triradicals based on Blatter's radical, which had been completed during the previous year. This study led them to a theoretical work on how to extract magnetic exchange couplings for spin-systems with multiple unpaired electrons using wave-function computations. Using effective Hamiltonian theory, they have developed a new method for this purpose generalizing methods reported for tri-radicals. Computational implementation of this new method is currently ongoing. Apart from this, they have focused on understanding indices of aromaticity and this has contributed to a master thesis work.

N. Sathyamurthy

In collaboration with several colleagues in different institutions in different countries, Dr. Sathyamurthy has been able to demonstrate the utility of artificial neural networks (ANNs) in fitting ab initio potential energy surfaces and carrying out quantum dynamics to investigate rotationally inelastic collisions between atoms/molecules of astrophysical interest. The results have been published in prestigious journals like the Monthly Notices of the Royal Astronomical Society and the Astrophysics Journal.

He has also been involved in studying nonadiabatic

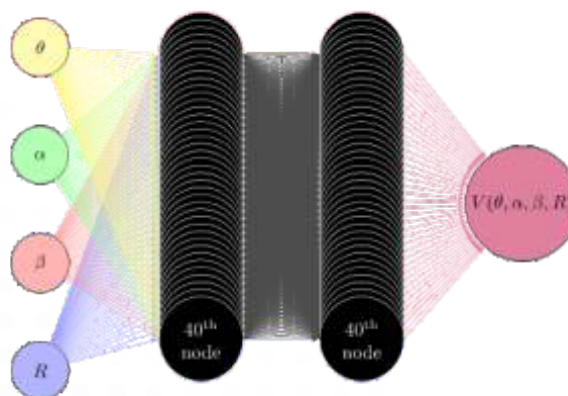


Fig. 2. Neural network design used to fit the four-dimensional ab initio PES for the rigid rotor HeH^+ - rigid rotor H_2 system.

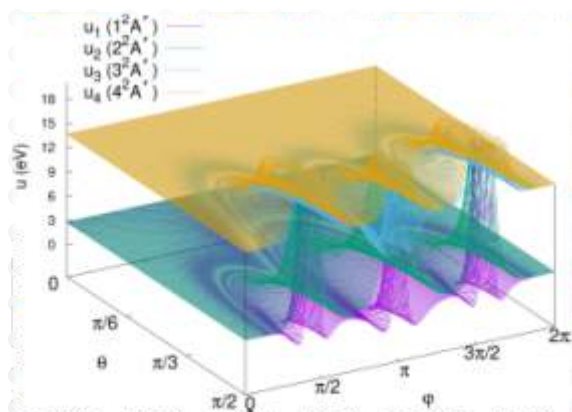


Figure 5. Lowest four adiabatic PESs for the HeH_2^+ system in θ - ϕ space of hyperspherical coordinates for fixed $\rho = 10$ bohrs.

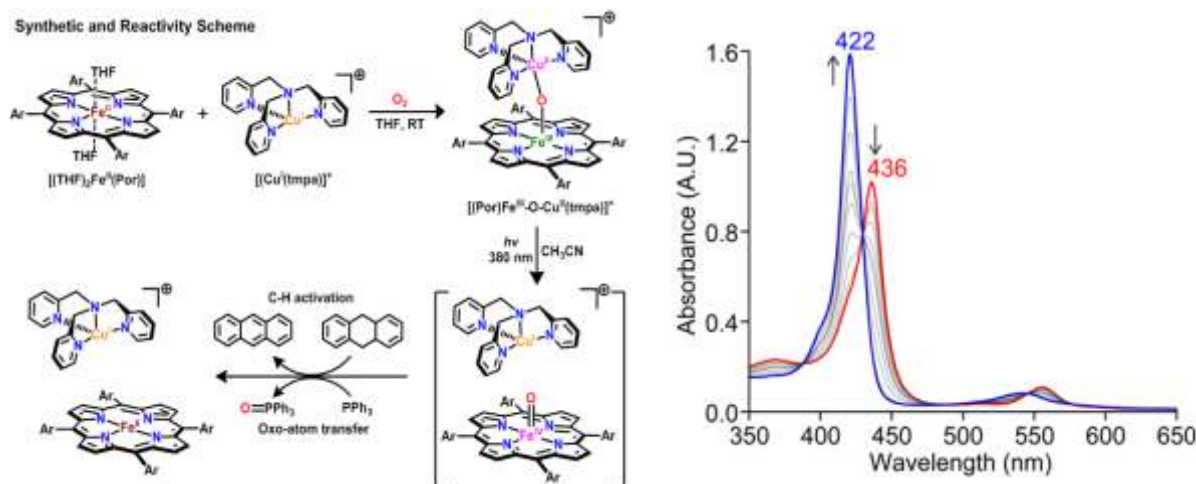
interactions in atom-diatom systems. In particular, in collaboration with Professor Satrajit Adhikari and his students and Professor Michael Baer, it was shown that a 2-state quantum dynamics on an ab initio potential energy surface could yield state-selected cross-section results for the reaction $\text{He} + \text{H}_2(v=0, j=0) \rightarrow \text{HeH}^+ + \text{H}$ in agreement with experimental results over a range of relative translational energy. This is one of the few studies that have shown quantitatively the need to include non-adiabatic interaction in reaction dynamics.

P. Balanarayan

The research group of Dr. Balanarayan works on the development of methods to treat atoms and molecules in strong high intensity laser fields. Particular attention is given to attosecond electronic dynamics of molecules. The developed methodologies are being coded into home grown packages named ABELDYN (AB initio Electronic DYNamics), ABDYN and ABELDYNPROP (a properties package for time varying electronic densities).

Pritam Mondal

Heme-copper oxidases (HCOs) are terminal enzymes on the mitochondrial or bacterial respiratory electron transport chain, which utilize a unique heterobinuclear active site (Heme-FeIII...CuI(L)) to catalyze the 4H⁺/4e⁻ reduction of dioxygen to water.



UV-vis spectral change (in acetonitrile at RT) under $\lambda = 380$ nm photoirradiation in presence of PPh₃

The mechanistic elucidation of these terminal oxidases has been studied in detail earlier; however, their photoreduction/photocatalytic properties are virtually unknown. After joining the institute in August 2023, Dr. Pritam Mondal started working on the photooxidation reactivities of such a heteronuclear active sites. His research group has synthesized a bioinspired μ -oxo bridged heme-FeIII-O-CuII(L) complex, which undergoes photoreduction to give the corresponding heme-FeIV=O...CuI(L) complex. The active catalyst, which is the putative ferryl (heme-FeIV=O) complex, is capable of oxygenating substrates with the concomitant formation of reduced heme-FeII. Such photooxidation using synthetic μ -oxo bridged heme-FeIII-O-CuII(L) assemblies has been probed with easily oxidized organic substrates (i.e., phosphines and sulfides, for oxygen atom transfer reaction) as well as C-H bonds (dihydroanthracene, for hydrogen atom transfer reaction). Furthermore, no photochemistry is observed upon irradiation of solutions containing only hydrocarbon or porphyrin. They are currently optimizing the synthetic protocol, photooxidation mechanism, and characterization of the final organic products.

Priya Kumari CP

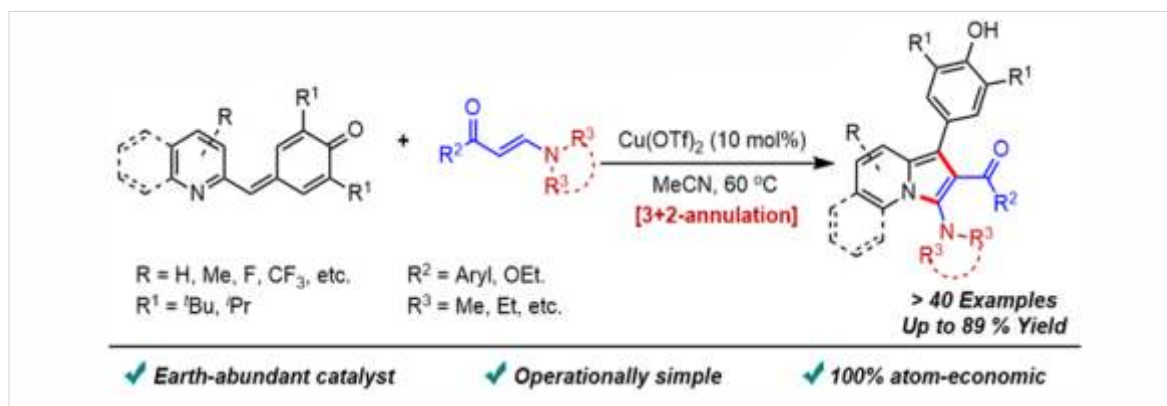
Delocalization is the key feature of aromatic compounds. According to Hückel theory, the π -delocalization provides an extra stabilization, which is known as the resonance energy, and this is the reason for the bond-equalized structure of benzene. However, later studies showed that the bond-equalization in benzene is a σ effect and that the π prefers a bond-alternated structure. It was shown that strong π -bonds, such as those between N atoms, prefer to be localized. Quite surprisingly, all the known examples for bond-alternated 6π systems are based on C, and not based on N. In such examples the bond-alternation was induced by steric factor or by antiaromaticity. Hexazine, the N analog of benzene is expected to have a planar bond-alternated structure, as the N-N π bonds are stronger; however, such a structure is not a minimum on the potential energy surface. Cyclic N₆ adopts a non-planar structure. This made Dr. Priya Kumari's group to look for strategies to planarize hexazine (N₆). They found that coordinating Lewis acids at alternative positions can do this. Whether to delocalize or not was decided by the strength of the Lewis acid. Stronger Lewis acids caused bond-equalization and weaker ones led to bond-alternation, and her group provided a qualitative explanation for this. They also assessed the kinetic stability of the designed N₆ systems to three N-N triple-bonded molecules and have proposed candidates that are likely to be realized experimentally. In short, as the π preference for bond-alternation is overpowered by the σ preference for bond-equalization, the only way to get a bond-alternated 6π system is by making the σ prefer it. This is exactly what they have done in our design (Phys. Chem. Chem. Phys. 2024, 26, 3569-3577).

Collaborative works with experimental chemists working on catalysis, solar cells, and leading group chemistry were also done, and some are about to be communicated.

R. Vijaya Anand

Dr. Vijaya Anand's research group is actively involved in exploring the synthetic applications of p-quinone methides (p-QMs) to

access structurally complex carbocycles and heterocycles. Recently, his group developed an atom-economical protocol to access highly functionalized indolizine derivatives. This transformation basically involves a Cu-catalyzed formal [3+2] annulation of 2-pyridinyl substituted p-QMs with enaminones to afford densely functionalized indolizines. This method displayed a good functional group tolerance and, was found to be effective for most of the enaminones and p-QMs, and the corresponding indolizines were obtained in moderate to good yields (Adv. Synth. Catal. 2023, 365, 3271).

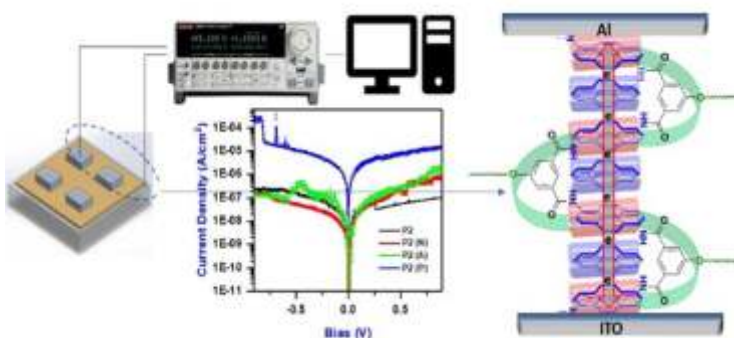


Dr. Anand's group is also working on the transformations of p-QMs under photoredox conditions. Recently, his group has demonstrated a redox-neutral and additive-free approach for the synthesis of indolyl diarylmethanes via a radical reaction of indoles p-QMs under visible-light mediated reaction conditions using eosin Y as an organophotoredox catalyst (Org. Biomol. Chem. 2023, 21, 6218). This protocol was found to be compatible with a wide range of differently substituted p-QMs and indoles in organic as well as in aqueous media under visible-light irradiation, furnishing the desired products in good to excellent yields. Another methodology describing the reductive dimerization of p-QMs was recently reported by his group. In this work, they demonstrated a visible-light-driven dimerization of para-quinone methides using eosin Y as a catalyst via a reductive homocoupling process. This protocol was found to be compatible with a variety of differently substituted para-quinone methides and a broad range of tetra-arylethane derivatives were obtained in moderate to good yields (Photochem. Photobiol. 2024; <https://doi.org/10.1111/php.13946>).



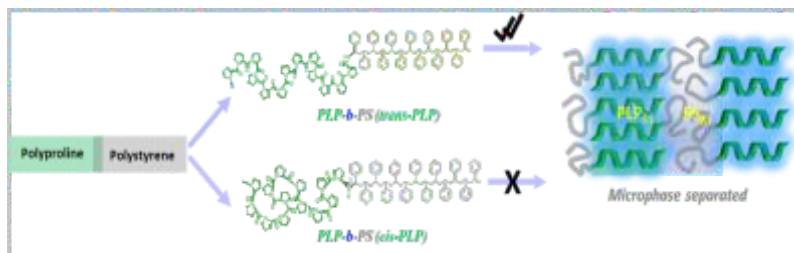
Raj Kumar Roy

Recently, the laboratory of Dr. Raj Kumar Roy demonstrated the design of periodically grafted aromatic polyamides that fold into an intrachain β -sheet structure in solution. This intricate folding process is driven by a combination of π -stacking and H-bond interactions that operate at the intramolecular level. In continuation of their previous work, herein they aimed to explore the possibility of translating the solution structures (β -sheet) to the solid state. They hypothesize that the intrinsic incompatibility between aromatic hydrocarbons and grafted PEG residues might promote self-segregation, which might be further stabilized by these aromatic polyamides' tendency to form intrachain β -sheets. The study has two objectives: one aims to investigate the bulk self-assembly of interchain-folded beta-sheet structures of aromatic polyamides, while the other seeks to explore their function in relation to higher-order structures. For example, they envision accessing π -enriched domains through the proposed self-segregation process, which could facilitate the through-space charge transfer (TSCT) process. TSCT, which involves the transfer of charge through a medium without direct contact, has important implications for applications such as organic



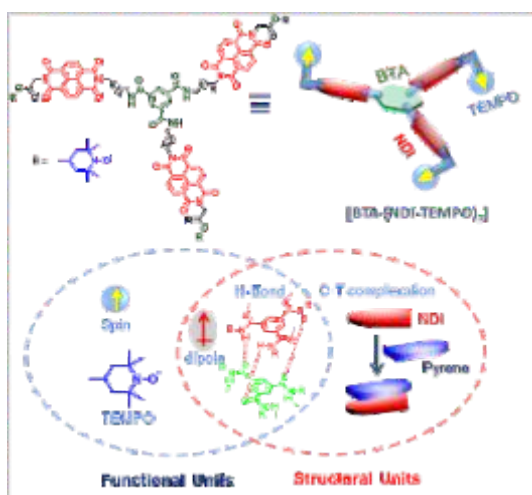
electronics, sensing, and energy conversion.

A second major objective of his research group is to design and synthesize functionalizable polypeptides by using ring-opening polymerizations of suitable N-carboxyanhydride monomers. They used these polypeptides later as stimuli-responsive biomaterials and studied their solution-folding behavior. Apart from this they also aimed to understand the role of polymers' secondary structure on bulk self-assembly provides not only a deeper insight into structure-property relationships but it is also imperative for designing functional materials. They designed and synthesized two block copolymers differing in the length of the polyproline block (PLP). Among the two conformations of PLP blocks, the diblock copolymer with trans-polyproline (PPII) microphase separated into a lamellar morphology irrespective of PLP block length. Despite identical compositions and molecular weights, the diblock copolymer with cis-polyproline (PPI) segment does not pose a well-defined microphase-separated structure could be attributed to the role of the secondary structure on their bulk self-assembly process.



Room-temperature organic Multi-Ferroelectrics: In the continuation of their previous work on organic ferroelectric material

they recently developed organic multiferroic materials. Despite the enormous demand for organic magnetoelectric compounds, only a few studies have been reported to date. Dr. Roy's research group developed a single-component magnetoelectric material with the highest magnetoelectric coefficient (α_{ME}) ever reported for in organic materials. They used a supramolecular approach for embedding the electrical dipoles and magnetic spins within a hierarchical order of organic material. In non-polar solvents, the organic scaffold self-assembles into a columnar structure, forming a nanofibrous organogel network with the aid of structure-forming segments. In particular, the xerogel, derived from organogel, maintains an orderly bulk structure and exhibits strong magnetoelectric behavior ($\alpha_{ME} \sim 216$ mV/Oe-cm), which is even an order of magnitude higher than the traditional commonly envisioned composite materials made of piezoelectric polymer and inorganic magnets. This single-component organic multiferroic material displays ferroelectricity ($T_c \sim 460$ K) and paramagnetic behavior at room temperature, with short-range ferromagnetic ordering below $T_c = 25$ K.



Ramesh Ramachandran

The research group of Dr. Ramesh Ramachandran is primarily focused on developing theoretical methods based on time-dependent quantum mechanics for both designing new SSNMR experiments and building models for quantifying NMR experimental data. Besides its implications in chemistry and structural biology, SSNMR also serves as a test-bed to investigate/understand some of the founding principles of quantum physics

S. Arulananda Babu

Dr. Arulananda Babu's research group reported the Pd(II)-catalyzed, picolinamide-directed δ -C(sp²)-H (ortho) functionalization of phenylalaninol scaffolds. Assembling of (ortho) δ -C-H arylated, alkylated, benzylated, alkenylated, brominated, and iodinated phenylalaninol scaffolds was accomplished. They have also shown the preparation of some modified Matijin-Su (aurantiamide) derivatives using the bis δ -C-H (ortho) arylated phenylalaninol compounds obtained from the δ -C(sp²)-H arylation reaction (Matijin-Su is an anti-HBV agent possessing the phenylalaninol unit). This work contributed to expanding the phenylalaninol library (Synthesis 2023; 55(24): 4113). They then described the Pd(II)-catalyzed, picolinamide-directing-group-aided C(sp²)-H (ortho) functionalization of racemic and enantiopure β -phenylalanines and 3-amino-3-phenylpropanols (1,3-amino alcohols). β -Phenylalanine is an arylated β -amino acid motif present in various natural products, bioactive molecules, and β -peptides and it is a precursor to medicinally active compounds. This work contributed to the expansion of the library of unnatural β -phenylalanine (β -amino acid) derivatives through site-selective C-H functionalization (Eur. J. Org. Chem. 2023, 26, e202300463). Next, they reported Pd(II)-catalyzed picolinamide-directed intermolecular arylation and benzylation of remote δ -C(sp²)-H bond (C(2) position) of the aryl ring in tyrosine derivatives and expansion of the library of unnatural tyrosine. Various racemic and enantiopure bis C(2) (ortho C-H) arylated and benzylated tyrosine derivatives were assembled in good yields. Tyrosine derivatives and biaryl amino acids are vital scaffolds in medicinal chemistry. Correspondingly, this work contributed towards the expansion of the unnatural tyrosine library with biaryl- or terphenyl and diarylmethane-based tyrosine scaffolds (Eur. J. Org. Chem. 2023, 26, e202300440). His group then demonstrated the assembling of a wide range of polyaryl compounds (π -extended biaryls) including terphenyls, tetraphenyls, pentaphenyls, and hexaphenyls in a single operation of Pd(II)-catalyzed C-H coupling of biaryl carboxamides and iodobiaryls. Traditionally, cross-coupling protocols involving organometallic reagents were employed to assemble the core structure of π -extended biaryls (polyphenylenes or polyaryls). The current investigation on the bidentate DG-aided C-H arylation of biaryl carboxamides with

iodobiaryls is expected to serve as a useful route to enrich the library of π -extended biaryls (polyphenylenes or polyaryls) (Asian J. Org. Chem. 2024, 13, e202300508). Chemical transformations involving the pyrenylglycine motif (an unnatural amino acid) and practical methods toward it are seldom known. They developed a method for synthesizing novel pyrenylglycine (pyrene-based glycine) unnatural amino acid derivatives via C-H functionalization (Org. Biomol. Chem., 2024, 22, 1279). They also reported the construction of racemic and enantiopure (D- and L-) fluorene and fluorenone-based novel unnatural amino acid derivatives. Fluorene- and fluorenone-based motifs are vital skeletons in materials and medicinal chemistry research. Accordingly, this work contributed towards enriching the library of fluorene and fluorenone unnatural amino acid scaffolds (Eur. J. Org. Chem. 2024, 27, e202400272).

Samrat Ghosh

Research work in the laboratory of Dr. Samrat Ghosh is aligned with the "Swachh Bharat Abhiyaan".

In most parts of the world including India, primary batteries like button cells, rectangular & cylindrical shaped Zinc-Carbon and Alkaline ones in varying sizes are used in huge numbers for powering glucometers, BP meters, wall & table clocks, doorbells, torches, remote controls, wireless keyboard & mouse, toys etc. Once they are dead (also known as spent batteries) they are discarded as these types of batteries are not rechargeable. In India, these discarded batteries are often seen littered around us and no one picks them up as there is no incentive or scope for this type of waste. When these batteries come in contact with water, they could harm our environment from the leaching out of toxic chemicals. This problem persists even today in spite of us being more eco-conscious than before as dedicated agencies for collecting these spent batteries are either few and far between or do not exist at all. This could be partly attributed due to lack of awareness about chemical know-how related to economically feasible recycling/recovery of chemicals from spent batteries.



To address the above societal relevant issue, Dr. Ghosh's laboratory (4L6AB1), attempts to develop sustainable chemical technologies to extract chemicals like EMD, zinc oxide and transform into chemicals which could be used either by battery or other chemical industries and laboratories as valuable precursor.

He delivered a talk titled, "Application of Innovation, Sustainable Chemistry in Recycling of Discarded Primary Batteries" in Professor Ram Chand Paul National Symposium on "Chemistry for Innovation & Sustainable Growth" on 16th February 2024 in the Department of Chemistry, Panjab University, Chandigarh.

Santanu Kumar Pal

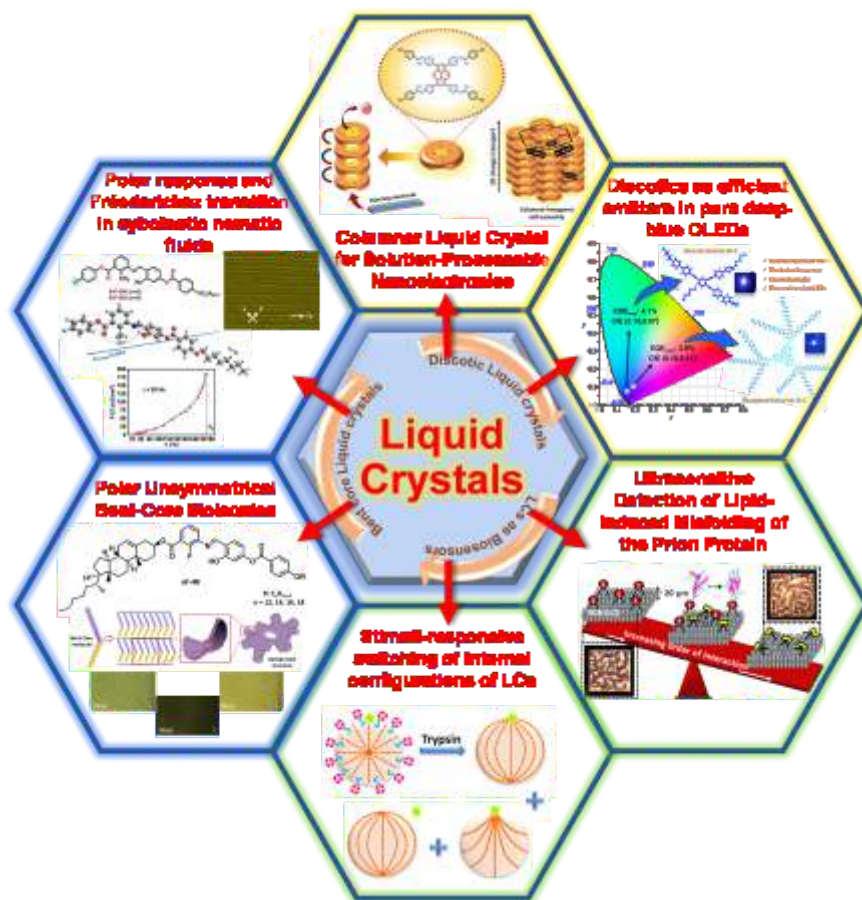
The research group of Dr. Santanu Kumar Pal has significantly explored different aspects of liquid crystals (LCs), spanning from design and synthetic strategies to optoelectronics, ferroelectrics, and bio-sensors.

Recent advancements in his laboratory in the field of discotic liquid crystals (DLCs) have been prolific. They designed a discotic triad showing potential application in fluorescence imaging and optoelectronic organic materials (J. Mol. Liq., 2023, 385, 122202). His group presented a unique molecular concept to realize a stable discotic nematic phase representing a promising lead as a pure deep-blue emissive component for OLEDs (J. Mol. Liq., 2023, 390, 122984). They also studied the potential use of DLCs in a hole-transporting organic semiconductor using the time-of-flight method (Chem. Commun., 2024, 60, 2922-2925). They have also explored charge transport in nanometer-thick films of luminescent pyrene-based DLCs showing electrical conductivity in the order of 10⁻⁴ S/m, which is the highest reported for DLC films in vertical transport devices (Small, 2024, 2308983). His laboratory presented distinct strategies for the induction of supramolecular chirality that extends throughout the entire columnar structure, helped to achieve precise control over chiral nanostructures and chiroptical activity within intricate multi-component systems (Chem. Asian J., 2024, e202300936).

In the field of bent-core LCs, his group reported unsymmetrical polar bent-core molecules exhibiting cybotactic clustering in the nematic phase, with the antiparallel arrangement of the polar molecules minimizing the large net dipole moment of the system (ChemPhysChem, 2023, 24, e202300133). They observed induced polar switching in the cybotactic nematic phase with a polarization value of -185 nC/cm² in an unsymmetrical bent-core compound toward the development of advanced-level optical and electro-optical applications of bent-core systems (J. Mol. Liq., 2023, 387, 122626). They also devised a strategic approach to exhibit a chiral dark conglomerate phase over a broad temperature range of -85 °C in an enantiotropic manner. Persistent dielectric behavior over the entire LC range holds the promise for chiral plasmonics, enantiomeric separation, and nano-templating applications (J. Mater. Chem. C., 2024, 12, 3915-3923).

Dr. Pal's research group has also progressed greatly along the lines of LC-based biosensors. They examined the ordering transition of LCs at 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine (POPC) decorated LC-aqueous interface to observe the biosensing of a physiologically important Ca²⁺ signaling protein recombinant human calmodulin with simple label-free optical data, high sensitivity, cost-effectivity and low sample requirement (Liq. Cryst., 2024, 51, 1-9). His group studied the self-assembly of randomly functionalized hyperbranched polymers and their linear analogues in solution and at the liquid crystal-water interfaces and their subsequent response to biorecognition events (ACS Appl. Mater. Interfaces, 2023, 15, 31233-31242). They also developed an effective LC-based methodology offering a potent and sensitive tool to detect and delineate molecular

mechanisms of prion protein misfolding mediated by lipid-protein interactions at the aqueous interface under physiological conditions (J. Phys. Chem. Lett., 2024, 15, 2117-2122). Moreover, they provided a fundamental understanding of the colloid positioning in response to external stimuli, demonstrating that for a certain population of droplets, the positioning of the colloids remains unperturbed in response to multistep reversible adsorption of interfacial amphiphiles (Anal. Chem., 2024, 96, 3780-3786).



S. S. V. Rama Sastry

Simultaneous dearomatizing spirannulation of pyridinium salts is still in its infancy. In this direction, Dr. Rama Sastry's research group described an organized skeletal remodelling of designed pyridinium salts by utilizing an interrupted Corey-Chaykovsky reaction to access unprecedented and structurally intriguing molecular architectures such as the vicinal bis-spirocyclic indanones and spirannulatedbenzocycloheptanones. This hybrid strategy rationally merges the nucleophilic features of sulfur ylides with the electrophilic pyridinium salts to achieve the regio- and stereoselective synthesis of new classes of cyclopropanoids (Chem. Sci. 2023, 14, 6963-6969).

The ring-reorganizing transformations of activated cyclopropanes are typically achieved under acidic conditions. However, work from Dr. Rama Sastry's laboratory work describes the first acid-free and Lewis base-mediated cascade ring-opening/recyclization of designed cyclopropylketones to access tetrahydrofluorenones. They rationally merge the nucleophilic features of phosphines with the electronically biased cyclopropanes to synthesize several new classes of hydrofluorenones (Org. Lett. 2024, 26, 2282-2286).

In another piece of work, they introduced an advancement in the Morita-Baylis-Hillman (MBH) chemistry that provides access to γ -spirannulatedenones. The treatment of enone-tethered azaarenium salts with catalytic amounts of organophosphines provides spiroindenyl dihydropyridines. It represents the γ -spirannulation of enones via an intramolecular MBH (IMBH) reaction utilizing dual phosphine- and anion-binding catalysis (Org. Lett. 2024, 26, 3273-3278).

Several other works from his laboratory got published in Org. Biomol. Chem (2023, 21, 738-742), Chem. Commun. (2023, 59, 11045-11056; 2024, 60, 4797-4800), and Org. Lett. (2024, 26, 4571-4575).

Sabyasachi Rakshit

Interdomain linkers regulate the mechanics of Immunoglobulin folds (Tanuja Joshi)

In protein biology, interdomain linkers are essential for the structural and functional integration of multi-domain proteins (MDPs). Titin, the largest known mechanical protein in muscles, acts as a molecular spring in sarcomere. Existing literature indicates that the domains in Titin's I-band are crucial for shock absorption and power storage. However, the role of linkers in this context remains underexplored. The role of IDLs in physiology is critical since various mutations present in the IDLs are associated with syndromic diseases. Dr. Sabyasachi Rakshit's research focuses on studying the mechanoreponse of

protein in presence of different interdomain linkers (IDLs) using home-built magnetic tweezers. The presence of different IDLs influences protein folding, stability, and dynamics. Understanding interdomain linkers is essential for elucidating protein mechanisms and designing synthetic proteins with tailored functionalities.

Investigating the molecular mechanism of Age-Related hearing loss (ARHL) due to mutations present in the non-interacting domains of the Cadherin-23 gene (Gaurav Kumar Bhati)

Recent research shows that mutations in tip-link proteins affect the function of hair cells and tip-link complexes, leading to hearing loss in humans. The Cdh23 (P217L) mutation known as hotspot mutation, affects 43% of the human population. The phenotype is more severe in homozygous [P217L][P217L] individuals, while less severe in heterozygous [P217L][WT], and compound heterozygous [P217L][R278Q] individuals. Dr. Rakshit's research group aims to find the molecular basis for the disease phenotype from biophysical point of view. In silico and experimental data suggest that mutants are softer than wild-type. They also observed that the P217L mutation affects the binding of Cdh23 with its partner protein, Pcdh15, whereas the R278Q mutation does not affect this binding. This explains why the [P217L][P217L] mutation results in more severe hearing loss compared to the [P217L][WT] and [P217L][R278Q] conditions.

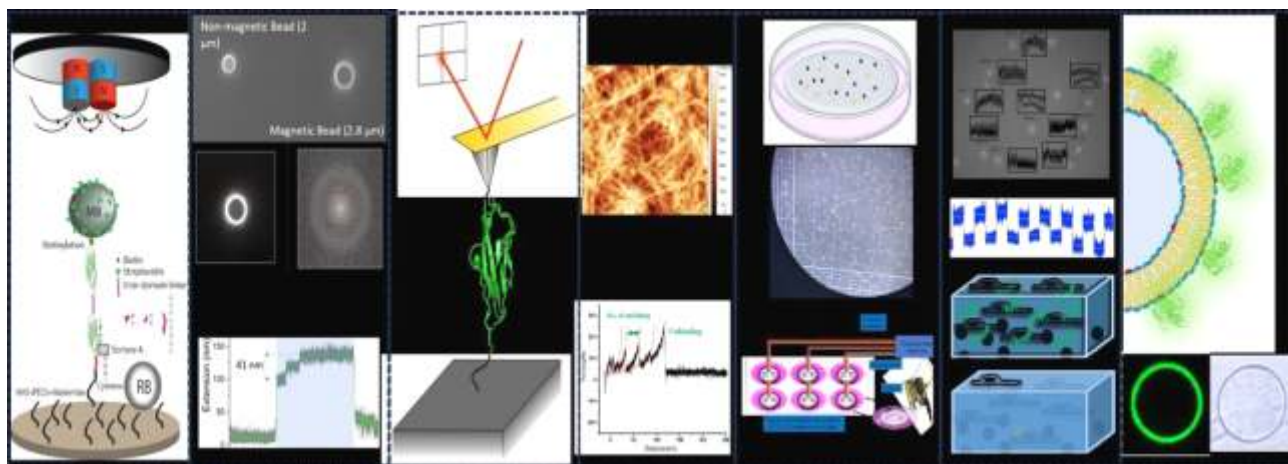


Figure shows the summary of the research work done in Dr. Sabyasachi Rakshit's laboratory.

Exploring Force-Driven Stochastic Folding Dynamics in Mechano-Responsive Proteins and Implications in Phenotypic Variation (Pritam Saha)

Tip-link acts as a force-sensor in inner ear mechanotransduction. Dr. Rakshit's laboratory studies the force-response of one of the tip-link proteins, Cadherin-23 at a single molecule level and a physiologically relevant force regime using home-built Magnetic Tweezers. They also investigate how the mutations (such as Cdh23 EC1 S47P) present in the Cadherin-23 protein, which is responsible for causing progressive hearing loss, alter the biophysical properties of the protein, impairing the tip-links functionality.

Understanding the mechanical properties of extracellular matrix in glioblastoma (Devansh Swadia)

Glioblastoma, known for its aggressive nature, presents a challenging treatment landscape due in part to the dense and rigid extracellular matrix surrounding the tumor cells. Dr. Rakshit's group investigates how CRTAC1, a protein associated with cartilage development, influences the mechanical properties of the extracellular matrix in GBM. Their research focuses on understanding the interplay between CRTAC1 and the mechanical properties of the extracellular matrix. They identified ways in which CRTAC1 may contribute to reducing the stiffness of the surrounding environment. This study contributes to the ongoing efforts to devise innovative approaches for treating Glioblastoma by mechanical changes in ECM.

Generating active lipid vesicles and investigating the effect of protein on membrane morphology (Veerpal Kaur, Charu Taneja)

An interesting and quickly expanding field of study is of chiral active particles. In vivo issues including drug delivery, tissue absorption, wound healing, cell sensing, and imaging may be resolved with the use of active particles. The goal of Dr. Rakshit's laboratory is to create isotropically symmetric chiral active particles coated with enzymes. For the chassis of these active particles, they employ lipid vesicles. Internal energy is created through the transformation of chemical energy. Translating, rotating, or both, these active particles can propel themselves by using their internal energy. Along with that, they are attempting to comprehend how reaction kinetics and protein-protein interactions affect artificial cell membranes. They hypothesize that protein-protein interactions on membranes could produce



tension at a single site and lead to morphological alterations such as finger-like projections, membrane distortions, budding, fission, or fusion.

Sanchita Sengupta

The research focus of Dr. Sengupta's group during the last year has been devoted to designing twisted donor-acceptor (D-A) conjugates as thermally activated delayed fluorescence (TADF) materials and exploring their applications as metal-free visible light photocatalysts for organic transformations.

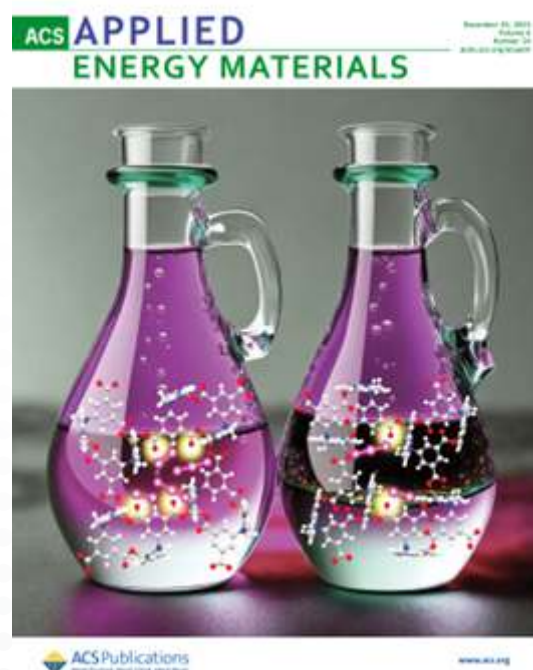
Her group reported the design and synthesis of twisted organic TADF triads DI-PF and DI-PI based on diindolocarbazole (DI) as the donor and dibenzo[a,c]phenazine (PF) and phenanthro[9,10-d]imidazole (PI) as the acceptors. The triads DI-PF and DI-PI showed strong charge transfer bands at 590 nm with a 196 nm Stokes shift and 519 nm with a 126 nm Stokes shift, respectively. For effective TADF properties, theoretical and experimental studies revealed small to relatively modest ΔE_{ST} of 0.01 eV and 0.37 eV for DI-PF and DI-PI, respectively. Transient photoluminescence decay profiles of DI-PF and DI-PI indicated shorter prompt components of 40 ns and 13.38 ns, respectively, and longer delayed components of 6.15 μ s and 2.05 μ s, respectively, confirming the TADF nature for both compounds. Furthermore, both compounds showed tunable and suitable excited state redox potentials for electron transfer photocatalysis. Accordingly, DI-PF and DI-PI were employed as photocatalysts in E to Z photoisomerization of stilbene with reasonably good yields of up to 66% for isomerization products and in arylation of various heteroarenes with up to 86% yields (Org. Chem. Front.2023, 10, 6087-6095; HOT paper). For another series of twisted TADF molecules CBZ-IQ, CBZ-2FIQ, DI-IQ and DI-2FIQ based on carbazole (CBZ) donor and indoloquinoline (IQ) acceptors, theoretical and experimental data showed reasonable singlet and triplet energy gaps of 0.17-0.26 eV for all compounds. The transient photoluminescence decay showed shorter prompt components (11.4 ns to 31 ns) and longer delayed components (36.4 ns to 1.5 μ s) further indicative of TADF process. These compounds were utilized for photocatalytic C-H arylation of heteroarenes with excellent isolated yields of upto 80%. All the emitters were also employed as photocatalysts in E to Z isomerization of stilbene with the excellent conversion of ~ 90% (Chem. Eur. J.2024, e202303754 (1-9)).

In a recent review, they have summarized the developments of perylene diimide (PDI)-based photocatalysts for H₂ evolution under four different categories highlighting the progress and the challenges of this research domain. Self-assembled PDI nanostructures have made the most advancements among all the categories, with highest hydrogen evolution rates while composites composed of perylene derivatives and graphitic carbonitride (g-C₃N₄) exhibited the second highest rate of H₂ evolution among the four categories. This review is intended to give researchers a better understanding and design principles for PDI- and other chromophore-based materials for efficient H₂ evolution and their further improvement (ChemCatChem2023, e202301033 (1-16)).

Their group was also involved in synthesizing new conjugated D-A molecules and explore their charge carrier mobilities and photocatalytic applications. Accordingly, A-D-A'-D-A small molecules consisting of naphthalimide and dithienopyrrolobenzothiadiazole (ACS Appl. Opt. Mater.2024, <https://doi.org/10.1021/acsaom.3c00446>) or tripodal triazine derivatives (Chem. Eur. J.2023, e202303244 (1-9) HOT paper) were synthesized that exhibited narrow optical bandgaps, high charge carrier mobilities and excellent photocatalytic behaviour towards oxidative condensation cyclization to form benzimidazole with broad substrate scope.

Sanjay Mandal

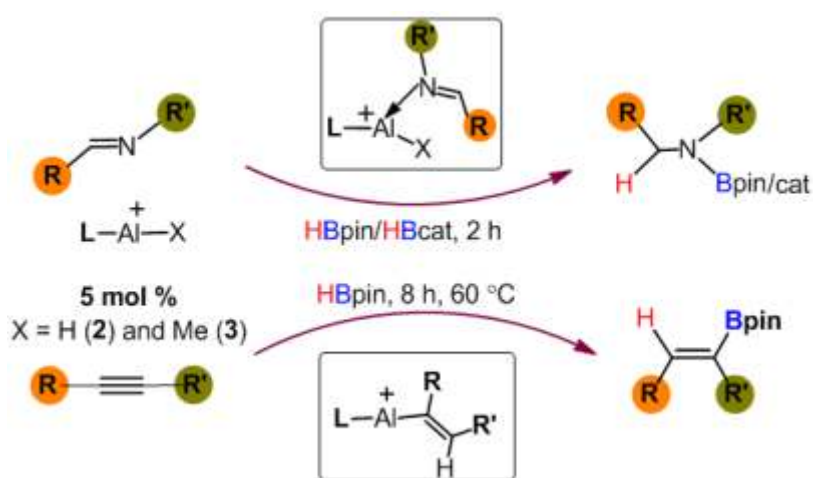
Dr.Sanjay Mandal's group is engaged in the strategic design of diverse coordination architectures with a special emphasis on Metal Organic Frameworks (MOFs) and Covalent Organic Frameworks (COFs) for their diverse structural aesthetics and for their possible roles in various applications, such as catalysis, luminescence, molecular separation, gas and liquid adsorption, magnetism, drug delivery, etc. Various spectroscopic techniques (UV-vis, FTIR, NMR, Raman, CD and Fluorescence), thermal analysis (TGA and DSC), electrochemistry, surface analysis (SEM/EDX, AFM and TEM), and X-ray crystallography (PXRD and SCXRD) are routinely used for establishing physicochemical properties of the new organic, inorganic and organometallic compounds. Their research has contributed to the fields of multi-step organic synthesis, coordination chemistry, heterogeneous catalysis, and materials science. The major projects that they have worked on are: (i) design of bifunctional heterogeneous catalysts with hydrogen-bond-donating (primary amide group) and/or hydrogen-bond-accepting (oxadiazole moiety) capabilities along with Lewis acid centers for a number of important organic transformations, and (ii) development of multifarious micro- and mesoporous nanomaterials for (a) sequestration and conversion of carbon dioxide, (b) ultrafast/ selective sensing of metal ions and neutral small molecules (nitroaromatics and ketones) at ppb/ppm level, and (c) study of non-radioactive surrogates of nuclear wastes such as multimedia I₂ capture. One such work from their group was selected in the cover page of an issue of ACS Applied Energy Materials (shown below).



Sanjay Singh

Research activities in Dr. Sanjay Singh's laboratory focus on different aspects of main group and transition element organometallic chemistry to address some fundamental questions and discover their catalytic applications. In this regard, they use the modern carbene i.e. Bicyclic (alkyl)(amino)carbene (BICAAC) as a ligand to stabilize various main group elements (B, Si, Ge, Sn, P and Sb) and transition metals (Ni, Cu, Pd, Au, Zn, Ir and Ru) complexes and perform intriguing reaction chemistry. In addition to this, we have also employed BICAAC as an organocatalyst for Borrowing Hydrogenation (BH) reaction and also for the reduction of carbonyl compounds and alkynes via the formation of BICAAC-borane adduct. They are also interested in the syntheses and properties of inorganic macrocycles, pyridinophanes and cryptands.

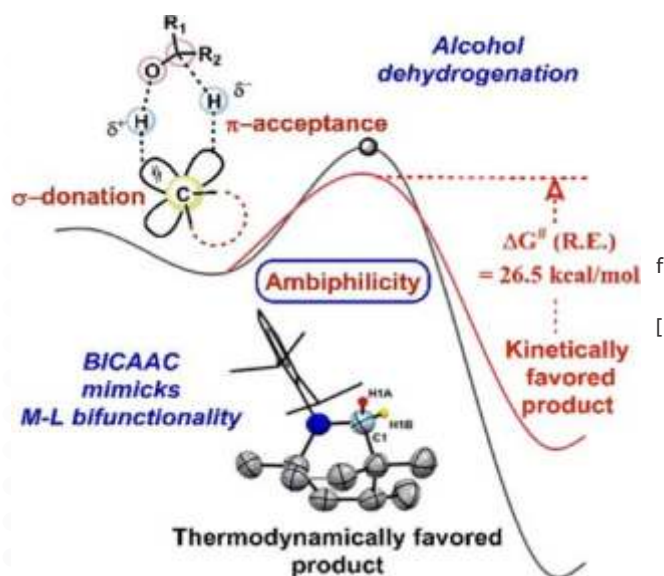
Highly electrophilic cationic aluminum complexes as Lewis acid catalysts: The high Lewis acidic nature of electronically unsaturated aluminum hydride cations $[LAlH]^+ + [HB(C_6H_5)_3]^-$ & $[LAlH]^+ + [B(C_6H_5)_4]^-$ and methyl aluminum cation $[LAlMe]^+ + [B(C_6H_5)_4]^-$ have been exploited for hydroboration (using HBpin/HBcat) of several imines and alkynes under the mild reaction conditions with excellent yields of the respective final products. Control experiments have been conducted to investigate the most probable catalytic cycle. Further, the work has been extended to explore the catalytic activities of the aforementioned aluminum hydride cations, $[LAlH]^+ + [HB(C_6H_5)_3]^-$ & $[LAlH]^+ + [B(C_6H_5)_4]^-$ for the hydrosilylation of imine. A variety of organo-silanes such as Et_3SiH , $MePhSiH_2$, $PhSiH_3$, TMSO, and PHMS have been inspected in this endeavour, and the outcomes dictated the increased efficiency of catalyst on lowering the steric bulk at the silicon centre.

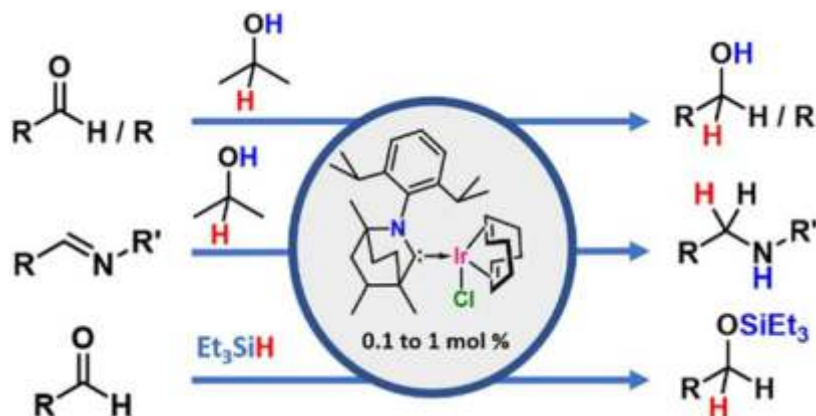


Chemistry with Bicyclic (Alkyl)(Amino)Carbene

- Ambiphilic alcohol dehydrogenation by BICAAC mimicking metal-ligand co-operativity: In this work, they have utilized the highly ambiphilic nature of this carbene towards alcohol dehydrogenation reaction. The two hydrogens borrowed from the alcohol are stored at the carbene carbon thereby converting it into a tetrahedral carbon, structure of which has been ascertained by 1H and ^{13}C NMR and SCXRD. Later, they have been able to successfully deliver the two hydrogens to an in-situ generated alkenylated fluorene molecule, finally completing the entire BH cycle. In this way, a unique bond activation strategy has been demonstrated by BICAAC which exactly mimics a transition metal. Thorough control experiments and DFT calculations have been performed to sketch the plausible mechanistic cycle.

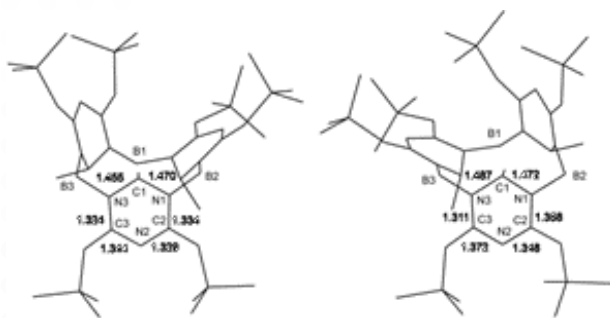
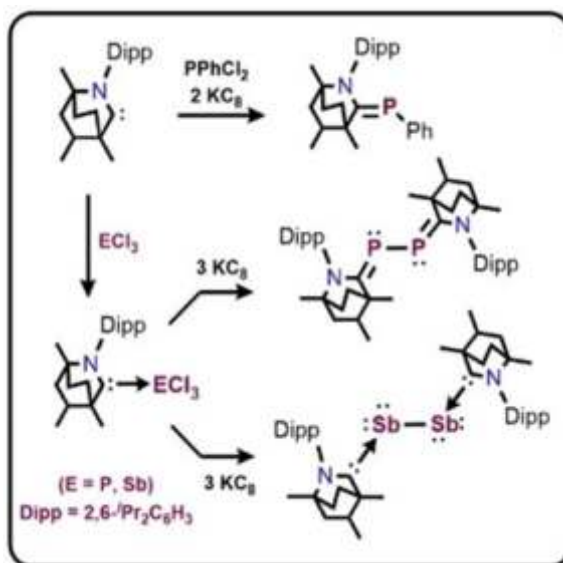
- Application of $Ir(BICAAC)Cl(COD)$ complexes as catalysts or transfer hydrogenation and hydrosilylation reactions: Herein, they have synthesized the mononuclear $Ir(I)$ using $Ir(Cl)(COD)_2$ precursor and the resulting complex has been exploited as catalyst for the transfer hydrogenation of various benzaldehyde derivatives using isopropyl alcohol as the hydrogen source. In addition to this, the same catalyst has been employed to successfully perform the hydrosilylation of various carbonyls and imines resulting in the formation of the corresponding hydrosilylated products in good yields.





- **Synthesis of BICAAC stabilized E-E bonded compounds (E=P, Sb):** In this work, they have successfully synthesized BICAAC based Lewis adducts, BICAAC:ECI₃ where E= group 15 element (pnictogens) i.e. P and Sb. Next we have synthesized a phosphalkene, (BICAAC)=P-Ph via the in situ 2e⁻ reduction of [BICAAC:PPhCl₂] with KC₈. Subsequently, three-electron reduction of the Lewis adducts forms low valent trans bent bis(BICAAC)E₂ complexes which have been thoroughly characterized by various spectroscopic techniques including SCXRD.

Inorganic macrocycles and cryptands: Conformationally rigid boron containing pyridinophanes and the aluminum congeners are very novel molecules including the aluminum anchored bicyclic pyridinophane. More recently, they have developed a protocol to prepare boracalixarenes by exploiting the dearomative hydroboration route of pyridine moieties with different boron hydrides. The picture below shows a boracalixarene like macrocycle in a partial cone conformation assembled from dearomatized triazine moieties.



Subhabrata Maity

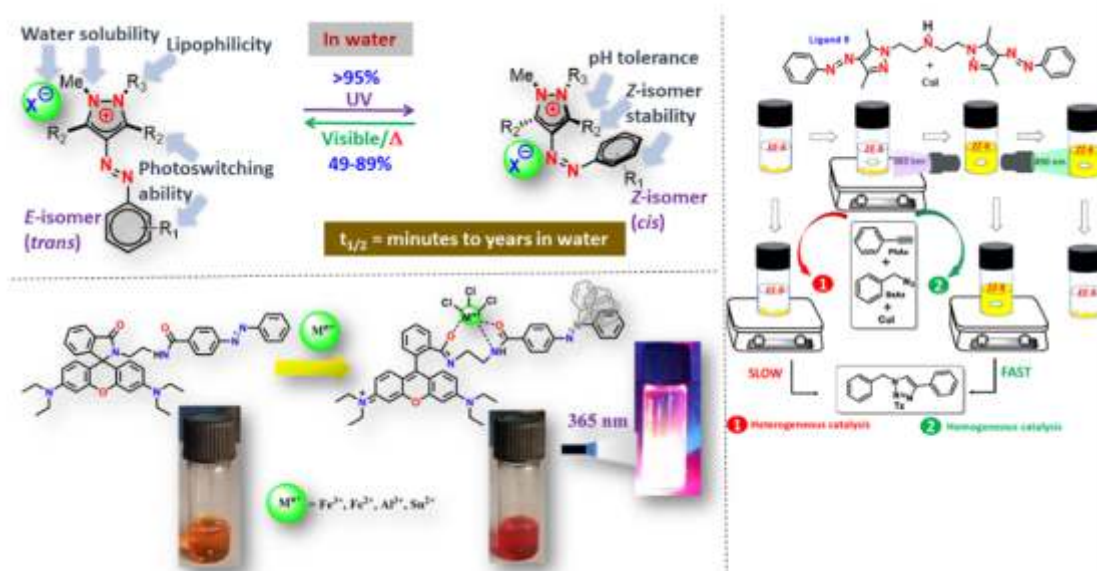
Directional interactions and the precise assembly of colloids at specific locations are critical for applications such as patterning and microarrays. Dr Subhabrata Maity's laboratory focuses on developing strategies to achieve self-assembly and spatial control in surface patterning leveraging enzyme-substrate interaction. These efforts aim to enable precise patterning at both micro- and macroscale environments, offering opportunities for controlled biomedical applications. In this study, they introduce two key factors that govern the self-assembly and spatial control of surfactant-functionalized nanoparticles in both micro- and macroscale environments: the synergistic affinity between enzymes, substrates, and nanoparticles, and the phoretic effect. The specific focus of this study revolves around the affinity between alkaline phosphatase (ALP) enzyme and its adenosine nucleotide-based substrates, namely adenosine mono/di/triphosphate (AM/D/TP). These substrates are noncovalently bound to the surface of nanoparticles, thereby facilitating the assembly of the overall ensemble in a spatiotemporally controllable manner. By utilizing this synergistic interactivity, they investigate the coexistence of assembly and patterning of both nanoparticles and enzymes within microfluidic channels and on glass slides. Furthermore, they explore the modulation of the coffee ring pattern, a characteristic phenomenon observed during the evaporation of colloidal droplets

on a glass surface. The presence of ATP-loaded nanoparticles with enzymes influences the pattern formation, and we extend this effect to the drying of blood serum droplets, highlighting the potential for low-cost, on-the-spot disease diagnostics. Overall, these studies shed light on the aggregation and spatial patterning of nanoparticles and enzymes in microfluidic systems. The findings suggest the presence of synergistic interactions, diffusiophoretic effects, and catalytic conditions that contribute to the observed aggregation patterns. These insights have potential implications for the development of microfluidic-based nanobiodevices and offer new avenues for exploring diffusiophoresis as a versatile tool for manipulating colloidal particles in chemical engineering applications.

In a separate work, in the field of biosensing they were able to design an easy, affordable strategy for measuring serum protein level. The leading indicator of prognosis for several diseases is the serum protein level. Notably, most of the serum proteins are globulin (30–40%) and albumin (50–60%), further divided into alpha-1, alpha-2, beta, and gamma globulins. The amount of serum albumin (ALB) and the ratio of ALB to globulin have been utilized as a general indicator of the health of the kidneys, liver, digestive system, and other organs. Gamma globulin (GGB), also known as immunoglobulin, is one of the most significant markers in immune-related disease. Serum electrophoresis is currently the only accurate technique for measuring both albumin and individual globulin levels at the same time. Despite being a dependable method, electrophoresis has certain drawbacks, including the need for equipment and a power supply, a long learning curve, and—most importantly—less sensitivity at low sample concentrations. Here, they provide an easy method for on-the-spot and quick detection of ALB and GGB based on surface patterning known as the coffee ring effect, specifically in the presence of a Zn(II)-metallo-surfactant (C16DPA·Zn2+).

Sugumar Venkataramani

Photoswitchable Molecular Systems: The research group of Dr. Sugumar Venkataramani has been engaged in making novel photoswitches with improved properties and performance so as to enable biocompatibility and applications in materials science. In this regard, they have made pyrazolium-based azo photoswitches with ionic character that showed exceptional bistability and effective photoswitching in water and aqueous conditions. By varying the substituents, the half-life of the photoswitched state can be tuned between minutes and years. Moreover, the tolerance to redox condition under physiological conditions, and no loss of activity in a wider range of pH makes these compounds ideal for photopharmacological applications (Ref: J. Am. Chem. Soc., 2023, 145, 19, 10584–10594). Another aim of their group's work is to modulate the functions and properties of the molecules by reversibly switching them with light of appropriate wavelength. In this regard, they have designed a molecular probe that is capable of multi-analyte sensing and differentiate them through fluorescence response that is modulated by light, improved limit of detection and response factors (Ref: ChemPhotoChem., 2023, 7, 9, e202300029). They have also tuned the water solubility of a ligand molecule through photoswitching and made in situ complexation with copper salt and induced catalysis in aqueous conditions. The reusability through recovering the catalyst was also tested (Chem. Eur. J., 2023, 29, 60, e202301906). This novel approach can be improved further for future catalytic applications, which is currently ongoing. During this period, their group has also contributed in a review on photoswitchable metal complexes, where the coordination of azoheteroarene-based ligands, their properties and applications were discussed (ChemPhotoChem., 2023, 7, 9, e202300068).



Matrix isolation infrared spectroscopy: In search of (heterocyclic) radicals and their importance, they have also studied photochemistry of 2-iodobenzothiazole (IBT). The cleavage of photolabile C–I and C–S bonds and the formation of the isocyno group drive the formation of the 2-isocyanophenylthiyl radical, whereas the iodine-triggered radical cyclization reverted the precursor (J. Org. Chem., 2023, 88, 15, 10574–10585). These photochemical channels and the photoproducts are highly relevant in photovoltaic cells and organic electronics. Understanding them will help design newer compounds, which is currently underway in our laboratory.

Suman Barman

Dr. Suman Barman's research group is actively engaged in determining structure-function relationship for enhanced electrocatalytic hydrogen evolution in the context of alternate energy resources. In this context, they have developed NiII based catalysts having strategic local proton storage inspired by naturally occurring hydrogenase enzyme. Detailed electrocatalytic activity are explored and it's mechanistic aspects are explored with DFT calculations (manuscript under preparation).

Apart from electrocatalysis, they are also carrying out development of bioinspired Cu(II)-nitrite complexes to demonstrate oxygen atom transfer reaction (OAT) and proton-coupled-electron transfer (PCET) reactivity with phenol. In this work they demonstrate how we can change the lowest-unoccupied molecular orbital's (LUMO) energy by synthetically modifying remote site substituents and its effect on electrochemical properties and reactivity towards OAT and PCET (manuscript under preparation).

Ujjal K Gautam

Dr. Ujjal Gautam's laboratory has been exploring the up cycling of waste plastic into luminescent carbon dots (CDs) employing an acid-mediated charring process followed by a chemical oxidative fragmentation process to form CDs. These CDs exhibited outstanding novel properties, i.e., (i) oxygen harvesting from the ambient air, (ii) light-induced hypoxia, and (iii) self-elimination or autophagy. They recently extended this approach to ten of the most stubborn waste plastics, which can contribute to the industrial-scale preparation of high-quality CDs and help tackle the plastic pandemic. Each transformation has 100% conversion efficiencies and is recovered as powders for easy transportation and storage. Importantly, they, for the first time, landscaped these novel properties. The O₂ harvesting ability, magnitude of hypoxia, and autophagy kinetics in CDs are highly structure-dependent and rationally could be controllable. Therefore, their study provides a pick-and-choice option for various CD applications.

Another aspect of their research has focused on producing carbon-free alternative fuels like hydrogen and hydrogen peroxide using sunlight or renewable waste noise. The earlier part involves tailoring lateral and vertical exciton dissociation within a metal-free photocatalytic system, carbon nitride (g-C₃N₄). Additionally, it examines seawater's potential for water-splitting, identifying the interplay between dielectric-mediated band tuning and electrostatic stability of photocatalysts in saline water. For noise harvesting, they have worked on the Sillen-Aurivillius (SA) phase, a unique class of layered perovskite oxyhalide for utilization in mechanical energy from noise to produce chemical energy i.e. producing fuel such as hydrogen and hydrogen peroxide. They have recently achieved prolonged piezocatalytic activity (150 h of by applying mechanical energy in the form of ultrasonic noise) by taking Sr₂Bi₃Nb₂O₁₁ Br as a model catalyst.



His group also works on developing Palladium-based and other inexpensive transition metal-based materials as alternatives to commercial platinum catalysts for electrochemical reactions for energy harvesting applications. In one of our studies, they investigated the changes these catalysts undergo from ambient laboratory conditions to operative fuel cell temperatures. Their observations demonstrate that Pt tends to get poisoned by enhanced surface oxide species (OHads) at higher temperatures, while Pd surprisingly shows more tolerance towards OHads, which gets improved further by the presence of oxophillic Nickel. Further, they investigated how various oxophillic entities such as Ni, Co, and Fe in the Pd lattice, and their varying amounts influence the surface oxide behavior of these catalysts as a function of temperature and the consequences on methanol oxidation performance. Another aspect of their works outlines a strategy to eliminate noble metals in electrocatalysis by creating a composite of carbon nanostructures and non-noble metals. Incorporating iron nanoparticles in N-doped carbon and growing CNTs resulted in high ORR performance ($E_{1/2} = 0.89$ V vs. RHE), surpassing commercial Pt/C, with enhanced activity from the synergistic effect of CNTs and active Fe-sites.

Vignesh R Kuduva

The major focus of Dr. Vignesh Kuduva's research group is on the synthesis and modelling of spin-Hamiltonian parameters (such as magnetic exchange coupling (J), zero-field splitting (D), and g-tensors) in transition metal and lanthanide metal complexes, using both experimental and computational approaches (DFT, ab initio methods) to better understand their molecular magnetic behaviour. Single-molecule magnets (SMMs) are metal complexes that can remain magnetized in the absence of a magnetic field, resulting in magnetic hysteresis at the molecular level and the capacity to function as magnets below their blocking temperature. His groups also looks at Single-Molecule Toroids (SMTs), which are molecules that have a toroidal magnetic state and could be employed in multiferroic materials. SMMs and SMTs have various fascinating prospective applications that have been proposed, including high-density information storage devices, quantum computing, and spintronics.

They also study the Spin-crossover (SCO) behaviour of 3d4 – 3d7 ions such as Fe(II), Co(II), and Mn(II) in an octahedral ligand geometry with N4O2, N3O3 type of moderate ligands.

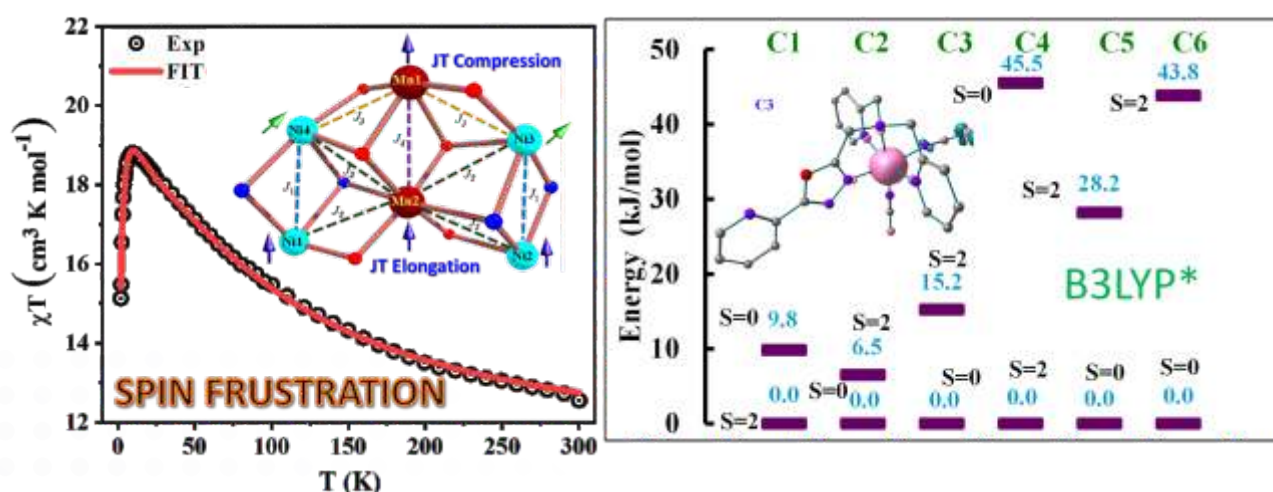


Figure: (left) Plots of χT vs T for $\{\text{Mn}_2\text{Ni}_4\}$ complex. The red solid lines are fitted data using the PHI program; (inset) Magnetic exchange pathways in the $\{\text{Mn}_2\text{Ni}_4\}$ complex. The blue arrows show the spin-up orientation of the metal ions, and a tilted orientation on the Ni3 and Ni4 centers shows a possible cause for the spin frustration. (right) DFT computed the energy difference between two spin states (HS and LS) using B3LYP* functional for all six Fe mononuclear complexes.

In a recent work, they reported a hexanuclear complex $[\text{MnIII}_2\text{NiII}_4(\text{N}_3)_4(\text{hep})_4(\text{OMe})_2(\text{OAc})_4] \cdot \text{MeOH}$ (1-MeOH) with one MnIII ion having the axis of Jahn-Teller tetragonal elongation and other one with Jahn-Teller compression which are unprecedented among Mn and Mn-Ni based complexes. It has been further studied by magnetic susceptibility measurements, which suggest that 1 possesses a mixture of spin ground states ($S = 6$ to 7), shows a dominant ferromagnetic coupling with a competing weaker antiferromagnetic coupling between the metal ions leading to a maximum in χT vs T was observed at 9.5 K (Figure, left). DFT computed J values predict dominant ferromagnetic interaction for three of the Js which supports the spin ground state of 6 or 7. Ab initio CASSCF calculations prove the presence of Jahn Teller elongated and compressed nature of two MnIII ions in complex 1 by yielding D values with different signs.

The reason for the spin frustration has been explained in detail where the fluctuating spins on the Ni3 and Ni4 justify the possible spin frustration effect (Figure, left; inset). In another work, they performed DFT calculations on six mononuclear Fe(II) complexes C1-C6 with three different NCE co-ligands where E = S (C1, C4), Se (C2, C5), and BH3 (C3, C6). Complexes with NCBH3 co-ligands with both the ligands (C3 and C6) exhibit SpinCO behavior. The existence of a spin transition in C3 and C6 is supported by DFT calculations performed on the electronic structures of both the low-spin and high-spin structures. To precisely replicate the HS-LS gap for all the complexes, two different functionals such as B3LYP and B3LYP* having different

percentages of HF exchange were utilized for the calculations. The computed energy gap values using the B3LYP* functional, the one with a smaller percentage of HF exchange, yielded better results which are also in excellent agreement with the experimental observations (shown in figure).



DEPARTMENT OF CHEMICAL SCIENCES

VISITS OF FACULTY MEMBERS

Arijit K De

- IIT Patna, 1 to 2 March 2024.
- GITAM School of Science, GITAM, Visakhapatnam, 7th December to 9th December 2023.
- IACS, Kolkata, 5 to 8 October, 2023.
- Berlin, Germany, 30 July- 4 August 2023.
- CSIR-CSIO Chandigarh, 14-16 June 2023.

Debashis Adhikari

- IISER Kolkata- 24th February, 2023

Priya Kumari CP

- IIT Madras to participate in TCS 2023 (07/12/2023)
- IISER Kolkata to participate in Inter IISER-NISER Chemistry meet (23/02/2024).

Santanu Kumar Pal

- Prof. Santanu Kumar Pal visited Chandigarh University in January 2024.
- Prof. Santanu Kumar Pal visited the Institute of Nano Science and Technology in July 2023.
- Prof. Santanu Kumar Pal visited Bannari Amman Institute of Technology, Sathyamangalam in June 2023.
- Prof. Santanu Kumar Pal visited the Centre for Nano and Soft Matter Sciences, Bangalore, in May 2023.
- Prof. Santanu Kumar Pal visited DAV University Jalandhar in April 2023.

Sabyasachi Rakshit

- February 2024: IOP Bhuvaneshwar to deliver a research talk at the Physics of Life conference.
- December 2023: IIT Bombay to deliver a research talk at the International Conference on Magnetic Tweezers and Optical Tweezers.
- June 2023: IISER Pune to deliver a research talk at the National Conference on Force Spectroscopy and Microscopy.

Sanchita Sengupta

- South China University of Technology (SCUT), Guangzhou, China, International Symposium on Supramolecular Dye Chemistry & Materials (ISSDCM 2024) from May 11- May 14, 2024 (invited talk).
- Guru Nanak Dev University (GNDU, Amritsar), International Conference on Luminescent Materials from Fundamentals to Applications (ICLMFA), Mar 15-16, 2024 (Invited talk).
- IISER Kolkata, Nanomaterials and Molecules: From Spectroscopy to Bioimaging (NaMoSBio), Jan 11-14, 2024 (Invited talk).

Sanjay Mandal

- SRM University AP. 9-12 June 2023. Panelist for Discussion on Industry-Academia Dialogue.
- NIT Kurukshetra. 4 March, 2024. Board-nominated selection committee member.

Ujjal K Gautam

- DESY, Hamburg, Germany, 3rd -8th May'23
- Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore. 7-9, December'23
- University of Tartu, Estonia, 9-14 May'23
- Technical University of Munich, Germany, 15-18 May'23
- Tezpur University (Central University), Assam, 22-24 January'24.

- Shiv Nadar Institution of Eminence, Greater Noida, 9-10 February'24
- Chandigarh University, 10th January'24



DEPARTMENT OF CHEMICAL SCIENCES

TALKS DELIVERED

Angshuman Roy Choudhury

Name of the presenter: Dr. Angshuman Roy Choudhury

Title of the talk: "Organic fluorine" in stabilizing crystal structures: Does it matter?

Name of the Conference: 26th Congress and General Assembly of the International Union of Crystallography, 22-29th August 2023, Melbourne, Australia.

Name of the presenter: Ms. Sakshi.

Title of the talk: Experimental and theoretical charge density analyses to understand the nature of weak interactions offered by organic fluorine.

Name of the Conference: 50th National Seminar on Crystallography, IMTECH, Chandigarh, 22-24 November 2023.

Arijit K De

- Sakshi Chawla, Ultrafast Excited-state relaxation Dynamics of Chromophores within Confinement: From Light Harvesting to Photoprotection, International Conference on Emerging Trends in Photodynamics and Photocatalysis (ETPP), IISER Mohali, 27 March 2024
- Arijit K. De, Elucidating the Origin of Large Stokes Shift in the Red Fluorescent Proteins mKeima and mBeRFP, Recent Trends in Chemical Science and Technology (RTCST), IIT Patna, 2-March-2024.
- Arijit K. De, Room-Temperature Polaron Dynamics in Lead-free Cs₄CuSb₂Cl₁₂ Layered Double Perovskite Nanocrystals, ATOS Materials in Focus Koti Resorts, Shimla 16 December 2023.
- Garima Bhutani, pH-Dependent Ultrafast Excited-State Dynamics of Large Stokes-Shifted Red Fluorescent Proteins (LSS RFPs), Saturday Seminar Series – "Light as Reagent and Product, 16 December 2023
- Arijit K. De, Ultrafast Dynamics of Singlet Fission within Molecular Nano-aggregates, Gitam Chemistry Research Conference 2023, Organised by Department of Chemistry, GITAM School of Science, GITAM, Visakhapatnam, 8 December 2023
- Arijit K. De, Probing Photo-induced Structural Dynamics By Impulsive Stimulated Raman Spectroscopy. An International Conference on Structure and Dynamics: Spectroscopy and Scattering (SDSS-2023), IACS, Kolkata, 7 October, 2023.
- Sakshi Chawla, Ultrafast Dynamics of Singlet Fission within Molecular Nano-aggregates. International Conference on "Molecularly Designed Functional Materials 2023 (MDFM 23)" conducted by S & T Digital, 30 September 2023.
- Arijit K. De, Mapping room-temperature polaron dynamics in double-perovskite nano-crystals by time-resolved impulsive stimulated Raman spectroscopy. The 15th Femtochemistry Conference (FEMTO15), Berlin, Germany, 4 August, 2023.
- Arijit K. De, Mapping hot carrier relaxation mediated by low-frequency phonon modes in a lead-free double perovskite nano-crystal. (Presented by Sakshi Chawla), The 31st International Conference on Photochemistry, Sapporo, Japan, 25 July 2023.
- Garima Bhutani, Elucidating pH-dependent excited-state dynamics leading to large Stokes shift in red fluorescent protein mBeRFP, The 31st International Conference on Photochemistry, Sapporo, Japan, 24 July 2023.
- Sakshi Chawla, Ultrafast Energy Transfer within Bio-inspired Light-Harvesting Supramolecular Assemblies of Chlorophyll a and Astaxanthin, The 31st International Conference on Photochemistry, Sapporo, Japan, 24 July 2023.
- Arijit K. De, Optical Trapping with Femtosecond Pulses: Excitements, Challenges and Opportunities., Indo French Workshop on Disruptive Nanophotonics, CSIR-CSIO Chandigarh, India, 14 June 2023.
- Arijit K. De, Effect of optical nonlinearity in trapping dynamics of polystyrene and silica micro-particle under femtosecond pulsed excitation: A comparative study. (Presented by Sumit Yadav), Optical Manipulation and Its Applications (OMA), Optica Biophotonics Congress: Optics in the Life Sciences, British Columbia, Canada, 26 April 2023.
- Arijit K. De, Testing the 'light-cone' model to assess trapping efficiency using annular beams in geometric optics limit. (Presented by Sumit Yadav), Optical Manipulation and Its Applications (OMA), Optica Biophotonics Congress: Optics in the Life Sciences, British Columbia, Canada, 25 April 2023.

Debashis Adhikari

Name of the presenter: Monojit Roy

Name of the Conference: International conference on Emerging Trends in Photodynamics and Photochemistry

Dates of Conference: 26.03.2024- 28.03.2024

Title of the Talk: Organo photocatalytic dehydrogenative preparation of amides directly from alcohols

Jino George

- Indo-French Workshop on Disruptive Nanophotonics (CSIR-CSIO & CEFIPRA) June 14-16, 2023.
- Invited talk, Emerging Materials-2023, IISER Pune, July 13-15th 2023.
- Invited talk, International Conference on Photochemistry, Sapporo, Japan, July 23-28th 2023.
- Invited talk,, International Conference on Molecular Energy Transfer in Complex Systems (iCOMET 2023), Jaipur, 12-17 November, 2023.
- Invited talk, Nanomaterials and Molecules: From Spectroscopy to Bioimaging (NaMoSBio), IISER Kolkata, 12-14 January, 2024.
- Invited talk, 19th edition of the Spectroscopy and Dynamics of Molecules and Cluster (SDMC) 2024 conference, Borgos Resort, Kaziranga, Assam, 22 -25 February, 2024.

N. Sathyamurthy

- Artificial neural networks in chemical dynamics, Kalinga Institute of Technology, Bhubaneswar, Sep. 5, 2023
- (He, H₂⁺) Dynamics on 2-State Diabatic Potential Energy Surfaces, Structure and Dynamics: Spectroscopy and Scattering (SDSS-2023), IACS, Kolkata, Oct. 5-8, 2023
- Quantum Dynamics of Rotationally Inelastic HeH⁺-H₂ Collisions on an Accurate Ab Initio Potential Energy Surface, 26th International workshop on quantum systems in chemistry, physics and biology (QCSP-XXVI), Jaipur, Oct. 14-20, 2023.
- Non-adiabatic interaction in (He, H₂⁺) Dynamics, Advances in Spectroscopy and Dynamics, IISc, Bengaluru, November 4, 2023
- Non-adiabatic interaction in (He, H₂⁺) Dynamics, International Conference on Molecular Energy Transfer in Complex Systems (iCOMET 2023), Jaipur, Nov. 12-17, 2023
- Potential Energy Surfaces and Chemical Dynamics, IISER Thiruvananthapuram, January 17-23, 2024
- Passionflower, Punjabi University, Patiala, February 7, 2024
- Passionflower, IISER Mohali, February 8, 2024
- Cations and Anions in Interstellar Media, IISER Mohali, February 9, 2024
- Spectral characteristics of the Flavones and Anthocyanins Present in Passionflower (*Passiflora incarnata*), SDMC, Kaziranga, Feb. 22-25, 2024
- Curiosity driven science: the case study of Passionflower, National Science Day, Manipal University, Jaipur, February 28, 2024
- Curiosity driven science: the case study of Passionflower, National Science Day Festival, Ashoka University, Sonipat, March 1, 2024

P. Balanarayan

- Non-nuclear maxima of LASER-dressed atoms and molecules, Spectroscopy and Dynamics of Molecules and Clusters (SDMC) 2024, Kaziranga, Feb 24 2024.
- Non-nuclear maxima of LASER-dressed atoms and molecules, Theoretical Chemistry Symposium 2024, IIT Chennai, Chennai, Dec 7 2023.
- Molecules in High Intensity LASER fields, an ab initio description, Quantum Sensing and Metrology, IACS, Kolkata, Dec 4 2023.
- Molecules in external fields: de novo designs for numerical simulations, IIT Mumbai, MS-TPCCP (Mini Symposium on Theoretical Physical Chemistry and Chemical Physics), IIT, Mumbai, July 26 2023

Priya Kumari CP

Title of the talk: Hexazine and its derivatives: What decides whether to delocalise or not?

Name of the Conference/Institute: Inter IISER-NISER Chemistry meet/IISER Kolkatha

Date: 23/02/2024

R. Vijaya Anand

- R Vijaya Anand delivered an invited talk in the "Sustainability and Interdisciplinarity in Chemical Sciences (SICS) conference"

to celebrate the '60th Foundation Day' program of the 'Indian Photobiology Society' (IPS) organized at IISER Kolkata during July 13-15, 2023.

- R Vijaya Anand gave a flash presentation in the "International Conference on Organometallics and Catalysis" (ICOC-III, held at 'The Zuri White Sands, Goa Resort & Casino' located in Goa during October 30 – November 02, 2023.

Raj Kumar Roy

Name of the presenter: Dr. Raj Kumar Roy

Title of the talk: "A deep insight into the design of aromatic polyamides with tunable secondary structures: Exhibiting enantio-separations and through-space charge transport applications"

Name of the Conference: Symposium on Polymer Science 2023" (SPS 2023) at IISER Kolkata on November 17-18, 2023.

Name of the presenter: Dr. Raj Kumar Roy

Title of the talk: "An insight into the role of polyproline's secondary structures during thermal phase transition and bulk phase separations"

Name of the Conference: SPSI-MACRO-2023 at IIT Guwahati on December 10-13, 2023.

Name of the presenter: Dr. Raj Kumar Roy

Title of the talk: "Understanding the role of polyproline's secondary structures in thermal phase transitions and bulk phase separations"

Name of the Conference: Complex Fluids-2023 at IIT Chennai on December 18-20, 2023.

Samrat Ghosh

Presenter: Samrat Ghosh

Title: "Toys and Crackers" Lecture Cum Demonstration

Conference: Festival of Science, Vigyan Utsav

Place: DAV College, Chandigarh

Date: 27th March 2024

Presenter: Samrat Ghosh

Title: Application of Innovation, Sustainable Chemistry in Recycling of Discarded Primary Batteries

Conference: Professor Ram Chand Paul National Symposium on "Chemistry for Innovation & Sustainable Growth"

Place: Department of Chemistry, Panjab University, Chandigarh.

Date: 16th February 2024

Presenter: Samrat Ghosh

Title: Eco-Friendly, Smoke free, Debris-Less, All Weather Firecracker. A frugal Innovation For Societal Benefit

Conference: Sustainable Visions: Crafting a Greener Future Through Lifestyle

Place: DAV College, Sector 10, Chandigarh

Date: 6th November 2023

Presenter: Samrat Ghosh

Title: Glimpses of Peter F. Drucker's Concept of Innovation & US Navy's Design Philosophy (K-I-S-S) in My Frugal Endeavours for Societal Benefit

Conference: National Conference on "Global Science For Global Wellbeing", 16th Chandigarh Science Congress (CHASCON 2023)

Place: Panjab University, Chandigarh

Date: 12th October 2023

Santanu Kumar Pal

- Prof. Santanu Kumar Pal delivered an invited lecture for the International Conference on Futuristic Materials for Sustainable Development Goals at Chandigarh University (January 2024) titled "Self-assembled Discotics as Molecular Semiconductors"
- Ritobrata De gave an oral presentation titled 'High electrical conductivity and hole transport in a columnar liquid crystal' at the 30th National Conference on Liquid Crystals (NCLC-2023) at Andhra University, Visakhapatnam on 2-4 November 2023.
- Ritobrata De gave an oral presentation titled 'Oxadiazole-adorned heterocoronenediscotics as ambipolar organic semiconductors' at the International Conference on Advanced materials for Better Tomorrow (AMBT-2023) conference organized by the Society for Interdisciplinary Research in Materials and Biology (SIRMB) and Department of Physics, Banaras Hindu University on 10-13 October 2023.

- Prof. Santanu Kumar Pal delivered an expert talk in the SSR-SERB workshop on nano in sensor and agriculture waste repurposing at the Institute of Nano Science and Technology (July 2023) titled "Biosensing using liquid crystals"
- Prof. Santanu Kumar Pal delivered an invited talk at the Gordon Research Conference on Liquid Crystal 2023 at SNHU, Manchester, NH, United States (June 2023) titled "Self-assembled Discotics as Molecular Semiconductors"
- Prof. Santanu Kumar Pal delivered a lecture at Bannari Amman Institute of Technology, Sathyamangalam (June 2023), on liquid crystals in general and their applications.
- Prof. Santanu Kumar Pal delivered a talk at the Centre for Nano and Soft Matter Sciences, Bangalore (May 2023) titled "Differentiating Conformationally Distinct Alzheimer's A β Oligomers Using Liquid Crystals"
- Prof. Santanu Kumar Pal delivered an invited lecture at an International conference on Intellection, Innovation, and Implication in Chemistry at DAV University Jalandhar (April 2023) titled "Self-assembled Discotics as Molecular Semiconductors"

S. S. V. Rama Sastry

- S. S. V. Ramasastry, An invited lecture at the Department of Chemistry, Emory University (USA) on 29 March, 2024.
- S. S. V. Ramasastry, An invited lecture at the Department of Chemistry, Hunter College, City University of New York (USA) on 27 March, 2024.
- S. S. V. Ramasastry, An invited lecture at the Department of Chemistry, Brooklyn College, City University of New York (USA) on 26 March, 2024.
- S. S. V. Ramasastry, An invited lecture at the Department of Chemistry, New York University (USA) on 25 March, 2024.
- S. S. V. Ramasastry, Participated in the ACS Spring Meeting 2024 in New Orleans (USA) and gave a lecture in the 'New Reactions & Methodology' session organised by the Division of Organic Chemistry 17 March, 2024.
- S. S. V. Ramasastry, An invited lecture in the School of Chemical Sciences, NISER Bhubaneswar on 28 February, 2024.
- S. S. V. Ramasastry, An invited lecture in the School of Chemical Sciences, IACS Kolkata on 26 February, 2024.
- S. S. V. Ramasastry, An invited talk during the Inter IISER/NISER Chemistry Meet (IINCM) 2024 organized by IISER Kolkata on 23 February, 2024.
- S. S. V. Ramasastry, An invited lecture in 'Frontiers in Sustainable Chemistry (FSC)-2024' conference organised by the Department of Chemistry, University of Delhi on 20 January, 2024.
- S. S. V. Ramasastry, An invited keynote lecture in 'Frontiers in Catalysis (FIC) - 2024' conference organised by the Central University of Rajasthan, Ajmer on 05 January, 2024.
- S. S. V. Ramasastry, An invited lecture in the 'National Symposium on Emerging Trends in Chemical Sciences (ETCS 2023)' organised by the Department of Chemistry, BHU Varanasi on 15 December, 2023.
- S. S. V. Ramasastry, An invited lecture in the Indo-French Conference on 'Synergy of Chemistry and Biology towards Affordable Health' at CSIR-IIT Hyderabad on 03 November, 2023.
- S. S. V. Ramasastry, An invited flash talk followed by poster presentation at the ICOC 2023 held at the Zuri White Sands Resort, Goa on 30 October, 2023.
- S. S. V. Ramasastry, Gave an invited lecture and chaired a session during the 'International Conference on Integrative Chemical Science for Health and Environment (ICHE-2023)' organised by Deshbandhu college, University of Delhi on 06 October, 2023.
- S. S. V. Ramasastry, An invited talk during the virtual FDP on 'Frontiers in Chemistry 2023' Organized by Sathyabama Institute of Science and Technology and IIT Madras on 22 September, 2023.
- S. S. V. Ramasastry, An invited online lecture to the Team Chemshala's Loquitur 2023, IISER Berhampur on 09 September, 2023.
- S. S. V. Ramasastry, Two invited talks in the refresher course on New Frontiers of Chemical Sciences organised online by UGC-HRDC, University of North Bengal, Siliguri on 25 August, 2023.
- S. S. V. Ramasastry, An invited lecture at the Department of Chemistry, Queen Mary University of London (UK) on 23 June, 2023.
- S. S. V. Ramasastry, An invited talk at the University of Greenwich at Gillingham (UK) on 22 June, 2023.
- S. S. V. Ramasastry, An invited lecture at the Department of Chemistry, IIT Delhi on 14 April, 2023.

Sabyasachi Rakshit

A. Sabyasachi Rakshit (PI)

- 'Chiral Active Cells' at Physics of Life at IOP Bhubaneswar, February 2024.
- 'The force-transducers (filters) in hearing and their longevity for prolonged hearing' at the International Conference on Magnetic Tweezer and Optical Tweezers at IIT Bombay, December 2023.

(iii) 'Tip-links in inner ear serve as band-stop-like filters of force' at FCSXIV, IISER Mohali, December 2023.

(iv) 'Tip-links in inner ear serve as band-stop-like filters of force' at National Conference on Force Spectroscopy and Microscopy, IISER Pune, June 2023.

B. Pritam Saha (4th year PhD student)

'Etiology of malleability in B-rich mechanosensing proteins' at International Conference on Interdisciplinary Applications of Magnetic and Optical Tweezers (MTOT 2023) at IIT Bombay, December 2023.

Sanchita Sengupta

- Sanchita Sengupta, Twisted Organic TADF and Multichromophoric Antenna for Efficient Multifunctional Sensing and Photocatalysis, International Symposium on Supramolecular Dye Chemistry & Materials (ISSDCM 2024), South China University of Technology (SCUT), Guangzhou, China, May 1-May 14, 2024.
- Sanchita Sengupta, Twisted Donor-Acceptor Molecules for Energy and Electron Transfer Mediated Photocatalysis, International Conference on Luminescent Materials from Fundamentals to Applications (ICLMFA), Guru Nanak Dev University (GNDU, Amritsar), March 15-16, 2024.
- Sushil Sharma (group member, oral presentation), Thermally Activated Delayed Fluorescence Compounds for Photocatalyzed Isomerization of Stilbene and Heteroarene Arylation, International Conference on Luminescent Materials from Fundamentals to Applications (ICLMFA), Guru Nanak Dev University (GNDU, Amritsar), Mar 15-16, 2024.
- Sanchita Sengupta, Utilization of Twisted Donor-Acceptor Molecules for Energy and Electron Transfer Photocatalysis, Nanomaterials and Molecules: From Spectroscopy to Bioimaging (NaMoSBio), IISER Kolkata, Jan 11-14, 2024.

Sanjay Mandal

- Sanjay Mandal. Invited Talk. Porous Nanomaterials for Energy and Environment Applications. PEC Chandigarh. 19 May, 2023.
- Sanjay Mandal. Invited Talk. Multifunctional Emerging Nanomaterials for Environment Applications. NISER Bhubhaneswar. 1 June, 2023.
- Sanjay Mandal. Invited Talk. Multifunctional Emerging Nanomaterials for Environment Applications. IISER Kolkata. 7 June, 2023.
- Sanjay Mandal. Invited Talk. Two Pillars of Multifunctional Emerging Nanomaterials for Environment Applications. SRM University AP. 12 June, 2023.
- Sanjay Mandal. Invited Talk. Two Pillars of Multifunctional Emerging Nanomaterials for Environment Applications. Chandigarh University. 7 July, 2023.
- Sanjay Mandal. Invited Talk. Multifunctional Emerging Nanomaterials for Environment Applications. SLIET, Longowal. 16 August, 2023.
- Sanjay Mandal. Expert Talk. Electron Microscopic Techniques: Principles, Instrumentation and Applications. NIT Hamirpur, 2 December, 2023.
- Sanjay Mandal. Expert Talk. Single Crystal and Powder and Their Applications, One Week FDP on Materials Characterization Techniques, (O. Plan No. AS-6 & ICT-88), NITTR Chandigarh. 6 December, 2023.
- Sanjay Mandal. Expert Talk. Single Crystal and Powder and Their Applications, Short Term Course on Analytical Techniques in the realm of Molecules and Materials (ATRAMM-2021), NIPER Mohali. 15 December, 2023.
- Sanjay Mandal. Invited Talk. Multifunctional Emerging Nanomaterials for Catalysis and Environment Applications. IIT KGP, West Bengal. 4 January, 2024.
- Sanjay Mandal. Invited Talk. Design of Multifunctional Emerging Nanomaterials for Catalysis and Environment Applications. IACS Kolkata, West Bengal. 5 January, 2024.

Subhabrata Maity

- Subhabrata Maiti. Biocatalytic and Phoretic Behaviour of a Zn(II)-metallomicellar Complex. Modern Trends in Inorganic Chemistry-XX/IISc Bangalore. 14-17 December, 2023.
- Subhabrata Maiti. Phoresis-driven catalysis and vice-versa. Manipulation, Automation and Robotics at Small Scales (MARSS-2023)/ New York University, Abu Dhabi. 9-13 October, 2023.
- Neetu, Subhabrata Maiti. Electric field driven dissipative DNA patterning: a prospective technique to spatially control catalysis. National Workshop on fluorescence and Raman Spectroscopy (FCS XIV)/IISER Mohali. Dec 9-15, 2023.
- Sakshi Juneja. Controlling phoretic mobility of DNA coacervate in salt gradient. Emerging trends in photodynamics and photocatalysis ETPP-2024/IISER Mohali. March 26-28, 2024.

Sugumar Venkataramani

● Sugumar Venkataramani:

Title: Azoheteroarenes in water and condensed phase

Name of the Conference: FCS Conference December 12-14, 2023, Indian Institute of Science Education and Research(IISER), Mohali, Punjab

Title: Reactive Intermediates and Unstable Species in Rare Gas Matrices

Name of the Conference: CRSI NSC-32 & 17 th CRSI-RSC February 1-4, 2024, Department of Chemistry, BITS Pilani, Pilani Campus, Rajasthan

Title: Azoheteroarene photo switches: Properties and applications

Name of the Conference: International Conference on "Luminescent Materials: From Fundamentals to Applications (ICLMFA-2024)" on March 15-16, 2024, GNDU, Amritsar, Punjab

● Sapna Singh:

Title: Azothiazole: Chemosensing and Photoswitching

Name of the Conference: Emerging Trends in Photodynamics and Photochemistry, 26-28 March, 2023, Indian Institute of Science Education and Research(IISER), Mohali, Punjab

● Himanshu Kumar:

Title: Light-triggered Phase Transition in Azoheteroarenes and their Applications in Solar Thermal Energy Storage Molecular Devices (ESMDs) and Photolithography;

Name of the seminar: Saturday Seminar Series - "Light as Reagent and Product", 16 December, 2023

Title: Light-triggered Phase Transition Molecular Materials and their Applications in Solar Thermal Energy Storage Molecular Devices;

Name of the Conference: "International Chemical Engineering Conference on Energy, Environment, and Sustainability (ICECEES-2024)", 15 February, 2024, IIT Roorkee

● Anjali Mahadevan:

Title: 2-Isocyanophenylthiyl Radical and its Iodine-triggered Radical Cyclization in Solid Argon

Name of the Conference: 755. WE-Heraeus-Seminar on Solvation Chemistry and Reactive Molecules, 17-23 September, 2023, Physikzentrum Bad Honnef", Hauptstrasse 5, 53604 Bad Honnef/GERMANY

Suman Barman

Name of the presenter: Suman K. Barman

Title of the talk: Hydrogen Evolution by Nickel Complexes: Local proton storage and effect of Local charged substituents

Name of the Conference/Institute: 6th Symposium on Advanced Biological Inorganic Chemistry (SABIC-2024). International conference organized by IACS Kolkata

Dates: January 7-11, 2024

Ujjal K Gautam

Name of the presenter: Ujjal K. Gautam

Title of the talk: Sustainable Conversion of Diverse Waste Plastics to Energy and Oxygen Harvesting Nanomaterials

Name of the Conference: 34th Annual General Meeting of MRSI and the 5th Indian Materials Conclave held at Banaras Hindu University, Varanasi

Dates: 12th -15th December'23

Name of the presenter: Ujjal K. Gautam

Title of the talk: Chemistry with waste plastic: pollution remediation, oxygen harvesting, and solar energy utilization

Name of the Conference: International Conference on Futuristic Materials for Sustainable Development Goals (FMSDG-2024) held at Chandigarh University

Dates: 9th -10th January'24.

Name of the presenter: Ujjal K. Gautam

Title of the talk: Sillen Aurivillius phases for energy harvesting applications

Name of the Conference: National Conference on "Advanced Functional Materials for Sustainable Applications," held at Shiv

Nadar Institution of Eminence, Greater Noida.

Dates: 9-10 February'24

Name of the presenter: Ujjal K. Gautam

Title of the talk: Shaping Pd nanostructures for sustainable electrochemical oxygen reduction

Name of the Conference: Invited talk at Technical University of Munich

Dates: 16 May'23

Name of the presenter: Ujjal K. Gautam

Title of the talk: Chemistry with waste plastic: pollution remediation, oxygen harvesting, and solar energy utilization

Name of the Conference: Invited Talk, University of Tartu, Tartu 51010, Estonia

Dates: 11th May'23

Name of the presenter: Ujjal K. Gautam

Title of the talk: Sillen Aurivillius phases for energy harvesting applications

Name of the Conference: 31st national conference, Condensed Matter Days (CMDAYS) Tezpur University (Central University), Assam

Dates: 22nd – 24th January'24.

Name of the presenter: Reeya Garg

Title of the talk: Origin and the invoking of photoactive Co-N₄ centers in Co-N-C for loss-less infusion of highly ORR active palladium in ambient conditions

Name of the Conference: International Conference on Materials Science, Engineering and Technology, Singapore 2023

Dates: 07th – 09th, September'23

Name of the presenter: Raj Sekhar Roy

Title of the talk: Edge-functionalization driven improved charge transfer in covalently interconnected g-C₃N₄ layers for enhanced photocatalytic hydrogen evolution

Name of the Conference: International Conference on Materials Science, Engineering and Technology, Singapore 2023

Dates: 07th – 09th, September'23

Name of the presenter: Dr. Bramhaiah Kommula

Title of the talk: Tailoring Emissive Centres and Photoactivity in Waste Plastic Derived Carbon Dots.

Name of the Conference: Emerging Trends in Photodynamics and Photochemistry (ETPP-2024), IISER Mohali, India

Dates: 26th – 28th, March'24

Name of the presenter: Arjun Kumar Sah

Title of the talk: Universal Piezo-Photocatalytic Wastewater Treatment on Realistic Pollutant Feedstocks by Bi₄TaO₈Cl: Origin of High Efficiency and Adjustable Synergy

Name of the Conference: Advanced Functional Materials for Sustainable Applications (AFMSA-2024), Shiv Nadar University, Delhi NCR, INDIA

Dates: 09th – 10th, February'24

Vignesh R Kuduva

- Mixed 3d-4f Single-Molecule Toroids,

Name of the Conference/Institute: 9th Asian Conference on Coordination Chemistry (ACCC9) organized by the Suranaree University of Technology and Chulalongkorn University, Bangkok, Thailand. February 19-22, 2024.

DEPARTMENT OF CHEMICAL SCIENCES

CONFERENCES ATTENDED

Angshuman Roy Choudhury

Name of the poster presenter: Ms Sakshi.

Title of the Poster: Topological analysis of electron densities of organic fluorine mediated interactions. Name of the Conference: Inter-IISER-NISER Chemistry Meet 2024 at IISER Kolkata, February 23-25, 2024.

Name of the poster presenter: Sunanda.

Title of the Poster: Application of Crystal Engineering in the Dimerization of C=N bond

Name of the Conference: 50th National Seminar on Crystallography (NSC50), held at CSIR-IMTECH, November 22-24, 2023.

Name of the poster presenter: Vandana Vishwakarma

Title of the Poster: Synthesis and characterization of Copper L-1 MOF with tritopic linker having acetylenic spacer

Name of the Conference: 50th National Seminar on Crystallography (NSC50), held at CSIR-IMTECH, November 22-24, 2023.

Arijit K De

- Arijit K. De, Nitin Yadav, Sakshi Chawla, Amit Kumar, Sasthi Paul, Sushila Kumari, Anjali Bansal, Amit Kumar, Indira Sarkar, International Conference on Emerging Trends in Photodynamics and Photocatalysis (ETPP), IISER Mohali, 25-27 March 2024.
- Arijit K. De, Elucidating the Origin of Large Stokes Shift in the Red Fluorescent Proteins mKeima and mBeRFP, Recent Trends in Chemical Science and Technology (RTCST), IIT Patna, 1 to 2 March 2024.
- Anjali Bansal, Inter IISER NISER Chemistry Meet 2024, IISER Kolkata, 23-25 February 2024.
- Subho Mitra, Spectroscopy and Dynamics of Molecules and Clusters (SDMC), Kaziranga, Assam, 22-25 February 2024.
- Subho Mitra, 9th Topical Conference on Ultrafast Photonics and Quantum Science, PRL Ahmedabad, 15-17 February 2024.
- Amit Kumar, Sushila Kumari, International Conference on Hybrid Halide Perovskite, IACS Kolkata, 22-23 December, 2023.
- Arijit K. De, Room-Temperature Polaron Dynamics in Lead-free Cs₄CuSb₂Cl₁₂ Layered Double Perovskite Nanocrystals, ATOS Materials in Focus Koti Resorts, Shimla 15 to 17 Dec 2023.
- Arijit K. De, Nitin Yadav, Garima Bhutani, Sumit Yadav, Sakshi Chawla, Subho Mitra, Amit Kumar, Abdul Alim, Sasthi Paul, Sushila Kumari, Anjali Bansal, Amit Kumar, Indira Sarkar, National Workshop on Fluorescence and Raman Spectroscopy (FCS XIV), IISER Mohali, 09-15 December 2023.
- Arijit K. De, Gitam Chemistry Research Conferences 2023 Organised by Department of Chemistry, GITAM School of Science, GITAM, Visakhapatnam, 7th December to 9th December 2023.
- Anjali Bansal, Indira Sarkar, International Conference on Optoelectronic and Bio-inspired Nanomaterials, IIT Roorkee, 4 - 6 December 2023.
- Amit Kumar, Sasthi Paul, Ultrafast Sciences - 2023 (UFS-2023) CSIR-National Physical Laboratory (CSIR-NPL), New Delhi 25-27 November 2023.
- Sakshi Chawla, International Conference on molecular Energy Transfer in Complex System, 12 - 17 November 2023.
- Arijit K. De, An International Conference on Structure and Dynamics: Spectroscopy and Scattering (SDSS-2023), IACS, Kolkata, 5 to 8 October, 2023.
- Sakshi Chawla, International Conference on "Molecularly Designed Functional Materials 2023 (MDFM 23), conducted by S & T Digital (virtual), 28 to 30 September 2023.
- Abdul Alim, Student Conference on Optics and Photonics (SCOP), Physics Research Laboratory Ahmedabad 27-29th September.
- Subho Mitra, Quantum Control of Light and Matter Gordon Research Conference, Salve Regina University, Newport, RI, USA, 6-11 August 2023.
- Arijit K. De, The 15th Femtochemistry Conference (FEMTO15), Berlin, Germany, 30 July- 4 August 2023.
- Garima Bhutani, Sakshi Chawla, The 31st International Conference on Photochemistry, Sapporo, Japan 23-28 July 2023.

- Arijit K. De, Sumit Yadav, Abdul Alim, Indo French Workshop on Disruptive Nanophotonics, CSIR-CSIO Chandigarh, India, 14-16 June 2023.
- Arijit K. De, Sumit Yadav, Abdul Alim, Optica Biophotonics Congress: Optics in the Life Sciences, virtual web conference, 23-27 April 2023.

Debashis Adhikari

Name of the presenter: Debashis Adhikari

Name of the Conference: MTIC 2023

Dates of Conference: 14th-17th December, 2023

Title of Talk: Phormazanate redox noninnocence applied to homogeneous catalysis

Name of the presenter: Debashis Adhikari

Name of the Conference: Inter-IISER Chemistry Meet

Dates of Conference: 24th-26th February, 2024

Title of Talk: Phormazanate redox noninnocence applied to homogeneous catalysis

Name of the presenter: Debashis Adhikari

Name of the Conference: S. N. Bose Institute of Basic Sciences, Kolkata

Dates of Conference: 5th-7th January, 2024

Title of Talk: Small organic molecules for photochemical applications

Name of the presenter: Ayanangshu Biswas

Name of the Conference: CHASCON 2023, National Conference on Global Science for Global Wellbeing

Dates of Conference: 12th-14th October, 2023

Title of the Poster: Ni-Azo phenolate Complex as an Efficient Catalyst for Borrowing Hydrogen Reactions through "Hydrogen Atom Transfer Pathway" propelled by Azo-Hydrazo Redox Couple (Awarded Best Poster Prize in this Conference)

Name of the presenter: Ayanangshu Biswas

Name of the Conference: Organic Chemistry Symposium, Thieme 2023, University of Delhi

Dates of Conference: 25th October, 2023

Title of the Poster: Ligand-Redox Mediated Ni-Catalysis Towards Borrowing Hydrogen Reactions via "Hydrogen Atom Transfer Pathway" Propelled by Azo-Hydrazo Redox Couple

Name of the presenter: Ayanangshu Biswas

Name of the Conference: PMRF Annual Symposium, IIT Indore (Nominated for the symposium by PMRF Review Committee, Recommended with Commendation)

Dates of Conference: 3rd-4th March, 2024

Title of the Poster: Borrowing Hydrogen Reactions via Hydrogen Atom Transfer Pathway: Exploring both Metal-mediated and Organo (Photo) catalytic Approach

Name of the presenter: Supriya Halder

Name of the Conference: International conference on Emerging Trends in Photodynamics and Photochemistry

Dates of Conference: 26.03.2024- 28.03.2024

Title of the Poster: Unlocking the photodehydrogenation ability of naphthalene monoimide towards the synthesis of quinazolinone

Name of the presenter: Supriya Halder

Name of the Conference: Theme organic chemistry symposium, Delhi university

Dates of Conference: 25.10.2024

Title of the Poster: Super-Reducing Behavior of Benzo[b]phenothiazine Anion under Visible-light Photoredox Condition

Name of the presenter: Sourav Mandal

Name of the Conference: International conference on Emerging Trends in Photodynamics and Photochemistry

Dates of Conference: 26.03.2024- 28.03.2024

Title of the Poster: Super-Reducing Behavior of Benzo[b]phenothiazine Anion under Visible- light Photoredox Condition

Name of the presenter: Sourav Mandal

Name of the Conference: Thieme organic chemistry symposium, Delhi university

Dates of Conference: 25.10.2024

Title of the Poster: Unlocking the photodehydrogenation ability of naphthalene monoimide towards the synthesis of quinazolinone

Name of the presenter: Shyamali Maji

Name of the Conference: International conference on Emerging Trends in Photodynamics and Photochemistry

Dates of Conference: 26.03.2024- 28.03.2024

Title of the Poster: Organophotocatalytic dehydrogenative preparation of amides directly from alcohols

Name of the presenter: Monojit Roy

Name of the Conference: International conference on Emerging Trends in Photodynamics and Photochemistry

Dates of Conference: 26.03.2024- 28.03.2024

Title of the Poster: Single electron transfer catalysis by diphenylthiourea under visible light photoredox conditions

Jino George

- Kuljeet Kaur; Invited talk, international conference on photochemistry, Sapporo, Japan, July 23-28th 2023.
- Jaibir Singh; Invited talk, 12th Asian Photochemistry Conference, Melbourne, Australia, 27 November - 1 December 2023.
- Jhuma Dutta: poster presentation on 19th edition of the Spectroscopy and Dynamics of Molecules and Cluster (SDMC) 2024 conference, Borgos Resort, Kaziranga, Assam, 22 -25 February, 2024.

P. Balanarayan

- P. Balanarayan, Non-nuclear maxima of LASER-dressed atoms and molecules, Spectroscopy and Dynamics of Molecules and Clusters (SDMC) 2024, Kaziranga, Feb 24 2024.
- P. Balanarayan, Non-nuclear maxima of LASER-dressed atoms and molecules, Theoretical Chemistry Symposium 2024, IIT Chennai, Chennai, Dec 7 2023.
- P. Balanarayan, Molecules in High Intensity LASER fields, an ab initio description, Quantum Sensing and Metrology, IACS, Kolkata, Dec 4 2023.
- P. Balanarayan, Molecules in external fields: de novo designs for numerical simulations, IIT Mumbai, MS-TPCCP (Mini Symposium on Theoretical Physical Chemistry and Chemical Physics), IIT, Mumbai, July 26 2023

Priya Kumari CP

Title of the talk: Hexazine and its derivatives: What decides whether to delocalise or not?

Name of the Conference/Institute: Inter IISER-NISER Chemistry meet/IISER Kolkatha

Date: 23/02/2024

IIT Madras to participate in TCS 2023 (07/12/2023)

R. Vijaya Anand

- R Vijaya Anand chaired a session in the National Organic Symposium Trust (NOST) conference held at ITC Hotel, Bhubaneswar during February 29 to March 03, 2024.
- R Vijaya Anand chaired a session in the International Conference on Emerging Trends in Photodynamics and Photochemistry organized at IISER Mohali during March 26-28, 2024.
- R Vijaya Anand chaired a session in the IISER NISER Chemistry Meet 2024 organized at IISER Kolkata during February 23-24, 2024.
- R Vijaya Anand chaired a session and also presented a poster in the "FORCE-IICS-2023" organized at Hyatt Regency, Kathmandu during September 28 – October 01, 2023
- Arun Kumar presented a poster at the IISER NISER Chemistry Meet 2024 organized at IISER Kolkata during February 23-24, 2024.
- Akshay Wadhwa attended the International Conference on Emerging Trends in Photodynamics and Photochemistry organized at IISER Mohali during March 26-28, 2024.
- Arun Kumar attended the International Conference on Emerging Trends in Photodynamics and Photochemistry organized at IISER Mohali during March 26-28, 2024.
- Shaheen Fatma presented a poster in the Junior National Organic Symposium Trust (J-NOST) conference organized at IISER Pune during October 10-12, 2024.

Raj Kumar Roy

Name of the presenter: Dr. Raj Kumar Roy

Title of the talk: "A deep insight into the design of aromatic polyamides with tunable secondary structures: Exhibiting enantio-

separations and through-space charge transport applications”

Name of the Conference: Symposium on Polymer Science 2023” (SPS 2023) at IISER Kolkata on November 17-18, 2023.

Name of the presenter: Dr. Raj Kumar Roy

Title of the talk: “An insight into the role of polyproline's secondary structures during thermal phase transition and bulk phase separations”

Name of the Conference: SPSI-MACRO-2023 at IIT Guwahati on December 10-13, 2023.

Name of the presenter: Dr. Raj Kumar Roy

Title of the talk: “Understanding the role of polyproline's secondary structures in thermal phase transitions and bulk phase separations”

Name of the Conference: Complex Fluids-2023 at IIT Chennai on December 18-20, 2023.

S. Arulananda Babu

Name of the Presenter: Yashika Aggarwal

Title of the Poster: Pd-(II)-catalysed, directing-group aided, γ -C(sp²)-H alkoxylation: Towards the synthesis of racemic and enantiopure aryl alkyl ethers.

Name of the Conference: XVII J-NOST (National Organic Symposium Trust) Conference for young researchers.

Dates: 10-12th October 2023

Name of the Presenter: Pooja patel

Title of the Poster: Construction of C5- indole unnatural amino acid motifs via diastereoselective Pd(II) catalysed β -C(sp³)-H functionalization.

Name of the Conference: Nature inspired initiatives in chemical trends (NIICT-2024).

Dates: 7- 9TH MARCH 2024

Award: Best poster award

Name of the Presenter: Amit kumar

Title of the poster: Expanding the Utility of Inexpensive Pyridine-N-oxide Directing Group for the Site-selective sp²/sp³ γ -C-H and sp² δ -C-H Functionalization of Carboxamides.

Name of the Conference: MMT- 2023 (Molecules and materials technology)

Dates: 21-22ND APRIL 2023

Name of the Presenter: Amit Kumar

Name of the Conference: ETPP-2024 (Emerging trends in photodynamica and photochemistry)

Dates: 26-28TH MARCH 2024

Name of the Conference: Sonam suwasia

Title of the Poster: Pd- catalysed coupling of C-H bonds of carboxamides with iodobenzenes toward modified azobenzenes.

Name of the Conference: MMT- 2023 (Molecules and materials technology)

Dates: 21-22ND APRIL 2023

Award: Best poster award.

Samrat Ghosh

Presenter: Professor R.K. Peddiniti, Chemistry Department, IIT Roorkee

Title: Chemistry for Innovation & Sustainable Growth

Conference: Professor Ram Chand Paul National Symposium on “Chemistry for Innovation & Sustainable Growth”

Place: Department of Chemistry, Panjab University, Chandigarh.

Date: 15th February 2024

Presenter: Dr. Pooja Devi, CSIO, Chandigarh

Title: Engineering For Sustainable Growth. Energy Harvesting, Storage & Utilization

Conference: Professor Ram Chand Paul National Symposium on “Chemistry for Innovation & Sustainable Growth”

Place: Department of Chemistry, Panjab University, Chandigarh.

Date: 15th February 2024

Presenter: Dr. Dhiraj K. Mahajan, IIT Ropar

Title: A case Study for Polymer Electrolyte Membrane for Fuel Cell

Conference: Professor Ram Chand Paul National Symposium on "Chemistry for Innovation & Sustainable Growth"

Place: Department of Chemistry, Panjab University, Chandigarh.

Date: 15th February 2024

Presenter: Dr. Vijay Kumar, National Institute of Technology, Srinagar, Jammu & Kashmir

Title: Hydrogels- Smart Materials with Multifunctional Applications

Conference: Professor Ram Chand Paul National Symposium on "Chemistry for Innovation & Sustainable Growth"

Place: Department of Chemistry, Panjab University, Chandigarh.

Date: 16th February 2024

Presenter: Professor Md. Ehesan Ali, INST, Mohali

Title: The Role of Spin-Vibrations in Single Molecule Magnets

Conference: Professor Ram Chand Paul National Symposium on "Chemistry for Innovation & Sustainable Growth"

Place: Department of Chemistry, Panjab University, Chandigarh.

Date: 16th February 2024

Presenter: Professor Bruce Alerts, University of California, USA

Title: Why Science Education is More Important than Most Scientists Think

Conference: National Conference on "Global Science For Global Wellbeing", 16th Chandigarh Science Congress (CHASCON 2023)

Place: Panjab University, Chandigarh

Date: 12th October 2023

Santanu Kumar Pal

- Anshika Baghla presented a poster at the Disordered and Soft Systems: DSSR 2024 conference held at CeNS Bengaluru from 27-28 March 2024, titled 'mesomorphic and dielectric properties of strategically designed chiral bent-core liquid crystals displaying wide temperature range dark conglomerate phase'.
- Anshika Baghla presented a Poster titled 'Fluorinated bent-shaped liquid crystals for the stabilization of blue phase and other exotic mesophases in a wide temperature range for various tunable device applications' at the PMRF Symposium 2024 held at IIT Indore on 3-4 March 2024.
- Shallu Dhingra presented a Poster titled 'Room temperature tri-alkynyl benzene based discotic nematic mesophase enabling high-efficiency deep blue OLEDs' at PMRF Symposium 2024 held at IIT Indore on 3-4 March 2024.
- Ritobrata De presented a Poster titled 'High electrical conductivity in a luminescent liquid crystal' at the National Workshop on Fluorescence and Raman Spectroscopy (FCS XIV) organized by IISER Mohali and INST Mohali on 9-15 December 2023.
- Anshika Baghla presented a Poster titled 'Mesomorphic and dielectric properties of strategically designed chiral bent-core liquid crystals displaying long-range dark conglomerate phase' at the 30th National Conference on Liquid Crystals (NCLC-2023) at Andhra University, Visakhapatnam on 2-4 November 2023.
- Soma Sil presented a Poster titled 'Design of liquid crystal-aqueous interface for detection of calcium ions using protein as recognition probe' at the 30th National Conference on Liquid Crystals (NCLC-2023) at Andhra University, Visakhapatnam on 2-4 November 2023.

S. S. V. Rama Sastry

- Participated and chaired a session in the 23rd NOST conference organised at the Welcomhotel by ITC Hotels, Bhubaneswar from 29 February till 03 March, 2024
- Gave an invited lecture and chaired a session during the 'International Conference on Integrative Chemical Science for Health and Environment (ICHE-2023)' organised by Deshbandhu college, University of Delhi on 06 October, 2023.
- An invited flash talk followed by poster presentation at the ICOC 2023 held at the Zuri White Sands Resort, Goa on 30 October, 2023.
- An invited lecture in the Indo-French Conference on 'Synergy of Chemistry and Biology towards Affordable Health' at CSIR-IICT Hyderabad on 03 November, 2023.
- An invited lecture in the 'National Symposium on Emerging Trends in Chemical Sciences (ETCS 2023)' organised by the Department of Chemistry, BHU Varanasi on 15 December, 2023.
- An invited talk during the Inter IISER/NISER Chemistry Meet (IINCM) 2024 organized by IISER Kolkata on 23 February, 2024.
- An invited lecture in 'Frontiers in Sustainable Chemistry (FSC)-2024' conference organised by the Department of Chemistry, University of Delhi on 20 January, 2024.
- An invited keynote lecture in 'Frontiers in Catalysis (FIC) - 2024' conference organised by the Central University of Rajasthan,

Ajmer on 05 January, 2024.

- Participated in the ACS Spring Meeting 2024 in New Orleans (USA) and gave a lecture in the 'New Reactions & Methodology' session organised by the Division of Organic Chemistry 17 March, 2024.

Sabyasachi Rakshit

A. Sabyasachi Rakshit (PI)

- (i) 'Chiral Active Cells' at Physics of Life at IOP Bhubaneswar, February 2024.
- (ii) 'The force-transducers (filters) in hearing and their longevity for prolonged hearing' at the International Conference on Magnetic Tweezer and Optical Tweezers at IIT Bombay, December 2023.
- (iii) 'Tip-links in inner ear serve as band-stop-like filters of force' at FCSXIV, IISER Mohali, December 2023.
- (iv) 'Tip-links in inner ear serve as band-stop-like filters of force' at National Conference on Force Spectroscopy and Microscopy, IISER Pune, June 2023.

B. Tanuja Joshi (5th year PhD student)

'Investigating the role of linker regions in regulating interdomain dynamics' at FCSXIV, IISER Mohali, December 2023.

C. Gaurav Kumar Bhati (5th year PhD student)

'Investigating the molecular mechanism of Age-Related hearing loss (ARHL) due to mutations present in the non-interacting domains of Cadherin-23 gene' at FCSXIV, IISER Mohali, December 2023.

D. Veerpal Kaur (4th year PhD student)

- (i) 'Redefining the structure of tip-links in hair-cells' at FCSXIV, IISER Mohali, December 2023.
- (ii) 'Redefining the structure of tip-links in hair-cells' at National Conference on Force Spectroscopy and Microscopy, IISER Pune, June 2023.

E. Pritam Saha (4th year PhD student)

- (i) 'Origin of malleability in β -rich mechanosensing proteins in hearing' at International Conference on Interdisciplinary Applications of Magnetic and Optical Tweezers (MTOT 2023) at IIT Bombay, December 2023.
- (ii) 'Origin of malleability in β -rich mechanosensing proteins in hearing' at FCSXIV, IISER Mohali, December 2023.

F. Devansh Swadia (2nd year PhD student)

- (i) 'Elucidating the role of CRTAC1 in extracellular matrix of glioblastoma' at FCSXIV, IISER Mohali, December 2023.
- (ii) 'Elucidating the role of CRTAC1 in extracellular matrix of glioblastoma' at National Conference on Force Spectroscopy and Microscopy, IISER Pune, June 2023.

Sanchita Sengupta

- Sanchita Sengupta, Twisted Organic TADF and Multichromophoric Antenna for Efficient Multifunctional Sensing and Photocatalysis, International Symposium on Supramolecular Dye Chemistry & Materials (ISSDCM 2024), South China University of Technology (SCUT), Guangzhou, China, May 1-May 14, 2024.
- Sanchita Sengupta, Twisted Donor-Acceptor Molecules for Energy and Electron Transfer Mediated Photocatalysis, International Conference on Luminescent Materials from Fundamentals to Applications (ICLMFA), Guru Nanak Dev University (GNDU, Amritsar), March 15-16, 2024.
- Sushil Sharma (group member, oral presentation), Thermally Activated Delayed Fluorescence Compounds for Photocatalyzed Isomerization of Stilbene and Heteroarene Arylation, International Conference on Luminescent Materials from Fundamentals to Applications (ICLMFA), Guru Nanak Dev University (GNDU, Amritsar), Mar 15-16, 2024.
- Group members Sushil Sharma (oral presentation), Vidushi Gupta (poster presentation), Anita Kumari (poster presentation) participated in International Conference on Luminescent Materials from Fundamentals to Applications (ICLMFA), Guru Nanak Dev University (GNDU, Amritsar), Mar 15-16, 2024.
- Sanchita Sengupta, Utilization of Twisted Donor-Acceptor Molecules for Energy and Electron Transfer Photocatalysis, Nanomaterials and Molecules: From Spectroscopy to Bioimaging (NaMoSBio), IISER Kolkata, Jan 11-14, 2024.
- Group member Anita Kumari (poster presentation) participated in Nanomaterials and Molecules: From Spectroscopy to Bioimaging (NaMoSBio), IISER Kolkata, Jan 11-14, 2024.

Sanjay Mandal

- Sanjay Mandal. Tuning the Conformational Isomerism in Metal-organic Frameworks: Single-Crystal-to-Single-Crystal Transformation, and Detection and Capture of Environmental Pollutants. 50th National Seminar on Crystallography (NSC50), Chandigarh. 22-24 November, 2023.
- Sanjay Mandal. Nanoscale Anti-Cancer Drug Delivery by a Smart and Biocompatible Metal-Organic Framework Carrier.

SABIC. Kolkata. 6-12 Jan, 2024.

- Sanjay Mandal. Multifunctional Emerging Nanomaterials for Environment Applications. ETSST2024, SRM University AP. 7-8 March, 2024.
- Rupinder Kaur. Oral presentation. Nanoparticles@MOF Composites for the Lewis Acid Catalysis of Three-component Organic Transformations. 6th Edition of Advanced Materials Science World Congress. 21th – 22nd March 2024.
- Rupinder Kaur. Oral presentation. CdO Nanostructures as Acid-Base Bifunctional Heterogeneous Catalysts for Making Coumarin-3-Carboxylic Acids at Room Temperature. 5th Edition of Advanced Chemistry World Congress. 25th - 26th March 2024.
- Vandana Sharma. Attended. International Conference on Emerging Trends in Photodynamics and Photochemistry. 26th - 28th March, 2024.
- Vishnu Kriplani. Attended. International Conference on Emerging Trends in Photodynamics and Photochemistry. 26th - 28th March, 2024.
- Ishfaq Shafi Koul. Attended. International Conference on Emerging Trends in Photodynamics and Photochemistry. 26th - 28th March, 2024.

Sanjay Singh

- Recent Advances in Inorganic Molecules to Materials (RAIMM-2023), IIT Kanpur, November 04, 2023.

Name of the presenter: Sanjay Singh

Title of the talk: Electronically Unsaturated Cationic Boron and Aluminum Complexes

Name of the Conference/Institute: Main Group Molecules to Materials-III, December 09-11, 2023, IIT Hyderabad.

Name of the presenter: Surbhi Bansal

Title of the poster: Bicyclic (alkyl)(amino) Carbene (BICAAC) Ligand in Transition Metal-mediated Catalysis and its Unexplored Face as an Organocatalyst

Name of the Conference/Institute: CHASCON 2023, National Conference on Global Science for Global Wellbeing (Panjab University, October 12-14, 2023)

Name of the presenter: Alisha Sharma

Title of the poster: Reactivity of Bicyclic(alkyl)(amino)carbene (BICAAC) towards hydroboration of aldehydes, ketones and alkynes using metal free approach

Name of the Conference/ Institute: CHASCON 2023, National Conference on Global Science for Global Wellbeing (Panjab University, October 12-14, 2023)

Subhabrata Maity

- Subhabrata Maiti. Emerging trends in photodynamics and photocatalysis ETPP-2024/IISER Mohali. March 26-28, 2024.
- Priyanka. Insights into enzyme-induced spatiotemporal dynamics of self-assembled motifs. Systems Chemistry Virtual Symposium 2023. July 10-11, 2023.
- Ekta Shandilya. Enzyme dictated patterning of nanoparticle assembly. Molecular Origin of Life. Munich. June 20-22, 2023.

Sugumar Venkataramani

Gayathri P.:

Name of the Conference: FCS XIV National workshop on Fluorescence and Raman spectroscopy, 9-15 December, 2023, Indian Institute of Science, Education and Research(IISER), Mohali, Punjab. (Attended)

Title: Arylazo-3,5-diphenylpyrazole derivatives: Molecular probes exhibiting reversible light induced phase transitions for energy storage and direct photolithographic patterning
Name of the Conference: Emerging trends in photodynamics and photocatalysis (ETPP-2024), 26-28 March, 2024, Indian Institute of Science, Education and Research(IISER), Mohali, Punjab. (Poster Presentation)

Title: Photoswitchable functional molecules

- **Name of the Conference:** Reminisce 2023, 10 April, 2023, AcSIR-CSIO, Sector-30 Chandigarh. (Poster Presentation)

Ramanpreet Kaur:

Name of the Conference: FCS XIV National workshop on Fluorescence and Raman spectroscopy, 9-15 December, 2023, Indian Institute of Science, Education and Research(IISER), Mohali, Punjab. (Attended)

Title: Photoswitchable azoheteroarene based chelating ligands: light modulation of properties, aqueous solubility and catalysis. **Name of the Conference:** RC Paul National Symposium Series Feb 2024, Panjab University, Chandigarh, 15-16 February, 2024. (Poster Presentation)

Title: Azopyridinium ionic photoswitches

Name of the Conference: Reminisce 2023, 10 April, 2023, AcSIR-CSIO, Sector-30 Chandigarh. (Poster Presentation)

Dr. Archana Velloth:

Name of the Conference: Emerging trends in photodynamics and photocatalysis (ETPP-2024), 26-28 March, 2024, Indian Institute of Science, Education and Research(IISER), Mohali, Punjab. (Attended)

Deepak Kumar:

Title: Photochemistry of p-azidophenyldiazenyl-3,5-dimethylisoxazole in solid argon

Name of the Conference: Emerging trends in photodynamics and photocatalysis (ETPP-2024), 26-28 March, 2024, Indian Institute of Science, Education and Research(IISER), Mohali, Punjab. (Poster Presentation)

Piyush Kumar:

Title: Photochemistry of 2-Iodoimidazole: A Computational and Matrix Isolation Infrared Spectroscopic studies
Name of the Conference: 755. WE-Heraeus-Seminar on Solvation Chemistry and Reactive Molecules, 17-23 September, 2023, Physikzentrum Bad Honnef, Hauptstrasse 5, 53604 Bad Honnef/GERMANY. (Poster Presentation)

Title: Electronic Structure, Stability and Reactivity of Imidazole Radicals and their Photochemistry Under Cryogenic Conditions in Inert Gas Matrices

Name of the Conference: Reminisce 2023, 10 April, 2023, AcSIR-CSIO, Sector-30 Chandigarh. (Poster Presentation)

Sapna Singh

Title: Photoswitchable Rhodamine-Based Multi-analyte Responsive Chemosensors

Name of the Conference: National Workshop on Fluorescence and Raman Spectroscopy, 9-15 December, 2023, Indian Institute of Science, Education and Research(IISER), Mohali, Punjab. (Poster Presentation)

Title: Photoswitchable Rhodamine-Based Multi-analyte Responsive Chemosensors

Name of the Conference: 31st International Conference on Photochemistry, 23-28 July, 2023, Sapporo Park Hotel, Sapporo, Japan (Poster Presentation)

Title: Azobenzene photoswitches functionalized with various amide linkers and their supramolecular behaviour

Name of the Conference: Inter IISER-NISER Chemistry Meet, 23-25 February, 2024, Indian Institute of Science, Education and Research(IISER), Kolkata. (Poster Presentation)

Anjali Mahadevan:

Title: Reversible Process Involving 2-Isocyanothyl Radical and Iodine-mediated Radical Cyclization in Argon Matrices

Name of the Conference: 31st International Conference on Photochemistry, 23-28 July, 2023, Sapporo Park Hotel, Sapporo, Japan (Poster Presentation)

Suman Barman

Name: Suman K. Barman

Name of the Conference/Institute: 20th International Conference on Modern Trends in Inorganic Chemistry International conference (MTICXX) organized by IISc Bangalore

Dates: 14-17 December 2023 (Attended the conference on invitation)

Name of the presenter: Suman K. Barman

Title of the talk: Hydrogen Evolution by Nickel Complexes: Local proton storage and effect of Local charged substituents

Name of the Conference/Institute: 6th Symposium on Advanced Biological Inorganic Chemistry (SABIC-2024). International conference organized by IACS Kolkata

Dates: January 7-11, 2024

Ujjal K Gautam

Name of the presenter: Dr. Ujjal K. Gautam

Name of the Conference: "Recent Advances in Materials (RAM-90)" held at Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore.

Dates: 7th - 9th, December'23

Name of the presenter: Dr. Maqsuma Banno

Title of the talk: A 'self-activating' Bi₃TaO₇-Bi₄TaO₈Br Photocatalyst and its use in Sustainable Production of Highly Desirable Pro-fluorophoric Rhodamin-110.

Name of the Conference: The 31st International Conference on Photochemistry, ICP 2023, Sapporo, Japan.

Dates: 23rd - 28th, July'23

Name of the presenter: Dr. Maqsuma Banno

Title of the talk: Ocean Splits Ocean: Use of Bi₄TaO₈Cl as Efficient Piezocatalysts.

Name of the Conference: Fostering Catalysis for Societal Benifit, Indo-French Conference, School of Chemistry, University of Hyderabad, India.

Dates: 15th - 17th, January'24

Name of the presenter: Supriya Sil

Title of the talk: Tailoring the Surface Charge of Polyethylene-derived Carbon Dots for Tunable Optical and Catalytic Properties.

Name of the Conference: International Winter School, JNCASR, India

Dates: 04th – 09th, December'23

Name of the presenter: Supriya Sil

Title of the talk: Tailoring the Surface Charge of Polyethylene-derived Carbon Dots for Tunable Optical and Catalytic Properties.

Name of the Conference: Advanced Functional Materials for Sustainable Applications (AFMSA-2024), Shiv Nadar Univeristy, Delhi NCR, INDIA

Dates: 09th - 10th, February'24

Name of the presenter: Arjun Kumar Sah

Title of the talk: Doubled layered Sillen-Aurivillius Sr₂Bi₃Nb₂O₁₁Br as Fatigue-Free Piezocatalysts with Ultrahigh Hydrogen Evolution Performance.

Name of the Conference: Emerging Trends in Photodynamics and Photochemistry (ETPP-2024), IISER Mohali, India

Dates: 26th – 28th, March'24

Name of the presenter: Supriya Sil

Title of the talk: Tailoring the Surface Charge of Polyethylene-derived Carbon Dots for Tunable Optical and Catalytic Properties.

Name of the Conference: Emerging Trends in Photodynamics and Photochemistry (ETPP-2024), IISER Mohali, India

Dates: 26th – 28th, March'24

Name of the presenter: Kiran Kanwar

Title of the talk: Landscaping sustainable conversion of waste plastics to carbon dots and enormous diversity in O₂ harvesting, hypoxia and autophagy.

Name of the Conference: Emerging Trends in Photodynamics and Photochemistry (ETPP-2024), IISER Mohali, India

Dates: 26th – 28th, March'24

Name of the presenter: Ankit Kumar

Title of the talk: Fine-Tuning the Surface Functionality of Plastic Derived-Carbon Dots for Photocatalytic Degradation of Various Dyes.

Name of the Conference: Emerging Trends in Photodynamics and Photochemistry (ETPP-2024), IISER Mohali, India

Dates: 26th – 28th, March'24

Vignesh R Kuduva

- Dr. Kuduva R. Vignesh attended the "20th Modern Trends in Inorganic Chemistry", conference organized by the Department of Inorganic Physical Chemistry, IISc Bangalore, India held on 14-17 December 2023.
- Two Ph.D. students: Mr. Amit Gharu and Ms. Imon Jyoti Dutta attended the "Theoretical Chemistry Symposium (TCS)-2023" held on 7-10 December 2023 in IIT Madras.
- Two Ph.D. students: Ms. Vipanchi and Mrs. Esha Gera attended the "20th Modern Trends in Inorganic Chemistry", conference organized by the Department of Inorganic Physical Chemistry, IISc Bangalore, India held on 14-17 December 2023.
- Four Ph.D. students: Mr. Amit Gharu, Ms. Imon Jyoti Dutta, Ms. Vipanchi, and Mrs. Esha Gera attended the "32nd CRSI National Symposium in Chemistry" held 2-4 February 2024 in BITS Pilani, India.

DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES

SUMMARY OF RESEARCH WORK

Anoop Ambili

In the past year, Ambili's research group focused on the occurrence and characteristics of emerging pollutants in freshwater environments, specifically analyzing microplastics (MPs) and phthalate esters (PAEs) in Rewalsar Lake, Northwest Himalaya. MPs, predominantly composed of polystyrene, polyethylene, and polypropylene, were found in all samples, with higher concentrations near domestic sewage effluents and areas with intense religious and tourist activities. This underscores the significant impact of human activities on MP distribution. We also identified PAEs, including di-isobutyl phthalate, dibutyl phthalate (DBP), and di(2-ethylhexyl) phthalate (DEHP), in the sediments, with DEHP levels exceeding recommended environmental risk limits. These findings highlight the urgent need for effective waste management to mitigate pollution. Additionally, their group assessed saturated hydrocarbons and polycyclic aromatic hydrocarbons (PAHs) in sediments from the Mandapam island groups, Gulf of Mannar, India. By using hydrocarbon distribution patterns and n-alkane indices, they differentiated between biogenic and anthropogenic sources. Their study indicated significant petroleum pollution, supported by diagnostic ratios and the presence of an unresolved complex mixture (UCM) and elevated hopane concentrations. Sites near shipping activities and tourism exhibited the highest contamination levels. This research provides crucial data on the contamination profiles and sources of MPs, PAEs, and hydrocarbons in freshwater and marine environments, informing future management strategies to protect aquatic ecosystems from pollution. In summary, Ambili's research has significantly advanced the understanding of emerging pollutants in both freshwater and marine environments. By identifying key contamination profiles and sources, they have provided essential data that can guide future efforts in pollution management and mitigation. Their work underscores the need for continued research and targeted interventions to protect aquatic ecosystems from the adverse effects of human activities and emerging pollutants.

Arvind Kumar Shakya

Shakya's research group is continuously involved in the procurement of equipment and other activities related to setting up his research lab. He has submitted a project as PI under DST/WTC/2K23 call for "Development of a fixed bed bioreactor system for synchronous removal of coexisting multiple contaminants from drinking water sources". He is also a Co-PI in a project proposal, "Occurrence, distribution, and interactions of organic, inorganic and microbial contaminants in groundwater systems from semi-arid Punjab: Implications for water quality and public health," submitted under the CSR scheme of the HEFA. Furthermore, he is also involved as a Co-PI in another project under DST/WTC/2K23.

Baerbel Sinha

In the past year Sinha's research group at IISER Mohali has made significant contributions towards quantifying the contribution of open waste burning emissions to India's air pollution crisis and proposing viable solutions towards mitigation of these emissions. Their work highlights that the successful promotion of traditional consumption patterns and a culture that values reuse and recycling can limit waste production to 268 ± 14 Tgy⁻¹ by 2030 and 356 ± 34 Tgy⁻¹ by 2050, respectively. The adoption of an American style use and throw culture, on the other hand, would result in a waste production of 547 Tgy⁻¹ and 828 Tgy⁻¹, by 2030 and 2050, respectively, and would see Indian megacities choking under their waste mountains. Aggressive promotion of source segregation coupled with the conversion of biodegradable waste to biogas under the Sustainable Alternative Towards Affordable Transportation (SATAT) compressed biogas blending program of the Indian Government, not only helps to save foreign currency and promotes a carbon-neutral transport sector, but also helps to reduce the amount of waste subjected to open waste burning from 68 (45-105) Tgy⁻¹ in 2015 to 21-48 Tgy⁻¹ and 2-22 Tgy⁻¹ of waste 2030 and 2050, respectively. Such a policy choice will eliminate open burning emissions other than landfill fires in the mid-2030s, one decade earlier compared to what can be accomplished under a business-as-usual scenario. Waste burning is the dominant source of chloride over continental India Indo-Gangetic Plain. Since ammonium chloride dominates inorganic aerosol formation from ammonia in the Indo-Gangetic Plain during winter and results in a massive increase in the aerosol burden during peak pollution events, a reduction in open waste burning can make significant contributions towards improving wintertime air quality. The ammonium chloride aerosols also aggravate severe winter fog episodes over the Indo-Gangetic Plain.

In addition, her group contributed to work assessing the costs of ozone pollution in India for wheat producers, consumers, and government food welfare policies and a study evaluating synergistic ozone-climate control to address emerging ozone pollution challenges.

Chandrakanta Ojha

Major research activities:

- Combined ascending and descending pass data of Sentinel-1 SAR sensor data of European Space Agency (ESA) for generating a 3-D velocity map (horizontal and vertical direction) and displacement time series. Further, develop an integrated framework combining InSAR-derived vertical land motion (VLM) and Groundwater data to characterize an aquifer system and model groundwater dynamics over the Chandigarh-Mohali region.
- InSAR-derived velocity map combined with machine learning technique for infrastructure monitoring and vulnerability risk assessment over the Joshimath landslides region in the Chamoli district of Uttarakhand
- Kerala's coastal land was integrated with sea level rise (SLR) data of tide gauge stations under various IPCC scenarios, and the impact assessment was projected from the current to the next 100 years over the coast using a U-net-based machine learning approach.
- Processed long times-series Sentinel-1A/B data over Gujarat Gulf of Khambat region for flood mapping for coastal inundation risk assessment.
- Prepared and submitted research proposals to various national funding agencies (e.g.,) ISRO-Respond, NISAR, etc.
- Submitted papers to multiple international conferences like AGU, EGU, IGARSS, AOGS and presented talks at those meetings.
- Attended various training programs and delivered invited talks and guest lectures to various university and research organizations in India.
- Act as a primary convener of a session in the Asia Oceania Geosciences Society (AOGS)- symposium -2023, Singapore on August 2023.
- Act as a primary convener and chair of a special session in the InGARSS-2023 symposium in Bangalore, India, during December 2023.
- Completed setting up my new research laboratory and procured facilities and equipment for the Satellite Remote Sensing Lab (SRS Lab) at IISER Mohali.
- Field survey visits to SAS Nagar and Chandigarh (Punjab) on August 2023 and Joshimath, Chamoli district (UK) on 28 March 2024.
- Guest Editor of Remote Sensing Journal's special issue

Raju Attada

Attada's research group has been actively engaged in several projects from April 1, 2023, to March 31, 2024. The summary of their recent work: Dr. Chaubey has been investigating future changes in hydro-climate extremes over the Hindu Kush Himalaya (HKH) in the context of climate change. His research focuses on predicting the extremity of hydro-climate events such as droughts and floods. To achieve this, he employs various emission scenarios based on the Shared Socioeconomic Pathways from the Coupled Model Intercomparison Project Phase 6 climate model datasets. Ms. Sharma (PhD fellow) has been developing a Multi-Physics Ensemble Framework to better represent precipitation in the Western Himalayas. Her work includes an assessment using the Weather Research and Forecasting (WRF) model to improve precipitation predictions in this region. Mr. Saini (PhD fellow) has been studying the key drivers of extreme rainfall events. She uses advanced numerical weather prediction models to understand and analyze these phenomena. Ms. Athira (PhD fellow) is exploring the connection between sudden stratospheric warming and extreme cold waves in North India. Her research aims to understand how these events are linked to cold stress conditions in the region. Each of these projects contributes valuable insights into climate and weather patterns, enhancing our understanding of extreme events and their impacts in mountain regions.

Sourabh Bhattacharya

Bhattacharya's research group focused on the anatectic regime responsible for the generation of tungsteniferous granites in parts of NW India. They explored the various factors that could affect the W-Sn fertility of peraluminous granites, focusing on anatectic source and melt-residue equilibrium during anatexis (Fig. a). The aim was to model the equilibrium and disequilibrium melting, and fractional crystallization, to assess their effects on the W-Sn budget of granitic melt. Modelling suggests that ~30-35% of metapelitic source rock partially melts, with muscovite and biotite dehydration reactions primarily contributing W and Sn. However, the metal contribution of these reactions, in terms of W/Sn ratio, is distinct. Upon fractionation, the granitic melt derived by disequilibrium melting (W:141 ppm, Sn: 455 ppm) is significantly enriched in ore metals compared to the one from equilibrium melting (W: 92 ppm, Sn: 355 ppm). Compared to the global average pelite, Sirohi metasediments, being chemically mature, show improved potential to generate a metal-fertile granitic melt. Results highlight the importance of recycled sediments that are pre-enriched in W and Sn prior to anatexis, towards the metal fertility of S-type granites. In addition to this, their group also worked out the subsolidus hydrothermal history of the Balda tungsten deposit, by means of modeling the fluid-rock interaction processes and evolution of late-stage magmatic and ore fluids. Furthermore, they developed an open-source application that utilizes deep learning techniques to simplify and expedite the processing of EPMA mineral-chemical data. In particular, the focus was on developing an application capable of tackling factors such as dataset dimensionality, oxide redundancy, and any inherent compositional bias in their training dataset. Overall, the proposed scheme improves predictive accuracy and reduces operational time and unsystematic errors, facilitating robust

implementation on large mineral-composition datasets. They also address other considerations in ML-based classification program development.

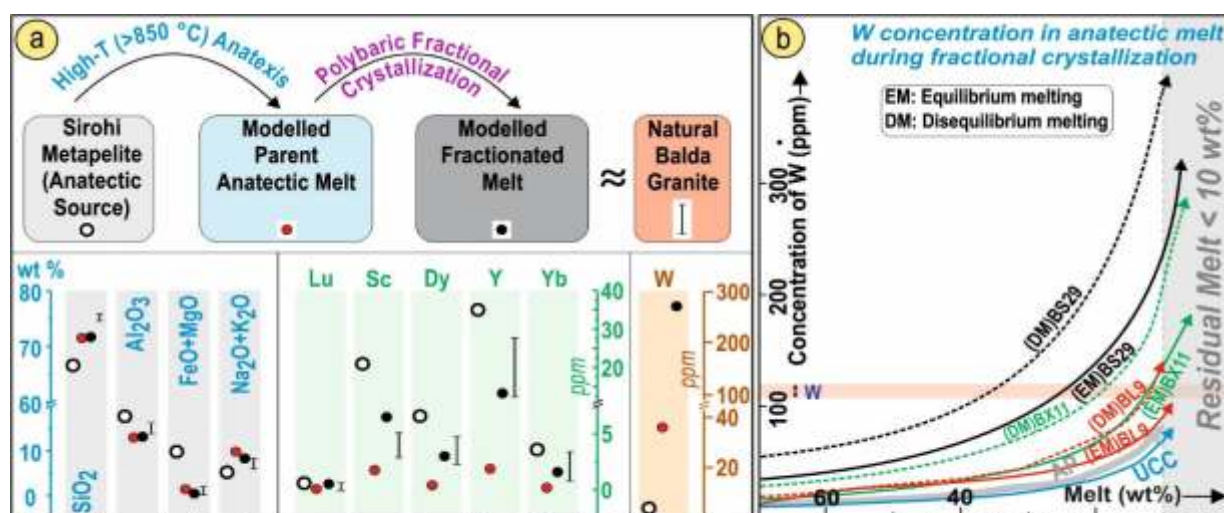


Fig. (a) Diagram showing the elements of anatectic modeling addressing the generation of tungsteniferous granites in NW India. Fig. (b) Modeled W concentrations in anatectic melt during its fractional crystallization path with respect to three metasedimentary protolith samples (BL9, BS29 and BX11). The orange-coloured horizontal bar shows the range of W concentration in melt inclusions reported worldwide from W-Sn granites.

Sunil A. Patil

Patil's research focuses on studying extracellular electron transfer (EET)-capable anaerobic microorganisms from extreme environments and developing integrated microbial electrochemical technologies for electricity-driven bioproduction of chemicals from industrial CO₂ and wastewater management at the point sources. Last year, their group achieved considerable progress in developing microbial electrosynthesis technology for industrial CO₂ utilization. Particularly, the microbial electro-acetogenesis process for biogas upgradation was validated in a few liter-scale systems, and its techno-economic assessment was conducted to identify the key technical bottlenecks associated with its scale-up. Further technology development and scale-up tests are currently in progress. In the wastewater management topic, they reported a low-cost green wall system coupled with a slow sand filter for efficient grey water management with minimized resource consumption and area footprint. This system could offer an economically feasible and easy-to-implement sustainable technological solution for household grey water management, even in the imminent terrestrial space or land constraint scenario. Their group also successfully completed the iHYDROMET (integrated hydroponics-microbial electrochemical technology) system validation for domestic wastewater management by conducting a year-long study in field sites. In a separate study, they found out that the iHydROMET system is suitable for growing not only aesthetic plants (e.g., Money plant, Vinca) but also leafy greens/vegetables (e.g., Spinach, Chilli), along with domestic wastewater treatment at the point sources. They also achieved considerable research progress in isolating a few haloalkaliphilic anaerobic bacteria with different metabolic capabilities by following the electrochemical cultivation approach. These include bacteria capable of sulfide oxidation linked to Mn reduction and nitrate reduction linked to iron oxidation, besides halophilic CO₂-fixing lithotrophic bacteria. Detailed characterization of the novel isolates for their extracellular electron transfer and specific metabolic capabilities is currently in progress.

Patil's research team (Dr. Sunil, Moumita, Ravineet, and Mansi) was among the top winners at the Carbon Zero Challenge 3.0 – a flagship event organized by IIT Madras (2023).



Vinayak Sinha

Sinha's current research is focused on improving a fundamental process-based understanding of reactive gaseous emissions-atmospheric chemistry-air quality and climate and their bi-directional feedback over South Asia. The experimental studies are combined with relevant modeling tools (chemical box models and chemical transport models) to accurately assess air pollution and climate change effects on atmospheric chemistry for proposing mitigation strategies and policies.

Their group has contributed with new strategic knowledge concerning the source apportionment of reactive organic compounds present in the ambient air of Punjab during the post-harvest paddy burning season (Kumar et al., Env Poll, 2023), and in collaboration with IISER Bhopal shed light on the potential of using CO₂ observations over India for the regional carbon budget estimation by improving the modeling system (Thilakan et al., ACP, 2024). Their group also contributed to a study published in PNAS that assessed the costs of ozone pollution in India for wheat producers, consumers, and government food welfare policies (Pandey et. al, PNAS, 2023) and to the understanding of winter fog over IGP (Ghude et. al, BAMS, 2023) as well as a study on ozone-climate control to address emerging ozone pollution challenges (Lyu et al., One Earth, 2023). Meanwhile,

their group completed the measurement phase at the super site Delhi for year-long measurements of gaseous and aerosol chemical constituents of ambient air in Delhi as part of the Ministry of Earth Science sponsored research project "RASACAM", which is led by IISER Mohali in collaboration with the Indian Institute of Tropical Meteorology Pune and the Indian Meteorological Department.



Yunus Ali Pulpadan

During the assessment period, Pulpadan's research group focused on two primary themes: (i) Rainfall-Induced Landslides - investigated the anthropogenic and topographic controls of landslides triggered by rainfall in Himachal and Western Ghats, estimated landslide volumes and developed early warning models, and (ii) Fluvial Incision and Sediment Budget - Studied transient fluvial incision in the headwater channels of the Western Himalayas, and developing low-cost monitoring solutions for sediment budgets in these settings.



These research themes aligned with four major projects awarded to the group, including two sanctioned during the assessment period: ISRO-DMSP Grant: "Rainfall-induced Soil Bedrock Landslides: Volume Estimates and Uncertainties using Existing Scaling Exponents", and Kurita Water and Environment Foundation, Japan Project: "A Novel Framework for Water Quality Prediction Based on Socio-economic Indicators, Satellite Imaging, and Machine Learning." The group investigated a disaster-stricken region of Himachal Pradesh, conducting a quantitative assessment of anthropogenic contributions to

landslide activities in the Lesser Himalaya following an extreme downpour event in July-August 2023. They developed a comprehensive landslide inventory for the region, verified through fieldwork, revealing that anthropogenic sources accounted for 49.9% of the total landslides. This activity level was nearly equivalent to that observed in undisturbed zones, underscoring the need to incorporate anthropogenic landslide controls and incorporate dynamic susceptibility models in future studies. The research also distinguished between triggering and non-triggering rainfall during extreme events in the Lesser Himalaya, a much-needed data for landslide early warning systems.

Additionally, the group studied the role of large landslides and landslide dams in bedrock incision and landscape evolution. Utilizing unmanned aerial vehicles (UAVs) equipped with LiDAR sensors, they conducted multi-temporal assessments of changes in the fluvial systems of Western Himalayan watersheds, analyzing their impact on potential future catastrophic floods and sediment disasters. The UAV-LiDAR technology provided a robust tool for accurately capturing and analyzing the evolving morphology of affected river systems. The study on the Chamoli disaster site and downstream areas offered a detailed record of river incision and channel widening, providing insights into ongoing geomorphic changes. By generating highly accurate Digital Elevation Models (DEMs) through LiDAR technology, the research achieved unprecedented detail and precision in mapping the evolving topography. Comparative analysis of multi-temporal DEMs provided a comprehensive understanding of immediate impacts and established a foundational repository of critical data. This work aims to deliver new quantitative insights into fluvial morphodynamics following large-scale landscape perturbations. Understanding the dynamic evolution of morphological changes caused by events like the Chamoli disaster will deepen our understanding of the implications of climate change on fluvial systems in the foothills of the Himalayas.

DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES

VISITS OF FACULTY MEMBERS

Chandrakanta Ojha

- Civil Engineering, Chandigarh University, Punjab, India, 06 April 2024
- GIS Cell, Motilal Nehru National of Technology Allahabad (MNNIT), Uttar Pradesh, India, 4-5 March 2024
- Geology Department, Panjab University, Chandigarh, India, 12 February 2024
- CSIR-CSIO, Chandigarh, India, 5 December 2023
- DST-CPR, Panjab University, Chandigarh, India, 24 November 2023
- Civil Engineering, Chandigarh University, Chandigarh, India, 18 August 2023
- IEEE GRSS Bombay Section, Mumbai, India, 21 April 2023

Raju Attada

- King Abdullah University of Science and Technology, 10 June -15 July 2023

Sourabh Battacharya

- Institute of Geological Sciences (Warsaw, Poland) for collaborative research work, visit funded by Polish Academy of Sciences.

Sunil A. Patil

- IIT Mandi, September 25-27, 2023

Vinayak Sinha

- CSIR-NAL, Bengaluru, March 13-14, 2024
- University of Dhaka, Bangladesh from 6-7 June, 2023
- Max Planck Institute, Harnack House, Berlin, Germany from 24-25 July 2023
- Max Planck Institute for Chemistry, Mainz, Germany on 20 July, 2023
- National University of Singapore, Singapore from 26-28 September 2023

Yunus Ali Pulpadan

- Doon University, March 20, 2024 (Resource Person and External Examiner).
- Wadia Institute of Himalayan Geology, November 26, 2023 (Resource Person)
- Aligarh Muslim University, February 20, 2024 (Resource Person)
- Kerala University of Fisheries and Ocean Studies February 02, 2024 (Resource Person)
- Punjab University February 14, 2024 (Resource Person)
- Savitribai Phule Pune University July 27, 2023 (Resource Person)

DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES

TALKS DELIVERED

Anoop Ambili

- Anoop Ambili. Lipid Biomarkers: Molecular Tools for Understanding Climate-Human- Fire Dynamics. CHASCON - 2023 (National Conference on Global Science for Global Wellbeing), Punjab University. October 13, 2023.

Arvind Kumar Shakya

- Arvind Kumar Shakya, Water Management (Sustainable Development), KV-2 Chandi Mandir, Chandigarh Cantt, on 18/12/2023.
- Arvind Kumar Shakya, "Bioengineered systems for Sustainable water and wastewater treatment", Rama University Uttar Pradesh, on 05/03/2024.
- Arvind Kumar Shakya, "Bioengineered Systems for Sustainable Water and Wastewater Management & Treatment", Pushpa Gujral Science City, Punjab, India, on 22/03/2024.

Baerbel Sinha

- Dr. Baerbel Sinha presented an Invited talk entitled "Can India leapfrog into a clean air future – perspectives from measurements, source-receptor modelling and emission inventories " at the European Geophysical Union Meeting, 23-28 April 2023 in Vienna, Austria
- Dr. Baerbel Sinha presented an Invited talk "Small or big fires - which ones exert more influence on the atmospheric chemistry over the NW-IGP" at the Max Planck Institute for Chemistry, Mainz, Germany on 6th March 2023
- Dr. Baerbel Sinha presented an Invited talk "Small or big fires - which ones exert more influence on the atmospheric chemistry over the NW-IGP" at the at the Institute for Atmospheric and Environmental Sciences Goethe University Frankfurt on 7th March 2023

Chandrakanta Ojha

- C. Ojha, Satellite-based remote sensing technique for Earth observation, Chandigarh University, 06 April 2024
- C. Ojha, SBAS-based InSAR solution for anthropogenic and natural hazard monitoring and mitigation, 4-5 March 2024
- C. Ojha, Fundamental of SBAS-based Multi-Temporal InSAR Techniques for Deformation Studies, Geology Department, Panjab University, 12 February 2024
- C. Ojha, Monitoring Land Subsidence Due to Groundwater Dynamics Using MT-InSAR, CSIR-CSIO, 5 December 2023
- C. Ojha, Radar Remote Sensing for Monitoring Induced Land Subsidence due to Overexploitation of Groundwater in India and World, Panjab University, 24 November 2023
- C. Ojha, Scope, Opportunity, and Career Aspects in the Field of Satellite Remote Sensing, Chandigarh University, 18 August 2023
- C. Ojha, Advancement on Satellite Radar Interferometry technique monitoring induced land subsidence due to groundwater over-extraction, IEEE GRASS Bombay Chapter, 21 April 2023

Raju Attada

Name of the presenter: Raju Attada

Title of the talk: Evaluation of extreme precipitation climate indices over Hindu-Kush Himalayan in CMIP5 to CMIP6

Name of the Conference/Institute: International Conference On Regional Climate, CORDEX 2023 held at IITM Pune

Dates: 25-29 September 2023

Name of the presenter: Raju Attada

Title of the talk: Changes in Frequency of Central Indian Summer Monsoon Precipitation Extremes during 2005-2020

Name of the Conference/Institute: TROPMET'23, held at Jaipur

Dates: 22-24 November 2023

Name of the presenter: Raju Attada

Title of the talk: Frequency of Central Indian Summer Monsoon Precipitation Extremes during 2005-2020

Name of the Conference/Institute: AOGS, Singapore

Dates: 30 Jul-04 Aug 2023.

Name of the presenter: Nischal Sharma

Title of the talk: Role of Quasi-resonant Planetary Wave Dynamics in Winter Precipitation Extremes over India's High Mountain Region

Name of the Conference/Institute: EGU General Assembly 2023, Vienna, Austria (24-28 Apr 2023).

Name of the presenter: Nischal Sharma (Lightning talk)

Title of the talk: Winter Precipitation Characteristics in an Ultra-scale Convection Permitting Model

Name of the Conference/Institute: International Conference On Regional Climate, CORDEX 2023 held at IITM Pune (25-29 September 2023).

Name of the presenter: Nischal Sharma

Title of the talk: Role of Quasi-resonant Amplification of Planetary Waves and associated Winter Precipitation Extremes over India's High Mountain Region

Name of the Conference/Institute: TROPMET-2023, Birla Institute of Technology Mesra, Jaipur (22-24 November 2023)

Name of the presenter: Rohtash (Lightning talk)

Title of the talk: Evaluation of Monsoon Precipitation Extreme in WRF-based Dynamically Downscaled Reanalysis over the Indian Himalayas

Name of the Conference/Institute: International Conference On Regional Climate, CORDEX 2023 held at IITM Pune (25-29 September 2023).

Name of the presenter: Athira K S (Lightning talk)

Title of the talk: Circulation Patterns of Distinct Cold Wave Conditions in North India

Name of the Conference/Institute: International Conference On Regional Climate, CORDEX 2023 held at IITM Pune (25-29 September 2023).

Name of the presenter: Dr. Pawan Kumar Chaubey

Title of the talk: Projected changes in Compound Extremes under low to high emission SSPs Scenarios

Name of the Conference/Institute: EGU General Assembly 2024

Dates: 14 -19 April 2024

Sourabh Bhattacharya

- Jitendra Kumar Roy, Phase equilibria constraints on the anatexis origin of peraluminous granites parental to tungsten deposits: a case study in NW India. Granitoids, continents, life and puns: A tribute to Hervé Martin - Clermont-Ferrand (France) 5-8th 2023

Sunil A. Patil

- Integrated Microbial Electrochemical Technologies (METs) for wastewater treatment. SERB-sponsored Karyashala workshop "Microbial Fuel Cells: A Sustainable Technology For Clean Water And Green Energy," organized by NIT Tiruchirappalli, March 4-9, 2024.
- Industrial carbon dioxide utilization through integrated bioelectrochemical processes. International Conference on New Horizons in Biotechnology (NHBT-2023), jointly organized by the CSIR-National Institute for Interdisciplinary Science and Technology, Trivandrum and the Biotech Research Society, India (BRSI) at Trivandrum, Kerala, November 26-29, 2023.
- Integrated bioelectrochemical processes for utilizing CO₂ from biogenic sources. Conference on "Catalysis for energy, environment and sustainability (CEES -2023)" & "CO₂India Network 2nd annual meet" held at IIT Mandi, September 25-27, 2023.
- Geobacillus haloalkaliphilicus: a metabolically-versatile haloalkaliphilic bacterium capable of extracellular electron transfer (EET). 6th Asia-Pacific International Society of Microbial Electrochemistry and Technology (ISMET) conference held at Korea Chamber of Commerce and Industry, Seoul, South Korea, July 26-28, 2023.

Vinayak Sinha

- Air quality in an environment impacted by extremes: New perspectives from recent research in South Asia, Invited Talk at 3rd Asia-Pacific Network for Global Change Research (APN-GCR) Workshop for the Impact of the COVID-19 Pandemic on Air Quality of the Monsoon Asia Region in Dhaka, Bangladesh, 6 June, 2023.

Yunus Ali Pulpadan

- Impacts of Anthropocene Hazards and Sensitivity of Mountain Ecosystems. National seminar on "Natural Hazards in the

- Himalayas: Prediction, Mitigation, and Support", March 20-21, 2024, Doon University, Dehradun, India.
- Remote Sensing of Fluvial Systems: UAV-Based Optical Granulometry and Rapid River Incision Mapping in Rishiganga Following a Major Ice-Rock Avalanche. Workshop on "Decoding Clastic Sedimentary Systems", February 20-22, 2024. Aligarh Muslim University, India.
- Post Earthquake - Rainfall induced disasters in tectonically active terrains. ISRO-DMSP workshop on "Application of space technology for landslide hazard, heavy rainfall, and floods in Northwestern Himalayas" . 12-17 February 2024, Punjab University, Chandigarh, India.
- Understanding landslide mechanisms from a remote sensing perspective. ISRO-DMSP Training Program on "Geospatial Insights for Landslide Mapping and Mitigation", 29-07 January 2024, Kerala University of Fisheries and Ocean Studies (KUFOS), Kerala, India.
- Fluvial response to mass movements in the Himalayas: quantifying rapid river incision due to the 2021 Chamoli disaster. 2nd Indo-German week of the young researcher, 25th November – 1st December 2023, SERB-DFG, Wadia Institute of Himalayan Geology, Dehradun, India.
- Landslide hazards in different settings and understanding their mechanisms from a remote sensing perspective; and Hands-on training on automated landslide mapping and machine learning based landslide susceptibility modeling. DST-SERB sponsored workshop on 'Application of Geospatial, Geophysical, and Machine Learning Techniques in Landslide Studies'. 24-30 July, 2023 Savitribai Phule Pune University, Pune, India.



Image credits: Dr. Parth R. Chauhan

DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES

CONFERENCES ATTENDED

Anoop Ambili

- Diptimayee Behera. Late Holocene climate variability and its impact on cultural dynamics in central India. INQUARoma, July 14th – 20th 2023.
- Diptimayee Behera. Investigating possible links between Holocene environmental changes and cultural transitions across India. INQUARoma, July 14th – 20th 2023.
- Diptimayee Behera. Occurrence, distribution and sources of petroleum contamination in reef-associated sediments of Mandapam Group of Islands, Gulf of Mannar, India. Goldschmidt Goldschmidt2023 Conference (Virtual), Lyon (France). July 9th to 14th 2023.
- Diptimayee Behera. Investigating possible links between Holocene environmental changes and cultural transitions across India. Advances in Human Evolution, Adaptation and Diversity (AHEAD meeting), Tarragona, northeast Spain.
- Nishant N. Gradual climatic changes in a Quaternary fluvial section at Mahadeo Piparia, Madhya Pradesh, India. INQUARoma, July 14th – 20th 2023. November 15th to 17th 2023.
- Sunil Kumar. Microplastic contamination and heavy metal in groundwater from semi-arid regions of North-West Indian subcontinent: Characteristics, impacts, and risk assessment. India-Dalhousie Student Research Symposium: Addressing Common Challenges via Research & Innovation / Dalhousie University, Canada. 3rd March 2024
- Sunil Kumar. Quantifying Microplastics abundance and their implications as vectors for heavy metal adsorption in freshwater aquatic system of Kashmir Himalaya. ISEAC-41, Amsterdam, Netherlands. 20th to 24th November 2023.

Baerbel Sinha

- Dr. Baerbel Sinha presented an Invited talk entitled “Can India leapfrog into a clean air future – perspectives from measurements, source-receptor modelling and emission inventories” at the European Geophysical Union Meeting, 23–28 April 2023 in Vienna, Austria
- Dr. Baerbel Sinha presented an Invited talk entitled “Assessment of crop yield losses for Triticum aestivum in Punjab and Haryana using in-situ measurements, relay seeding experiments and the DO3SE model” at the European Geophysical Union Meeting, 23–28 April 2023 in Vienna, Austria
- Dr. Baerbel Sinha attended the Tropospheric Ozone Assessment Report II Workshop in Cologne from 8th to 10th March 2023

Chandrakanta Ojha

- Aparna R, C. Ojha, “SBAS - InSAR Analysis of Coastal Subsidence in Kerala, India, to monitor Flood Inundation Risk Due to Relative Sea Level Rise”, IEEE India Geoscience and Remote Sensing Symposium (InGARSS 2023), Bengaluru (India), December 10–13, 2023.
- Padhi, S. Chawla, P. Dhayal, C. Ojha, “Monitoring Landslide-Subsidence Zone over Joshimath region in North India exploring Sentinel-1 using SBAS-InSAR Technique.” American Geophysical Union (AGU), San Francisco (USA), Dec. 2023.
- Aparna R, C. Ojha “Vulnerability assessment of future flood hazards correlated with coastal subsidence and sea level rise in Kerala, India.” American Geophysical Union (AGU), San Francisco (USA), Dec. 2023.
- Ojha, D.S. Vaka, A. Pepe, Y.S. Rao, “Investigating land subsidence exploring Sentinel-1 data using MT-InSAR technique over Mumbai City, India”, Asia Oceania Geosciences Society (AOGS 2023), Singapore, 30 July- 04 August 2023.
- P. Dhayal, and C. Ojha “Assessment of Land Subsidence and Groundwater Depletion using InSAR technique over Jodhpur city, Rajasthan, India.” Asia Oceania Geosciences Society (AOGS 2023), Singapore, 30 July- 04 August 2023.
- Aparna R, C. Ojha “Assessment of Coastal Subsidence and Inundation Risk due to Sea Level Rise in Kerala, India using MT-InSAR Technique.” Asia Oceania Geosciences Society (AOGS 2023), Singapore, 30 July- 04 August 2023.
- M. Ojha, C. Ojha, S. Goswami, M. Shirzaei, I. Nayak, P.C. Sahu, “Finding suitable aquifer formation for groundwater recharge in a drought-prone area of eastern India.” Asia Oceania Geosciences Society (AOGS 2023), Singapore, 30 July- 04 August 2023.
- P. Dhayal, and C. Ojha “Sentinel-1 data monitoring Land Subsidence and Groundwater dynamics in the populous cities of Rajasthan, India,” European Geosciences Union (EGU) General Assembly, Vienna (Austria), 23–28 April 2023.
- S. Chawla, C. Ojha, and M. Shirzaei, “Subsidence due to groundwater exploitation using InSAR technique over Chandigarh-

- Mohali regions of northern India," European Geosciences Union (EGU) General Assembly, Vienna (Austria), 23-28 April 2023.
- M. Ojha, C. Ojha, I. Nayak, S. Goswami, and P.C. Sahu, "Demarcation of lowered water table zones in a drought-affected area of western Odisha, India," European Geosciences Union (EGU) General Assembly, Vienna (Austria), 23-28 April 2023.
- Sharma, N. Sagwal, and C. Ojha, "Investigating InSAR-derived land motion due to aquifer compaction in the northeast regions of Haryana, India," European Geosciences Union (EGU) General Assembly, Vienna (Austria), 23-28 April 2023.

Raju Attada

- Deepak P, Raju Attada and Amita Kumari (2023) Exploring the Vertical Moist Thermodynamic Characteristics of the Extreme Rainfall over Monsoon Core Region, International Conference On Regional Climate, CORDEX 2023
- Rohtash Saini and Raju Attada (2023) Dynamically downscaled Indian Summer Monsoon Precipitation Characteristics over Indian Himalayas, International Conference On Regional Climate, CORDEX 2023 held at IITM Pune
- Rohtash Saini and Raju Attada (2023) Western Himalayan Extreme Precipitation Events in High Asia Refined Analysis: Climatology and Variability, 30th July to 04 August 2023 at SUNTEC Singapore.
- Raju Attada, Sreehari K, Nischal, Rohtash and K P Sooraj (2023) Evaluation of extreme precipitation climate indices over Hindu-Kush Himalayan in CMIP5 to CMIP6, International Conference On Regional Climate, CORDEX 2023 held at IITM Pune
- Attada R. et al. (2023) Recent Changes in Indian Summer Monsoon Core Region's Precipitation Extremes, AOGS, Singapore, 29 July-4 August 2023
- Rohtash, Attada R, Nischal, and K Sreehari (2023). High Asia Refined analysis-based Monsoon precipitation characteristics over Indian Himalayas. 23-28 April 2023. EGU General Assembly 2023.
- Nischal, Attada, R., and Hunt, K. M. R.: Role of Quasi-resonant Planetary Wave Dynamics in Winter Precipitation Extremes over India's High Mountain Region, EGU General Assembly 2023, Vienna, Austria, 24-28 Apr 2023, EGU23-16756.
- Nischal, Attada, R., Anantharaj V., Radhakrishnan, C., and Sreehari, K. (2023). Winter Precipitation Characteristics in an Ultra-scale Convection Permitting Model. 25-29 Sep, Lightning Talk and Poster Presentation, ICRC-CORDEX 2023, IITM-Hub.
- Nischal, and Attada, R. (2023), Intense Western Disturbance Associated Extreme Precipitation Events over the Western Himalayas as Simulated by WRF Model. 30 Jul-04 Aug, Poster Presentation, AOGS2023, Singapore.
- Nischal, Attada, R., Hunt, K. M. R., Barlow, Mathew (2023). Role of Quasi-resonant Amplification of Planetary Waves and associated Winter Precipitation Extremes over India's High Mountain Region. 22-24 Nov, Oral Presentation, TROPMET-2023, Jaipur.
- Athira K S and Raju Attada. (2023), Negative Phases of Arctic Oscillation Trigger Extreme Cold Waves in North India. 23-25 Aug, Poster Presentation, OSICON, INCOIS Hyderabad.
- Athira K S and Raju Attada. (2023), Circulation Patterns of Distinct Cold Wave Conditions in North India. 25-29 Sep, Lightning Talk and Poster Presentation, ICRC-CORDEX 2023, IITM-Hub.
- Athira K S and Raju Attada. (2023), Connecting Arctic Warming to Severe Winter Temperatures in North India. 11- 15 Dec, Poster Presentation (online), AGU 2023.

Sourabh Bhattacharya

- Jitendra Kumar Roy, Phase equilibria constraints on the anatexis origin of peraluminous granites parental to tungsten deposits: a case study in NW India. Granitoids, continents, life and puns: A tribute to Hervé Martin - Clermont-Ferrand (France) 5-8th 2023

Sunil A. Patil

- Sadhotra C. and Yadav S., "Understanding the Membrane Components Involved in the Extracellular Electron Transfer Process of Haloalkaliphilic Geoalkalibacter Halelectricus" at the North American - International Society for Microbial Electrochemistry and Technology (NA-ISMET) 2024 conference, Houston, Texas, U.S.A., April 3-5, 2024. (Poster)
- Ravi K. Yadav and Sunil A. Patil, "Assessing the field-scale performance and environmental impact of integrated Hydroponics-Microbial Electrochemical Technology (iHydroMET) for sewage management at point sources" Oral presentation at the India-Dalhousie Student Research Symposium, 3-4 April 2024. (Oral)
- Ravineet Yadav, Mohammed Qasim, and Sunil A. Patil, "pyMES: A Set of Python Tools for Mathematical Modelling, Prediction of Rational Experiment Design and Scale-up of Microbial Electrosynthesis from CO₂" at The Carbon Recycling Network - Fourth Annual Conference, Nr Macclesfield, Cheshire, UK, March 25-27, 2024 (Poster)
- Srishti Chaudhary, Srinivasan Krishnamurthi, and Sunil A. Patil, "A novel nitrate-reducing Halomonas sp. possessing extracellular electron transfer capability from a haloalkaline environment" at Second South Asian Symposium on Microbial Ecology at Kathmandu Nepal, 1-3 November, 2023. (Poster)
- Ramandeep Singh and Sunil A. Patil, "Haloalkaliphilic bacteria capable of linking sulfide oxidation to manganese(IV) oxide reduction" at Second South Asian Symposium on Microbial Ecology at Kathmandu Nepal, 1-3 November, 2023. ("Flash oral)
- Moumita Roy, Mansi, and Sunil A. Patil, "Performance assessment of the liter-scale microbial electro-acetogenesis process for biogas upgradation through CO₂ utilization" at 6th European Meeting of the International Society for Microbial

- Electrochemistry and Technology (EU-ISMET), Wageningen, Netherlands, Sept 6–8, 2023. (Oral)
- Moumita Roy, Mansi, and Sunil A. Patil, "Bench-top validation of the electro-acetogenesis process for biogas upgradation through CO₂ utilization" at Microbial/Enzymatic Electrochemistry Platform (MEEP) symposium, Lucerne, Switzerland, July 5-7, 2023. (Oral)

Vinayak Sinha

- Vinayak Sinha, Aligning Clean Air and Climate Action: Selected insights from a decade of atmospheric chemistry research over South Asia, Invited Talk 5th edition India Clean Air National Summit, Bengaluru, 24.08.2023

Yunus Ali Pulpadan

- Attended and Co-Chaired the session 'Machine learning applications in landslide science' at World Landslide Forum6 held in Florence, Italy14 - 17 November, 2023.
- Attended and Co-chaired a session the 'Hazard mapping and modelling, spatial vulnerability assessment, and disaster risk' at the 13th International Conference of the International Society for the Integrated Disaster Risk Management (IDRiM). 28 - 30 September 2023, IIT Roorkee, India



Image credits: Dr. Yunus Ali Pulpadan

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

SUMMARY OF RESEARCH WORK

Adrene Freeda D

Dr Freeda is working on two papers. One of the papers is titled as "Translating the Dumpsters: A Scatological Reading of Gabriel Garcia Marquez's *The Autumn of the Patriarch*" and is pursued with a coauthor Layalakshmi R. She is also working on a single authored paper titled "Sound and Silence in Chaplin's *City Lights* and Fritz Lang's *M*"

Anu Sabhlok

Anu Sabhlok and Ritajyoti Bandyopadhyay received the SPARC grant (July 2023) for a project titled 'Assembling the city: Gender and utility infrastructures in North India'. Fieldwork for this project started in August 2023 and students from the HSS622 (Cities: Urban Theory and Lab) course participated along with HSS doctoral students. Fieldwork in Shimla was conducted in July 2024. Their group collected participant observation, interviewed key stakeholders on water and sanitation related aspects, gathered archival data from local newspapers and HP State archives and Le Corbusier center.

Anu Sabhlok received a grant from Open Philanthropy to support research on air pollution in small-town North India. This project is in collaboration with Dr. Rohit Negi at Ambedkar University. They aim to identify local sources of pollution and better understand how residents and relevant government officials perceive the issue. <https://www.goodventures.org/our-portfolio/grants/iiser-mohali-north-india-pollution-research/>

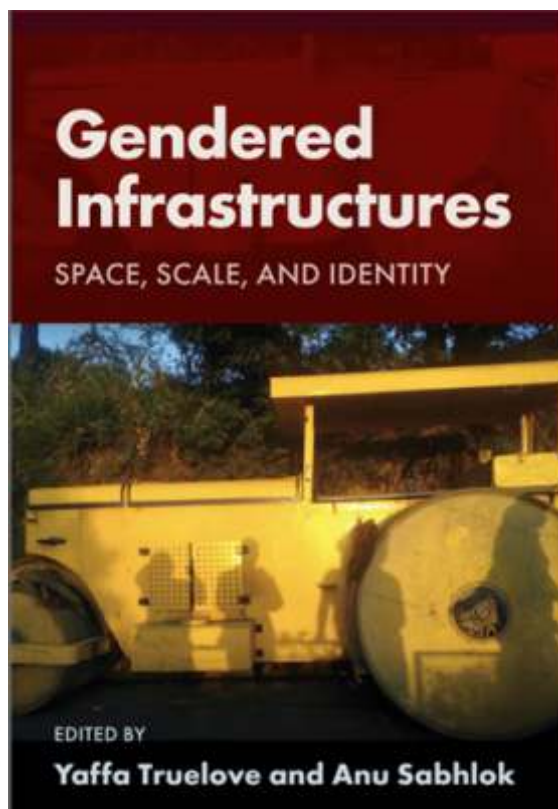
They conducted preliminary fieldwork to identify sites for study in Punjab and Himachal and two sites were identified: namely Bhatinda in Punjab and Mandi in Himachal. So far they have put together an environmental history of Bhatinda and Sundernagar (Mandi) that reveals connections between water, air and soil pollution.

They conducted fieldwork on the Hindustan Tibet Road in November 20023 and July 20204, The fieldwork focused on gathering oral histories of locals, labourers and BRO officials to document the history of the old Hindustan Tibet Road and to understand its current alignment, labour and material processes related to the road.

Hemantika Basu, Postdoc in HSS conducted fieldwork on Placement Agencies and the Commodification of Care Domestic Labour in Kolkata. In depth interviews were conducted with different placement agencies located primarily in the Eastern and Southern part of the city (witnessing proliferation) and child-care givers (workers) associated with these placement agencies were interviewed on their working lives.

Currently a research article based on the findings is being developed for presentation in the upcoming GLU Conference in September 2024.

Hemantika Basu published a book chapter entitled Hierarchization in Healthcare: Female Nurses and Ayahs in Private Healthcare in Siliguri, West Bengal In M. John and C. Wichterich (Eds.). *Who Cares? Care Extraction and Struggles of Indian Health Workers by ZUBAAN: New Delhi.*



Debdulal Saha

Dr Saha is currently working on the effects of the technology and digital platforms on the labour markets. Currently, he has undertaken two projects under this theme which are based on primary fieldwork. First, a major research project on 'Employment, Digital Labour and Urban Precarity: Insights from Chandigarh, Kolkata, Hyderabad and Mumbai' are being conducted. The Indian Council of Social Science Research (ICSSR), New Delhi funds this project. Primary data has been collected and data are being analysed. Second, in an IISER Mohali supported research Dr Saha is developing a Labour Precarity Index (LPI) in platform economy and urban informal economy based on secondary data and primary survey.

Based on the above two undertaken projects, in this period, he submitted a mobility research project on 'Effects of Digital Mediation of Urban Labour Markets: Insights from the New Gig Economies in India' for the Ministry of Education, Government

of India under Scheme for Promotion of Academic and Research Collaboration (SPARC) to collaborate with Brandeis University, USA and University of Louisville, USA which has been granted in April 2024.

Parth R. Chauhan

Laboratory work in the Paleoanthropology & Archaeology Lab included lithic analysis, vertebrate fossil analysis, rock art image analysis and related data collection and entry through 3D-scanning, measurements, relevant qualitative and quantitative attributes. Archaeological, geological and paleontological fieldwork was carried out by various lab and project members in the local Siwalik Hills, Thar Desert, Maharashtra, and Goa. Collaborative links for future research projects were made with colleagues in Kashmir University, Shiv Nadar University and Government of Madhya Pradesh in Bhopal and with colleagues in Indonesia. The lab also hosted a visit by Prof. Bruce Bradley (Retired, University of Exeter, U.K.) for consultation purposes and intellectual interactions with lab members. Site visits (e.g. Masroor rock cut temples) were made in the Kangra Valley of Himachal Pradesh and in the Bearma Valley of Madhya Pradesh (e.g. Bandavgarh Nationak Park).



Rajesh Venkatasubramanian

Rajesh's research continues to investigate the history of the progressive literary movement in Tamil and the intellectual history of various strands of the Left in Tamil Nadu. During the last year, he published a chapter titled 'Progressivism and Tamil Modernity: Tracing the History of Progressive Literature in Tamil, 1940-1970' in an edited volume on Indian Modernities: Literary Cultures from the 18th to the 20th Century by Routledge. The chapter attempts to weave a story of literary progressivism in the Tamil language of the mid-20th century, focusing on the lives of literary personalities and their intellectual output. During June and July 2023, Rajesh was affiliated with the International Centre for Ethnic Studies (ICES), Sri Lanka, as a Research Fellow. He travelled around Sri Lanka, meeting and interviewing literary scholars affiliated with the progressive literature of Sri Lankan Tamils. Upon his return to India, Rajesh was invited to contribute a keyword entry for an edited volume on Decolonial Keywords: South Asian Thoughts and Attitudes to be published by Bloomsbury publisher. He submitted the entry for the volume to be published in the coming year. Rajesh is on sabbatical leave for 2024, affiliated with the Madras Institute of Development Studies (MIDS), trying to complete a few more chapters for the intended monograph on literary progressivism in Tamil Nadu and Sri Lanka.

Ritajyoti Bandopadhyay

After finishing a monograph, Dr Bandopadhyay started a new project on Calcutta's political modernity in the second half of the twentieth century. Currently, he is collecting research materials in various repositories in India and abroad. During this time, two of his PhD students submitted and defended their PhD theses.

During this period, I have also published two articles in Q1 journals:

- Ritajyoti Bandyopadhyay (2023): 'A Gramscian reading of Oli Mould's Seven Ethics Against Capitalism'. Dialogues in Human Geography (SAGE, Q1, peer reviewed forum article): <https://journals.sagepub.com/doi/10.1177/20438206231177083>
- Shreya Ghosh and Ritajyoti Bandyopadhyay (senior author), (2024): 'Labour Segmentation in NCR Delhi's Automobile Sector: A Political Response of Capital to Labour Struggles', Third World Quarterly (Taylor and Francis, Q1): <https://doi.org/10.1080/01436597.2024.2327457>

There were several vibrant discussions around my monograph in international journals during the period under review:

Book Forum on Streets in Motion:

Society & Space (SAGE, Q1):

<https://www.societyandspace.org/book-review-forums/streets-in-motion-the-making-of-infrastructure-property-and-political-culture-in-twentieth-century-calcutta-by-ritajyoti-bandyopadhyay>

Reviews of my Monograph in Major Peer Reviewed Journals:

Antipode (Wiley, Q1):

<https://antipodeonline.org/2023/03/20/streets-in-motion/>

International Journal of Urban and Regional Research (Wiley, Q1):

https://www.ijurr.org/book_review/ritajyoti-bandyopadhyay-2022-streets-in-motion-the-making-of-infrastructure-property-and-political-culture-in-twentieth-century-calcutta-cambridge-cambridge-university-press/

Society and Culture in South Asia (SAGE):

<https://journals.sagepub.com/doi/10.1177/23938617221145808>

Social Change (SAGE):

<https://journals.sagepub.com/doi/10.1177/00490857231168413>

Economic and Political Weekly:

<https://www.epw.in/journal/2023/27/book-reviews/historicising-street.html>

Sunny Kumar

In this period, Dr Kumar primarily worked on research article titled 'Rethinking Colonial Difference:

Investigating the Discourse of Punjab's Turbulence and the Idea of Non-Regulation'.

This article critically assesses the theories of *colonial difference* which locate its emergence in the peculiar conditions of the colony or the colonial rule. Refuting the underlying assumptions of such theories, he argues that *colonial difference* was primarily a product of the imperial imagination and was not reflective of any essential feature of the colony. Its purpose was to characterize the colony as devoid of any substantive political and cultural merit. As an instance of such an application of the concept of *colonial difference*, he studies the construction of the discourse of turbulent Punjab by the British in the nineteenth century which construed the inhabitants as inherently unruly, violent, and treacherous and recommended colonization as necessary for peace and stability in the region. He shows that the discourse of Punjab's turbulence was more a reflection of British anxieties emanating from the expansive, violent, and racially exclusive nature of their project rather than of any intrinsic trait of the region. More importantly, it attempted to validate the establishment of a more authoritarian non-regulation administration in Punjab without sacrificing the liberal credentials of the British empire. By closely studying the official debates in the post-annexation era, he shows how contrarian philosophies of governance contented to settle the fate of Punjab and how colonial difference, in this case, the motif of turbulence, inherited and emanated from the universalist character of British colonialism and was deployed in accordance with the contingencies of its imperial project rather than the colonial context.

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

VISITS OF FACULTY MEMBERS

Anu Sablok

- IISER Pune: Feb 2023. Member comprehensive external peer Review Committee
- IISER Pune: Dec 2023. Inter IISER HSS meet

Parth R. Chauhan

- Parth R. Chauhan visited Shiv Nadar University. Interaction with faculty of Department of Archaeology. March 14th, 2024.

Rajesh Venkatasubramanian

- Visited the Faculty of Arts, Punjabi University, Patiala, 20 April 2023.
- Visited the Department of Humanities and Social Sciences, IIT Madras, 24-28 April 2023.
- Visited the Department of English and Cultural Studies, Panjab University, Chandigarh, 11-12 May 2023.
- Visited the International Centre for Ethnic Studies (ICES), Colombo, Sri Lanka, 26 June 2023.
- Visited the Department of Tamil, University of Jaffna, Sri Lanka, 11 July 2023.
- Visited the UGC-Human Resource Development Centre, Panjab University, Chandigarh, 20 September 2023.
- Visited the Department of Humanities and Social Sciences, IISER Pune, 9-11 December 2023.

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

TALKS DELIVERED

Anu Sabhlok

- Anu Sabhlok along with the Shehar Collective. Title of the talk: Design as prompt: experiments in pluriversal politics and southern urban practice. Name of the Conference/Institute: Youth Cartographies: A Methodologies Workshop Pondicherry. Dates: 12-14 March, 2024

Debdulal Saha

- Debdulal Saha. Gig Economy and Urban Precariat in India. National Seminar on "Social Science Research in India: Potential, Prospects and Priorities organised by Centre for Research in Rural and Industrial Development (CRRID), Chandigarh. 29 February - 01 March 2024.

Parth R. Chauhan

Rajesh Poojari

- Rajesh Poojari. Title: "Introduction to the Archaeology-Palaeontology-Anthropology Lab and archaeological artefacts" for IISER Mohali Foundation Day. 27th September 2023
- Rajesh Poojari. Definition and Concept of Conservation and Preservation in Archaeology, IISER Mohali, 21st August 2023 and Global Rock Art for HSS616, IISER Mohali, 19th Sept. 2023.
- Rajesh Poojari: The Archaeological Process: on-site and in the lab. Primary Students, BD Somani School, Mumbai, 3rd Nov 2023.
- Rajesh Poojari: Introduction to Museology and Conservation. Diploma students, Archaeology, INSTUCEN Mumbai, 16th Dec.

Parth R. Chauhan

- Parth R. Chauhan presented online: Analysing Palaeolithic India through Lithic technology for Speaking Archaeologically. November 18, 2023.
- Parth R. Chauhan presented 2 lectures online South Asia and human evolution in global context for Savitribai Phule Pune University. September 29 and October 4, 2023.

Rajesh Venkatasubramanian

- Theory-Literature Interface: Possibilities of Re-Searching India. Department of English and Cultural Studies. Panjab University, Chandigarh. 11 May 2023.
- Historiographies of Language, Literature and Culture. UGC-Human Resource Development Centre. Panjab University, Chandigarh. 20 September 2023.
- Literature and History: Possibilities of a Dialogue. South Eastern University, Oluvil. Sri Lanka. 19 July 2023.

Sunny Kumar

- 'Trends of Indian National Movement from 1920-30s' at History Department, Shiv Nadar University on 12th March.
- 'Global History, Global South and Decolonisation: Few Critical Reflections' in "Writing Global History: Global South Perspectives," held on 8-9th March 2024 at the University of Delhi.
- 'Decolonisation and Global South: Some Foundational Issues in a Promising Project' at Global History as Practice, ECR Workshop organised by Global History and Culture Centre, University of Warwick, 4-5th April, 2023

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

CONFERENCES ATTENDED

Anu Sabhlok

- Name of the presenter: Subhashri Sarkar. Title of the talk: 'She' the taxi driver : A Feminist Political Economy Approach to the Platform Economy. Name of the conference: Association for Heterodox Economics Conference (AHE) 2024. University of WEst England, Bristol..Dates: 10-12 July, 2024
- Name of the presenter; Anu Sabhlok along with the Shehar Collective. Title of the talk: Climate Change and the Small City: A view from Abohar. Name of the Conference: International conference on Sustainable and Inclusive Urban Development in Global South: Experiences and Future Strategies. August 10th-12th, 2023

Debdulal Saha

- Debdulal Saha. Digital precariat: Transport workers in urban India. 64th Annual Conference by the Indian Society of Labour Economics (ISLE) organised ISLE & School of Economics, University of Hyderabad at Hyderabad. 29-31 March 2024.
- Thangsiandong Guite. Gaps in the regional development of Northeast India. 1st Annual International Conference on Social Sciences organised by Mizoram University (MZU). 8-10 November 2023.
- Bikash Padhan. Poverty, Human Development and Growth in India. International Conference on 'Rethinking Economic Development in India: Sustainability, Livelihood and Efficiency' organised by the Department of Economics, Nagaland University in collaboration with Nagaland Economic Association. 12-13 October, 2023.
- Guguloth Srikanth. Tribal Development in India: A study on Socio-economic, Health and Educational Status of Tribals. International Conference on 'Rethinking Economic Development in India: Sustainability, Livelihood and Efficiency' organised by the Department of Economics, Nagaland University in collaboration with Nagaland Economic Association. 12-13 October, 2023.
- Alinda Merrie Jan. Internalising Social Reproduction in Site of Production: The Conundrum of Stigmatised Labour and Empowerment. 64th Annual Conference by the Indian Society of Labour Economics (ISLE) organised ISLE & School of Economics, University of Hyderabad at Hyderabad. 29-31 March 2024.
- Alinda Merrie Jan. Attended postgraduate workshop on 'Advanced Research Methods' organised by Association for Heterodox Economics at the University of Leeds, UK. 16-18 January 2024.
- Anibesh Singh. Attended postgraduate workshop on 'Advanced Research Methods' organised by Association for Heterodox Economics at the University of Leeds, UK. 16-18 January 2024.
- Anibesh Singh. Attended workshop on 'Foundations of Applied Econometrics' organised by the Indian Econometric Society and hosted by BML Munjal University and Birmingham City University. 14-20 December 2023.
- Rishiraj Sinha. The Making of Exploitative Practices in the Tea Industry of India. International Conference on 'Migration and Sustainable Development: Opportunities, Challenges and Way Forward' organised by Tata Institute of Social Sciences and International Institute of Migration and Development at Mumbai. 15-16 December 2023.
- Rishiraj Sinha. A case of institutional exploitation: Understanding the labour question in the Tea Industry of India. 7th Young Social Scientists' Conference organised by Omeo Kumar Das Institute of Social Change and Development (OKDISCD), Guwahati. 26-28 February 2024.
- Rishiraj Sinha. Charting Institutional Reforms in the Tea Industry: A Labour-Centric Perspective. 64th Annual Conference by the Indian Society of Labour Economics (ISLE) organised ISLE & School of Economics, University of Hyderabad at Hyderabad. 29-31 March 2024.

Parth R. Chauhan

- Ketika Garg, Parth R. Chauhan, Rajesh Poojari. CAA 50 years of synergy, Amsterdam, 3-6 April, 2023. 164. Exploring Pathways Between Rock Art Sites in Central India Using A Network Approach: Implications for Cultural Dispersals and Social Interactions (PPT).
- A.M. Joshi, M. Tanksale, R. Poojari, S. Chopra, A. Srinivas, R. Patnaik, P. Sukumaran, A. Kaur, A. Deshpande, T. Padhan, V. Singh, P. Chauhan. A New Assemblage of Proboscidean Fossils From Central India and Associated Stratigraphic and Taphonomic Observations (POSTER). Society of Vertebrate Paleontology's 83rd meeting in the Queen City, Cincinnati, Ohio, USA, Oct 18-21, 2023.

- YezadPardiwalla and Vijay Sathe. Out of the Glue. Unravelling fossil localities in the cemented bed of the Bearma, a lesser-known river valley in Madhya Pradesh, Central India. INQUA 2023, Rome Italy from 14th-20th July, 2023.
- Anubhav Preet Kaur. Palaeoecological implications for hominin dispersal(s) in the Pinjor Formation (2.58-0.63 Ma) in the Siwalik Hills north of Chandigarh in northern India. INQUA 2023, Rome Italy from 14th-20th July, 2023.
- Anubhav Preet Kaur. Palaeoecological context of hominin adaptations from Early-to-Middle Pleistocene (2.58-0.6 Ma) in the Siwalik Hills of northern India. Paleoanthropology Society annual meeting. March 2024.
- Parth R. Chauhan, Jigna Desai, Prabhin Sukumaran, Mrudula M. Mane, Mihir Tanksale, Tejas Garge, Varad Sabnis. Imaging Ancient Images: Multifaceted observations of select petroglyph sites in the Konkan zone of Goa and Maharashtra. Rock art conference and workshop. Maharashtra and Goa state governments. January 22 to 28, 2024.
- Parth R. Chauhan attended conference on Luminescence dating at PRL. Ahmedabad. February 21-23, 2024.
- Parth R. Chauhan. From Stones to Lines on Stones: Documenting prehistoric artifacts & rock art presented at Advanced methods in Historical & Archaeological Methods; February 5-7, 2023; CUK, Karnataka.
- Parth R. Chauhan presented (with Prabhin Sukumaran, Jigna Desai and Mrudula Mane) Comparison of Konkan petroglyphs with rock paintings. Conference on prehistory of Maharashtra. Government of Maharashtra, Nashik. November 23-25, 2023. Included site visit to Gangapur.
- Parth R. Chauhan presented Prehistoric overview of Maharashtra and new research trends for conference on Maharashtra Cultural Heritage. July 6-8, 2023.
- Parth R. Chauhan attended inter-IISER-HSS conference/workshop at IISER Pune. December 9-11, 2023.
- Parth R. Chauhan attended a workshop on rock art at Benares University. October 3 to 10, 2023. Sponsored by IGNCA.
- Parth R. Chauhan presented online: Considering paleoanthropological connections between China, the Indian Subcontinent and other relevant Asian zones. ATEs conference for ATEs conference, Lanzhou, China. August 23-25, 2023.
- Parth R. Chauhan attended human evolution workshop in Indonesia and visited important cultural heritage sites (e.g. Sangiran). September 11 to 25, 2023.
- Parth R. Chauhan presented online: Introduction to Indian prehistory for Talaash, Jharkhand. August 14, 2023.
- Parth R. Chauhan presented online: Current status of prehistoric archaeology research in India. For World Anthropology Congress. August 2023. Bhubhaneshwar.
- Parth R. Chauhan attended workshop as advisory board member on establishing luminescence lab at MPSCT, Bhopal. July 4, 2023.
- Parth R. Chauhan presented Current Issues in India palaeoanthropology and the potential role of the northern zone. University of Kashmir, Srinagar. June 9, 2023.
- Parth R. Chauhan presented Multi-aspect perspectives on the Pleistocene fauna of peninsular India including current issues and future directions. INQUA Rome, Italy. July 2023.
- Prabhin Sukumaran, Stanley H. Ambrose, Lewis A. Owen, Swati Verma, Varun Vyas, Mihir Tanksale and Parth R. Chauhan. Late Pleistocene Climates and Environments in the Tapi River Valley, India, and associated palaeoanthropological significance. INQUA, Rome, Italy. July 2023.
- Ningnung Jakoinao presented Palaeoecological Reconstruction of the Karewas of Kashmir – A Multiproxy Approach via Luminescence Dating and its Applications. 5th Workshop on Luminescence Dating and its Applications, Physical Research Laboratory, Ahmedabad 21.02.2024 to 23.02.2024
- Y. Prabakar Paul. Participated in National workshop on Geochronology organized by IUAC, Delhi. (3-4 October 2023)
- Y. Prabakar Paul. Participated in 5th Workshop on Luminescence dating and its Applications organized by Association for Luminescence Dating (ALD), India at Physical Research Laboratory, Ahmedabad. (21 – 23 February 2024). Presented a poster on the title, "Insights into the Typo- Technological Attributes of the Microlithic Assemblage from Aalanur".
- Y. Prabakar Paul. Participated in National Workshop on Geochronology organized by IUAC, Delhi. (18 & 19 March 2024)

Rajesh Venkatasubramanian

- Amitoj Kaur Chandi. Punjabi literary periodicals. Work in Progress Workshop. Periodicals and Print Culture Research Group (PPCRG). Nottingham Trent University, United Kingdom, 18 May 2023.
- Amitoj Kaur Chandi. Feminism in Print: Workshop with Catherine Clay (NTU) and Ursula Ackrill. Radical Print Summer School 2023. Nottingham Trent University, United Kingdom, 19 May 2023.
- Amitoj Kaur Chandi. 'Historiographical assessment of Punjabi literary histories' International interdisciplinary conference "From Colonial Modernity to Decolonisation: The British Empire and Beyond". The University of Auckland, 15-16 September 2023.
- Nilkantha Pal. 'Interrogating Brahmo Idea of Children's Education: A View from Colonial Bengal'. International Conference on Ethics in Politics and Society, Peace and Disarmament, Philosophy of Education and Oriental Philosophy organised by Bangladesh Philosophical Society and Department of Philosophy, University of Dhaka, Bangladesh. 4-5 August 2023.

- Nilkantha Pal. 'Children's Periodicals in Colonial Bengal: Childhood, Class Formation, and Bengali Print Market, c. 1880-1920'. International Conference on Children's Literature: Classics to Contemporary, organised by the Kashmiri Section, Department of Modern Indian Languages, Aligarh Muslim University, Aligarh. 4-5 November 2023.
- Nilkantha Pal. 'The Making of Bengali Muslim Children's Periodicals: Literary Self-critique, Child Readers, and Nationhood'. Winter Graduate School. Department of Humanities and Social Sciences, IISER Mohali. 18-22 March 2024.
- Swapnil Chaudhary. 'Colonial Medical Legislations and Indian Reactions'. From Colonial Modernity to Decolonisation. University of Auckland. 15-16 September 2023.
- Swapnil Chaudhary. 'RSS Activities in an Ayurveda College'. CIRCLE Graduate South Asia Conference. University of Guelph. 3-5 October 2023.
- Swapnil Chaudhary. 'Antiquity and Medicine: Hindu Ayurveda in the late 19th Century'. Winter Graduate School. IISER Mohali. 18-22 March 2024.
- Utkarsha Negi. Research Capacity Development Workshop on 'Researching Marginalities' as part of the Research Project on 'Cultivating the Humanities and Social Sciences and Supporting the Under-Represented Scholars of South Asia'. Savitribai Phule Pune University in collaboration with the Association of Asian Studies (AAS) and sponsored by Swedish International Development Cooperation Agency (SIDA), 03-07 October 2023.
- Utkarsha Negi. 'Marginalized Women's Quest for Education: Reading 20th century Scheduled Caste Women's Autobiographies'. 47th Indian Social Science Congress 'Science Education And Research In Swaraj India'. University of Science and Technology, Ri-Bhoi, Meghalaya, 05-09 February 2024.
- Utkarsha Negi. 'Intersectionality in India'. Winter Graduate School. Department of Humanities and Social Sciences, Indian Institute of Science Education and Research Mohali, 18-22 March 2024.
- Vir Pratap Singh Gautam. 47th Indian Social Science Congress, 'Science Education and Research in Swaraj India'. University of Science and Technology, Ri-Bhoi, Meghalaya, 05-09 February 2024.

DEPARTMENT OF MATHEMATICAL SCIENCES

SUMMARY OF RESEARCH WORK

Abhik Ganguli

- Jointly with Suneel Kumar, The group members of Dr Ganguli have investigated the question of local constancy in the weight space of the reduction modulo p of certain 2 dimensional crystalline representations of $G_{\mathbb{Q}_p}$ as an application of the mod p local Langlands correspondence for $GL(2, \mathbb{Q}_p)$. An explicit lower bound (in terms of the slope) for the radius of constancy is also given.
- Investigating the connections between appropriate trianguline families (with their associated weight maps) and the local behaviour of mod p reductions of p -adic Galois representations in these families.
- Investigating the problem of determining optimal modular weights associated to mod p Galois representations attached to automorphic forms of definite unitary groups $U(3)$ split at all places above p .

Alok Maharana

- In collaboration with Prof. R.V. Gurjar, an invariant of projective algebraic varieties was defined which is biregular in nature. This is in contrast to birational invariants like gonality for smooth projective curves or degree of irrationality for higher dimensional projective varieties. They aim to show that for smooth projective complex algebraic surfaces with first Betti number zero, the order of the first integral homology group is bounded by a function of this invariant. The value of the defined invariant for most minimal algebraic surfaces was calculated. A paper is under preparation.
- In a different direction, with Dr. Lingaraj Sahu and Mr. Hemant, the study of embedded eigenvalues on the continuous spectrum of a self-adjoint operator on a Hilbert space was continued.

Amit Kulshrestha

Continuing his research in the field of word maps, Professor Kulshrestha is currently engaged in two projects. The first project, in collaboration with Anupam Singh and Sushil Bhunia, addresses the chirality problem in algebraic groups. The second project, in collaboration with Harish Kishnani, focuses on expressing elements in finite nilpotent groups as products of commutators. Together with Harish Kishnani, they have established the Amit-Ashurst conjecture on word fibers in many cases. Further, in collaboration with Gurleen Kaur and Ayush Udeep, they are working on calculating the representation dimensions of various p -groups.

Chanchal Kumar

The study of algebraic properties of combinatorially interesting monomial ideals have been the main focus of Professor Kumar's current research. His group has continued their study of spherical parking functions of simple graphs. The group members are trying to compute the number of uprooted spanning trees of many classes of simple graphs and compute their number of spherical parking functions.

Chandrakant S. Aribam

An improvement of the so-called Chebotarev density theorem for an elliptic curve that admits an isogeny of prime degree is made along with his PhD student Mr Pronay Karmakar. This improvement can now be used to give bounds of Selmer groups. This work will go towards the thesis of Mr Karmakar.



Chetan Balwe

Dr Balwe's research area is motivic homotopy theory. If $S(X)$ denotes the sheaf of naively $A1$ -connected components of a variety, it is conjectured that the sequence $S_n(X)$ should stabilize at some finite stage for any variety. Examples were constructed by Nidhi Gupta showing that there is no uniform upper bound on the number of iterations required for stabilization. To prove that stabilization does occur in this sequence is an open problem. An ongoing project with Nidhi Gupta focuses on proving that stabilization does occur on the level of field-valued points.

Jotsaroop Kaur

In a joint work with her post doc Dr. Riju Basak, Dr Kaur has characterized Hardy spaces for $0 < p < 1$ corresponding to the twisted Laplacian. They also prove sharp estimates for the boundedness of the solution of the wave equation corresponding to the twisted Laplacian when the initial data is in these Hardy spaces.

In a joint work with Dr. Debdip Ganguly (IIT D) and Dr. Prasun Roy Chowdhury they prove sharp Hardy, Hardy-Rellich and Rellich identities corresponding to the Grushin operator.

Kapil Hari Paranjape

In collaboration with Mr Prakash Joshi (Int PhD student co-guided with Dr Vaibhav Vaish), Professor Paranjape's group has looked at the problem of constructing non-torsion cycles on algebraic varieties which are in the kernel of the Abel-Jacobi map.

In collaboration with Dr Alok Maharana, the group members studied various questions connected with Category theory, Locales, Logic and Constructibility. Specifically, they developed proofs that avoided the axiom of choice in contexts where typically this axiom is utilised.

They examined alternative approaches to defining holomorphic functions on an open set in the complex plane using Runge's theorem as the basis.

Krishnendu Gongopadhyay

Professor Gangopadhyay's group members investigated reversibility of transformations arising from geometric contexts. They have obtained an understanding of the reversible maps in linear and affine groups, and applied that to classify transformations. They classified limit sets of cyclic subgroups of the special linear group in three dimensions. They introduced an infinitesimal analogue of reversible maps in Lie groups and applied this notion to classify reversibility for unipotent elements in classical Lie groups.

Lingaraj Sahu

Dr Sahu's group members are interested in the study of change in the spectrum of Schrödinger type operators under perturbation. The eigenvalue which is embedded in the continuous spectrum is highly unstable, under a small perturbation it may disappear and shows spectral concentration. With Alok and Hemant they have studied spectral concentration phenomena in some particular models. They also have tried to understand the persistence of embedded eigenvalues.



Mahender Singh

Small Coxeter groups are precisely the ones for which the Tits representation is integral. This makes the study of their congruence subgroups relevant. It turns out that two canonical extensions of the symmetric group, namely, twin groups and triplet groups are small Coxeter groups. These groups are known to play the role of braid groups under the Alexander–Markov correspondence for planar knot theories, with their pure subgroups admitting suitable hyperplane arrangements as Eilenberg–MacLane spaces. Dr Singh's group proved that the congruence subgroup property fails for infinite small Coxeter groups that are not virtually abelian. As an application, they deduce that the congruence subgroup property fails for both twin groups and triplet groups on more than three strands. They also determined subquotients of principal congruence subgroups of these groups and investigated crystallographic quotients of these two families of small Coxeter groups. They have obtained a complete description of homomorphisms between virtual twin groups and symmetric groups, resulting in the precise structure of the automorphism group of the virtual twin group on at least two strands.

Unifying various constructions of quandles including Coxeter quandles, free quandles, knot quandles of prime knots, and Dehn quandles of orientable surfaces, they introduce Dehn quandles of groups with respect to their subsets. They proved that the enveloping group of the Dehn quandle of a given group with respect to its generating set is a central extension of that group. Specialising in surfaces, they gave generating sets for Dehn quandles of orientable surfaces with punctures and computed their automorphism groups. As applications, they recovered a result of Niebrzydowski and Przytycki, proving that the knot quandle of the trefoil knot is isomorphic to the Dehn quandle of the torus. For the first time, they developed two approaches to writing efficient presentations for a large class of quandles. The first approach gives finite presentations for Dehn quandles of a class of Garside groups and Gaussian groups. The second approach is for general Dehn quandles when the centralisers of generators in their underlying groups are known. Several examples, including Dehn quandles of spherical Artin groups, surface groups and mapping class groups of orientable surfaces have been given to illustrate the results.

Neeraja Sahasrabudhe

The work on "Interacting urn model on finite directed graphs" was extended to interactive sampling and vertex-dependent reinforcement. This manuscript was submitted and is currently under review. Dr Sahasrabudhe's group members are currently working on the remaining cases and an extension involving weighted sampling. The manuscript titled "Urns with multiple drawings and graph based interactions" was submitted and is also under review. For both the interacting urn models they proved convergence and fluctuation results for fraction of balls of either colour under certain conditions on the reinforcement scheme and the underlying graph structure. They are currently working on obtaining local limit theorems. In opinion dynamics, they studied a variant of the voter model in presence of bots with a fixed lifetime and determined the optimal spread of bots across a finite horizon. This manuscript is currently under preparation. The work on 'preferential attachment trees with fitness' is ongoing. In addition to exploring properties of degree distribution, they are also studying the asymptotic properties of counts of subtrees of various types. A new project on Elephant Random Walks (ERW) was started.

Pranab Sardar

- Dr Sardar's group members generalize all previously known existence theorems of Cannon-Thurston (CT) maps for complexes of spaces, with PhD student Rakesh Halder. More precisely they find sufficient conditions for the existence theorems of CT maps for the inclusion of a subtree of hyperbolic spaces into the ambient tree of spaces. In all previously known such results a common condition was that the fiberwise maps were q_i embeddings. They could relax that.
- They also find new and more conceptual examples of subgroups of hyperbolic groups where the CT map does not exist. These examples are natural and much easier to understand than those produced earlier by Baker and Riley.

Ratna Pal

1. Increasing union of bounded domains in \mathbb{C}^k (joint project with Prof. John Erik Fornæss): Let M be a complex manifold. Let M be an increasing union of manifolds M_n , where each M_n is biholomorphic to a fixed bounded domain k . One could ask whether one can describe M in terms of Ω . This problem is referred to as the union problem in literature and has a long rich history. The above form of union problem was first taken up by Fornæss–Sibony. They attempted and partially succeeded in describing M taking into consideration the infinitesimal Kobayashi metric of M . It turned out that answering this question in full generality is extremely hard. Recently, some advancement in this direction has been made by Balakumar –Borah –Mahajan –Verma. Namely, they described M for some special domain Ω , provided M is Kobayashi hyperbolic. In her ongoing work with Fornæss, we pursue to determine further classes of Ω for which we can describe the final union M .
2. Short \mathbb{C}^k 's (joint project with Prof. John Erik Fornæss and Prof. Erlend Wold): Recall that a domain k which can be expressed as an increasing union of unit balls (up to bi-holomorphism) such that the Kobayashi metric vanishes identically in Ω , but allows a bounded (above) pluri-subharmonic function, is called Short \mathbb{C}^k . The genesis of Short \mathbb{C}^k 's is in the union problem and these domains were first described by Fornæss. They arise naturally in complex dynamics as non-autonomous basins of attraction and these are essentially the only known class of examples of Short \mathbb{C}^k 's. Now in this special class of examples, there are uncountably many Short \mathbb{C}^k 's which are mutually biholomorphically non-equivalent. This indicates up to biholomorphism Short \mathbb{C}^k 's form a large class of domains and in general Short \mathbb{C}^k 's could be very different from each other. This diversity across the class of Short \mathbb{C}^k 's makes it very difficult to develop a general theory. Thus to date, the theory of Short \mathbb{C}^k 's is underdeveloped. There are only a handful of articles

available on this topic. In this joint project, Dr Pal's group members are trying to build a general theory of Short Ck's. To do so we bring in tools and techniques from several different areas of complex geometric analysis and holomorphic dynamics. It is noteworthy that all her previous work on Short Ck's revolves around the aforementioned class of examples and the present work is quite different in its spirit.

3. Dynamics of degenerate resonant maps (joint project with Prof. Jasmin Raissy): Let F be a germ of holomorphic map in C^k , for k at the origin. The asymptotic behavior of the sequence of iterates $\{F^n\}$ near the origin is controlled to a great extent by the eigenvalues of DF_0 . Roughly speaking if $\lambda_1, \dots, \lambda_k$ be the eigenvalues of DF_0 , then F is called one-resonant with respect to the eigenvalues $\lambda_1, \dots, \lambda_m$, with $m \leq k$ linking them to the tangent to the identity maps. They proved the existence of attracting domains in these cases on par with the Leau-Fatou flower theorem for parabolic maps in one dimension. In the present joint project with Raissy, they study the dynamics of degenerate one-resonant and multi-resonant maps. In particular, they investigate the possibility of having attracting domains in these cases.

Sudesh Kaur Khanduja

Dr Khanduja's group members have dealt with the problem of computing discriminant as well as integral basis of an important family of algebraic number fields. They have solved this problem for the family $\{K_n\}$ of algebraic number fields, where K_n is obtained by adjoining to the field of rational numbers a root of the n th exponential Taylor polynomial with n running over all positive integers. They have given a formula for the exact power of any prime p dividing the discriminant of K_n in terms of the p -adic expansion of n . An explicit p -integral basis of K_n is given for each n . These p -integral bases quickly lead to the construction of the integral basis of K_n . This work has been done jointly with Ankita Jindal and has appeared in the paper entitled "Discriminant and integral basis of number fields defined by exponential Taylor polynomials" published in Proceedings of Edinburgh Math Society, volume 67(2024) 528-541

Santhosh Kumar Pamula

Dr Pamula's group members have been working on functional calculus related problems in the case of locally C^* -algebras. They have established the notion of Gelfand representation in the local version (jointly with a PhD student). This is under preparation. A future goal is to characterise certain type of locally completely positive inducing multilinear maps defined on Hilbert locally C^* -modules.

On the other hand, they introduced the notion of "disintegration of locally Hilbert spaces" (jointly with a post-doctoral fellow). This work shows that diagonalizable operators defined on disintegration of locally Hilbert space form a locally von-Neumann algebra and it is a commutant of the class of all decomposable operators. Specifically, they are interested in extending the notion of decomposability to the class of representations on locally C^* -algebras and characterise irreducible representations in this context.

Shane D'Mello

1. Continued the work of classifying real rational curves in a three dimensional quadric with Ms. Priya Rani. They made progress in constructing the real rational curves with given restrictions and in the smooth isotopy classification of degree 6 real rational knots.
2. With Dr. Visakh Narayan, they have initiated the study of some aspects of Khovanov homology, especially the restriction that the homology places on other properties of knots.

Soma Maity

For an open manifold M and a function with bounded growth of derivative, there exists a Riemannian metric of bounded geometry on M such that the volume growth function lies in the same growth class as v . This was proved by R. Grimaldi and P. Pansu in the case of manifolds with one end. We prove the same when the manifold has more than one end and called the constructed metrics Grimaldi-Pansu metrics. Dr Maity's group gives uniform bounds for the volume growth function of these metrics in terms of the given bgd-function in the case of a certain class of manifolds which can be written as connected sums of a finite collection of closed manifolds. The group members study the volume doubling condition and the Relative Connected Annulus property of the Grimaldi-Pansu metrics, which play an important role in studying geometric analysis on manifolds with finitely many ends.

In another project they are studying the spectrum of the Laplacian of compact Riemannian manifolds without boundary. Burago, Ivanov and Kurylev showed that eigenvalues and eigenfunctions of the Laplace-Beltrami operator on a Riemannian manifold are approximated by eigenvalues and eigenvectors of a (suitably weighted) graph Laplace operator of a proximity graph on an epsilon-net under some curvature conditions. They are trying to generalize this result under weaker curvature conditions.

Tanusree Khandai

Dr Khandai continued with her study of the finite-dimensional representations of current Lie algebras and the graded representations of the multiloop Lie algebras. Along with Dr Shushma Rani and her PhD Student, Ms Divya Setia, they studied the structure of tensor products of certain Demazure modules for the current Lie algebras of type A_n and showed that such modules have filtrations by truncated Weyl modules or by modules which are fusion product of level 1 and level 2 Demazure modules. Their studies also helped us establish results on the structure of a class of truncated Weyl modules for current

algebras of type A3. Currently they are working on extending these results for current Lie algebras of type A.

In a project with Dr Sudipta Mukherjee they are also studying the characters of irreducible representations for a class of exponential polynomial Lie algebras.

Vaibhav Vaish

Dr Vaish's primary research revolves around exploring motives relevant to Shimura varieties, and in the process he has also constructed general objects of broader mathematical interests. Continuing with the theme, this year, with my PhD student Shruti Rastogi, they demonstrated that his earlier constructions of a motivic intersection complex (for a three fold) are indeed a Chow motive. Thus they satisfy a part of Wildeshaus' intrinsic criterion for a motivic intersection complex. This would constitute the bulk of the student's PhD thesis, and a preprint from the same is under preparation.

Varadharaj Ravi Srinivasan

Let F be a differential field of characteristic zero with an algebraically closed field of constants C , A be a differential central simple F -algebra, K be a Picard-Vessiot extension for the differential F -module A and $G(K|F)$ be the differential Galois group of K over F . The group members of Dr Srinivasan prove that a differential field extension L of F having C as its field of constants splits the δ -central simple algebra A if and only if the differential field K embeds in L .

They then extend the theory of differential matrix algebras over a differential field F , put forward by Magid and Juan (2008), to arbitrary differential central simple algebras. In particular, they establish a natural bijective correspondence between the isomorphism classes of differential central simple algebras of dimension n^2 over F that are split by the differential field K and the classes of inequivalent representations of the algebraic group $G(K|F)$ in $PGL_n(C)$. We show that $G(K|F)$ is a reductive or a solvable algebraic group if and only if A has certain kinds of differential right ideals.

Yashonidhi Pandey

The following submissions were accepted:

1. (with A. J. Parameswaran) Etale fundamental group of moduli of torsors under parahoric group scheme on a curve, Proc. Indian Acad. Sci. (Math Sci.) 2023, 133:19
2. (with A. J. Parameswaran) Brauer group of Hilbert scheme of two points on a smooth projective surface and applications, Proc. Indian Acad. Sci. (Math Sci.) 2023, 133:41
3. He attended lectures by Professor Patrick Polo on Group schemes in the Chennai Mathematical Institute from August 6, 2023 to September 7, 2023



DST-FIST Facility: Computation Lab

DEPARTMENT OF MATHEMATICAL SCIENCES

VISITS BY FACULTY MEMBERS

Amit Kulshrestha

- Indian Statistical Institute Delhi, May 27-30, 2023.
- BITS-Pilani, Goa Campus, January 02-05, 2024.
- Indian Institute of Science Education and Research Pune, February 22-24, 2024.

Chetan Balwe

- November 27-30, 2023: Center for Excellence in Basic Sciences, Mumbai.
- December 28-29, 2023: National Institute for Science Education and Research, Bhubaneswar.
- January 2-3, 2024: Tata Institute of Fundamental Research, Mumbai.
- January 26-28, 2024: Center for Excellence in Basic Sciences, Mumbai
- March 1-4, 2024: National Institute for Science Education and Research, Bhubaneswar.
- March 5-8, 2024: Indian Institute of Technology, Kanpur

Kapil Hari Paranjape

- Ashoka University: 11-12 April 2023.
- HRI, Allahabad: 30 July-02 August 2023.

Krishnendu Gongopadhyay

- Sikkim University, Sikkim, May 26-June 1, 2023.
- St. Xavier's College, Kolkata, June 5-10, 2023.
- Indian Institute of Technology, Bombay, July 3-8, 2023.
- Heidelberg University, Germany, July 20-30, 2023.
- Mathematisches Forschungsinstitut, Oberwolfach, July 30-August 4, 2023.
- Pondicherry University, Puducherry. August 20-23, 2023.
- Indian Statistical Institute, Delhi, October 10-12, 2023.
- Raiganj University, Raiganj, West Bengal, October 13-17, 2023.
- Banaras Hindu University, Varanasi, October 27-31, 2023.
- Gakushuin University, Tokyo, Japan, November 23-27, 2023.
- Kanazawa University, Kanazawa, Japan, November 28-29, 2023.
- Harish-Chandra Research Institute, Prayagraj, December 14-20, 2023.
- Gautam Buddha University, Greater Noida, December 21, 2023.
- IISER Pune, Pune, February 23-24, 2024.
- Burdwan University, Burdwan, West Bengal, March 5-6, 2024.
- North Bengal University, Siliguri, March 12-14, 2024.

Mahender Singh

- University of South Florida, USA. 01 May-31 July 2023.
- NISER Bhubaneshwar, India. 29 September-02 October 2023.
- IIT Ropar, India. 26-29 December 2023.

Neeraja Sahasrabudhe

- IIT Bombay. 11-22 December 2023.

Pranab Sardar

- Presidency University, Kolkata, May 24-June 02, 2023.
- HRI, Prayagraj, December 17-20, 2023.

Ratna Pal

- May 17 to May 31, TIFR CAM
- November 7 to November 8, The Institute of Mathematical Sciences
- November 9 to November 11, Chennai Mathematical Institute

Sudesh Kaur Khanduja

- Indian Statistical Institute New Delhi, April 4-6, 2023.
- IIT Roorkee, August 10-13, 2023
- IIT Hyderabad, December 3-7, 2023.
- Birla Institute of Technology & Science Pilani, Hyderabad Campus, Dec 06, 2023.
- National Institute for Technical Teachers Training and Research (NITTTR), Chandigarh, Dec. 18, 2023.
- IIT Bombay, Feb 12-13, 2024

Santhosh Kumar Pamula

- University of Hyderabad, during 12-14, Feb 2024.

Soma Maity

- NISER Bhubaneswar, 29th September to 2nd October, 2023.
- SRM University, Vijaywara

Tanusree Khandai

- NISER, Bhubaneswar, 29.9.23 – 1.10.23
- ICTS, Bangalore 13.11.24-24.11.24
- Punjabi University, Patiala, 18.12.24-20.12.24
- IIT Guwahati, 21.12.24-25.12.24

Vaibhav Vaish

- HBCSE, TIFR Mumbai, 4th March to 8th March 2024.

Yashonidhi Pandey

- Chennai Mathematical Institute: August 6, 2023 to September 7, 2023
- Chennai Mathematical Institute: January 2, 2024 to 29 January 2024

DEPARTMENT OF MATHEMATICAL SCIENCES

TALKS DELIVERED

Abhik Ganguli

- Dr. Suneel Kumar, "On the local constancy of certain mod p Galois representations" in the conference: Rational points on modular curves in ICTS Bengaluru (September, 2023).

Amit Kulshrestha

- Amit Kulshrestha. Chirality in images of word maps, Stat-Math Unit Seminar, Indian Statistical Institute Delhi, May 29, 2023.
- Amit Kulshrestha. Weaving stories in a mathematics classroom, DPS Society Human Resource Development Centre, Greater Noida, May 30, 2023.
- Amit Kulshrestha. इबारती सवालों की भाषा का सवाल, Pathshala webinar series of Azim Premji University, November 22, 2023.
- Amit Kulshrestha. Mathematics without borders : UGC-HRDC Refresher Course, Punjabi University, Patiala, December 13, 2023.
- Amit Kulshrestha. Life and Work of Srinivasa Ramanujan, National Mathematics Day, Maitreyi College, Delhi, December 22, 2023.
- Amit Kulshrestha. Role of language in learning mathematics : some experiments in an undergraduate classroom, Education 2.0 : New Horizons in Teaching, Learning and Assessment, BITS-Pilani, Goa Campus, January 03, 2024.
- Amit Kulshrestha. Word maps in p -groups, Workshop in Group Theory, Indian Institute of Science Education and Research Pune, February 24, 2024.
- Harish Kishnani, Subrata Barman. Inter IISER-NISER Mathematics Meet 2023, NISER Bhubaneswar, September 29-October 01, 2023.
- Harish Kishnani. Identically distributed words on nilpotent groups, Workshop in Group Theory, Indian Institute of Science Education and Research Pune, February 24, 2024.
- Harish Kishnani. Images and probability distributions of word maps, Inter IISER-NISER Mathematics Meet 2023, NISER Bhubaneswar, September 29, 2023.

Chanchal Kumar

- Chanchal Kumar delivered an expert talk on Applications of Algebra at Department of Mathematics, University Institute of Sciences, Chandigarh University on Jan 11, 2024.
- Chanchal Kumar delivered a talk on Counting Spanning trees in a National Conference on Recent Advancement in Mathematics held at Central University of Jammu on March 27, 2024.

Chandrakant S. Aribam

Name of the presenter: Chandrakant Aribam,

Title of the talk: Euler systems for some elliptic curves with a p -isogeny

Name of the Conference/Institute: Inter IISER-NISER Math Meet,

Dates: 29/09/2023 to 02/10/2023

Jotsaroop Kaur

Name of the presenter: Jotsaroop Kaur

Title of the talk: Fourier Analysis: Classical and Modern Aspects

Name of the Conference: National Seminar in Harmonic Analysis at St. Berchman's College, Changanaserry

Dates: (Preferably in bullet points): 6-8 Dec, 2023

Kapil Hari Paranjape

- Gave a talk on "Beyond Abel and Jacobi" at Ashoka University on 12 April 2023; also at HRI, Allahabad, 1 August 2023; also at Frontiers in Mathematics IISERTVM in February 2023.

Krishnendu Gongopadhyay

- Krishnendu Gongopadhyay. Reversibility in groups and geometry, Sikkim University, Special lecture (Colloquium talk), Sikkim University, May 29, 2023.
- Krishnendu Gongopadhyay. 6 hrs course on Geometry, Teacher's Enrichment Workshop: Groups and Geometry. St Xaviers College, Kolkata, July 5-7, 2023.
- Krishnendu Gongopadhyay. Reciprocity in Hecke Groups, Conference: Groups and Representations, IIT Bombay, July 4, 2023.
- Krishnendu Gongopadhyay. Conjugacy classes of automorphism of the unit ball in a Hilbert space. The 29th International Conference on Finite or Infinite Dimensional Complex Analysis and Applications, Pondicherry University, Puducherry, August 22, 2023.
- Krishnendu Gongopadhyay. Reciprocity and the conjugacy classes of centralizers in Hecke groups. (online) Geometric and Algebraic Methods in Knot Theory, Tomsk, Russia. September 19, 2023.
- Krishnendu Gongopadhyay. Reversibility in affine groups, Indian Statistical Institute Delhi, October 12, 2023.
- Krishnendu Gongopadhyay. Reversibility in groups and geometry, Raiganj University, West Bengal, October 13, 2023.
- Krishnendu Gongopadhyay. Reversibility in affine groups, Gakushuin University, Tokyo, November 27, 2023.
- Krishnendu Gongopadhyay. Conjugacy classes of automorphism of the unit ball in a Hilbert space. Kanazawa University, November 28, 2023.
- Krishnendu Gongopadhyay. 3 hours course (online): Matrices and their applications in geometry. Interdisciplinary Refresher course entitled "Development in Mathematics and It's Applicability. December 4, and December 6, 2023.
- Krishnendu Gongopadhyay. Groups in Geometry (online). UGC Refresher course, DDU University, Gorakhpur, December 18, 2023.
- Krishnendu Gongopadhyay. Reversibility in geometry. National Mathematics Day Lecture. Gautam Buddha University, Gr. Noida. December 21, 2023.
- Krishnendu Gongopadhyay. Conjugacy classes of automorphism of the unit ball in a Hilbert space. Workshop on group theory. IISER Pune. February 23, 2024.
- Krishnendu Gongopadhyay. Reversibility of the quaternionic Möbius transformations. International Conference on Mathematics and Applications-2024 (ICMA-2024), Department of Mathematics, The University of Burdwan. March 05, 2024.
- Krishnendu Gongopadhyay. Decomposing a determinant one matrix over the complex numbers as a product of two involutions. International Seminar on Topology, Algebra and Applications (ISTAA-2024), North Bengal University, March 13, 2024.
- Tejbir Lohan. Product of two involutions in special linear groups. Inter IISER-NISER Math Meet. NISER Bhubaneswar. September 29, 2023.
- Tejbir Lohan. Product of two involutions in special linear groups. World of Group Crafts-III, Online international conference. September 4, 2023.
- Tejbir Lohan. Reversibility of linear and affine transformations. Institute of Mathematical Sciences. Chennai. July 26, 2023.
- Tejbir Lohan. Reversibility of affine transformations. Young Mathematician's Symposium, IISER Mohali, May 8-9, 2023.
- Debattam Das. Reciprocity in Hecke groups. Young Mathematician's Symposium, IISER Mohali, May 8-9, 2023.
- Debattam Das. Reciprocity in Hecke groups. Inter IISER-NISER Math Meet. NISER Bhubaneswar. September 29, 2023.

Mahender Singh

- Dr. Nishant Rathee (postdoc of Dr. Mahender Singh). Relative Rota-Baxter groups, skew left braces, and related problems. Inform on Algebra seminar at University of Salento, Italy (Online). 17 January 2024.
- Dr. Mahender Singh. Four lectures on identification Spaces and quotient topologies. Annual Foundation School, IIT Ropar, India. 26-29 December 2023.
- Mr. Pravin Kumar (PhD student of Dr. Mahender Singh). Congruence subgroups of Small Coxeter groups. World of GroupCraft III (online). 04 September 2023.
- Mr. Pravin Kumar (PhD student of Dr. Mahender Singh). Planar braid groups. NISER Bhubaneswar, India. 04 August 2023.
- Mr. Pravin Kumar (PhD student of Dr. Mahender Singh). Curves on surfaces: knots and virtual knots. Weekly Geometry Topology Seminar, IISER Bhopal, India. 28 April 2023.

Neeraja Sahasrabudhe

- Neeraja Sahasrabudhe. Interacting Urn Models. Applied Mathematics Webinar (Jeddah-Riyadh-Dammam), online talk. 12 April 2023.
- Neeraja Sahasrabudhe. Urn Processes with Graph-based Interactions. 10th International Workshop on Applied Probability (IWAP), Thessaloniki, Greece.

Pranab Sardar

- **Name of the presenter:** Pranab Sardar

Title of the talk: Geometry of complexes of groups- a brief survey

Name of the Conference/Institute: A day honoring Misha Kapovich (Online conference)

Dates: June 15, 2023

- **Name of the presenter:** Rakesh Halder

Title of the talk: Cannon-Thurston maps for morphisms of trees of hyperbolic spaces

Name of the Conference/Institute: Autumn school on large scale geometry (Georg August University, Göttingen, Germany)

Dates: October 9-13, 2023

- **Name of the presenter:** Pranab Sardar

Title of the talk: A short course on Bass Serre theory

Name of the Conference/Institute: A workshop on group theory and around.

Dates: December 16-20, 2023

Ratna Pal

- **Name of the presenter:** Ratna Pal

Title of the talk: Short C2's and their automorphism groups

Name of the Conference: Annual Conference of Indian Women and Mathematics (IWM)

Dates: July 13 to July 14, 2023, IISER Bhopal

- **Name of the presenter:** Ratna Pal

Title of the talk: Hénon maps, Short C2's and beyond

Name of the institute: The Institute of Mathematical Sciences

Date: November 8, 2023

- **Name of the presenter:** Ratna Pal

Title of the talk: Hénon maps, Short C2's and beyond

Name of the institute: Chennai Mathematical Institute

Date: November 9, 2023

- **Name of the presenter:** Ratna Pal

Title of the talk: Relation between Hénon maps with biholomorphic escaping sets

Name of the Conference: Interactions in SCV 2023

Dates: December 11 to December 15, 2023, IISER Pune

Sudesh Kaur Khanduja

- When is $\mathbb{Z}[\theta]$ the ring of integers? Name of Institute: Indian Statistical Institute, New Delhi, April 5, 2023.
- An overview of life and work of Maryam Mirzakhani. Mathematics Department, Panjab University, Chandigarh, May 2, 2023.
- A walk through Irreducible Polynomials over \mathbb{Q} . Name of the Seminar: Debrecen Number Theory Seminar, September 22, 2023
- When is $\mathbb{Z}[\theta]$ integrally closed. Name of the Institute: Birla Institute of Technology & Science Pilani, Hyderabad Campus, December 06, 2023.
- Some aspects of life and work of Srinivasa Ramanujan, Name of the Institute: PG DAV College, University of Delhi, December 18, 2023..
- An interaction with Numbers, Name of the Institute: Panjab Engineering College, Chandigarh December 20, 2023.
- Fascinating World of Numbers. Name of the Institute: National Institute for Technical Teachers Training and Research (NITTTR), Chandigarh, December 21, 2023.
- Some well known Irreducibility Criteria for Polynomials over rationals and their generalisations, Name of the Institute: IIT Bombay. February 13, 2024

Santhosh Kumar Pamula

- A Radon-Nikodym type theorem for local completely positive maps. National Conference on the Recent Developments in Mathematical Sciences-2024 at University of Hyderabad. The conference was held during 12-14, Feb 2024.

Soma Maity

- Volume growth on manifolds with more than one end, Inter IISER-NISER math meet 2023 at NISER Bhubaneswar, 29th September to 1st October, 2023.
- Uniform Poincare inequalities on measured metric spaces, An international conference on women in pure and applied mathematics, 1st to 5th January, 2024.

Tanusree Khandai

- **Name of the presenter:** Tanusree Khandai
Title of the talk: Demazure Filtrations of Tensor Product Representations of Current Lie Algebras.
Name of the Conference/Institute: Inter IISER-NISER Math Meet 2023 / NISER, Bhubaneswar
Dates: 29.9.23-1.10.23
- **Name of the presenter:** Tanusree Khandai
Title of the talk: Fusion Product and Chari Venkatesh Modules for Current Lie algebras of type A_2
Name of the Conference/Institute: Algebraic and Combinatorial Methods in Representation Theory, ICTS, Bangalore
Dates: 21.11.23
- **Name of the presenter:** Divya Setia
Title of the talk: Demazure filtration of tensor product modules of current Lie algebra of type A
Name of the Conference/Institute: Algebraic and Combinatorial Methods in Representation Theory, ICTS, Bangalore
Dates: 17.11.23
- **Name of the presenter:** Tanusree Khandai
Title of the talk: Highest Weight Representations of Semi simple Lie algebras
Name of the Conference/Institute: Lecture Series to Commemorate birth centenary of Harish-Chandra. Online talks organized by Bhaskaracharya Pratishthana and IISER Pune
Dates: 5.12.23-8.12.23
- **Name of the presenter:** Tanusree Khandai
Title of the talk: Introductory Lectures on Matrices and Linear Algebra
Name of the Conference/Institute: IWM Winter School, Punjabi University, Patiala
Dates: 18.12.23-20.12.23
- **Name of the presenter:** Tanusree Khandai
Title of the talk: Demazure Filtrations of Tensor Product Modules and Character Formula
Name of the Conference/Institute: 38th Annual Conference of the Ramanujan Mathematical Society, IIT Guwahati
Dates: 22.12.2023
- **Name of the presenter:** Shushma Rani
Title of the talk: Tensor product multiplicities and CV modules for current Lie algebras of \mathfrak{sl}_3
Name of the Conference/Institute: Young Mathematician's Symposium 2023, IISER Mohali
Dates: 8.5.2023
- **Name of the presenter:** Sudipta Mukherjee
Title of the talk: Classification of irreducible integrable Harish-Chandra modules for loop affine-Virasoro algebras.
Name of the Conference/Institute: Young Mathematician's Symposium 2023, IISER Mohali
Dates: 8.5.2023
- **Name of the presenter:** Divya Setia
Title of the talk: Filtration by $V(\xi)$ -modules in tensor products.
Name of the Conference/Institute: Young Mathematician's Symposium 2023, IISER Mohali
Dates: 8.5.2023
- **Name of the presenter:** Divya Setia
Title of the talk: Representation theory of Lie algebras and its connection with Algebraic combinatorics
Name of the Conference/Institute: Graduate Students' Seminar, IISER Mohali
Dates: 24.1.2024

Varadharaj Ravi Srinivasan

- **Name of the presenter:** Varadharaj Ravi Srinivasan

Title of the talk: Complete Reducibility of Differential Central Simple Algebras

Seminar: Kolchin Seminar in Differential Algebra, City University of New York,

Date: November 17, 2023

Yashonidhi Pandey

- Geometry of Curves and Surfaces, Two invited talks in DST centre in Banaras Hindu University on 25th and 26th July 2023
- Brauer group of Hilbert scheme of two points on a smooth projective surface and applications, Talk on 31st August 2023 in CMI.
- Bruhat-Tits theory in higher dimensions, 22 Sept 2023 in IISER Mohali
- Brauer group of Hilbert scheme of two points on a smooth projective surface and applications, 29 Sept 2023 in IISER Mohali



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DEPARTMENT OF MATHEMATICAL SCIENCES

CONFERENCES ATTENDED

Abhik Ganguli

- Dr. Suneel Kumar, "On the local constancy of certain mod p Galois representations" in the conference: Rational points on modular curves in ICTS Bengaluru (September, 2023).

Amit Kulshrestha

- Amit Kulshrestha. Education 2.0 : New Horizons in Teaching, Learning and Assessment, BITS-Pilani, Goa Campus, January 03-04, 2024.
- Amit Kulshrestha. Workshop in Group Theory, Indian Institute of Science Education and Research Pune, February 23-24, 2024.
- Harish Kishnani, Subrata Barman. Workshop in Group Theory and Around, Harish-Chandra Research Institute, December 14-20, 2023.
- Amit Kulshrestha, Harish Kishnani, Subrata Barman. Workshop in Group Theory, Indian Institute of Science Education and Research Pune, February 23-24, 2024.
- Harish Kishnani. CMI-HIMR Summer School on Probabilistic Group Theory, University of Bristol, June 19-23, 2023. Harish Kishnani. CMI-HIMR Summer School on Probabilistic Group Theory, University of Bristol, UK, June 19-23, 2023.

Chanchal Kumar

- Visited the Central University of Jammu to participated in the national conference on 'Recent advances in Mathematics' held on March 27-28, 2024.

Chandrakant S Aribam

- Chandrakant Aribam, "Euler systems for some elliptic curves with a p -isogeny," Inter IISER-NISER Math Meet, Dates: 29/09/2023 to 02/10/2023

Chetan Balwe

- Chetan Balwe, "An introduction to A_1 -homotopy theory", IIT Kanpur. Date: March 5, 2024
- Chetan Balwe, " A_1 -homotopic invariants of varieties", IIT Kanpur. Date: March 6, 2024
- Chetan Balwe, " A_1 -homotopy and algebraic groups", IIT Kanpur. Date: March 7, 2024

Jotsaroop Kaur

- Jotsaroop Kaur, Fourier Analysis : Classical and Modern Aspects" National Seminar in Harmonic Analysis at St. Berchman's College, Changanaserry, 6-8 Dec, 2023

Kapil Hari Paranjape

- Participated and gave a talk in Frontiers in Mathematics, IISER TVM, February 2023.

Krishnendu Gongopadhyay

- Krishnendu Gongopadhyay. Conference: Groups and Representations, IIT Bombay, July 3-8, 2023.
- Krishnendu Gongopadhyay. BACH Seminar. Heidelberg University. July 21, 2023.
- Krishnendu Gongopadhyay. Reporter (Report No. 33/2023. DOI: 10.4171/OWR/2023/33). Teichmüller theory: Classical, Higher, Super, Quantum. Jul 30--Aug 4, 2023. Mathematisches Forschungsinstitut, Oberwolfach, Germany.
- Krishnendu Gongopadhyay. The 29th International Conference on Finite or Infinite Dimensional Complex Analysis and Applications, Pondicherry University, Puducherry, August 21-25, 2023.
- Krishnendu Gongopadhyay. Geometric and Algebraic Methods in Knot Theory, Tomsk, Russia. September 16-20, 2023. (online)
- Krishnendu Gongopadhyay. Workshop on group theory and around. Harish-Chandra Research Institute Prayagraj. December 14-20, 2023.
- Krishnendu Gongopadhyay. Workshop on Group Theory-2024. IISER Pune. February 23-24, 2024.

- Krishnendu Gongopadhyay. International Conference on Mathematics and Applications-2024 (ICMA-2024), Department of Mathematics, The University of Burdwan. March 05-06, 2024.
- Krishnendu Gongopadhyay. International Seminar on Topology, Algebra and Applications (ISTAA-2024), North Bengal University, March 12-14, 2024.
- Debattam Das. International Colloquium on Randomness, Geometry and Dynamics, January 1-12, 2024. IISER Pune.
- Debattam Das. Geometry, Analysis and Mathematical Physics, NISER Bhubaneswar, Bhubaneswar.
- Debattam Das. NCM Workshop: Groups and Computations. Krea University. July 3-8, 2023.

Mahender Singh

- Dr. Mahender Singh. Algebra and topology of solutions to the Yang-Baxter equation. Inter IISER-NISER Math Meet 2023, NISER Bhubaneswar, India. 29 September–02 October 2023.
- Mr. Pravin Kumar (PhD student of Dr. Mahender Singh). Exotic groups in low dimensional topology. Inter IISER-NISER Math Meet 2023, NISER Bhubaneswar, India. 29 September–02 October 2023.
- Dr. Neeraj Kumar Dhanwani (postdoc of Dr. Mahender Singh). Writing periodic mapping classes into product of Dehn twists. Inter IISER-NISER Math Meet, NISER Bhubaneswar, India. 29 September–02 October 2023.
- Mr. Pravin Kumar (PhD student of Dr. Mahender Singh). Crystallographic quotients of planar braid groups. Young Mathematicians' symposium 2023, IISER Mohali, India. 09 May 2023.

Neeraja Sahasrabudhe

- Neeraja Sahasrabudhe. Urn Processes with Graph-based Interactions. 10th International Workshop on Applied Probability, Thessaloniki, Greece.
- Neeraja Sahasrabudhe. Lectures of Probability and Stochastic Processes XVI, ICTS Bengaluru. 17-21 November 2023.
- Yogesh. Lectures in Probability and Stochastic Processes XVI, ICTS Bengaluru. 17-21 November 2023
- Yogesh. ICTS-Networks Workshop on Challenges in Networks, ICTS Bengaluru. 29 January-02 February 2024.

Pranab Sardar

- **Name of the conference:** International colloquium on randomness, geometry and dynamics
Dates: Dec 31, 2023-Jan 07, 2024.
Name of the presenter: Rakesh Halder
Title of the talk: Cannon-Thurston maps for morphisms of trees of hyperbolic spaces
- **Name of the Conference/Institute:** Autumn school on large scale geometry (Georg August University, Gottingen, Germany)
Dates: October 9-13, 2023.

Ratna Pal

- **Name of the Conference:** Interactions in SCV 2023
Dates: December 11 to December 15, 2023, IISER Pune
- **Name of the Conference:** TIFR International Colloquium on Randomness, Geometry and Dynamics, Dates: January 8 to January 12, 2024

Sudesh Kaur Khanduja

- Life and Work of Maryam Mirzakhani and Maryana Viazovska. Celebration of International Women day, IISER Mohali, May 18, 2023
- On the Irreducibility of some Classical Polynomials over \mathbb{Q} . International Conference on Algebraic Geometry, Coding Theory and Combinatorics in honour of 60th birthday of Professor Sudhir Ghorpade held at IIT Hyderabad during Dec 4-8, 2023.
- Fascination of prime numbers. 12th International Conference on Soft Computing for Problem Solving: Indian Institute of Technology Roorkee. August 11-13, 2023.

Soma Maity

- Soma Maity, Volume growth on manifolds with more than one end, Inter IISER-NISER math meet 2023 at NISER Bhubaneswar, 29th September to 1st October, 2023.
- Soma Maity, Uniform Poincare inequalities on measured metric spaces, An international conference on women in pure and applied mathematics, 1st to 5th January, 2024.
- Anusha Bhattacharya, Geometry, Analysis and Mathematical Physics 2023 at NISER Bhubaneswar from 24th July to 2nd August, 2023.
- Anushree Das, Geometry, Analysis and Mathematical Physics 2023 at NISER Bhubaneswar from 24th July to 2nd August, 2023.
- Anushree Das, Marvellous Event on Geometric Analysis-MEGA23 at Będlewo, Poland, October 8-13 2023.

- Ranadip Ganguly, VIASM-ICTP Summer School on Differential Geometry organized by Vietnam Institute for Advanced Study in Mathematics, during August 14 -25, 2023.

Tanusree Khandai

- **Name of the presenter:** TanusreeKhandai
Title of the talk: Demazure Filtrations of Tensor Product Representations of Current Lie Algebras.
Name of the Conference: Inter IISER-NISER Math Meet 2023,
Dates: 30.9.23
- **Name of the presenter:** TanusreeKhandai
Title of the talk: Fusion Product and Chari Venkatesh Modules for Current Lie algebras of type A_2
Name of the Conference: Algebraic and Combinatorial Methods in Representation Theory
Dates: 21.11.23
- **Name of the presenter:** Divya Setia
Title of the talk: Demazure filtration of tensor product modules of current Lie algebra of type A
Name of the Conference: Algebraic and Combinatorial Methods in Representation Theory
Dates: 17.11.23
- **Name of the presenter:** Tanusree Khandai
Title of the talk: Demazure Filtrations of Tensor Product Modules and Character Formula
Name of the Conference: 38th Annual Conference of the Ramanujan Mathematical Society
Dates: 22.12.23

Vaibhav Vaish

- Prakash Joshi, "NCM workshop on Birational Geometry" at CMI Chennai. 22nd May - 03rd June 2023.
- Shruti Rastogi, "Rational points on Modular Curves" at ICTS Bangalore. 11th September - 22nd September 2023.
- Vaibhav Vaish, "Representation theory of real Lie groups and Automorphic forms" at HRI Allahabad, 3rd October to 7th October 2023.
- Prakash Joshi, "Arizona Winter School on Abelian Varieties" at The Southwest Center for Arithmetic Geometry. 2nd March - 6th March 2024.

Varadharaj Ravi Srinivasan

- **Name of the presenter:** Varadharaj Ravi Srinivasan
Title of the talk: A Classification of First order Differential Equations.
Name of the Conference: Applications to Compute Algebra (ACA2023), Warsaw, Poland
Date: July 17, 2023

Yashonidhi Pandey

- Patrick Polo, Lectures on Group schemes, Chennai Mathematical Institute: August 6, 2023 to September 7, 2023
- Patrick Polo, Lectures on Group schemes, Chennai Mathematical Institute: January 2, 2024 to 29 January 2024



DEPARTMENT OF PHYSICAL SCIENCES

SUMMARY OF RESEARCH WORK

Abhishek Chaudhuri

Chaudhuri's research focus during this period has been primarily on two broad research themes: active matter and biological physics. Their group has tried to address specific questions in each of these themes using both analytical approaches and coarse-grained simulations.

Stochastic Resonance in periodically driven DNA. Their group numerically investigated stochastic resonance (SR) the unzipping of a model double-stranded DNA by a periodic force. They observe multiple peaks in stochastic resonance in the output signal as the driving force frequency is varied for different force amplitudes, temperature, chain length, and chain heterogeneity. Multiple peaks point to the existence of multiple stable and metastable states, which correspond to dynamical states of partially zipped and unzipped conformations and transitions between them. They quantify such transitions by looking at the time evolution of the fraction of bound base pairs.

Polymer translocation in time-dependent environments. The translocation of biopolymers across nanopores is a ubiquitous process in biology. Examples range from the transport of RNA through a nuclear membrane pore complex, viral ejection of DNA into host cells, and protein transport through membrane channels. There are different scenarios in biological nanopores such as the twin pore complex in the inner membrane of mitochondria and the nuclear pore complex (NPC), where the pore size can change during protein translocation. In synthetic nanopore design, elastomeric nanochannel devices have been used to regulate the width of the channels by applying mechanical stresses. To mimic the behavior of such systems, their group studied the driven translocation of a semiflexible polymer in time-dependent environments. In one case they varied the pore width periodically and investigated translocation dynamics. Here they showed polymers translocate more efficiently through oscillating pores compared to static ones, with the rate of translocation depending significantly on the polymer stiffness and the attractive nature of the pore. Notably, the translocation dynamics exhibit a gain in time, which inversely correlates with polymer stiffness at lower pore attractiveness but increases with stiffness when the pores are highly attractive. Such a dependence leads to the possibility of a high degree of robust selectivity in the translocation process.

Slip-ideal-slip behavior in tip-links. Tip-links which are protein complexes in the inner ear, convey force from sound and trigger mechanotransduction. In collaboration with the experimental group of Dr. Sabysachi Rakshit (DCS), their group showed that the tip-link complexes show slip-ideal-slip bond dynamics; exponential decay of lifetime with force initially (slip), an intermediate force regime where the lifetime does not change (ideal) and a high force regime where the tip-links dissociate as a slip bond again.

Ambresh Shivaji

In the past year, Shivaji's research group has focussed on the following projects:

Small b mass contribution to $H \rightarrow e^+e^- \mu^+ \mu^-$ decay at $O(\alpha_s)$ in the standard model:

The dominant contribution to the $H \rightarrow e^+e^- \mu^+ \mu^-$ decay at two-loop comes from the top quark loop. Their group has computed this contribution, and theoretical predictions are now available. Since the bottom (b) quark is much lighter than the top quark, they expect only a small correction at $O(\alpha_s)$ from b quark. This can, in principle, be estimated using the code that they developed for the top quark contribution. However, to avoid numerical instabilities due to the separation of mass scales, it is desirable to compute b quark contribution separately. This requires a small m_b mass expansion of the master integrals. This is quite a non-trivial task at two loops. As a first step, they calculated the two loop form factors for the case when m_b is set to zero in the loop, but it is kept finite in the Yukawa coupling.

NLO QCD corrections in $e^-P \rightarrow e^- \nu H j + X$:

In the past, their group has studied the effect of anomalous couplings in charged-current and neutral-current processes at future electron-proton colliders. As a next step, they have computed the NLO QCD correction to these processes at the total cross-section level so that the new physics effects can be compared better with the predictions in the standard model. Shivaji's group is now studying the effect of QCD corrections on kinematic distributions.

Two-loop form factor for dark matter annihilation to two jets:

In a model of dark matter (DM) where DM couples to the standard model particles via a colored scalar, their group has computed a two-loop form factor for $DM DM \rightarrow g g, q \bar{q}$. The annihilation of DM to two gluons is similar to Higgs's decay into two gluons in supersymmetric theories. However, the DM annihilation of two quarks is unique to the model. This calculation will be

helpful in predicting the relic density of DM.

The group has published the following works in peer-reviewed international journals.

- Karabo Mosala, Pramod Sharma, Mukesh Kumar, Ashok Goyal (2024); Axion-like particles at future e-p collider; Eur. Phys. J. C, Vol. 84, Page 44
- Taushif Ahmed, Ekta Chaubey, Mandeep Kaur, Sara Maggio (2024); Two-loop non-planar four-point topology with massive internal loop. Journal of High Energy Physics, Volume 05, Page 064
- K.M. Black et al. (2024). Muon Collider Forum Report. Journal of Instrumentation, Volume 19, T02015.

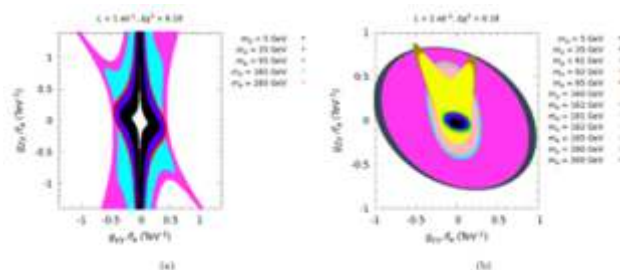


Fig. 7 The 95% C.L. exclusion regions are shown in the $g_{Z\gamma}/f_a - g_{\gamma\gamma}/f_a$ plane for selective m_{ϕ} in (a) Case (I) and (b) Case (II) considering $g_{Z\gamma} = 0.1$, with the observable based on multiple-time χ^2 analysis as explained in text with integrated luminosity of $L = 3.0 \text{ pb}^{-1}$.

Anil Kumar Dasanna

Dasanna's group works in computational soft and biological matter systems such as mechanics of cells and biomolecules, physics of membranes, and active matter systems. The central idea is to apply physical principles in understanding the physics behind numerous biological and soft matter processes. His group largely uses computational methods such as Brownian dynamics, Langevin dynamics, dissipative particle dynamics, multiparticle collision dynamics and stochastic methods.

He started working in IISER Mohali in December 2023. Since then, he has started working with a few BS-MS students on various soft matter problems, such as confinement effects of active Brownian particles, dynamics of active polymers, etc.

Ananth Venkatesan

This year Ananth Venkatesan's group had some interesting microwave projects in anticipation of fixing their dilution Refrigerator. The Dilution refrigerator had a magnet lead changed, and his group is working with various possible Joule-Thomson impedances to reduce its condensing pressure and base temperature.

A protocol for Microwave Pound locking to track resonance and noise processes of Microwave resonators was implemented as part of a MS thesis of Mr Jai Samarth. The student has also shown an FMR as a system to test the power detector boards, he has assembled. Another MS student, Mr Nitish, has developed PCB-based microwave resonators and filters. When their group makes superconducting PCB devices in-house, they will be able to apply the Pound locking scheme.



On the left a Device made with PCB Prototyping system. On the right an Ultrasonic wire-Bonder used to make fine connections

A PhD student has developed the protocols to use the RF PCB milling machine from the FIST facility. He has used it for making bridge circuits for a quartz crystal resonator, several microwave resonators and detector circuits with two MS students.

A Post-Doc Dr Deena Nath has trained on e-beam lithography after the SEM was ready to use last year. He has also trained/helped new PhD students from a few labs along with Mr Avtar Singh a technician on SEM protocols.

As part of our STARS grant, their group has completed the procurement of the equipment to start our work on SrTiO₃ based quasi 2D electron systems. They are in the process of starting measurements with the magnet ready in our lab.

Venkatesan's group has also set programs for sweeping a room-temperature magnet. This will allow undergraduates to do some spintronic experiments.

With an eye to the upcoming quantum mission, their group is working on ideas and proof of concept of SNSPDs. They are collaborating on NV centers with a group in IIT Ropar. Their group is working to collaborate with some theory groups on concepts of minimum uncertainty electronic wave packets. A PhD student is completing a controversial experiment on electronic friction across a superconducting transition.

Dipanjan Chakraborty

The research activities of Chakraborty's group focused on the specific themes of active matter and a class of non-equilibrium-driven systems called pump models. In active matter, the research focused on the single particle dynamics of heated Janus colloids trapped in an isotropic harmonic confinement. Of specific interest was the cross-correlation between the displacement and the orientation vector. In the coarse-grained modeling of an active system, the hydrodynamic flow field is completely ignored. The long-ranged spatial and temporal correlation resulting from the hydrodynamic flow field gives extremely interesting result that has been known for a passive Brownian particle. Their studies have revealed a strong correlation between the symmetry axis along which the propulsion occurs and the displacement vector at shorter time scales and a strong anti-correlation at times scales of the order of the rotational diffusion time, after which the two vectors decouple. The power spectral density of the displacement vector is also calculated and measured from simulation to compare with direct experimental results.

The other direction of research in the field of non-equilibrium statistical mechanics is the investigation of first passage properties of stochastic variables. Of particular interest is the persistence probability in non-equilibrium systems. Persistence conveys the meaning of survival. The persistence probability is simply the probability that a stochastic process has not changed its sign-up to time t . The significance of this quantity is that it can probe the non-stationary dynamics which is otherwise difficult to measure. In their recent communicated work, their group has extended their earlier methodology to an active an-isotropic Brownian particle and has shown that this persistence probability can not only distinguish between an isotropic and an an-isotropic particle but also between a passive and an active particle.

Their group was actively involved in investigating a class of non-equilibrium-driven systems called pump models, which are particularly intriguing due to the property that they involve periodic forces that vanish on an average but still drive an averaged directed current. The model system was that of repulsively interacting two-dimensional colloidal that was driven by flashing ratchet potential, which is commensurate with the underlying lattice. The "flashing" was implemented by stochastically switching "On" and switching "Off" the potential with a prescribed switching rate which we denote as the frequency of the drive. The directed current in the system shows a resonance behavior as opposed to lower dimensional systems where the particle current saturates. The most promising finding was the structural changes in the system as a function of the frequency of the drive. The system exhibits a re-entrant transition from soft-solid to a modulated liquid to again a solid as the frequency of the drive was increased. With such a feature, where the structure and the current can be controlled with an external parameter, the system has possible application in template-assisted drug delivery. The complete characterization of the non-equilibrium phase diagram required large-scale simulations.

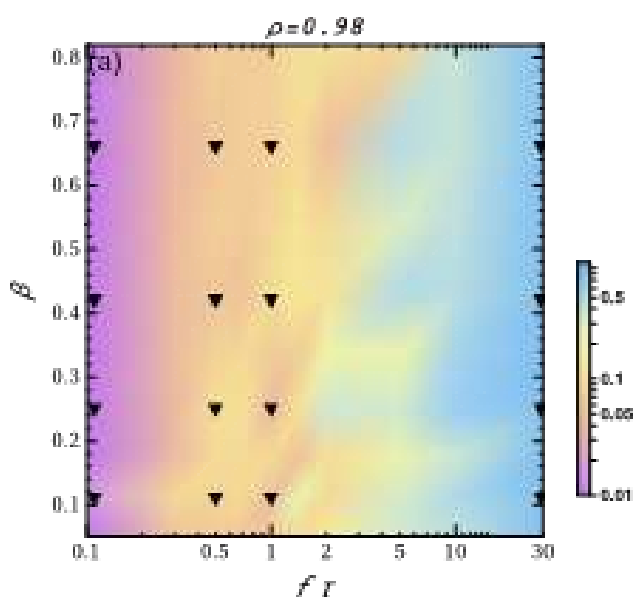


Figure : Phase diagram of a ratcheted two-dimensional colloidal suspension as a function of asymmetry and frequency.

Goutam Sheet

Skyrmions and magnetic bubbles in spin-orbit coupled metallic magnets.

(Physical Review B108 (18), 184419 (2023))

Goutam Sheet's research group demonstrated that layered Van Der Waals ferromagnetic metals Fe_nGeTe_2 host topological textures, e.g., Skyrmions, in the presence of an external magnetic field. Motivated by the demonstration of metallicity as well as ferromagnetism in the 2D materials Fe_nGeTe_2 ($n \geq 3$), their group developed a model to understand the origin and the nature of topologically stable magnetic textures in a class of itinerant magnets. The model is generally applicable to spin-orbit coupled systems that display itinerant magnetism. Results of Monte Carlo simulations on the model display agreement with our experimental data on Fe_3GeTe_2 in identifying filamentary domain walls as the ground-state structure in the absence of a magnetic field. In the presence of a magnetic field, the model predicts either isolated Skyrmions or Skyrmion lattice, depending on the strength of the spin-orbit coupling. Their MFM experiments, on the other hand, reveal large-size magnetic bubbles with certain additional features. These magnetic structures were understood within the model when an easy-axis anisotropy term, as relevant to the materials under discussion, was included. Their combined experimental and theoretical investigation on a class of vdW itinerant magnets has allowed them to identify easy-axis anisotropy as an important parameter that can tune the nature of topological textures from Skyrmions to magnetic bubbles. This generalization of Skyrmion-like topological textures establishes a conceptually new framework for characterizing real-space imaging data of experiments on itinerant magnets.

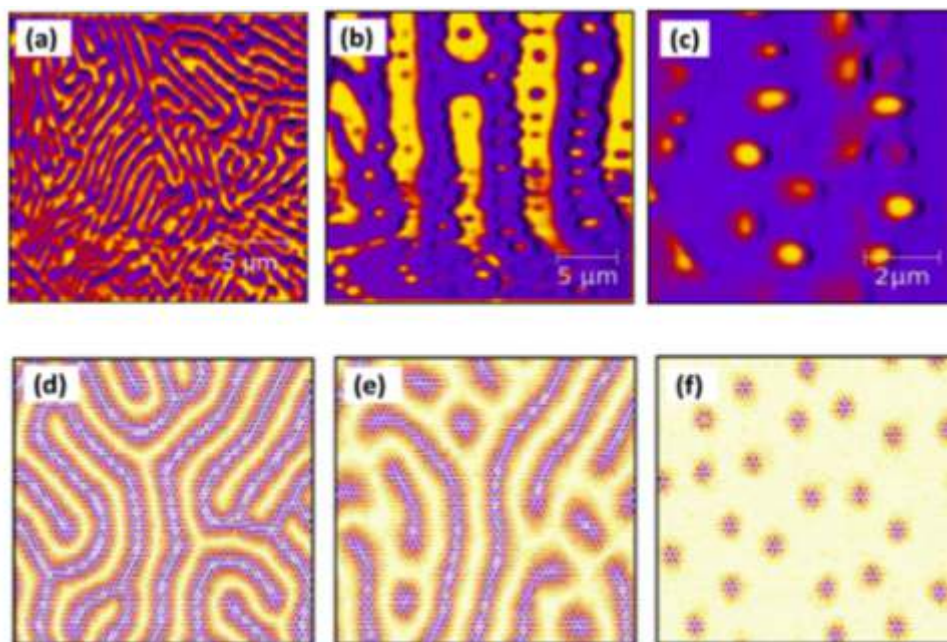


Figure: MFM dual pass phase images taken on a cleaved single crystal of Fe_3GeTe_2 where (a) was taken at 1.6 K in the zero-field cooled (ZFC) state. The filamentary domains can be seen clearly. (b)-(c) were imaged in the field-cooled state in the presence of the field of the MFM cantilever. Representative spin configurations at $T/t = 0.01$ and $\lambda/t = 0.5$ for (d) $h_z = 0.2$, (e) $h_z = 0.44$, and (f) $h_z = 0.84$. The color bar corresponds to the z component, and the arrows indicate the planar components of the spins.

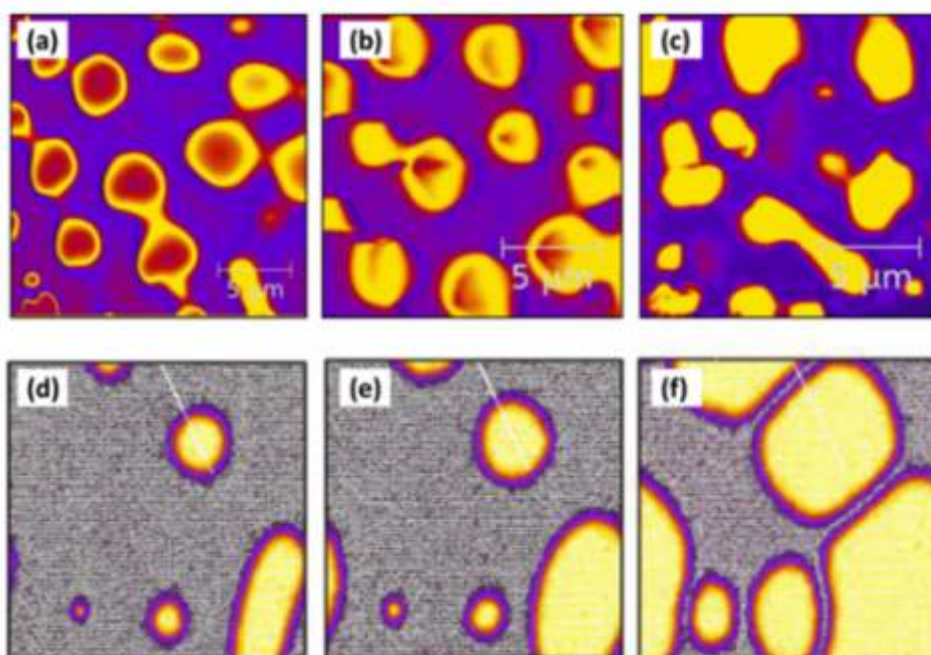


Figure: (a)-(c) MFM dual pass images, recorded at different regions on the sample surface, in the field-cooled state (FC) where an external field of 1.2 kOe was applied. The lift height was kept constant at 30 nm for all the images. Representative spin configurations at $T/t = 0.01$, $\lambda/t = 0.1$, and $A_u = 0.08$ for (d) $h_z = 0.004$, (e) $h_z = 0.016$, and (f) $h_z = 0.028$.

Electrically controlled quantum transition to an anomalous metal in 2D

(ACS Applied Electronic Materials 5 (10), 5446-5452 (2023))

Gautam Sheet's research group demonstrates a new in-situ mechanism to control the fraction of disorder in a 2D superconductor at $\text{LaVO}_3/\text{SrTiO}_3$ interfaces through external gate voltage control. The unprecedented control over the island size is obtained through the control of nanometer-scale ferroelectric domains formed on the SrTiO_3 side.

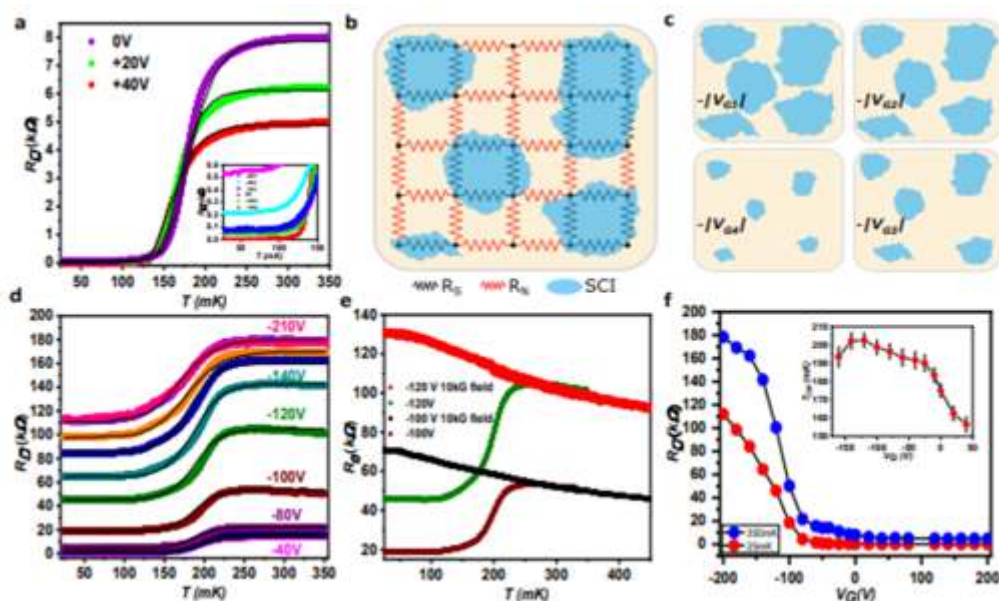


Figure : Electric-field controlled phase transition. (a) Resistance (R) vs temperature (T) plots with increasing (positive) gate voltage (V_G). The inset shows change in resistance below TCM. (b) A schematic illustration of the random resistor-network model used for simulating the segregated superconducting islands at $\text{LaVO}_3/\text{SrTiO}_3$ interfaces. (c) A schematic demonstrating decreasing superconducting island (SCI) size and increasing inter-island distance with decreasing V_G . Here $|V_{G1}| < |V_{G2}| < |V_{G3}| < |V_{G4}|$. (d) R vs T plots at decreasing V_G showing dramatic increase in resistance while the transition at TCM remains almost unaffected. Solid black lines in (a, d) are resistor-network model simulation fit. (e) R vs T at $V_G = -100\text{V}$, -120V showing insulating behaviour of the background under applied magnetic field of 1T. (f) R vs V_G characteristics below and above TCM. The inset shows TCM vs V_G characteristics.

The mechanism through which superconductivity is destroyed upon controlled disordering often holds the key to understanding the mechanism of emergence of superconductivity. Here their group demonstrate a new in-situ mechanism to control the fraction of disorder in a 2D superconductor. By controlling an electric field V_G , they created an assembly of segregated superconducting nano-islands and varied the inter-island distance to accomplish a quantum phase transition from a superconducting phase to a strange quantum anomalous metallic (QAM) phase at $\text{LaVO}_3/\text{SrTiO}_3$ interfaces. In the QAM phase, the resistivity dropped below a critical temperature (TCM) as if the system was approaching superconductivity, and then saturated, indicating the destruction of global phase coherence and the emergence of a new phase where metal-like transport of Bosons (a Bose metal) becomes a possibility. The unprecedented control over the island size is obtained through the control of nanometer-scale ferroelectric domains formed in the SrTiO_3 side of the interface due to a low-temperature structural phase transition. This is a demonstration of a reversible way of controlling inhomogeneity in situ in two dimensions and stands out in the research of inhomogeneous materials where, so far, changing inhomogeneity essentially meant changing the material itself. Their work provides an important insight into the mechanism of the emergence of superconductivity in SrTiO_3 -based low-carrier density superconducting systems. The data suggests that in such systems there are multiple energy scales where phase incoherent Bosonic pairs form before global phase coherence to a superconducting condensate happens. Controlling nanoscale superconducting islands by tuning ferroelectricity with an external electric field provides a new avenue of controlling disorder in low dimensions and this will spur research to realize new quantum phases in low-dimensional quantum materials through in-situ ferroelectric domain engineering.

Laser-induced structural modulation and superconductivity in SrTiO_3

(Appl. Phys. Let. 123 (5): 052601 (2023).

Their research group has created structural phase separation with clear domain boundaries at room temperature on single crystals of SrTiO_3 (111) by irradiating the surface with high-power density excimer laser pulses. They found signatures of the coexistence of local ferroelectricity as well as filamentary superconductivity in lightly doped SrTiO_3 . This work has indicated the possibility of controlling ferroelectricity and superconductivity in functional electronic devices through surface engineering.

Under normal conditions, stoichiometric SrTiO_3 is an excellent dielectric. It shows a structural phase transition, from cubic to tetragonal, below 105 K. In this structure, well-separated domains hosting tetragonal phases with different long axes exist giving rise to the so-called X, Y, and Z domains. At very low temperatures it becomes a quantum paraelectric in which local ferroelectric domains are found at the X, Y, and Z domain boundaries. The creation of oxygen vacancy in SrTiO_3 makes it conduct with low carrier density which also undergoes an unconventional superconducting transition at sub-kelvin temperatures. Their group has created structural phase separation with clear domain boundaries (as in the X, Y, and Z domains) at room temperature on single crystals of SrTiO_3 by irradiating the surface with high-power density excimer laser pulses. They find that the domain boundaries are dominantly conducting, and the irradiated crystals undergo a superconductivity phase transition below 180 mK, indicating that the superconducting phase appears at the domain

boundaries. This concurrence of local ferroelectricity and superconductivity in lightly doped SrTiO₃ supports a ferroelectric fluctuation-mediated Cooper pairing in the system. The results also point out the possibility of controlling ferroelectricity and superconductivity in functional electronic devices through surface engineering

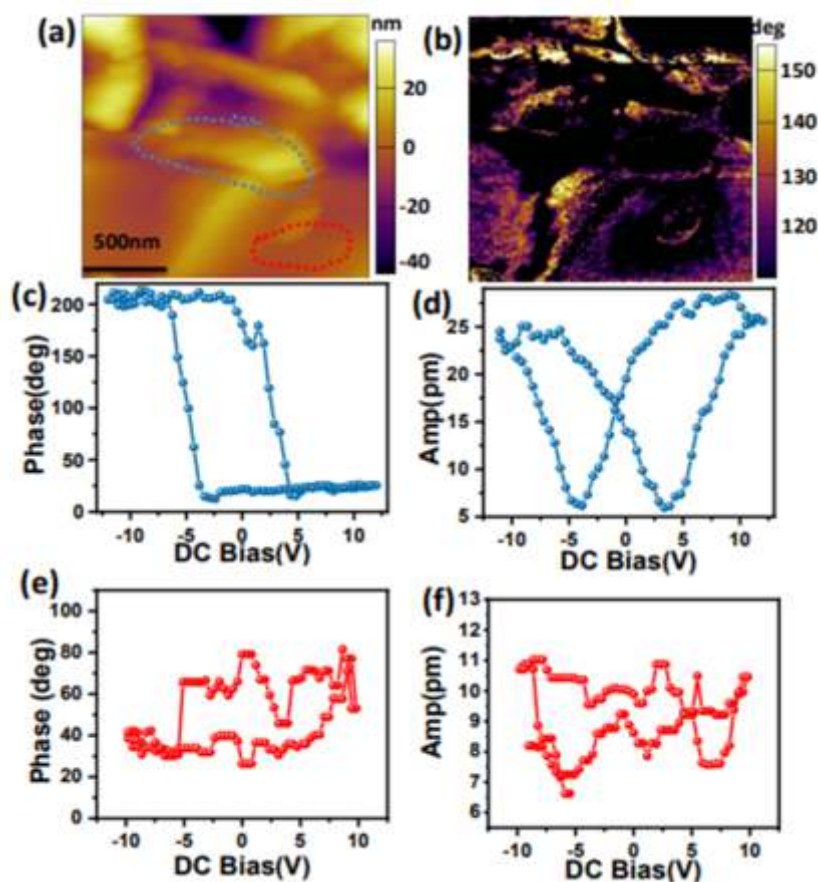
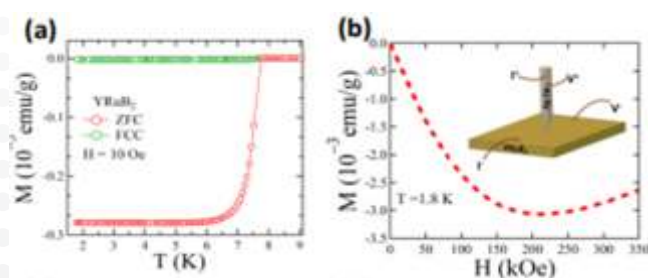


Figure : (a) The AFM topographic image of the L-STO sample ($1.7 \mu\text{m} \times 1.7 \mu\text{m}$) showing the domain boundaries and the flat regions marked blue and red dotted lines respectively. (b) Corresponding PFM phase image of the sample. (c,d) Phase and amplitude of switching spectroscopy PFM (SS-PFM) showing ferroelectric response at domain boundaries. (e,f) Phase and amplitude of SS-PFM in the flat regions showing no ferroelectric-like response.

Topological proximity drives multiple superconducting gaps in YRuB₂

(Physical Review B Letters (2024))

Gautam Sheet's group found experimental evidence of multiple superconducting energy gaps in YRuB₂. First-principles calculations reveal that the emergence of the smaller gap in their surface-sensitive experiments is a consequence of a proximity-induced superconducting gap in the Topological surface states in the system, some of which cross the Fermi surface and contribute to global transport. While the possibility of topological superconductivity (TSC) in hybrid materials involving those with topologically nontrivial band structure and superconductors has been proposed, the realization of TSC in a single stoichiometric material is most desired for fundamental experimental investigation of TSC and its device applications. As per electronic structure calculations, YRuB₂ is a system that hosts a single superconducting energy gap in the bulk as well as special symmetry-protected topological surface states (TSS). Their group performed Andreev reflection spectroscopy on YRuB₂ and found experimental evidence of multiple superconducting energy gaps. Their calculations indicate that the TSS in the system crosses the Fermi energy, indicating that the second superconducting gap is an induced gap on the TSS that exists in proximity to the bulk superconductor. These proximity-induced superconducting TSS make YRuB₂ a strong candidate for topological superconductivity.



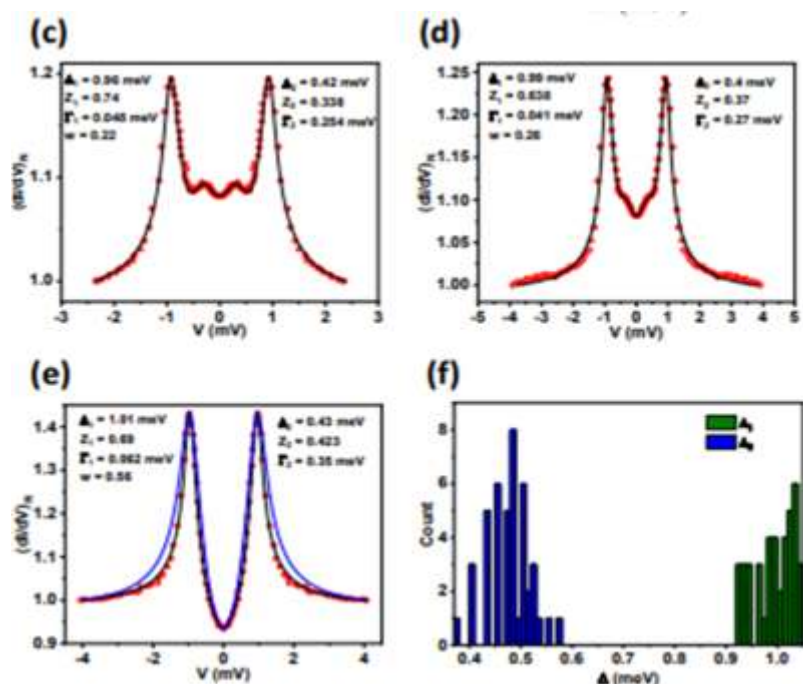
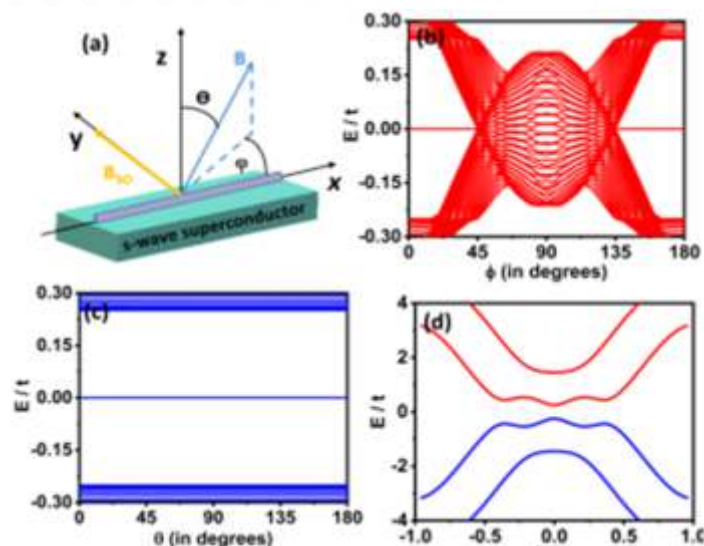


Figure : (a) Temperature dependence of bulk magnetization measured in both zero field cooling (ZFC) and field cooled cooling mode with 10 Oe magnetic field (FCC). (b) Field dependence of bulk magnetization at a temperature of 1.8 K. Inset shows a schematic describing the formation of point contact on YRuB₂. (c,d) Conductance spectra obtained in the ballistic regime (red circles) and their corresponding two-gap BTK fit (black line). (e) Conductance spectra obtained in the ballistic regime (red circles) and their corresponding single gap BTK fit (blue line) and two gap fit (black line). (f) Statistics of superconducting energy gaps (Δ_1 and Δ_2) for 43 different contacts.

Weakly coupled Majorana wire arrays under tilted magnetic fields.

(J. Appl. Phys. 133 (22): 224301(2023).

Their group theoretically studied the effect of tilting the external magnetic field in and out of the plane of an array of weakly coupled Majorana nanowires and found a rich phase diagram. This study of weakly coupled Majorana array wires is useful to study the tunneling characteristics of such a proposed device. An array of Rashba-coupled semiconducting nanowires lying in proximity to an s-wave superconducting substrate, with weak inter-wire coupling, in the presence of an external magnetic field shows an even-odd effect in the differential conductance over a chosen parameter space. Such an effect is a direct consequence of end Majoranas in each nanowire hybridizing into bonding and anti-bonding states. In the present work, their group study in detail the impact of tilting of an external magnetic field on the differential conductance of an array of both uncoupled and weakly coupled wires. The phase diagram evolution with various control parameters, including the tilt angle of the magnetic field, has also been presented. From a detailed analysis of the field-angle dependence of the odd-even effect, and the evolution of the same over a large parameter space they summarize that the results can be used to exploit magnetic-field angle in an array of Rashba-coupled semiconducting nanowires on a superconducting substrate as an important tuning parameter to investigate zero-bias conductance peak arising from Majorana edge modes vis-a-vis that arising from a non-topological origin.



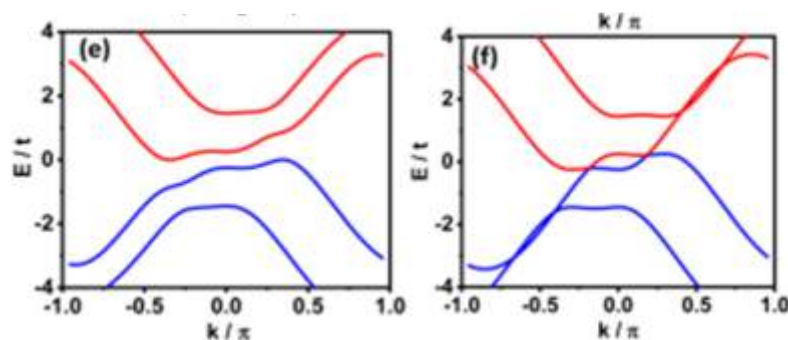


Figure: (a) Schematic illustrating a proximitized one-dimensional nanowire (lying along the x axis) and the orientation of external magnetic field B . B_{SO} , the effective magnetic field generated due to Rashba spin-orbit coupling, is taken along the y direction. (b) The evolution of the energy spectrum with ϕ or VZeeman being fixed at $0.85 t$ and being set to 90° is shown. The spectrum is symmetric for positive and negative values of ϕ . (c) The variation of the energy spectrum with θ for VZeeman being fixed at $0.85 t$ and ϕ being set to 0° is shown. A state at zero energy appears for all values of θ . (d) The energy dispersion of one-dimensional nanowire when field angles are $\phi = 0^\circ$ and $\theta = 90^\circ$. The bulk is fully gapped near zero energy, (e) The energy dispersion for critical angle $\phi_c = 44.5^\circ$ when $\theta = 90^\circ$. The gap is partially closed at this orientation, and (f) the energy dispersion for $\phi = 90^\circ$ and $\theta = 90^\circ$. The gap becomes fully closed at zero energy for this orientation of magnetic field. The other parameters used for calculations are $t_x = t$, $\alpha = 1t$, $\tau = -2t$, and $\delta = 0.6t$

Harvinder Kaur Jassal

One of the approaches to study accelerated expansion of the Universe is through modified gravity. Jassal's research group studied $f(R)$ gravity models and showed that for certain classes of viable quintessence models, the Jordan frame universe grows to a maximum finite size, after which it begins to collapse back. In the late time limit, where the Einstein frame universe continues to expand, the Jordan frame universe begins to collapse. Their group then generalized the condition for this expansion-collapse duality for time-varying equations of state models; this mapping between an expanding geometry and a collapsing geometry at the field equation level has interesting potential implications on the large-scale structure formation in the Universe. Their group then used the Jordan frame-Einstein frame correspondence to explore dual universes with contrasting cosmological evolutions. They also studied the mapping between Einstein and Jordan frames where the Einstein frame universe describes the late-time evolution of the physical universe, which is driven by dark energy and non-relativistic matter. Jassal's research group showed that an Einstein frame universe, with cosmological evolution of the cosmological constant model, always corresponds to a bouncing Jordan frame universe governed by a Brans-Dicke theory. On the other hand, quintessence models of dark energy with non-relativistic matter components are shown to be always dual to a Brans-Dicke Jordan frame with a turn-around. The evolution of the equation of state of the quintessence field determines whether the turn-around is a bounce or a collapse. They have also studied the stability of such conformal maps against linear perturbations.

Their group carried out deep Near-UltraViolet (NUV) and Far-UltraViolet (FUV) imaging of an interacting galaxy system comprising of a Seyfert type 1 galaxy NGC 7469 and its companion IC 5283 to resolve and map the star-forming regions in the outer arms and to look for signs of interaction between the two galaxies. For this analysis, they used AstroSat Ultra Violet Imaging Telescope (UVIT) to obtain NUV and FUV images of NGC 7469 in four different filters and carried out photometry of star-forming regions in the two galaxies and obtained their distribution. Their images show the presence of an outer spiral arm which is better resolved than before. Additionally, they have identified 33 new star-forming regions, not resolved by earlier observations, out of 51 total identified in the UVIT composite image. Enhanced star formation activity is observed coinciding with the interaction. The Spectral Energy Distribution and the photometric results show that most of the star formation activity is confined inside the central starburst ring. This work has been accepted for publication in the *Astronomy and Astrophysics Journal*.

Jasjeet Singh Bagla

Research work completed and published in this year in Bagla's group is spread across three themes:

- Formation of the large-scale structure of the universe is often described in an approximate manner by considering only the collapsed halos of dark matter as the objects defining the distribution. The same halos also serve as the sites for the formation of galaxies and clusters of galaxies. This approach, referred to as the excursion set formalism, is described in terms of variables that do not depend explicitly on the initial spectrum of density perturbations in the universe or even on the specifics of cosmological parameters that specify the expansion history of the universe. Thus, the excursion set approach is defined in terms of variables that are universal. Using N -body simulations of self-similar models, their group has shown that there is a departure from universality in the mass function of collapsed halos and that this arises from the shape of the spectrum of density fluctuations. This work (Gavaset al. 2023) goes on to demonstrate the applicability of this to initial conditions relevant to our universe by improving the description of the mass function. This is a useful step in the direction towards precision cosmology as observations are improving and we need better theoretical models in order to carry out a comparison of observations and different models.

- The study of exotic image formation in gravitational lenses with a special focus on hyperbolic umbilics when three such systems were discovered in a single cluster of galaxies. This is in consonance with their predictions (Meena and Bagla 2022) and in disagreement with earlier work that hardly any such systems will be observed. With this fresh impetus, their group has started work on a series of projects to help observers identify such image formations through quantitative diagnostics. In Meena and Bagla (2023), they analyzed simple models for clusters of galaxies using realistic density profiles and substructures and their impact on the formation of hyperbolic umbilics.
- Their group has completed an analysis of deep observations of the extended Groth strip (EGS) using the upgraded Giant Meter wave Radio Telescope (uGMRT) for a red shifted 21cm line of atomic Hydrogen for galaxies with red shifts up to 0.4. Preliminary analysis of this data was used for the first detection of atomic Hydrogen in galaxies at intermediate redshifts. They also showed that the atomic gas mass in these galaxies exhibits a distinct change from the observed trends in the local universe. In two projects completed this year, they studied the scaling relations for star-forming galaxies at intermediate red shifts (Bera et al. 2023a) and also estimated the gas accretion rate for such galaxies (Bera et al. 2023b).

K.P. Yogendran

During this period, together with the members of K.P. Yogendran's group, Mr. Akash Singh and Ms. Supragyan Priyadarshinee, Dr. Yogendran was studying aspects of the dense nuclear matter inside a typical neutron star. These concern the phases of the star at finite baryon density, and the focus of his group is on determining the phase diagram and the equations of state of this matter using a novel technique called AdS holography.

Independently, Dr.K.P. Yogendran collaborated with Dr. Sabyasachi Rakshit and Dr. Abhishek Chaudhuri and their group members on studying the dynamics of the tip-links when subject to static forces using an AFM.

Kamal P. Singh

Singh's research group has been engaged in the investigation of several notable research areas. These include the advancement of high-power blue lasers, the exploration of high-power laser interactions with different materials, the precision time-resolved measurement of ultra fast processes with attosecond temporal resolution and enhanced stability through simplified design, the analysis of light interaction with fluid at the nanoscale, and the spectroscopic study of femtosecond laser-induced. The outcome of these works is briefly described below:

-Singh's group has developed a robust all-solid-state 100W scale blue-laser system for high-precision copper processing. By integrating powerful laser-diode arrays with Peltier chips in a compact laser head, they have achieved stable thermal and optical performance. The system emits a continuous wave of 40–100W at $\lambda = 452.2 \pm 2.5$ nm with 98% power stability and ~24% wall-plug efficiency, all within a portable enclosure. Notably, this represents the pioneering achievement of an all-solid-state air-cooled laser with a 100W class output. Their successful applications include cutting, bending, and soldering copper on a battery pack, demonstrating nanoscale adhesion in the copper-solder joints and enabling copper strips to withstand extreme loading cycles without nanoscale cracks through a 0.5–4 kW/cm² intensity laser annealing scan.

-One of the group members has done theoretical studies on the tunability of half-cycle cutoff (HCO) harmonics with an inhomogeneously enhanced laser pulse. The study compares high harmonic generation (HHG) in three types of inhomogeneously enhanced laser pulses using the time-dependent Schrödinger equation in one dimension. The results show that the HCO shifts to higher orders with increased inhomogeneity strength in isotropic cases and shifts differently in anisotropic inhomogeneity. Additionally, increasing the carrier-envelope phase (CEP) results in shifts towards higher orders in the enhanced HCO for the lower-order harmonic region. The periodicity of the harmonic spectra also varies depending on the type of inhomogeneity, with implications for CEP tuning.

-Their group has written an article in Resonance for undergraduate students and teachers. In this article, they provide a pedagogical overview of the physics and technology behind attosecond pulses and their applications in exploring the dynamics of matter on an ever-shorter time scale. They begin with milestones that led to the attosecond era and explain the basic mechanism behind the generation and characterization of attosecond pulses. Their group describes the experimental implementation of the attosecond setup and discusses some applications in resolving the attosecond phenomenon. Emerging directions in this new field are also mentioned.

Kavita Dorai

Kavita Dorai's research group activities have focused on consolidating and expanding the horizons of their work in NMR Quantum Computing and its applications. They employed a feed-forward artificial neural network (FFNN) architecture to perform the tomography of quantum states and processes obtained from noisy experimental data. The FFNN model is further used to characterize different quantum processes including two-qubit entangling gates, a shaped pulsed field gradient, intrinsic decoherence processes present in an NMR system, and various two-qubit noise channels (correlated bit flip, correlated phase flip, and a combined bit and phase flip). Their group experimentally demonstrated the transfer of an unknown single-qubit state from Alice to Bob via a two-step discrete-time quantum random walk on a cycle with four vertices on a four-qubit nuclear magnetic resonance quantum processor. The qubits with Alice and Bob are



used as coin qubits, and the walk is carried out in a two-qubit 'Gaming Arena'. The required entangled state is generated naturally via conditional shift operators during the quantum walk, instead of being prepared in advance. They implemented controlled operators at Bob's end, which are controlled by Alice's coin qubit and arena qubits, in order to reconstruct Alice's randomly generated state at Bob's end. Using an entanglement witness, they certify that the quantum walk generates a genuine quadripartite entangled state of all four qubits. The results demonstrate that the quantum circuit is able to perform quantum state transfer via the two-step quantum random walk with high fidelity. They experimentally demonstrate the implementation of a recently proposed robust and state-independent heat-bath algorithmic cooling (HBAC) method on an NMR quantum processor. The new method proved that optimal HBAC is possible without prior state information and using a single fixed operation. They modified the protocol to experimentally perform efficient cooling of ^{13}C and ^{15}N spins.

Kinjalk Lochan

During this year, Kinjalk Lochan's research group was involved in studying various classical and quantum properties of both early and late-time cosmological universes. One central idea pursued was the understanding of the classical and quantum equivalence of a proposed duality between expanding and collapsing universes. It was demonstrated that late time accelerating and expanding cosmological space times can equivalently be described by a collapsing and shrinking universe in a modified gravity theory. As a consequence, it was observed that even the late-time universe would harbor the same amount of quantum character as a collapsing universe would as it turns microscopic. Such quantum aspects are expected to have significance for the evolution of the universe. Further, it was shown that the quantum fluctuations of geometry in an inflationary universe remain significant and hint towards the overreach of quantum gravity deep into the semi classical regime, where, typically, the inflationary predictions are made. This opens up a space for variance in the accurate prediction from the inflationary dynamics if it is quasi de-Sitter like. The publications around these research themes coming out from their group are listed below:

Harkirat Singh Sahota, & Kinjalk Lochan, "Analyzing quantum gravity spillover in the semiclassical regime," *Eur. Phys. J. C* 83, 1162 (2023)

Dipayan Mukherjee, & Harkirat Singh Sahota, "Einstein and Jordan frame correspondence in quantum cosmology: expansion-collapse duality" *Eur. Phys. J. C* 83, 803 (2023)

Dipayan Mukherjee, Harvinder K. Jassal, & Kinjalk Lochan, "Bouncing and collapsing universes dual to late-time cosmological models" *Eur. Phys. J. C* 84, 318 (2024)

Kulinder Pal Singh

Spectral and timing analyses of the Chandra X-ray data of HD 179949, a prototypical star with a hot Jupiter planet, show that the abundance of elements is low relative to the solar and the stellar photosphere and a large bias due to high first ionization potential (FIP) elements. Along with Swift and XMM-Newton measurements, a dominant signal tied to the stellar polar rotational period is seen consistent with the corona being rotational-pole dominated. Periodicity found at both the planetary orbital frequency and at its beat frequency with the stellar polar rotational period suggest a magnetic connection between the planet and the stellar pole, likely driven by a quasi-continuous form of heating rather than sporadic, impulsive flare-like reconnections. <https://doi.org/10.3847/1538-4357/acd054>. Study of coronal, transition, and chromospheric activity of four rapidly rotating (period <0.5 days) stars located within 50pc, with AstroSat, detects many FUV and X-ray flares in them. <https://www.ias.ac.in/article/fulltext/joaa/044/0090>. Multi-wavelength observations of a magnetic cataclysmic variable Swift J0503.7-2819: FUV and X-rays from AstroSat, optical from Southern African Large Telescope and X-rays from XMM-Newton and Swift observatories; show X-ray modulations due to orbital and spin periods. Spin-orbit period ratio of 0.8 and orbital period below the period gap (2-3hours) of CVs, Swift J0503.7-2819 is the newest addition to the growing population of nearly synchronous MCVs with low luminosity. Kulinder Pal Singh's research group proposes a ring-like accretion flow using period ratio, stability arguments, and observational features. <https://doi.org/10.1093/mnras/stad3139>.

AstroSat-FUV observations of spiral galaxy UGC 10420, on the edge of the X-ray emitting region of cluster Abell 2199, show intense knots of star formation on its leading edge accompanied by a tail of the same on the diametrically opposite side. The galaxy disc is larger than that seen in the optical and mid-infrared, and the star formation rate derived from UV-to-IR spectral energy distribution is 9 times that expected for a star-forming field galaxy of similar mass. Diffuse X-ray emission and two symmetrically placed X-ray hot spots on either side of an X-ray weak nucleus are discovered with Chandra X-ray Observatory. Galaxy's interaction with hot intra-cluster medium, perturbs the gas in the galaxy causing starburst in the leading edge of the disc, and developing turbulence that may push some of the gas out of the disc. Interactions between the gas ejected from the galaxy and the intra-cluster medium can then locally trigger star formation in the wake of the galaxy experiencing ram-pressure stripping. <https://doi.org/10.1088/1475-7516/2024/02/05>. Study of AGN in galaxies, NGC 4593 and NGC 7469, using simultaneous UV/X-ray observations with AstroSat and Swift show that in NGC 4593 X-ray variations lead those in the FUV and NUV by ~38 ks and ~44 ks, respectively, favouring disc-reprocessing model. Opposite trend, soft X-ray variations lagging those in the FUV and NUV bands by ~41 ks and ~49 ks respectively, in NGC7469, favors thermal Comptonization model. DOI: <https://doi.org/10.1093/mnras/stad755>. Accretion disk emission from 8 AGN seen in AstroSat FUV grating spectra, combined with Hubble Space Telescope spectra find redder power-law slopes in the FUV band than predicted by the standard accretion disk model. Inner disk temperatures are lower than the peak temperatures predicted for standard disks around maximally spinning supermassive black holes accreting at Eddington rates. <https://doi.org/10.3847/1538-4357/acc941>. AstroSat observations of AGN in NGC 4051, reveal rapid variability (amplitude of 37% in X-rays, and 3-5% in the UV bands). X-ray variations lead FUV and NUV variations by ~7.4 ks and ~24.2 ks, respectively, favoring the thermal disc reprocessing model.

Manabendra Nath Bera

In Bera's research group (Quantum Information and Quantum Physics group), they have carried out research in the field of quantum information and computation theory involving quantum thermodynamics and heat engines, quantum non-Markovianity in states and evolutions, quantum a-causality and communications, quantum measurements and quantum Bayes' theorem, quasi-probabilities, and metrology. In particular, their group have:

- Explored the role of quantum quasi-probabilities and, based on them, derived bound for quantum advantages in post-selected multi-parameter metrologies.
- Studied the quantum thermodynamics in open quantum systems and resource theory of quantum heat engines.
- Developed an information theoretic framework to quantify quantum non-Markovianity in quantum states.
- Developed a framework to characterise quantum non-Markovianity in terms of causal information back flow from environment to system.

Mandip Singh

Main research was carried out on quantum imaging of transparent phase shifting patterns in higher dimensions (six-dimensional phase-space). The concept of imaging of patterns localized in the six-dimensional phase-space was introduced by Dr. Mandip Singh in 2018 through an experiment. The work during 2023-2024 was focused on its equivalent realization for transparent patterns. Higher dimensional phase-space localized patterns cannot be imaged by a lens, and the human brain cannot perceive them as usual images. In addition, experiments on quantum imaging with hyper-entangled photons are realized. Hyper-entangled state of two photons is a nontrivial quantum state, where two photons exhibit polarization discrete entanglement and Einstein Podolsky Rosen (EPR) continuous variable entanglement independently. The concept of quantum ghost imaging of transparent patterns was also first introduced by Dr. Mandip Singh, and its experimental realization was completed in his lab and published in 2023. His group first realized this nontrivial quantum entanglement and its application in quantum imaging. Quantum imaging activity was a part of a DST-funded research project of the Quantum Enabled and Science and Technology (QuEST) scheme. Apart from quantum and higher dimensional imaging, new experiments with quantum entangled photons of foundational significance were performed.

[1] Subtomographic imaging of a polarisation sensitive phase pattern localised in phase space Manpreet Kaur, Sheenam Saxena & Mandip Singh. Scientific Reports, 14, 2641 (2024).

Pankaj Kushwaha

Continuing his research group's focus on exploring/understanding the physics of relativistic jets and active galactic nuclei, he started two new projects: one led by his PhD student Megha and the other by MS thesis student Sameer while he with his collaborators have focused on intensive and extensive investigation of the peculiar blazar OJ 287 from different angles and the FSRQ PKS 1510-089. His postdoc Avik has focused on understanding a source that has transitioned to a new spectral state – very rare in blazars and he along with his collaborator Ashwani focused on another source showing similar behavior. Together these studies attempt to address the ongoing debates related to the origin of gamma-ray, jet physical processes, and plausible physical conditions, and

- In the quest to explore and understand very high energy gamma-rays emission (Energy > 100 GeV) from flat spectrum radio-quasars (FSRQs), his PhD student Megha analyzed 14-year data of all such sources (9-total), explored statistical properties to understand the behaviors and investigated plausible theoretical scenarios for observed behaviors using non-thermal radiative processes. The work is almost finalized and ready for submission – pending the last ongoing content check and revision.
- Contributed in the data reduction, compilation, statistical analysis, and interpretation of polarimetry and photometric study of peculiar blazar OJ 287: one of his long-term sources of focus study, reporting a rarely seen photopolarimetric behavior that might be related to binary black hole interaction and it's imprinted on the jet (now published: <https://iopscience.iop.org/article/10.3847/2041-8213/acfd2e>; I am one of the contact authors)
- Contributed to analysis, interpretation, and investigation of plausible processes of three collaborative projects (1 published: <https://academic.oup.com/mnras/article/527/3/5220/7438893> – part of his project started at his previous Institute ARIES, Nainital, 2: ongoing writing) to understand, identify, and quantify observed behavior of potential blazars at optical bands.
- Submitted the ongoing work using simultaneous optical to X-ray spectral study of OJ 287 with a focus on understanding the X-ray spectral changes, reporting an extended particle spectrum during low states, plausibly a steady state contribution -- has undergone revisions and work still in progress (<https://arxiv.org/abs/2305.16144>; strong competition with an International group)
- Supervised MS Thesis student (Sameer Yadav: MS18018) with a new project related to his future direction of expansion – a cross-disciplinary work exploring cosmology with gamma-rays. The work got accepted and published (<https://www.mdpi.com/2075-4434/12/4/34>)
- With a focus on identifying plausible observational signatures for the rarely seen spectral state transition in blazars, his

post-doc Avik explored one source, while with his collaborator Ashwani, he explored another source using multi-wavelength data and modeling. Avik's work is in the final stages of submission, while the other is already published (<https://www.aanda.org/articles/aa/abs/2024/01/aa47719-23/aa47719-23.html>)

Prasenjit Das

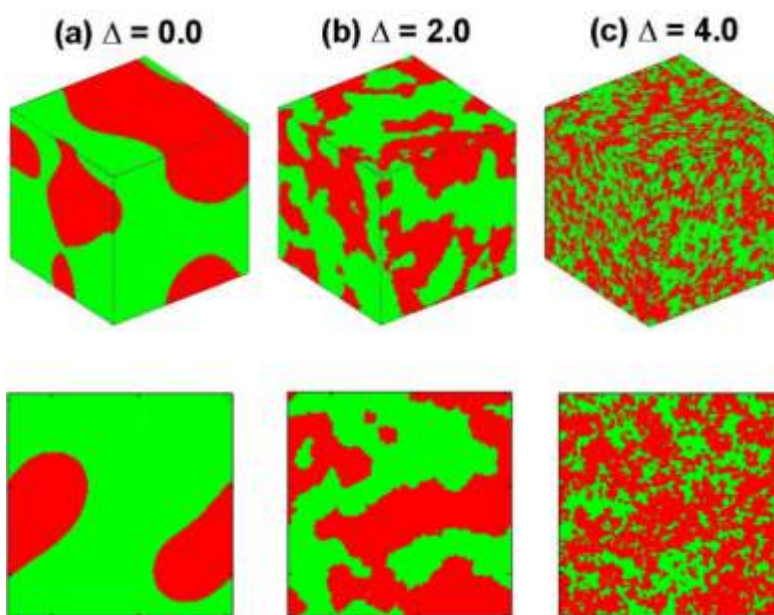
Prasenjit Das's research group was involved in several research projects during this period.

- a) Dr. Prasenjit Das was involved in studying the pattern dynamics of both density and velocity fields in $d=2, 3$ in phase separating binary fluid mixtures using Model H kinetics. The outcomes of our comprehensive numerical study are summarized as follows:

- (i) For $d=3$, they found a clean observation of all expected growth regimes and the corresponding crossovers in the disorder-free Model H. The density length scale shows a power-law behavior with $L1 \sim t^x$ with $x = 1/3 \rightarrow 1 \rightarrow 2/3$.

The density correlation function $C1(r,t)$ exhibits dynamical scaling in $d=3$, and the structure factor shows a Porod tail due to scattering from sharp interfaces. The velocity length scale shows a diffusive behavior: $L2 \sim t^{1/2}$. The corresponding $C2(r,t)$ exhibits dynamical scaling but does not show oscillatory behavior. In this case, structure factor $S2(k,t)$ shows a generalized Porod tail: $S2(k,t) \sim k^{-6}$, which is characteristic of scattering from monopole defects.

- (ii) For $d=3$, we have also studied the effect of random field disorder on spinodal decomposition in Model H. The scaling functions are disorder-dependent and show distinct features of fractal interfaces. Further, the growth law is no longer a power-law, but they cannot confirm that it has a logarithmic form, as for the RFIM.



Phase separation in a binary mixture (A+B) with random field disorder Δ in $d=3$ at time $t=5000$. The A-rich regions are marked in red, while the B-rich regions are marked in green.

- (iii) For $d=2$, the density length scale shows three regimes of power-law growth as $L1 \sim t^x$ with $x = 1/3 \rightarrow 1/2 \rightarrow 2/3$. Again, $C1(r,t)$ and $S1(k,t)$ show dynamical scaling. As for $d=3$, the tail of $S2(k,t)$ shows the usual Porod law associated with scattering from interfaces. Further, $C2(r,t)$ and $S2(k,t)$ also exhibit dynamical scaling. The tail of $S2(k,t)$ shows a generalized Porod tail, $S2(k,t) \sim k^{-4}$, which arises due to scattering from vortex cores. The length scale of the velocity field is diffusive.
- b) Mr. Subhanker Howlader was involved in studying the virial equation of state for a granular system. The equation of state for an ideal gas is $P=nkBT$. In the case of imperfect gases where mutual interactions among the constituents are important, pressure P can be expressed as the series expansion of density n with appropriate coefficients, known as virial coefficients B_m . Das's group has obtained the first four virial coefficients for a model interaction potential $\Phi(r)$ using multidimensional Monte-Carlo integration and importance sampling methods. Next, they perform molecular dynamics simulations with the same $\Phi(r)$ for a many-particle system to obtain P as a function of T and n to compare numerical data with the virial equation of state.
- c) Mr. Sayantan Mondal was involved in studying motility-induced phase separation in symmetric and asymmetric active binary mixtures. They start with the coarse-grained run-and-tumble bacterial model that provides evolution equations for the density fields. Next, they study the phase separation dynamics by solving the evolution equations using the Euler discretization technique. They characterize the morphology of domains by calculating the equal-time correlation function

$C(r, t)$ and the structure factor $S(k, t)$. For $k \rightarrow \infty$, $S(k, t)$ follows Porod's law: $S(k, t) \sim k^{-(d+1)}$ and the average domain size $L(t)$ shows a diffusive growth as $L(t) \sim t^{1/3}$ for all mixture compositions.

Rajeev Kapri

Stochastic Resonance (SR) in double-stranded DNA driven by a periodic force:

Rajeev Kapri's research group investigated SR in a model dsDNA driven by a periodic force using Monte Carlo simulations. The SR is measured by looking at the oscillations of the separation of the end monomers of the strands where the periodic force is applied. The output signal, defined as the spectral density of the signal at an oscillation frequency, is found to be an excellent quantifier of SR in our model. They found that the output signal as a function of the oscillation frequency at varying force amplitudes and temperatures shows multiple resonance peaks which appear as signatures of dynamical states of partially zipped and unzipped conformations and transitions between them. The peak frequency increases with increasing chain lengths and shows excellent scaling behavior.

Translocation of a semiflexible polymer through extended patterned pores:

They employed Langevin dynamics simulations to study the following problems:

- (1) Their group explored the translocation dynamics of a semiflexible polymer, as it passes through an extended attractive pore whose width oscillates with time. It was found that the combined effect of pore-polymer interactions and polymer stiffness has a profound impact on the translocation dynamics. They found that an oscillating pore width could lead to a significantly more efficient translocation of stiff polymers when compared to translocation via a static channel that has a width equal to the mean width of the oscillating pore. However, for pores with lesser attractive interactions, this gain in translocation time reduces with increasing stiffness of the polymer. For pores with stronger attractive interactions, the gain in translocation increases with the increasing stiffness of the polymer. This intriguing reversal, which occurs independent of the dimensionality of the problem, is explored in the parameter space of driving force, chain stiffness, and pore stickiness.
- (2) They presented a detailed picture of the dynamics of polymer translocation through variously patterned pores in two dimensions in the presence of an external force that periodically varies. Their group considered both homopolymers, which are uniformly semiflexible, and heteropolymers, with alternate stiff and flexible segments. They found that the gain in translocation time for homopolymers exhibits oscillations with the frequency of the external periodic force. It is interesting to note that although the gain varies significantly with chain stiffness for a uniformly attractive pore, these changes are negligible for pores with varying interactions. This behavior with variably structured pores is further characterized using the mean translocation time and waiting time distributions. For heteropolymers, there are notable differences in the waiting-time distribution between various pores, which change over the three distinct patterned pores and for varying oscillation frequencies depending on the block length of the stiff/flexible segment. They employed these differences in a sequencing technique to investigate the potential for detecting heteropolymers by allowing them to pass through numerous pores. They demonstrated how the combination of periodic forcing, chain heterogeneity, and pore patterning can help with sequence detection.

Ramandeep Singh Johal

The focus of Johal's study in quantum thermodynamics has been to characterize the working conditions for a 3-level atom undergoing a quantum Otto cycle with arbitrary changes in its two energy gaps. Their study has clearly shown the role of majorization conditions between the hot and cold canonical probability distributions in deciding the nature of energy gap modulation viz-a-viz the probability distributions. This study has filled a long-standing gap in the complete characterization of this working medium as an Otto engine. Their group has analyzed the mapping of a single reservoir quantum measurement based engine to a two-reservoir heat engine and shown that the use of measurement as a resource may imply the use of nonequilibrium reservoirs under certain conditions. Another study attempts to find optimal working conditions for a thermoelectric device with both internal and external irreversibilities. In order to make the model analytically tractable, their group worked in the limit of small contact resistances. Their results show optimal regimes for both thermoelectric generators as well as refrigerators. Another study gives pedagogic instruction on the use of approximation techniques to simplify the solution of quadratic equations in an example of an atom-photon system. A fundamental study has been performed in the Legendre transform technique as used in statistical mechanics, where an alternate transform is defined, and Jaynes' maximum entropy condition has been derived on the basis of this transform without using the Maximum entropy principle.

Samir Kumar Biswas

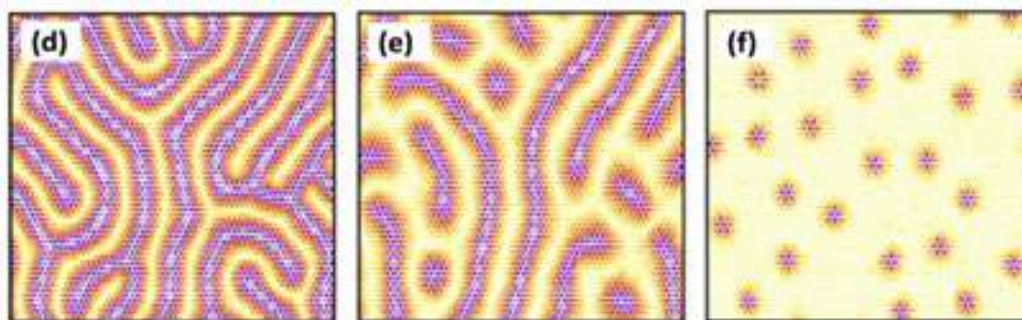
Last year, Biswas's research group was working to develop FPGA and high-speed data acquisition for a new type of 3D ultrasound and photoacoustic imaging system for health sciences. They have developed PVDF co-polymer-based lead-free ultrasound and photoacoustic sensors. They have tested a few sensors in the area of ultrasound imaging and photoacoustic imaging. Since last year, their group has been developing a system for focusing light in scattering media for studying bio-systems. They are also developing Nanofiber for advanced sensor and bio-membrane development.

Sanjeev Kumar

The following research topics were explored in his research group during this year: (i) skyrmion formation in van der Waals magnets, (ii) competition between Jahn-Teller effect and spin-orbit coupling in t2g systems, (iii) semiclassical approach to J1-J2

Heisenberg antiferromagnet, and (iv) anomalous metal phase at LVO/STO interface. Topics are briefly described below:

- (i) Their group developed a unified microscopic description for the formation of skyrmions and ferromagnetic bubbles in Fe₃GeTe₂. Monte Carlo simulations on a model consisting of Hund's rule coupling, spin-orbit coupling and uniaxial anisotropy resulted in spin textures (see figure below) with filamentary domains, isolated skyrmions and ferromagnetic bubbles.



Typical magnetic patterns obtained via Monte Carlo simulations on a model with Hund's rule and spin-orbit couplings

- (ii) They started developing a general formalism for studying lattice Hamiltonians that contain Jahn-Teller distortion and spin-orbit coupling. The main idea is to bring the Hamiltonian to the form that describes a coupled classical-quantum system. A hybrid Monte Carlo approach can then be applied to investigate such models. This work is currently in progress.
- (iii) Presence of an intermediate spin-liquid phases between two antiferromagnetic states is a well-known feature of the paradigmatic J1-J2 square lattice model of frustrated magnets. Their group is attempting to find a semi-classical approach to understanding the magnetic phases of this model. The main aim is to study the effect of vacancies on the spin-liquid window in this model.
- (iv) They proposed a random resistor network model to describe the unusual metallic properties of the LVO-STO interface. Their model correctly described the temperature and electric field dependence of the electrical resistivity experimentally observed for this system.

Satyajit Jena

During this period, Jena's group primarily engaged in activities related to the CMS collaboration at CERN. This year, five PhD students joined the CMS Collaboration. Their group's work encompassed the following areas: (a) the characterization of leptoquark physics, (b) the estimation of tau neutrino flux, and (c) machine learning and tomography activities.

- (a) Leptoquarks (LQ) are hypothetical bosons that naturally emerge from many theories of physics beyond the standard model (SM), such as Grand Unification, Technicolor, composite models, and Supersymmetry. They are color-triplets that carry quantum numbers such as spin and fractional electric charge, and uniquely carry both baryon and lepton numbers allowing them to mediate quark-lepton transitions. There is growing observational evidence that supports inter-generational mixing in leptoquark decays. Most notably, a measurement of the ratio R_K by the LHCb Collaboration hinting at a possible breaking of lepton universality, and results by the Muon ($g - 2$) Collaboration that see increased tension with the SM in the measured muon magnetic moment anomaly.

His group is engaged in four specific projects in this domain:

1. Bharat Sirswa is conducting a search focused on pair-produced scalar (spin 0) leptoquark pairs. In this search, the leptoquark (anti-leptoquark) decays into a muon (antimuon) and a charm quark (antiquark).
 2. Hianshu is investigating the Jet Substructure Analysis in $t\bar{t} \rightarrow t\bar{t} + \text{jet}$ events. This work aims to delve into the finer details of jet formations and their underlying physics, enhancing our understanding of particle interactions at high energies.
 3. Supriya is analyzing the W-helicity fractions in single top event topologies in pp collisions at a center of mass energy of 13 TeV, utilizing the full Run 2 data from CMS. This research could provide insights into the weak force interactions and top quark behavior.
 4. Abhishekh is studying the production and decay of leptoquark pairs into $B_s B_s^+$ at the CMS Experiment. This work is crucial for understanding the potential existence and properties of leptoquarks, contributing to our knowledge of BSM physics.
- (b) Estimation of tau-neutrino flux: This research, led by PhD student Kartik Joshi and BSMS student Safana, focuses on neutrino physics, a field that offers a window into exploring physics beyond the Standard Model (BSM). The theory of neutrino oscillation, which provides evidence of neutrinos having non-zero mass, has been established by several pioneering experiments. Despite extensive studies on neutrino oscillation, tau neutrinos remain rare among the three known neutrino flavors. Their group performed an analysis to understand the energy versus flux relationship of tau neutrinos at the INO and JUNO experimental sites. This analysis is crucial for improving our understanding of tau neutrino behavior and its implications for BSM physics. An article detailing this work has been submitted for publication in a peer-reviewed journal.

(c) Machine Learning and Tomography Activities:

Two BSMS students completed their theses on the application of machine learning in data analysis, focusing on different aspects of enhancing our understanding and detection capabilities in particle physics.

1. Yogendra Kumar explored the enhancement of R-parity conserving Supersymmetry (SUSY) sensitivity at the Large Hadron Collider (LHC) using machine learning techniques. His thesis demonstrated how advanced algorithms could improve the detection and analysis of SUSY events, which are crucial for uncovering new physics beyond the Standard Model.
2. Sidhant Padwal focused on developing an equivariant neural network architecture that maintains symmetry with respect to the operations of the Lorentz group. This innovative approach could revolutionize how we process and interpret data in high-energy physics, ensuring that our models respect the fundamental symmetries of nature.

Additionally, two BSMS students are currently working on muon tomography development projects. Muon tomography, which uses muons to image the interior of large objects, holds significant potential for various applications.

Sudeshna Sinha

Noise-Aided Invertible Logic from Coupled Nonlinear Systems: Sinha's research group proposed a network of interconnected nonlinear systems to serve as probabilistic p-bits in the presence of a noise floor, to implement the powerful unconventional paradigm of invertible logic that has found applications in important critical problems such as integer factorization and machine learning. Such p-bits may be considered to be intermediate between logic bits used in conventional digital electronics and the q-bits used in quantum computing. Specifically, her group has demonstrated the successful implementation of direct and invertible logic gates, with different logic functionalities OR, AND, NOR, and NAND, using noise-aided attractor hopping in the network of p-bits. Importantly, the probability of switching between attractors can be controlled in a clean and reliable manner by a tunable bias, and so the design of direct and inverted logic is based on finding the correct set of biases for the nodes of the network. The bistable nature of their p-bits allows them to map the states to binary inputs and output. Their group demonstrated that simply setting suitable bias values and network interconnection strengths allows them to flexibly reconfigure their network to yield both directed and inverted OR, AND, NOR, and NAND logic operations. Interestingly, furthermore, the operational reliability is optimal in a window of moderate noise, reminiscent of stochastic resonance. This concept was verified through numerical simulations, as well as electronic circuit experiments.

Impact of Random Links on Neuronal Extreme Events: Sinha's group explored the influence of random connections on the creation of extreme events in the spiking patterns of the action potentials of model neurons diffusively coupled in networks. They find that the presence of a small fraction of static random links in the network suppresses extreme events, while a high fraction of such links induces extreme events for sufficiently high coupling strengths. Interestingly, when the random links are time-varying, even a small number of such links can make the network prone to extreme events in a significant range of coupling strength. They also find the phenomena of synchronized extreme events emerging in the network under random connections, and these events are more catastrophic in nature as they occur concurrently across the network. Additionally, when the random links are dynamically switched, even a very small fraction of random links in the system leads to such synchronous extreme spiking events. Lastly, their group finds that the variability of the probability of extreme events becomes large when the network is on the verge of a transition to a regime where the number of extreme events becomes significantly high. So, this feature can be utilized as an early warning signal, and has potential implications for extreme-event risk appraisal in dynamical networks.

Tripta Bhatia

Bottom-Up Approach to Explore Alpha-Amylase Assisted Membrane Remodelling. Chemistry and Physics of Lipids, 259, 105374 (January 2024).

Abstract: Soluble alpha-amylases play an important role in the catabolism of polysaccharides. In this work, Bhatia's research group shows that malt α -amylase can interact with the lipid membrane and further alter its mechanical properties. Vesicle fluctuation spectroscopy is used for quantitative measurement of the membrane bending rigidity of phosphatidylcholines lipid vesicles from the shape fluctuation based on the whole contour of Giant Unilamellar Vesicles (GUVs). The bending rigidity of the 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine lipid vesicles in water increases significantly with the presence of 0.14 micromolar alpha-amylase (AA) in the exterior solution. It appears that the enzyme present in the external solution interacts with the outer layer of the bilayer membrane, leading to an asymmetry of the solution on either side of the bilayer membrane and altering its elasticity. At AA concentration of 1.5 micromolars and above, changes in the morphology of the GUV membrane are observed. The interaction between AA in the external solution and the external leaflet causes the bilayer membrane to curve spontaneously, leading to the formation of outbuds, giving a positive spontaneous curvature of $C_0 \leq 0.05 \mu\text{m}^{-1}$ at $\approx 1 \text{ mg / ml}$ of the AA concentration. Their group validated and characterized its concentration-dependent role in stabilizing the membrane curvature. Their findings indicate that the involvement of the enzyme, depending on the concentration, can have a considerable effect on the mechanical characteristics of the membrane.

Stability of multi-lamellar lipid tubules in excess water. European Biophysics Journal, 52, 749- 756 (October 2023).

Abstract: In the lyotropic phase of lipids with excess water, multilamellar tubules (MLTs) grow from defects. A phenomenological model for the stability of MLTs is developed that is universal and independent of the underlying growth mechanisms of MLTs. The stability of MLTs implies that they are in hydrostatic equilibrium and stable as elastic objects that

have compression and bending elasticity. The results show that even with solvent pressure differences of 0.1 atm, the density profile is not significantly altered, so suggesting the stability is due to the trapped solvent. The results are of sufficient value in relation to lamellar stability models and may have implications beyond the described MLT models, especially in other models of membrane systems.

Redefining the structure of tip-links in hair-cells. *Biochemistry*, **62**, 15, 2244–2251 (July 2023)

Abstract: Tip links are seen under microscopes as double-helical tetrameric complexes of long nonclassical cadherins, cadherin-23 and protocadherin-15. The twisted filamentous structure enables tip links to regulate mechanotransduction in hearing and balance. While the molecular details of the double-helical protocadherin-15 cis dimers have been deciphered, a similar conformation of cadherin-23 is still elusive. In a search of cadherin-23 cis dimers, their group performed photoinduced cross-linking of unmodified proteins in solution and on lipid membranes and observed no trace of cadherin-23 cis dimers. Reportedly, tip links are dynamic connections, assembling and disassembling in seconds. Using lipid vesicles, they measured significantly slower aggregations between cis dimers of tip link cadherins than via dimer-monomer interactions, indicating that the trans interactions between two cis dimers may possess steric restraints and defer reassociations. Reconnections of tip links are thus kinetically most desired between protocadherin-15 cis dimers and cadherin-23 monomers. Here they propose that the helical geometry of tip links is induced by protocadherin-15 cis dimers, while cadherin-23 remains single before tip linking.

Vishal Bhardwaj

Vishal Bhardwaj's research worked on the Search for the baryon and lepton number violating decays $D \rightarrow p e$ and $D \rightarrow p \mu$. These rare decays are forbidden to the order of 10^{-39} . The discovery of this decay mode would have suggested New Physics beyond the Standard Model. Their group didn't find any significant signal and provided the world's best Upper Limit. The result has been published in *Phys. Rev D* as Letters.

Bhardwaj's group tried to suppress the background of $B \rightarrow J/\psi K^+ K^-$ decay mode in $X(3872) \rightarrow \psi(2S) \gamma$ search using BDT. They found that over-training in BDT can shape the background-like signal. They are also working on the radiative decays of $D_{s1}^+ \rightarrow D_s^+ \gamma$ decays.

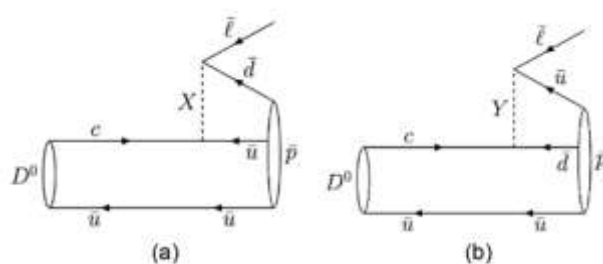
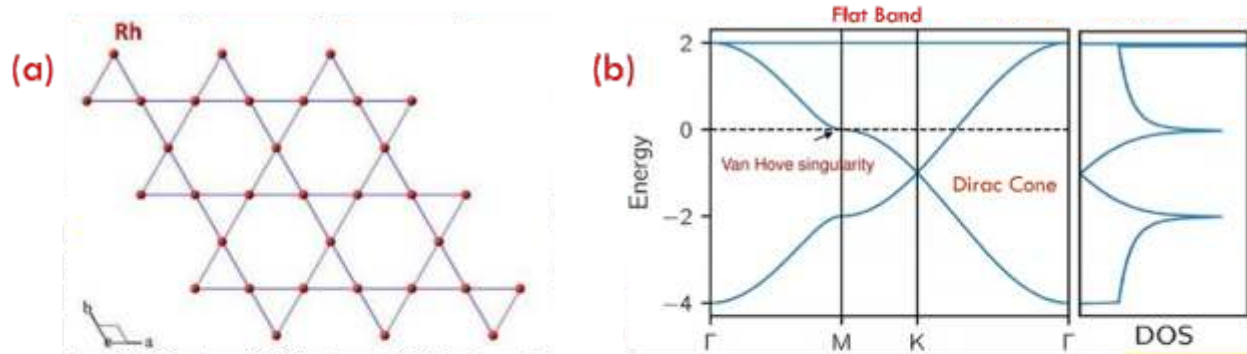


FIG. 1. Feynman diagrams of the decays $D^0 \rightarrow \bar{p} \ell^+$ with non-SM gauge bosons (a) X and (b) Y .

Yogesh Singh

Dr. Yogesh Singh's group worked on the following topics:

1. The metallic Kagome lattice is a platform for exploring the marriage of electron topology and strong correlation effects. Their group has embarked on a detailed study of the electronic and magnetic properties of the family of materials RT_3B_2 ($R = \text{La, Y, Lu, T} = \text{Ru, Rh, Os}$), which crystallizes in a layered structure where T atoms form a perfect Kagome lattice. From the first-principles calculations of the electronic band structure, they identify all features of Kagome bands: a flat band, Dirac cones, and van Hove singularities. Evidence for charge density wave instabilities is found in the phonon density of states for some materials, whereas superconductivity is found for some. [*Phys. Rev. B* 107, 085103 (2023).]
2. Their group has previously reported that the honeycomb lattice iridate Cu_2IrO_3 is a realization of the Kitaev quantum spin liquid from magnetic and thermodynamic measurements. They have further studied the structural evolution of Cu_2IrO_3 under pressure by powder x-ray diffraction (PXRD) and Raman scattering measurements. A structural phase transition (monoclinic $C2/c \rightarrow$ triclinic $P1$) is observed with a broad mixed-phase pressure range (~ 4 to 15 GPa). In the low-pressure phase, they observe enhanced magnetic frustration without the emergence of any magnetic ordering. Additionally, an enhanced dynamic Raman susceptibility is also observed in this regime suggesting enhanced Kitaev correlations. [*Phys. Rev. B* 107, 085105 (2023).]
3. $\text{Ca}_{10}\text{Cr}_7\text{O}_{28}$ is a bi-layer Kagome based quantum spin liquid discovered by us. Using temperature-dependent Raman scattering measurements, their group found an unusual line broadening and frequency shift below about 100K, which is much larger than any magnetic scale in the system. They were able to use theoretical calculations to suggest that this is consistent with the coupling of magnetic and orbital degrees of freedom in $\text{Ca}_{10}\text{Cr}_7\text{O}_{28}$. [*Phys. Rev. B* 108, L241103 (2024).]
4. Their group has continued the investigations on the novel superconductors OsB_2 and RuB_2 . Their studies reveal that these materials are unusual because although most bulk measurements like magnetism or heat capacity suggest that these materials are low T_c , low critical field s-wave superconductors, microscopic probes like μSR or spectroscopic measurements point to unusual time-reversal symmetry breaking inside the superconducting state, which can't be explained by a simple s-wave order parameter. Density functional theory calculations of the bulk and surface electronic band-structure points to topological surface states which may be related to the effects seen above.



(a) The Kagome structure of Rh atoms in LaRh_3B_2 . (b) The tight-binding band structure of electrons hopping on the Kagome lattice. The band-structure features three novel features (i) a linearly dispersing Dirac cone, (ii) a Van Hove singularity, and (iii) a flat band. At each of these locations, the density of states (DOS) diverges, giving the possibility of novel electronic instabilities.
[From Savita et al. *Phys. Rev. B* **107**, 085103 (2023).]

DEPARTMENT OF PHYSICAL SCIENCES

VISITS BY FACULTY MEMBERS

Ambresh Shivaji

- IISER Tirupati, Dec 14-18, 2023
- IIT Patna, Feb 06-08, 2024
- HBCSE-TIFR Mumbai, Feb 20-22, 2024

Ananth Venkatesan

- Department of Physics IIT Mandi as Guest Speaker for Science Day on February 28th 2024
- National Physical Laboratory Delhi as Colloquium speaker September 2023

Goutam Sheet

- Argonne National Laboratory, USA 15/06/2023 to 30/06/2024
- Meeting on "Development of Scanning SQUID microscopes operating down to milli-Kelvin temperatures" on 05th July 2024 at DST, New Delhi

Harvinder Kaur Jassal

- Indian Institute of Astrophysics, Bengaluru, August 8-13, 2023.

Jasjeet Singh Bagla

- Indian Institute of Astrophysics Bangalore, September 10-13, 2023

K.P. Yogendran

- NIT Jalandhar, 11th-12th May, 2023

Kinjalk Lochan

- Visited Indian Association for Cultivation of Sciences, Kolkata during 05-10 February 2024

Kulinder Pal Singh

- ISRO committee meeting for examining the Future X-ray Polarimetry Mission, May 24, 2023 at ISRO HQ, Bengaluru.
- ISRO Committee meeting XPoSat Users Committee, May 25, 2023 at ISRO HQ, Bengaluru.
- 89th Annual Meeting of the Indian Academy of Sciences (3-5 Nov. 2023) at BITS-Pilani, KK Birla Goa Campus, Goa.

Manabendra Nath Bera

- International Institute of Information Technology, Hyderabad, Telangana. 8-14 May 2023.
- S N Bose National Centre for Basic Science, Kolkata, West Bengal. 19-30 June 2023.
- Indian Institute of Technology (IIT) Mumbai, Maharashtra. 1-9 July 2023.

Pankaj Kushwaha

- Tata Institute of Observational Research (TIFR), Mumbai; 21-29 May 2023

Prasenjit Das

- School of Physical Sciences, Jawaharlal Nehru University, New Delhi, Date: 14-March-2024.

Sanjeev Kumar

- Ashoka University: April 01 - 02, 2023
- MPIPKS Dresden: July 31 - August 04, 2023
- NISER Bhubaneswar: November 26 - 29, 2023

Satyajit Jena

- IIT Kanpur, 26th January 2024 – 29th January 2024, To attend “space-bourne particle detector for dark matter serch” workshop.

Sudeshna Sinha

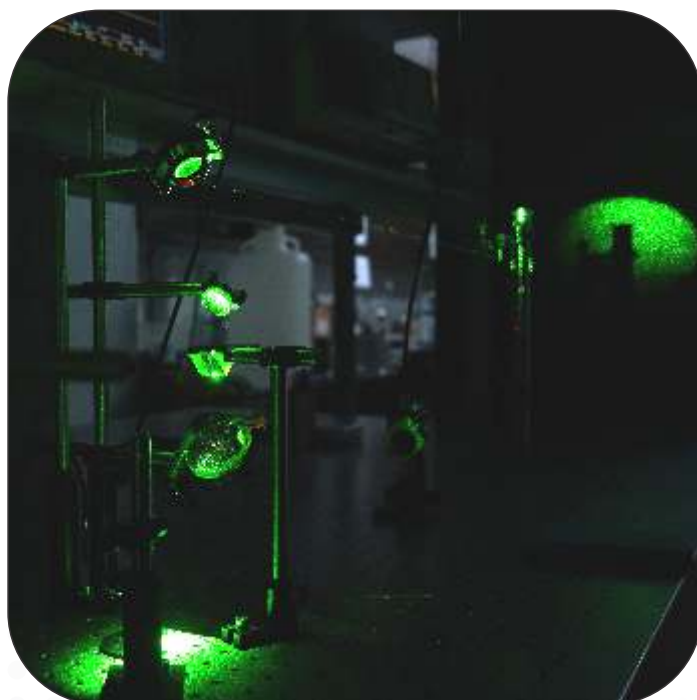
- Quantlase Laboratory, Abu Dhabi. 23-26 May 2023
- Technical University, Berlin. 23-28 October 2023

Tripta Bhatia

- NFLP, IIM Lucknow, March 2024.
- BITS Pilani, K. K. Birla Goa Campus, December 2023.
- IIT Mandi, June 2023.

Yogesh Singh

- IIT Madras, 9-13 Jan. 2024
- IISc Bangalore, 17-18 Jan. 2024
- IISER TVM, 19-20 Jan. 2024
- NPL Delhi, 9-10 Sept. 2023
- Ashoka University, 1-2 April 2023.



DEPARTMENT OF PHYSICAL SCIENCES

TALKS DELIVERED

Abhishek Chaudhuri

- **Name of the presenter:** Abhishek Chaudhuri.
Title of the talk: Role of myosin contractility in force fluctuations within focal adhesions.
Name of the Conference: 1st National Conference on Force Spectroscopy and Microscopy.
Dates: June 24-26, 2023.
- **Name of the presenter:** Abhishek Chaudhuri
Title of the talk: Active Matter
Name of the Conference: Condmat@2023 at Ashoka University
Dates: April 1-2, 2023.
- **Name of the presenter:** Anweshika Pattanayak
Title of the talk: Active rods in temperature gradient
Name of the Conference: Condmat@2023 at Ashoka University
Dates: April 1-2, 2023.
- **Name of the presenter:** Subhashree S. Khuntia
Title of the talk: Random walkers following their own chemical trail
Name of the Conference: Condmat@2023 at Ashoka University
Dates: April 1-2, 2023.
- **Name of the presenter:** Sandip Roy
Title of the talk: Behaviour of passive polymer under active motor protein bed
Name of the Conference: Condmat@2023 at Ashoka University
Dates: April 1-2, 2023
- **Name of the presenter:** Love Grover
Title of the talk: Active Membranes and Particles
Name of the Conference: Condmat@2023 at Ashoka University
Dates: April 1-2, 2023
- **Name of the presenter:** Subhashree S. Khuntia
Title of the talk: Random walkers following their own chemical trail
Name of the Conference/Institute: Saarland University, France.
- **Name of the presenter:** Subhashree S. Khuntia
Title of the talk: Random walkers following their own chemical trail
Name of the Conference/Institute: Laboratoire de Physique Théorique et Modélisation CY Cergy Paris Université.
- **Name of the presenter:** Subhashree S. Khuntia
Title of the talk: Dynamical patterns emerging from chemically active random walkers
Name of the Conference/Institute: TU Berlin.
Dates: 7th July, 2023.

Ambresh Shivaji

- Ambresh Shivaji, Characterization of Higgs boson at particle colliders (Invited talk), IISER Tirupati (2023)
- Ambresh Shivaji, Phenomenology of Higgs decay to four leptons at O(a α s), WG4 discussion session (Invited talk), WHEPP 2023, IIT Gandhinagar (2024)

- Ambresh Shivaji, Characterization of Higgs boson at particle colliders (Invited talk), IIT Patna (2024)
- Ambresh Shivaji, Probing Higgs boson properties via higher order effects, Advanced school and workshop on Multiloop scattering amplitudes (Invited talk), NISER Bhubaneswar (2024)
- Mandeep Kaur, The multi-loop challenge: Understanding the complexities of perturbative quantum field theory. 8th Shivalik HEPCATS Workshop, hosted by Dr B R Ambedkar National Institute of Technology, Jalandhar, India. May 12, 2023.
- Mandeep Kaur, Analytical evaluation of multi-loop multi-scale Feynman integrals with massive or massless external lines. University of Regensburg, Germany. June 16, 2023.
- Mandeep Kaur, Two-loop master integrals and phenomenological study of QCD corrections to partial decay width of $H \rightarrow e^+e^-\mu^+\mu^-$. Sapienza Università Di Roma, Italy. June 20, 2023
- Mandeep Kaur, Precision studies of Golden decay channel of the Higgs boson; Advanced School & Workshop on Multiloop Scattering Amplitudes, held at NISER Bhubaneswar; January 19, 2024
- Mandeep Kaur, Two-loop master integrals for di-jet production with massive internal loops; 9th Shivalik HEPCATS Workshop hosted by IISER Mohali, India; January 27, 2024.
- Warsimakram I Katapur, Two-loop form factors for Dark Matter annihilation to colored Standard Model particles, 9th Shivalik HEPCATS Workshop, hosted by IISER Mohali, India, Jan 27, 2024
- Warsimakram I Katapur, Two-loop form factors for Dark Matter annihilation to colored Standard Model particles, Quarkonia meet Dark Matter, held at Technical University of Munich, Germany; Mar 19, 2024
- Pramod Sharma, Tagging of Light Flavour using machine learning techniques, ICTS - Statistical Methods and Machine Learning in High Energy Physics, ICTS Bangalore (2023)
- Pramod Sharma, Axion-like particles at future $e-p$ collider, 9th Shivalik HEPCATS Workshop, IISER Mohali, Jan 28, 2024

Dipanjn Chakraborty

- **Invited Talk:** Dipanjn Chakraborty, Particle current and structural transition in a driven two-dimensional colloid. Complex fluid dynamics symposium: Rheology and instability in complex fluids. IIT Ropar, December 1-2, 2023.

Goutam Sheet

- Dr. Goutam Sheet visited CSIR-NPL, New Delhi on 1st June 2023.
- Dr. Goutam Sheet visited SPS (School of Physical Science) JNU, New Delhi as an invited speaker to discuss "Principles of low-temperature STM/AFM measurements and data analysis" on 30.04.2023

Harvinder Kaur Jassal

- Harvinder Kaur Jassal, Reconstructing dark energy cosmology, IIA Astrophysics seminar as part of the activities commemorating "75 years of India's independence: Azadi ka Amrit Mahotsav.", August 9, 2023.
- Harvinder Kaur Jassal, T. Padmanabhan's contributions to Cosmology, International Conference on Gravitation and Cosmology, December 6, 2023.
- Ramanpreet Singh, Hubble Tension – A Statistical Review, HEPCATS, May 25, 2024.

Jasjeet Singh Bagla

- Jasjeet Singh Bagla, Introduction to Cosmology, Introductory Course on Astronomy and Astrophysics for College Teachers (Online course hosted by IUCAA Pune), April 26, 2023
- Jasjeet Singh Bagla, Hubble relation, distances and expanding universe, Introductory Course on Astronomy and Astrophysics for College Teachers (Online course hosted by IUCAA Pune), April 29, 2023
- Jasjeet Singh Bagla, Cosmological Models from a Newtonian approach, Introductory Course on Astronomy and Astrophysics for College Teachers (Online course hosted by IUCAA Pune), May 3, 2023
- Jasjeet Singh Bagla, History of the Universe, Introductory Course on Astronomy and Astrophysics for College Teachers (Online course hosted by IUCAA Pune), May 6, 2023
- Jasjeet Singh Bagla, Exotic Gravitational Lenses in the light of recent discoveries, 8th Shivalik HEPCATS (NIT Jalandhar), May 12, 2023
- Jasjeet Singh Bagla, Gravitational Lensing and exotic image formation, Indian Institute of Astrophysics Bangalore, September 12, 2023
- Jasjeet Singh Bagla, Indian Space Observatories and Planetary Missions, Rotary Club Chandigarh, September 25, 2023
- Jasjeet Singh Bagla, Gravitational Lensing, International Conference of Advancements in Mathematics (School of Mathematics, Thapar University, Patiala), September 29, 2023
- Jasjeet Singh Bagla, Astronomy and sky watch, Festival of Science (Govt College Bathinda, organized by SPSTI), October 4, 2023

- Jasjeet Singh Bagla, Gravitational Lensing: From exotic images formations to modulation of gravitational waves, Resonance outreach program (Kashmir University Srinagar), October 12, 2023
- Jasjeet Singh Bagla, Gravitational Lensing: From exotic images formations to modulation of gravitational waves, Government College Baramulla (Kashmir), October 14, 2023
- Jasjeet Singh Bagla, Gravitational lensing in astronomy, 10th IAPT National Symposium (Department of Physics, Panjab University, Chandigarh), October 28, 2023
- Swati Gavas, A Local Perspective on Hubble Tension from Cosmological N-body Simulations, Challenges and Innovations in Computational Astrophysics V, November 7-9, 2023
- Sauraj Bharti, HI stacking prediction for upcoming survey with SKA precursors, Challenges and Innovations in Computational Astrophysics V, November 7-9, 2023
- Swati Gavas, A Local Perspective on Hubble Tension from Cosmological N-body Simulations, International Conference on Gravitation and Cosmology, IIT Guwahati, December 6-9, 2023
- Sauraj Bharti, HI stacking prediction for upcoming survey with SKA precursors, International Conference on Gravitation and Cosmology, IIT Guwahati, December 6-9, 2023
- Swati Gavas, Dispersion in the Hubble-Lemaître constant measurements from gravitational clustering, 42nd meeting of the Astronomical Society of India, January 31 – February 4, 2024
- Prajakta Mane. Strategies to identify strongly lensed type Ia supernovae in the Rubin LSST. LSST Time Domain Working Group Meeting held online. March 26, 2024

Kamal P. Singh

- Ultrathin Delay lines for attosecond probing of matter, Workshop on Ultrafast and THz Technologies, 22 Oct. 2023, National Physical Laboratory, New Delhi
- Novel Attosecond Delay Lines for Isolating Non-adiabatic Light-Atom Interaction and its Metrology, ICAMNOP, 22-24 December 2023, DTU, New Delhi
- Attosecond delay lines for attosecond probing of matter, Workshop on Ultrafast and THz Technologies, Feb. 2024, ISAMOP, Ahmedabad

Kavita Dorai

- Prof. Kavita Dorai. "Simulation of open quantum dynamics and characterization of quantum states and processes via artificial neural networks and NMR". NMRS-2024: Special Symposium on Clinical Application of NMR/MRI. CBMR Lucknow, February 2-5, 2024.
- Prof. Kavita Dorai. "NMR Quantum Computing". DST Workshop on Quantum Computing: The Next Generation Computing Technology. CDAC-Mohali, January 16, 2024.
- Prof. Kavita Dorai. "Landmark Experiments in Quantum Mechanics". Love for Physics Talent Enrichment Program. JBNSTS Kolkata, October 1, 2023.
- Prof. Kavita Dorai. "NMR Spectroscopy and its Applications to Physics, Chemistry, Biology & Imaging". Refresher Course in Chemistry. UGC-HRDC, Punjabi University Patiala, August 5, 2023.
- Prof. Kavita Dorai. "Academia: The last barrier towards gender equality and how to cross it". Faculty Development Programme, Women in Indian Society: Navigating Challenges and Opportunities. Punjabi University Patiala, June 9, 2023.

Kinjalk Lochan

- Kinjalk Lochan, lecture on Thanu Padmanabhan's work : Quantum musings, 10th ICGC 2023 at IIT Guwahati, 06 Dec 2023
- Kinjalk Lochan, How long before we find particles in the vacuum, IACS, Kolkata, 07 Feb 2024
- Harkirat Singh Sahota, Analyzing quantum gravity spillover in the semi classical regime, 10th International Conference on Gravitation and Cosmology: New Horizons and Singularities in Gravity (ICGC 2023), IIT Guwahati, 7th December 2023
- Harkirat Singh Sahota, Quantum gravity with perfect fluid: Ambiguities and their imprints, IACS Kolkata, 12th December 2023
- Harkirat Singh Sahota, Quantum cosmology with perfect fluid: Ambiguities and their imprints, IIT Madras, 27th March 2024
- Dipayan Mukherjee, Bouncing and collapsing universes dual to late-time cosmological models Indian Institute of Technology Bombay, India, 10 May 2023.
- Dipayan Mukherjee, Dual descriptions of late-time cosmology: Bouncing and collapsing Jordan frames, XV International Conference on Gravitation, Astrophysics and Cosmology, Gyeongju, South Korea, 04 July 2023:
- Dipayan Mukherjee, Expansion-collapse duality between Einstein and Jordan frames: Implications at quantum level, 10th International Conference on Gravitation and Cosmology, IIT Guwahati, India, 06 December 2023
- Dipayan Mukherjee, Conformal Representations of the Universe: Exploring Counter-intuitive Realms, Centre for Theoretical Physics, JMI, New Delhi, India, 14 March 2024

- Dipayan Mukherjee, Conformal representations of the Universe: Exploring counter-intuitive realms, Raman Research Institute, Bengaluru, India, 21 March 2024

Kulinder Pal Singh

- "Adaptive Optics in Astronomy" in the Robotics Club of IISER Mohali, January 19, 2024.

Manabendra Nath Bera

- Quantum Bayes' Rule Affirms Consistency in Measurement Inferences in Quantum Mechanics, IIT Hyderabad, Telangana. 8-14 May 2023
- Quantum Bayes' Rule Affirms Consistency in Measurement Inferences in Quantum Mechanics, S N Bose National Centre for Basic Science, Kolkata, West Bengal. 19-30 June 2023.
- Quantum Bayes' Rule Affirms Consistency in Measurement Inferences in Quantum Mechanics, Indian Institute of Technology (IIT) Mumbai, Maharashtra. 1-9 July 2023.
- Quantum Bayes' Rule Affirms Consistency in Measurement Inferences in Quantum Mechanics, Quantum Information Processing and Applications, HRI, Prayagraj. 4-10 December 2023.
- Squashed quantum non-Markovianity: a measure of genuine quantum non-Markovianity in states, International Conference on Photonics, Quantum Information, and Quantum Communication, S. N. Bose National Centre for Basic Sciences, Kolkata. 29 January - 02 February 2024.

Mandip Singh

- Mandip Singh. Quantum ghost imaging of transparent phase patterns with hyper-entangled photons (poster). European Quantum Technologies Conference, Hannover, Germany. 16-20 Oct 2023.
- Mandip Singh. Quantum Imaging and quantum information processing with photons. Workshop: Quantum Information Technologies with Photonic Devices, Quantum Enabled Science and Technology theme-1, Punjabi University Patiala, 16-17 March 2024

Pankaj Kushwaha

- Active Galactic Nuclei: Observations and Inferences; Multidisciplinary Approach to Understand the Mysteries of our Universe, NIT Rourkela (India); 17 -- 21 July 2023 (Invited talk)
- Simultaneous Optical to X-ray Observations of OJ 287: Insights into particle spectra and X-ray spectral changes; International Symposium on Recent Developments in Relativistic Astrophysics (ISRA 2023), Gangtok, Sikkim (India); 11-13 December 2023
- Spectro-temporal study of Jet Emission: Insight into Relativistic Particle Spectra; 9th Shivalik HEPCATS Meeting, IISER-Mohali; 27-28 January 2024

Prasenjit Das

- Domain Kinetics in Critical and Off-critical Active Matter Systems, 10th Soft Matter Young Investigator's Meet, Jim Corbett National Park, Ram Nagar, Uttarakhand.

Rajeev Kapri

- Polymer Translocation. Condmat@2023/Ashoka University Sonapat. 01-02, April 2023
- Random Walks. Science Outreach Program 2023/Gangolihat Uttarakhand. 14-18, May 2023
- Unzipping a DNA Hairpin in an Active Bath. Physics of life: Active and living matter. 08-10, February 2024
- Unzipping a DNA Hairpin in an Active Bath. ISPCM2024/ICTS Bangaluru. 03-05, April 2024

Samir Kumar Biswas

- Mr. Nagendra "Pulsed Laser Deposited Ba_{0.8}Sr_{0.2}TiO₃ Ferroelectric Thin-Films for Ultrasound Sensing Applications at IEEE APSCON 2024, BITS Goa
- Dr. Pratap, "A new scheme for 3D ultrasound imaging with custom design FPGA based high-speed data acquisition system" at IEEE SAUS 2024, IIT Gandhinagar
- Mr. Amit "A new spatial correlation method with ℓ_2 -norm based quadratic cost function for advancing contrast in structured light at ICLOP 2024, Paris

Sanjeev Kumar

- Skyrmions in itinerant magnets. Condmat@2013, Ashoka University, Sonapat. April 02, 2023.
- Emergent Particles in Condensed Matter Physics. Recent Advances in Physics, GGDSD college Chandigarh. October 07, 2023.
- Competition between Jahn-Teller effect and spin-orbit coupling. QMAT2023, NISER Bhubaneswar. November 27, 2023.

Satyajit Jena

- Satyajit Jena, Review of “space-borne particle detector for dark matter”, at IIT Kanpur, Workshop on space-borne particle detector for dark matter search”, 27th January 2024 – 28th January 2024,
- Satyajit Jena, Machine Minds: Navigating the Landscape of AI & ML at DST Centre for Policy Research – Panjab University, Chandigarh, 1st March 2024,
- Bharat Sirswa, Search for leptoquark pair production decaying into $-+c +$ at CMS, CERN in the EXO Group, 3 June 2024.
- Supriya Nayak and Himanshu Rajpoot, Low pT Electrons for Flavor Anomaly Studies, Egamma HLT group at TSC Coordination meeting, CERN on 19th March 2024

Sudeshna Sinha

- Chaos and Noise in the aid of Logic. Quantlase Laboratory. 24 May 2023
- Mastering Chaos with Physics Aware Neural Networks. TU Berlin. 26 October 2023
- Colloquium. IISER Kolkata. 1 Nov 2023
- Homi Bhabha Memorial Public Lecture. IISER Pune. 16 Nov 2023
- Distinguished Speaker. National Physicists' Conclave. SRM-IST, Chennai. 7 February 2024.

Tripta Bhatia

Title of the talk: Remodelling Bilayer Tension and Curvature

Name of the Conference/Institute: Symposium on Active and Living Matter, IIT Mumbai. Feb 2024.

Title of the talk: Lipid Vesicles Adhesion Mediated by Sugar Cleaving Enzyme Invertase

Name of the Conference/Institute: Complex Fluids meeting, IIT Chennai. Dec 2023.

Vishal Bhardwaj

- “Charm Physics”, Workshop in High Energy Physics Phenomenology (WHEPP XVII), IIT Gandhinagar, January 2-11 2024.

Yogesh Singh

- Quantum Spin Liquids: phases with topology and entanglement, Physics workshop, Ashoka University 2nd April 2023.
- New Organisational Principle for Phases in Quantum Materials. Colloquim, NPL Delhi, 29th Sept. 2023
- Quantum Spin Liquids. P. W. Anderson Centenary Symposium/IISc Bangalore. 18th Jan. 2024
- Quantum Spin Liquids: Concept and Realization, Frontier Symposium in Physics, IISER TVM, 19th Jan. 2024

DEPARTMENT OF PHYSICAL SCIENCES

CONFERENCES ATTENDED

Abhishek Chaudhuri

- **Name of the presenter:** Abhishek Chaudhuri.
Title of the talk: Role of myosin contractility in force fluctuations within focal adhesions.
Name of the Conference: 1st National Conference on Force Spectroscopy and Microscopy.
Dates: June 24-26, 2023.
- **Name of the presenter:** Abhishek Chaudhuri
Title of the talk: Active Matter
Name of the Conference: Condmat@2023 at Ashoka University
Dates: April 1-2, 2023.
- **Name of the presenter:** Anweshika Pattanayak
Title of the talk: Active rods in temperature gradient
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- **Name of the presenter:** Sandip Roy
Title of the talk: Behaviour of passive polymer under active motor protein bed
Name of the Conference: Condmat@2023 at Ashoka University
Dates: April 1-2, 2023
- **Name of the presenter:** Love Grover
Title of the talk: Active Membranes and Particles
Name of the Conference: Condmat@2023 at Ashoka University
Dates: April 1-2, 2023

Ambresh Shivaji

- Mandeep Kaur, Warsimakram I Katapur. 8th Shivalik HEPCATS Workshop, hosted by Dr B R Ambedkar National Institute of Technology, Jalandhar, India. May 12, 2023
- Ambresh Shivaji. Workshop in High Energy Physics Phenomenology XVII (WHEPP XVII), IIT Gandhinagar. Jan 2-11, 2024
- Mandeep Kaur, Elliptics summer school 2023, held at University of Zurich, Switzerland. June 5-9, 2023
- Mandeep Kaur, Warsimakram I Katapur, Ambresh Shivaji. Advanced School & Workshop on Multiloop Scattering Amplitudes, held at NISER Bhubaneswar. January 15-19, 2024
- Mandeep Kaur, Pramod Sharma, Warsimakram I Katapur, Ambresh Shivaji. 9th Shivalik HEPCATS Workshop, hosted by IISER Mohali, India. Jan 27-28, 2024
- Pramod Sharma, Warsimakram I Katapur, Ambresh Shivaji. 16TH International Workshop On Heavy Quarkonium (QWG 2024), hosted by IISER Mohali, India. Feb 26-Mar 1, 2024
- Warsimakram I Katapur. Quarkonia meet Dark Matter, held at Technical University of Munich, Germany. Mar 18-22, 2024

Ananth Venkatesan

- Dr Ananth Venkatesan "Are phonons lagging behind a nano-beam? Nonlinear Akhiezer damping Phenomena in Palladium nanomechanical beams" "Friday Colloquium Series" of CSIR-NPL New Delhi 15th Sept 2023.

- Dr Ananth Venkatesan “Nano-scale electronic and mechanical devices from a physicist's perspective” School of Physical Sciences IIT Mandi Special Lecture for Science Day Celebration.

Dipanjana Chakraborty

- Dipanjana Chakraborty, Physics of Life:Active and Living Matter, February 8-10,2024.
- Poster Presentation: Nittish Chettri, Physics of Life:Active and Living Matter, February 8-10,2024.
- Poster Presentation: Dimpay Yanglem Devi, Physics of Life:Active and Living Matter, February 8-10,2024.

Goutam Sheet

- **Name of the presenter.** NikhleshSingh Mehta

Title of the talk: Topological surface states host superconductivity induced by the bulk condensate in YRuB₂”
(poster presentation)

Name of the conference: International Winter School and Conference themed “Recent Advances in Materials (RAM-90)”
at JNCASR Bengaluru

Dates: December 04-09, 2023

- **Name of presenter:** Nikhlesh Singh Mehta

Title of talk: Topological surface states host superconductivity induced by the bulk condensate in YRuB₂” (oral presentation)

Name of the conference: American Physical Society (APS) March Meeting 2024

Venue: Minneapolis, Minnesota, USA

Dates: March 3, 2024 to March 8, 2024

Jasjeet Singh Bagla

- James Watt, The Cosmic Web: From Galaxies to Cosmology, SRM University Chennai, September 22, 2023
- Jasjeet Singh Bagla, Gravitational Lensing, International Conference of Advancements in Mathematics (School of Mathematics, Thapar University, Patiala), September 29, 2023
- Jasjeet Singh Bagla, Gravitational Lensing: From exotic images formations to modulation of gravitational waves, Resonance outreach program (Kashmir University Srinagar), October 12, 2023
- Swati Gavas, A Local Perspective on Hubble Tension from Cosmological N-body Simulations, Challenges and Innovations in Computational Astrophysics V, November 7-9, 2023
- Sauraj Bharti, HI stacking prediction for upcoming survey with SKA precursors, Challenges and Innovations in Computational Astrophysics V, November 7-9, 2023
- Swati Gavas, A Local Perspective on Hubble Tension from Cosmological N-body Simulations, International Conference on Gravitation and Cosmology, IIT Guwahati, December 6-9, 2023
- Sauraj Bharti, HI stacking prediction for upcoming survey with SKA precursors, International Conference on Gravitation and Cosmology, IIT Guwahati, December 6-9, 2023
- Swati Gavas, Dispersion in the Hubble-Lemaître constant measurements from gravitational clustering, 42nd meeting of the Astronomical Society of India, January 31 – February 4, 2024
- Jasjeet Singh Bagla, 42nd meeting of the Astronomical Society of India (IISc Bangalore), January 31 – February 4, 2024 (I attended the meeting as the chairperson of the scientific organizing committee.)
- Prajakta Mane. Poster titled Identifying Gravitationally Lensed Supernova Type Ia in the Rubin LSST Data. 42nd Meeting of Astronomical Society of India at IISc Bangalore. February 1-4, 2024
- Sauraj Bharti, HI stacking prediction for upcoming survey with SKA precursors (Poster), MeerKAT@5 (Stellenbosch, South Africa), February 20-23, 2024
- Prajakta Mane. Strategies to identify strongly lensed type Ia supernovae in the Rubin LSST. LSST Time Domain Working Group Meeting held online. March 26, 2024

K.P. Yogendran

- Akash Singh, “Explorations of QCD Phases”, 8th Shivalik HEPCATS Meeting, NIT Jalandhar, 12th May 2023.
- Akash Singh, Selected participant in “Holography @25”, ICTP-SAIR School, 5-17th June, 2023 (ONLINE)
- Akash Singh, ICGTS-IAGRG School on Gravitation and Cosmology, ICTS Bangalore, 9-20th October, 2023
- Akash Singh, Poster on “Holographic Condensates and Compact Stars”, International String Meeting, IIT Mumbai, December 10-16 2023
- Akash Singh, Students Trending talks on Theory, IIT Mandi, 4th-15th July, 2023.

Kamal P. Singh

- Bhavesh Kumar Dadhich. Nanodiamonds enable femtosecond-processed ultrathin glass as a hybrid quantum sensor. Indo-French Workshop on Disruptive Nanophotonics, organised by CSIR-CSIO & CEFIPRA, Chandigarh. June 14-16, 2023. (Poster)
- A. Tyagi. Attosecond stable dispersion free delay line for easy ultrafast metrology. Indo-French Workshop on Disruptive Nanophotonics, organised by CSIR-CSIO & CEFIPRA, Chandigarh. June 14-16, 2023. (Poster)
- Kamal P. Singh, Probing magnetic properties of silk, CondMat2023, Ashoka University, April 2, 2023. (Presentation)
- Biswajit Panda, Unpaired electrons based magnetism in protein molecule, CondMat2023, Ashoka University, April 2, 2023. (Poster)
- Jayant S. Devara, Inkless printing of Nano-oxides on copper substrates using a high-power blue laser, CondMat2023, Ashoka University, April 2, 2023. (Poster)

Kavita Dorai

- "Simulation of open quantum dynamics and characterization of quantum states and processes via artificial neural networks and NMR". NMRS-2024: Special Symposium on Clinical Application of NMR/MRI. CBMR Lucknow, February 2-5, 2024.

Kinjalk Lochan

- Kinjalk Lochan, lecture on Thanu Padmanabhan's work : Quantum musings, 10th ICGC at IIT Guwahati, 06 Dec 2023
- Harkirat Singh Sahota, Analyzing quantum gravity spillover in the semiclassical regime, 10th International Conference on Gravitation and Cosmology: New Horizons and Singularities in Gravity (ICGC 2023), IIT Guwahati, 7th December 2023
- Dipayan Mukherjee, Dual descriptions of late-time cosmology: Bouncing and collapsing Jordan frames, XV International Conference on Gravitation, Astrophysics and Cosmology, Gyeongju, South Korea, 04 July 2023:
- Dipayan Mukherjee, Expansion-collapse duality between Einstein and Jordan frames: Implications at quantum level, 10th International Conference on Gravitation and Cosmology, IIT Guwahati, India, 06 December 2023

Manabendra Nath Bera

- Quantum Bayes' Rule Affirms Consistency in Measurement Inferences in Quantum Mechanics, Quantum Information Processing and Applications, HRI, Prayagraj. 4-10 December 2023.
- Squashed quantum non-Markovianity: a measure of genuine quantum non-Markovianity in states, International Conference on Photonics, Quantum Information, and Quantum Communication, S. N. Bose National Centre for Basic Sciences, Kolkata. 29 January - 02 February 2024.

Mandip Singh

- Quantum ghost imaging of transparent phase patterns with hyper-entangled photons (poster). European Quantum Technologies Conference, Hannover, Germany. 16-20 Oct 2023.
- Quantum Imaging and quantum information processing with photons. Workshop: Quantum Information Technologies with Photonic Devices, Quantum Enabled Science and Technology theme-1, Punjabi University Patiala, 16-17 March 2024

Pankaj Kushwaha

- ;Active Galactic Nuclei: Observations and Inferences; Multidisciplinary Approach to Understand the Mysteries of our Universe; 17 - 21 July 2023 (Invited talk)
- Simultaneous Optical to X-ray Observations of OJ 287: Insights into particle spectra and X-ray spectral changes; International Symposium on Recent Developments in Relativistic Astrophysics (ISRA 2023); 11 - 13 December 2023
- Spectro-temporal study of Jet Emission: Insight into Relativistic Particle Spectra; 9th Shivalik HEPCATS Meeting; 27 - 28 January 2024

Prasenjit Das

- Mr. Sayantan Mondal attended an International Conference on Complexity and Nonlinear Dynamics in Science, Engineering, Technology, and Mathematics (CNLDS)-2023 at IIT Hyderabad during June 5 to 7, 2023.
- Mr. Sayantan Mondal attended a workshop on Advanced Multi-scale Simulation of Soft Matter Systems at IIT Gandhinagar during July 17 to 22, 2023.
- Mr. Subhanker Howlader attended a workshop on Advanced Multi-scale Simulation of Soft Matter Systems at IIT Gandhinagar during July 17 to 22, 2023.
- Dr. Prasenjit Das, remotely attended multiple national and international talks and conferences during the mentioned time period.

Rajeev Kapri

- Polymer Translocation. Condmat@2023/Ashoka University Sonapat. 01–02, April 2023
- Unzipping a DNA Hairpin in an Active Bath. Physics of life: Active and living matter. 08–10, February 2024
- Unzipping a DNA Hairpin in an Active Bath. ISPCM2024/ICTS Bangaluru. 03–05, April 2024

Samir Kumar Biswas

- PVDF-TrFE/BSTO composite polymer based transducers for high resolution ultrasound and photoacoustic imaging N Singh, R Shivam, SK Biswas Biomedical Spectroscopy, Microscopy, and Imaging III 13006, 68-72
- PVDF-TrFE/BSTO composite polymer based transducers for high resolution ultrasound and photoacoustic imaging N Singh, R Shivam, SK Biswas Biomedical Spectroscopy, Microscopy, and Imaging III 13006, 68-72
- Low-power coherent light and wavefront shaping for reducing photobleaching effect in fluorescence based imaging A Kumar, A Sharma, S Thakur, SK Biswas Unconventional Optical Imaging IV 12996, 158-162
- Polarized composite-polymer materials PVDF-TrFE/Bi2O3 for fabricating broadband high frequency ultrasound and photoacoustic transducers S Rakhoulya, N Das, N Singh, SK Biswas 2024 IEEE South Asian Ultrasonics Symposium (SAUS), 1-4
- A new scheme for 3D ultrasound imaging with custom design FPGA based high-speed data acquisition system SK Biswas, P Khuntia, T Sharma, B Sharma, N Singh, J Kedia, S Krishnan
- 2024 IEEE South Asian Ultrasonics Symposium (SAUS), 1-4

Sanjeev Kumar

- Sanjeev Kumar. Skyrmions in itinerant magnets. Condmat@2013, Ashoka University, Sonapat. April 02, 2023.
- Sanjeev Kumar. Emergent Particles in Condensed Matter Physics. Recent Advances in Physics, GGSDS college Chandigarh. October 07, 2023.
- Sanjeev Kumar. Competition between Jahn-Teller effect and spin-orbit coupling in t_{2g} systems. ElastQ23 workshop, MPIPKS Dresden. August 01, 2023.
- Sanjeev Kumar. Competition between Jahn-Teller effect and spin-orbit coupling. QMAT2023, NISER Bhubaneswar. November 27, 2023.
- Soumyaranjan Dash: Competition between Jahn-Teller effect and spin-orbit coupling (poster). QMAT2023, NISER Bhubaneswar. November 27-29, 2023.

Sudeshna Sinha

- Keynote talk Disorder in aid of Order. International Conference on Emerging Frontiers in Nonlinear Complex Systems, Computational Intelligence, and their Applications (ICNCS-2024). VIT University, Chennai. 8 February 2024.

Tripta Bhatia

- **Title of the talk:** Remodelling Bilayer Tension and Curvature
Name of the Conference/Institute: Symposium on Active and Living Matter, IIT Mumbai.
Dates (Preferably in bullet points): 22-23 Feb 2024.
- **Title of the talk:** Lipid Vesicles Adhesion Mediated by Sugar Cleaving Enzyme Invertase
Name of the Conference/Institute: Complex Fluids meeting, IIT Chennai.
Dates (Preferably in bullet points): Dec 2023.

Vishal Bhardwaj

- Neetesh Mudgal, Statistical Methods and Machine Learning in High Energy Physics 2023, ICTS Bengaluru, August 28-September 8, 2023.
- Neetesh Mudgal, Chascon2023, Panjab University, October 12-14, 2023.
- Sourabh Chutia, Poster, Chascon2023, Panjab University, October 12-14, 2023.
- Manish Kumar, Poster, Chascon2023, Panjab University, October 12-14, 2023.
- Ankit, Poster, PGI-HEM-ONC FEST 2023, PGIMER Chandigarh, October 22-24, 2023.
- Vishal Bhardwaj, Session Chair, 16th International Conference on Heavy Quarks and Leptons (HQL 2023), 28 November-2 December 2023.
- Manish Kumar, Poster presentation, 16th International Conference on Heavy Quarks and Leptons (HQL 2023), 28 November-2 December 2023.
- Vishal Bhardwaj, talk, Workshop in High Energy Physics Phenomenology (WHEPP XVII), IIT Gandhinagar, 2 January - 11 January 2024.

- Neetesh Mudgal, 16th International Workshop on Heavy Quarkonium (QWG 2024) IISER Mohali, , February 26- March 1, 2024.
- Sourabh Chutia, 16th International Workshop on Heavy Quarkonium (QWG 2024) IISER Mohali, , February 26- March 1, 2024.
- Neetesh Mudgal, 16th International Workshop on Heavy Quarkonium (QWG 2024) IISER Mohali, , February 26- March 1, 2024.

Yogesh Singh

- Co-organiser, International conference on Highly Frustrated Magnetism, 9-13 Jan. 2024, IIT Madras.
- Quantum Spin Liquids. P. W. Anderson Centenary Symposium/IISc Bangalore. 18th Jan. 2024
- Quantum Spin Liquids: Concept and Realization, Frontier Symposium in Physics, IISER TVM, 19th Jan. 2024
- Quantum Spin Liquids: phases with topology and entanglement, Condmat@23 workshop, Ashoka University 2nd April 2023.



9

AWARDS & HONOURS



AWARDS & HONOURS

AWARDS WON BY THE FACULTY

Indranil Banerjee

- Awarded the Scientific High-Level Visiting Fellowship from the Embassy of France to visit ENS Paris in 2023
- Appointed as the Editorial Board Member of the journal Current Clinical Microbiology Research for the period 2024-25

Jogender Singh

- Jogender was awarded the Har-Gobind Khorana 'Innovative Young Biotechnologist Fellowship' (IYBF) from DBT, Govt of India (2023)
- Jogender was selected as an Associate of the Indian Academy of Sciences, Bengaluru (2023)
- Jogender was selected as a Young Associate of the Indian National Science Academy (2024)

Kausik Chattopadhyay

- Kausik Chattopadhyay is elected as a Fellow of Royal Society of Biology, UK.

Lolitika Mandal

- Elected Fellow: Indian National Science Academy

Mahak Sharma

- Dr. Mahak Sharma received "INSA Associate Fellowship" for the year 2023.
- Dr. Mahak Sharma received an American Society for Cell Biology (ASCB) "Women in Cell Biology Family Care Grant" to present her research work at the ASCB 2023 meeting held in Boston (USA).

Manjari Jain

- Manjari Jain was nominated as a member of the Grants and Awards Committee of the Association of Tropical Biology and Conservation (ATBC) for a period of 3 years (2023-2025).
- Manjari Jain was invited as a Plenary speaker in the Full-stack Bioacoustics meet at the Max Planck Institute of Animal Behaviour and University of Konstanz, October 2023.

Purnananda Guptasarma

- TATA Transformation Prize (2023) awarded by TATA Sons and the New York Academy of Sciences

Sadhan Das

- Arteriosclerosis, Thrombosis, and Vascular Biology (ATVB) Editorial Board member (2023-2025) (American Heart Association Journal).
- Received International grant to attend BIOSANTEXC research mobility program at ENS-Lyon, France

Samrat Mukhopadhyay

- Prof. Samrat Mukhopadhyay received the prestigious JC Bose Fellowship.
- Prof. Samrat Mukhopadhyay was elected to the fellowship of the Indian National Science Academy (INSA).

Santosh B. Satbhai

- BIOSANTEXC Discovery Program 2023 Travel Grant (for 7 day visit to ENS Lyon in September-October 2023).

Arijit Kumar De

- Arijit K. De, International Travel Support from SERB (DST), India: (File No.ITS/2023/002570), 12 October 2023.

Debashis Adhikari

- Invited as Guest Editor for the forum in "Photocatalysis" in Organometallics (ACS), 2024

Jino George

- International travel scheme (ITS) grant for Dr. Jino George to deliver a talk at International Conference on Photochemistry, Sapporo, Japan, July 23-28th 2023.

N. Sathyamurthy

- INSA Distinguished Professorship for Professor N. Sathyamurthy

Sanchita Sengupta

- Dr. Sanchita Sengupta was inducted as Early Career Advisory Board (ECAB) member of Organic Chemistry Frontiers (RSC) (Jan 2024 onwards).
- Dr. Sanchita Sengupta received Outstanding RSC Reviewer Award for the year 2023 for the journal Organic Chemistry Frontiers (March 2024).
- Dr. Sanchita Sengupta received MoE-STARs Grant (2023) Research funding for three years (May 2023) for a project titled "Metal-free Multichromophoric FRET Macrocycles as Multi-Stimuli Responsive Smart Materials for Multifunctional Sensing and Visible and NIR Photocatalysis".

Santanu Kumar Pal

- Prof. Santanu Kumar Pal received the International Travel Support (ITS), SERB, to attend the 2023 Gordon research conference in Liquid Crystal.

S. S. V. Ramasastry

- S. S. V. Ramasastry was awarded International Travel Support from SERB and Travel Award from ACS-DOC to participate in the ACS Spring Meeting 2024 in New Orleans, USA

Subhabrata Maiti

- Editorial Advisory Board Member of the journal Chem Systems Chem (Chemistry Europe, European Chemical Societies Publishing, Wiley-VCH) since 2023.
- Featured in ACES (Asian Chemical Editorial Society) talent issue by Chemistry – An Asian Journal, 2023.

Sugumar Venkataramani

- Awarded CRSI Bronze medal in CRSI NSC-32 & 17 th CRSI-RSC February 1-4, 2024, Department of Chemistry, BITS Pilani, Pilani Campus, Rajasthan

Ujjal K. Gautam

- MRSI Medal, 2023

Kuduva R. Vignesh

- Dr. Kuduva R. Vignesh received the Travel Grant award from the Science and Engineering Research Board (SERB) under the International Travel Support (ITS) scheme, to attend the 9th Asian Conference on Coordination Chemistry (ACCC-9) held 19-23 February 2024 in Bangkok, Thailand.

Krishnendu Gongopadhyay

- Elected as a Fellow of the National Academy of Sciences, India (NASI).
- Awarded the Simon Visiting Professorship by the Mathematisches Forschungsinstitut Oberwolfach (MFO, Oberwolfach Research Institute for Mathematics), Germany.
- Awarded travel grant from the National Board for Higher Mathematics (NBHM) to visit Heidelberg for availing the Simon Fellowship.
- Selected for SERB-SIRE Fellowship 2023 (but could not avail it).

Kapil Hari Paranjape

- Convenor, Section Committee-I (Mathematics), INSA, New Delhi.
- INSA nominee to the Council of the Indian Statistical Institute, Kolkata.
- Member of the Governing Council of the Indian Association for the Cultivation of Science, Kolkata (Till July 2023).
- Member, Physical Sciences-I Committee for evaluation of FRG proposals, UGC.
- Advisor, Editorial Board for Proceedings of the Indian Academy of Sciences (Mathematical Sciences).

Neeraja Sahasrabudhe

- IISER Mohali Best teacher award 2023.

Ratna Pal

- INSA Young Associate 2024
- SERB Start-up grant
- SERB MATRICS grant

Yashonidhi Pandey

- Thesis examiner of Jagadish Pine at Chennai Mathematical Institute (PhD supervisor: Professor Vikraman Balaji) entitled Universal Parabolic moduli over Mg_n

Ananth Venkatesan

- The STARS grant we applied last year was awarded ~ 49 lakhs.

Arvind

- Elected Fellow, The National Academy of Sciences (NASI) 2023

Jasjeet Singh Bagla

- Appointed for a second term as an associate editor, Resonance – Journal of Science Education.

Sudeshna Sinha

- Appointed member of the International Science Council (India) for International Union of Pure and Applied Physics (IUPAP)
- Appointed to the Editorial Board of Proceedings of the Royal Society A: Mathematical, Physical & Engineering Sciences (Royal Society, UK)

Tripta Bhatia

- DAAD-DST International travel grant for 3 years.

Baerbel Sinha

- Dr. Baerbel Sinha was appointed as editorial advisory board member of Discover Atmosphere a Springer Nature publication

Chandrakanta Ojha

- Dr. Ojha is selected as the session chair of a special session in the India Geoscience and Remote Sensing Symposium (InGARSS) 2024, Goa (India), which will be held in December 2024
- Dr. Ojha was selected as primary convener and session chair of a session in the Asia Oceania Geosciences Society (AOGS)-symposium – July 2023, Singapore
- Dr. Ojha was selected as the session chair of an invited session in the InGARSS-2023, Bangalore (India), December 2023
- Dr. Ojha is the Guest Editor Special Issue on “New Approaches in High-Resolution SAR Imaging”, Remote Sensing Journal
- Dr. Ojha is invited as a Guest Editor Special Issue on “Satellite-based Techniques for Earth and Environmental Hazards Monitoring”, Environmental Research Communications (IOP Publisher).

Sunil A. Patil

- A team led by Dr. Sunil A. Patil with his Ph.D. students Moumita Roy and Ravineet Yadav was among the top 7 winners at Carbon Zero Challenge, a flagship event organized by IIT Madras (2023).

Vinayak Sinha

- Appointed Deputy Editor of Global Sustainability journal, Cambridge University Press
- External Expert Member of National Curriculum Committee for School of Earth, Environmental and Sustainability Sciences, IISER Trivandrum
- External expert for faculty recruitment and promotion of faculty/scientists at IIT Jammu, CSIR and IISER Trivandrum
- Expert member of WMO Environmental Pollution and Atmospheric Chemistry Scientific Steering Committee (EPAC SSC) (Innovation and Research), Geneva
- Scientific member of the International Commission on Atmospheric Chemistry and Global Pollution: Montreal, CA under International Association of Meteorology and Atmospheric Sciences (IAMAS), which is in turn part of the International Union of Geodesy and Geophysics (IUGG).

AWARDS WON BY THE STUDENTS, POST-DOCS, AND OTHER GROUP MEMBERS

1. Arpita Sharma. Conference attending grant from FEMS in terms of waving of registration money and free conference dinner for FEMS Congress 2023, Hamburg, Germany.
2. Arpita Sharma. Award for Travel Grant by Science and Engineering Research Board (SERB) to attend FEMS Congress 2023, Hamburg, Germany.
3. Arpita Sharma. Award for Travel Grant by Council of Scientific and Industrial Research (CSIR) to attend FEMS Congress 2023, Hamburg, Germany.
4. Sanjeev Routh. Award for Best Poster Presentation titled LOX-1: An emerging scavenger receptor (SR) in inflammatory signaling in response to pathogen associated molecular patterns (PAMPs) at SIRCON 2023 at Indian Institute of Science (IISc), Bengaluru, India held on 16th September to 17th September 2023.
5. Yogesh Saxena. Award for Travel Grant by Science and Engineering Research Board (SERB) to attend TOLL 2024 Conference, Rotterdam, Netherlands.
6. Mr. Nirmal Kumar received the "Young Researcher Award" at the National Biomedical Research Competition 2023
7. Ms. Gaganpreet Kaur won the Best Poster Award at the 7th Molecular Virology Meeting held at IISc Bangalore in 2023
8. Mahendra Singh received the International Union for Pure and Applied Biophysics (IUPAB) travel award for attending the EBSA Congress and EBSA 2023 Summer Biophysics School, held in Stockholm, Sweden, from 28th July to 3rd August 2023.
9. Mahendra Singh received the DST-SERB travel award for attending the EBSA Congress and EBSA 2023 Summer Biophysics School, held in Stockholm, Sweden, from 28th July to 3rd August 2023.
10. Kusum Lata received the DST-SERB travel award for attending the EBSA Congress and EBSA 2023 Summer Biophysics School, held in Stockholm, Sweden, from 28th July to 3rd August 2023.
11. Taruna Verma was selected for the 4th SERB SCHOOL Chemical Ecology, 2023, at IISc Bangalore.
12. Taruna Verma got the 2nd prize in poster presentation at the 4th SERB SCHOOL Chemical Ecology, 2023, at IISc Bangalore.
13. Aanchal Panchal has received an \$USD 2500 travel grant to attend the conference by the International Society for Behavioral Ecology Congress, to be held in Melbourne, Australia, in October 2024.
14. Ms. Roopali Khanna from Prof. Samrat Mukhopadhyay's lab received the Biophysical Journal Best Poster Award at the Indian Biophysical Society meeting, TIFR Hyderabad (March 2023).
15. Deep Shikha: Best poster award by Springer Nature in the "7th International Conference on Plant Genetics and Genomics on the theme "GM and Genome Edited Crops: Promoting Agrobiodiversity Use for Sustainable Agricultural Development" New Delhi, India.
16. Samriti Mankotia: International Travel grant, Department of Biotechnology (DBT), Govt. of India.
17. Samriti Mankotia: Travel Grant from the conference organizers to attend the 10th International Symposium on Root Development, Ghent, Belgium.
18. My PhD student Ayushi Singh was awarded with DST-INSPIRE fellowship.
19. My graduate student Ayushi Raturi was awarded best poster award at ChESCon PU, 2023
20. Ms. Sakshi received best Poster Award in Inter-IISER-NISER Chemistry Meet 2024 held at IISER Kolkata from February 23-25, 2024.
21. Sunanda received best Poster presentation Award in the 50th National Seminar on Crystallography (NSC50), held at CSIR-IMTECH, November 22-24, 2023.
22. Sasthi Paul, Best Poster Award at International Conference on Emerging Trends in Photodynamics and Photocatalysis (ETPP), Mohali, 27 March 2024.
23. Anjali, Best Poster Award at Inter IISER NISER Chemistry Meet 2024, IISER Kolkata, 25 February 2024
24. Amit Kumar, Best Poster Award at Ultrafast Sciences - 2023 (UFS-2023) CSIR-National Physical Laboratory (CSIR-NPL), New Delhi, 27 November 2023.
25. Sakshi Chawla, Best Oral Presentation Award at the International Conference on Molecularly Designed Functional Materials 2023 (MDFM 23) conducted by S & T Digital, 30 September 2023
26. Subho Mitra, travel grant from International Travel Support (ITS), Science and Engineering Research Board, DST, India (Travel grant No. ITS/2023/002849), 07 July 2023.
27. Subho Mitra, Carl Storm International Diversity (CSID)' award from Gordon Research Conferences (GRC), Newport, USA, 28 June 2023.
28. Ayanangshu Biswas was awarded best poster prize in CHASCON 2023, National Conference on Global Science for Global Wellbeing.
29. Sourav Mandal was awarded best poster prize in international conference on Emerging Trends in Photodynamics and

Photochemistry.

30. Supriya Halder was awarded best poster prize in Thieme organic chemistry symposium, Delhi university
31. International travel scheme (ITS) grant for Mr. Jaibir Singh to deliver a talk at 12th Asian Photochemistry Conference, Melbourne, Australia, 27 November - 1 December 2023
32. Best Poster Award by Mr. Subhendu Samanta, Ms. Ankita Kumari and Mohammad Umer at SPSI-MACRO-2023 at IIT Guwahati on December 10-13, 2023.
33. Pritam Saha (Ph20024): Joint winner of the Mihir Chowdhury Student Fellowship as the best poster presentation award in FCS XIV at IISER Mohali on 9th-14th December 2023
34. Pritam Saha (Ph20024): In FCS XIV, the best poster award prize as MCSF fellowship of 50000 INR for expenditures in International conferences.
35. Pritam Saha (Ph20024): Winner of the best poster presentation award at the International Conference on Interdisciplinary Applications of Magnetic and Optical Tweezers (MTOT 2023) at IIT Bombay on 19th - 22nd December 2023
36. Pritam Saha (Ph20024): Winner of the best oral presentation award at the International Conference on Interdisciplinary Applications of Magnetic and Optical Tweezers (MTOT 2023) at IIT Bombay on 19th - 22nd December 2023
37. Ms. Vidushi Guota was awarded best poster award at the International Conference on Emerging Trends in Photodynamics and Photochemistry, IISER Mohali, March 26-28, 2024.
38. Dr. Sushil Sharma was awarded best oral presentation at the International Conference on Luminescent Materials from Fundamentals to Applications (ICLMFA), Guru Nanak Dev University (GNDU, Amritsar), March 15-16, 2024.
39. Ms. Anita Kumari was awarded best poster prize at the ICLMFA conference at GNDU Amritsar during March 14-15, 2024.
40. Mr. Sushil Sharma was awarded best poster prize at the International Conference in Photochemistry (ICP) held in Sapporo, Japan from 23-27 July, 2023.
41. Surbhi Bansal, Award Received: Third Best Poster Presentation in CHASCON 2023, National Conference on Global Science for Global Wellbeing during October 12-14, 2023 at Panjab University, Chandigarh
42. Anshika Baghla received the Best Poster Award at DSSR 2024, held at CeNS Bengaluru on 27-28 March 2024.
43. Ritobrata De received the best oral presentation award at the International Conference on Advanced Materials for a Better Tomorrow (AMBT-2023), organized by SIRMB and the Department of Physics, BHU, on 10-13 October 2023.
44. Soma Sil received "Dewan Jawaharlal Nayyar Award -2023" from the Indian Liquid Crystal Society (ILCS) in the category of best poster presentation in Chemistry at the 30th National Conference on Liquid Crystals (NCLC-2023).
45. Jay Prakash won the best poster award at the 'Recent Advances in Bioorganic and Medicinal Chemistry (RABMC)' symposium held at Panjab University Chandigarh on 20-Apr-2024.
46. Ramanpreet Kaur: Best Poster Award for the poster title "Photoswitchable azoheteroarene based chelating ligands: light modulation of properties, aqueous solubility and catalysis." at RC Paul National Symposium Series Feb 2024, Panjab University, Chandigarh, 15-16 February, 2024.
47. Deepak Kumar: Best Poster Award for the poster title "Photochemistry of p-azidophenyldiazenyl-3,5-dimethylisoxazole in solid argon" at Emerging trends in photodynamics and photocatalysis (ETPP-2024), 26-28 March, 2024, Indian Institute of Science, Education and Research (IISER), Mohali, Punjab.
48. Sapna Singh: Best Poster Award for the poster title "Azobenzene photoswitches functionalized with various amide linkers and their supramolecular behaviour" at Inter IISER-NISER Chemistry Meet, 23-25 February, 2024, Indian Institute of Science, Education and Research (IISER), Kolkata.
49. Himanshu Kumar: Best Oral Presentation Award for the talk "Light-triggered Phase Transition Molecular Materials and their Applications in Solar Thermal Energy Storage Molecular Devices" at International Chemical Engineering Conference on Energy, Environment, and Sustainability (ICECEES-2024), 15 February, 2024, IIT Roorkee.
50. Anjali Mahadevan: DST Travel Grant, RSC Travel Grant
51. Dr. Maqsuma Banno - Best Poster Award FCSB-2024 (Jan -15-17)
52. Dr. Maqsuma Banno - International Travel Grants for ICP-2023, Japan
53. Ms. Imon Jyoti Dutta, a PhD student, got the best poster award at the Theoretical Chemistry Symposium (TCS)-2023 held on 7-10 December 2023 in IIT Madras.
54. Ms. Imon Jyoti Dutta, a PhD student, got the best poster award at the 32nd CRSI National Symposium in Chemistry held 2-4 February 2024 in BITS Pilani.
55. Mr Pankaj Sahu a PhD scholar got selected to and was funded by SERB to attend a Karyashala (SERB-sponsored high-end workshop) under the Accelerate Vigyan scheme on "Recent Trends and Future Prospects for Beyond 5G in RF, Microwave, and Millimeter Wave Technologies organized by the Department of Electronics and Communication Engineering at the National Institute of Technology Tiruchirappalli from 23rd to 29th July 2023
56. Ms Vaishali Gulati, was awarded a student stipend of NTD 18000 by the conference organizers to present a poster at the

- international conference QIP2024 during January 13-19 2024 at Taipei, Taiwan. Poster Title: "Implementation of quantum non-Markovianity through the convex combination of Pauli semigroups on an NMR quantum processor".
57. Ms Gayatri Singh, was awarded a student stipend of KRW 560000 by the conference organizers to present a poster at the international conference AQIS2023 during August 28-September 1 2023 at Seoul, South Korea. Poster Title: "Experimental quantum state transfer of an arbitrary single qubit on a cycle with four vertices using a coined quantum random walk".
 58. Mr Krishna Shende, was awarded a student stipend from PMRF fellowship India, to present a poster at the international conference Quantum Thermodynamics 2023 during July 17-21 2023 at Vienna, Austria. Poster Title: "Experimental study of thermodynamic uncertainty relations on a quantum SWAP engine".
 59. PhD student Mr. Amit got DST travel grant for presenting his work at SPIE Photonics Europe, 2024, Strasbourg, France.
 60. Manish Kumar, best poster in Chascon 2023, Panjab University, October 12-14, 2023.
 61. Ankit, best poster in PGI-HEM-ONC FEST 2023, PGIMER Chandigarh, September 22-24, 2023.
 62. Amit Vashist received the Inspire Faculty Award and is being hosted by INST.
 63. Diptimayee Behera (PH18077) received travel support for participating in the "Advances in Human Evolution, Adaptation & Diversity" (AHEAD) conference held in Tarragona, northeast Spain.
 64. Sunil Kumar (PH18069) received DST-International Travel Support (ITS) to participate in the "ISEAC-41 The 41st International Conference on Environmental & Food Monitoring" in Amsterdam, Netherlands (20 November 2023 to 24 November 2023).
 65. Ajay Kumar (Ph20023) received DST-International Travel Support (ITS) to participate in the "SETAC 12th Young Environmental Scientists Meeting" in Germany (28 August 2023 to 01 September 2023).
 66. Diptimayee Behera (Ph18077). Session Co-convenor at AGU Fall Meeting (2023): Investigating the role of Polycyclic Aromatic Hydrocarbons (PAHs) in Past and Present Environments: Implications for Human Health and Ecosystems.
 67. Diptimayee Behera (Ph18077). Session Co-convenor at INQUARoma (2023): How Absolute and How Relative: Challenges and resolutions associated with applying dating techniques in Quaternary period.
 68. Arpit Awasti was awarded the prestigious Prime Ministers Research Fellowship
 69. Dr. Baerbel Sinha was awarded a travel grant to present an Invited talk entitled: "Can India leapfrog into a clean air future – perspectives from measurements, source-receptor modelling and emission inventories" at the European Geophysical Union Fall Meeting, 23-28 April 2023 in Vienna, Austria
 70. Shivam Chawla (Ph.D. student with Dr. Ojha) received a travel grant to attend ISRO-DMS two-week short-term course in March 2024 at MNNIT Allahabad, UP.
 71. Aparna R. (MS thesis student with Dr. Ojha) received an Early Career Scientists' Travel Grant to attend the European Geophysical Union (EGU) conference in April 2024, Vienna (Austria)
 72. Aparna R. (MS thesis student with Dr. Ojha) received the Berkner Travel Fellowship to attend the American Geophysical Union (AGU) fall meeting in December 2023, San Francisco (USA)
 73. Aparna R. (MS thesis student with Dr. Ojha) received a GRSS Travel Grant to attend the InGARSS- 2023, Bangalore (India), December 2023
 74. Aparna R. (MS thesis student with Dr. Ojha) received PhD offer in the Department of Geosciences at Texas Tech University (USA)
 75. Ravi Kumar (MS thesis student with Dr. Ojha) took PhD admission at the University of Rome La Sapienza, Rome, (Italy)
 76. Dr. S.K. Ghosh Memorial Young Scientist Award-2024 (March 2024)
 77. Best Poster Award: International Conference on Regional Climate-CORDEX 2023 (IITM Hub; September 2023)
 78. Moumita Roy (PhD Student working with Dr. Patil) received an Excellent Student Support Fund (Along with award money of CHF1000) at the Microbial/Enzymatic Electrochemistry Platform (MEEP) symposium: European Fuel Cell Forum, Lucerne, Switzerland (2023).
 79. Srishti (PhD Student working with Dr. Patil) won the Best Poster Presentation award at the Second South Asian Symposium on Microbial Ecology (SASME), Kathmandu, Nepal (2023).
 80. Ramandeep Singh (PhD Student working with Dr. Patil) received a travel award from the conference organizers, Second South Asian Symposium on Microbial Ecology (SASME 2023), Kathmandu, Nepal, 1-3 Nov 2023.
 81. Ravineet Yadav (PhD Student working with Dr. Patil) received financial support for registration and accommodation from UKRI - Biotechnology and Biological Sciences Research Council for attending The Carbon Recycling Network - Fourth Annual Conference, Nr Macclesfield, Cheshire, United Kingdom, 25-27 Mar 2024.
 82. Sahil Kaushal. Prime Ministers Research Fellowship
 83. Subhashri Sarkar was awarded with a travel bursary of £1,000 by the Cambridge Political Economy Society Trust (CPES).
 84. Anubhav Preet Kaur: Prehistoric Society Conference Bursary and Paleoanthropology Society Bursary for attending the Paleoanthropology Society Annual Meeting 2024

85. Anсад C has been awarded the International Bursary Award by the British Association for South Asian Studies (BASAS) for 2023.
86. Nilkantha Pal has been awarded The Mark Samuels Lasner Fellowship in Printing History by the American Printing History Association. January 2024.
87. Nilkantha Pal has been awarded a Minor Research Grant (£250) by the Bibliographical Society on June 14, 2023, for a research field trip to Dhaka, Bangladesh.
88. Soniya Yambem was awarded an ATBC travel grant of 250 USD. June 2023.
89. Gaurav Singh won the 3rd Best Speed Talk award at the conference Understanding Behaviour 2023, IISER Kolkata. June 2023.
90. Gaurav Singh was awarded a research grant of 4900 USD by the Earth Species Project, Experiment Foundation. Project theme: Artificial intelligence and interspecies communication. February 2024.
91. Kanika Rajput was awarded a Students' Research Grant of 2000 USD by the Animal Behaviour Society for her research on the Urban Ecology of Jungle Babblers.

10 MAJOR FACILITIES PROCURED



MAJOR FACILITIES PROCURED

Mahak Sharma

- **Spinning Disk Super-Resolution Confocal Microscope**

Description: Spinning disk confocal microscopes allow for fluorescence imaging of fast dynamic processes in live specimens. In this microscopy system, the specimen is illuminated and detected at multiple points simultaneously. The system uses two spinning disks, one containing thousands of pinholes, and the other, containing an equal number of microlenses to focus the laser beam into the pinholes, which enables fast, multicolor, three-dimensional live-cell imaging.

Sadhan Das

- **Nucleofactor 2b device (X-Unit)**

Nucleofactor 2b device will be used for the transfection of primary cell types, such as primary macrophages, and smooth muscle cells which are usually difficult to transfect by traditional transfection methods.

Samrat Mukhopadhyay

- **Single-Molecule Fluorescence Microscope** (SUPRA grant awarded to Prof. Samrat Mukhopadhyay).



Vidya Devi Negi

- My lab, the infection immunology lab (2i-lab) was set up and is fully functional now in AB2-L2T2. The space is being shared with Dr Sadhan Das. The 2i lab was capable to host 6 summer intern also this summer.

Arijit K. De

- **The Cary 60 spectrophotometer module**, Agilent Technologies Original Bundle PC and Intel Core i5 processor were purchased by the Condensed Phase Dynamics Group at IISER Mohali, Punjab, India. The central aim of acquiring this instrument is to explore, through a combination of theory and experiments, a wide range of applications in chemistry, biophysics, and condensed matter physics.

MODEL:

Agilent Cary WinUV software installation is delivered and licensed as "Commercial computer software" as defined in DFAR 252.227-7014 (June 1995), or as a "commercial item" as defined in FAR 2.101(a) or as "Restricted computer software" as defined in FAR 52.227-19 (June 1987) or any equivalent agency regulation or contract clause.

Specification:

The supplied power supply for this equipment is designed to operate within a range of 90-265 V AC and a frequency of 47-63 Hz.

The UV-visible spectrometer comprises five components:

1. A high-voltage Xenon flash lamp operating under cover.
2. A wavelength selector that isolates a limited region of the spectrum for measurement.
3. A sample holder.
4. A radiation detector that converts radiant energy into a measurable electrical signal.
5. A signal processor.

Additionally, an indicator lamp on the power button is provided, which displays different colors (such as red, orange, green) to indicate various conditions.

Application:

UV-Vis spectroscopy provides valuable information that allows us to identify and characterize molecules, measure their concentration in solution, and determine the purity of a sample. It is a powerful analytical tool that offers insights into

the structure, function, kinetics, and scanning kinetics of molecules, as well as RNA-DNA estimation and ADL shell analysis.



With this instrument, we can obtain absorption data of a sample across the entire UV-visible range, which can then be utilized for selecting the excitation wavelength in pump-probe spectroscopy.

Sabyasachi Rakshit

Syringe pump: In single-molecule experiments, a syringe pump plays a vital role in maintaining a consistent flow rate of liquids. This controlled flow is essential for precise measurements at the single-molecule level. The syringe pump operates by pushing a plunger within a syringe to deliver the liquid at a constant rate.

Syringe Pump

However, single-molecule experiments that could be conducted using a syringe pump include:

1. **Single-Molecule Pulling Experiments:** In these experiments, we can use a syringe pump to precisely control the application of force on individual molecules. By attaching one end of a molecule to a surface and the other end to a micropipette or cantilever, the syringe pump can be used to apply a controlled force and measure the molecule's response, such as stretching or unfolding.
2. **Single-Molecule Mixing Studies:** Syringe pumps are used to mix and deliver different reagents or samples to observe single-molecule interactions. By controlling the flow rate and timing of the reagent delivery, researchers can study binding events, chemical reactions, or conformational changes at the single-molecule level.
3. **Single-Molecule Flow Stretching Experiments:** In these experiments, a syringe pump is employed to flow a polymer solution through a microfluidic channel. By stretching the polymer molecules underflow, researchers can study their mechanical properties, such as elasticity and flexibility, at the single-molecule level.
4. **Single Molecule Imaging under Flow:** Researchers can use a syringe pump to create a controlled flow environment for imaging individual molecules. By flowing fluorescently labeled molecules past a detection system, scientists can track the movement and behavior of single molecules in real-time.

These experiments showcase the versatility of syringe pumps in enabling precise control over fluid flow, which is essential for conducting single-molecule studies with accuracy and reproducibility.



Kuduva R. Vignesh

- Procured a **glove-box** from the institute seed grant for my new lab.

Krishnendu Gongopadhyay

- A **Computational facility** utilizing FIST grant of the DST was inaugurated on October 20, 2023, at the Department of Mathematical Sciences. This will be used by Mathematics students and postdocs for computational purposes. On behalf of the Department, Dr. Varadharaj R. Srinivasan supervised the procurement.



Ananth Venkatesan

- Some minor equipment in our lab includes a **parallel plate reactor**. This equipment uses the RF power and vacuum hardware from an existing sputtering system. This will help us run plasma processes at higher pressures. This system will be limited to non toxic and mostly inert gases. We will mainly use this to advance our process that has a provisional patent to higher pressures. A screw compressor was installed to help with the N2 utility of our main plasma system.

The DST FIST Microwave facility has been setup in a dedicated room for the fabrication equipment and can be formally opened in the next year.

Tools for device fabrication

- RF PCB Prototyping machine and allied accessories



On the left a Device made with PCB Prototyping system.
On the right an Ultrasonic wire-Bonder used to make fine connections

A PCB prototyping machine that can make a smooth finish to get high quality Microwave

Wave guides on bare printed circuit boards. The initial issues with this systems interface last year after installation have been sorted with the supplier to make it work smoothly.

A low-cost programmable soldering oven made from a microcontroller running a simple toaster, PCB cutters etc have been set up. The initial issues with this systems interface have been sorted to make it work smoothly.

● Wire Bonder

A Wedge bonder capable of accessing deep microwave connectors and devices has been set up.

Test and Measurement systems:

- A Microwave Vector Network analyser (VNA) up to 20 GHz Bandwidth to probe response of devices. The same VNA also functions as a spectrum analyser.
- A lock-in Amplifier with a phase meter up to 600 MHz Bandwidth.
- A Microwave Arbitrary wave-form Generator.
- A set of three Phase coherent microwave signal Generators was installed It was also repaired due to a fault in an internal attenuator above 6 GHz during warranty.
- A sampling oscilloscope up to 25 GHz. This gives an average response and can only test repetitive signals

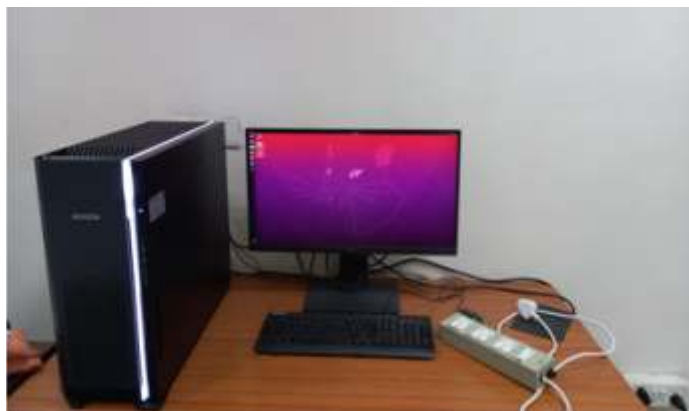
Kavita Dorai

- A high-field, **high-resolution 500MHz NMR spectrometer** (Bruker Biospin Inc. Switzerland) was installed in the NMR Research Facility. This NMR spectrometer has been purchased under the aegis of the extramural grant awarded to PI Prof. Kavita Dorai (Physical Sciences) by DST India under the Quantum Enabled Science and Technology scheme DST/ICPS/QuST/Theme-2 Funded project (Total cost INR 911.14 Lakhs).

Prasenjit Das

- Prasenjit Das purchased two workstations for high-performance computing.
(a) Tyrone SDI100C3A-34 workstation as per specifications below:
Processor(s): 2 x Intel Xeon Gold 6338 processors (28-Core, 2.7GHz, 42M, 205W)

RAM: 256GB DDR4-3200 ECC RDIMM (Max 4TB, 16 DIMMs)
 SSD/HDD(s): 1 x 960GB M.2 NVMe SSD, 1 x 8000GB 7200RPM SATA HDDs
 NIC: 2 x Gigabit (1000Base-T) Ethernet
 Graphics: Nvidia RTX A4000 with 16GB memory
 Power Supply: 1200W Single Power Supply (80PLUS Platinum)



(b) Tyrone Camarero SS400TR-34 workstation as per specifications below:

Processor(s): 1 x Intel® Xeon® W-2265 Processor, 3.50 GHz, 19.25 MB, Core 12
 RAM: 6 x 32GB DDR4-2600 ECC Register, Total 8 DIMM slots
 SSD/HDD(s): 1 x 512GB M.2 Nvme SSD, 1 x 4000 GB 3.5" SATA 7200 RPM HDD
 NIC: Dual LAN Gigabit Ethernet port
 Graphics: Nvidia RTX A4000 with 16GB memory
 Power Supply: 1200W Single Power Supply (80PLUS Platinum)

Samir Kumar Biswas

- Biswas's research group was working to develop FPGA and high-speed data acquisition for a new type 3D ultrasound and photoacoustic imaging system for health sciences. They developed, PVDF co-polymer based lead-free ultrasound and photoacoustic sensors

Chandrakanta Ojha

- Procured **High-Performance Computing (HPC) cluster** for his research group (SRSLab):

HPC will be used for processing a big data archive of various satellite radar data obtained from different space agencies for monitoring Earth observation phenomenon. The system will use a parallel computing environment for data processing and modeling of various natural and anthropogenic hazard phenomena at large spatio-temporal scales effectively.

- Procured low-end workstations for my research group (SRSLab)

The low-end workstations will be used to handle very sophisticated radar processing software for analysis and investigation at a local scale. The system will further use technical advancement of radar processing algorithms and develop an integrated framework combining multi-scale and multi-resolution remote sensing data for Earth observation.

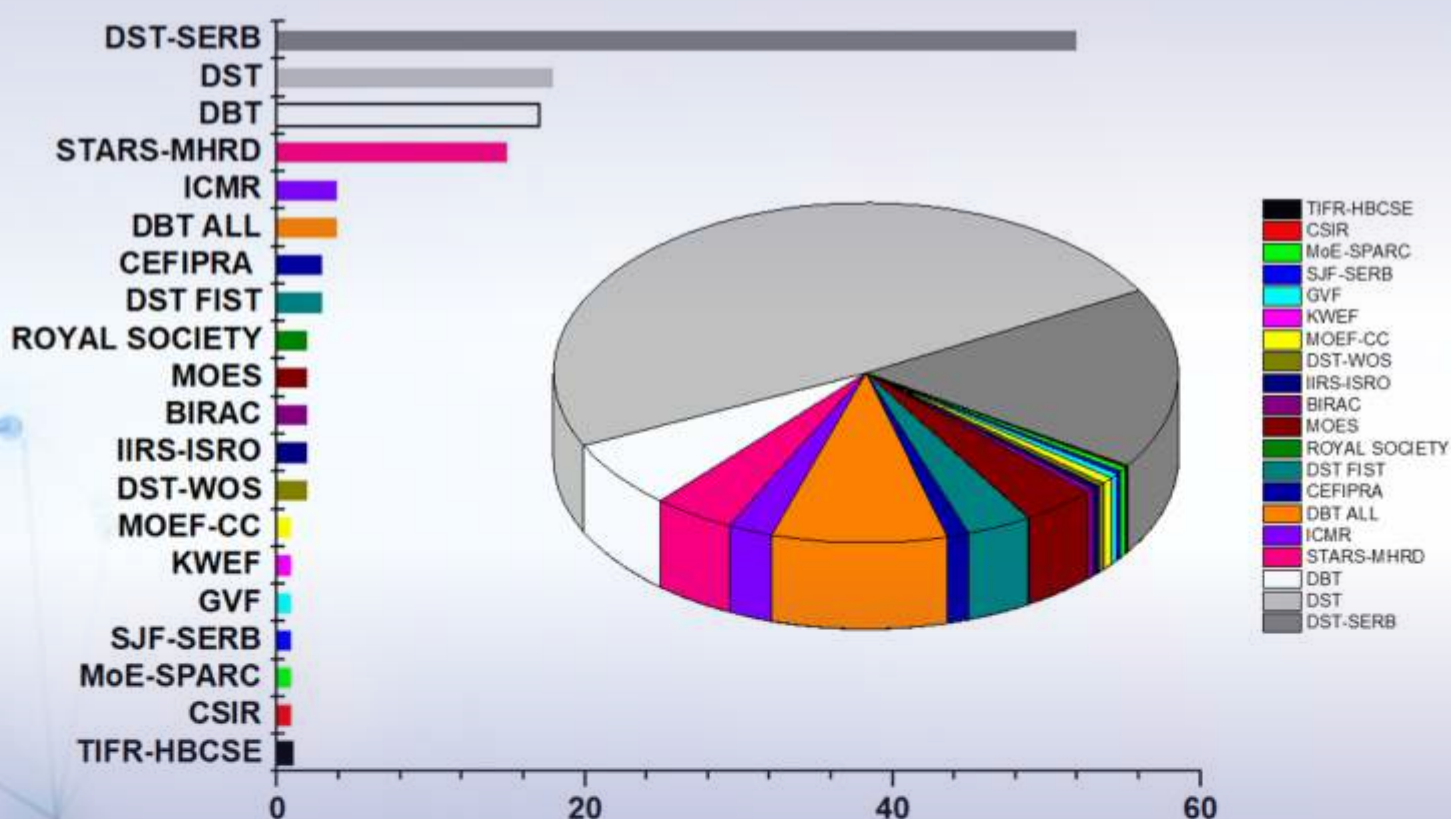
Yunus Ali Pulpadan

- Unmanned Aerial Vehicle (UAV)
- LiDAR Sensor for UAV
- Pro-DSS Turbidity Sensor

Prasenjit Das

- Prasenjit Das has purchased two **workstations for high-performance computing**. Each workstation has 16 cores, 64GB RAM, 4TB Hard-disk.

11 SANCTIONED PROJECTS 2023-24



SANCTIONED PROJECTS AND FELLOWSHIPS 2023-24

S. No.	Project No.	Name of Project	Principal Investigator	Funding Agency	Duration	Total Sanctioned Cost
1	IFC-23-0300	PHASE TRANSITIONS OF AN INTRINSICALLY DISORDERED VIRAL PROTEIN: FROM MOLECULAR GRAMMAR TO NANOSCALE AND MESOSCALE PROPERTIES	PROF. S. MUKHOPADHYAY	CEFIPRA	2023-2026	6505048
2	DBT-23-0301	COMPUTATIONAL INVESTIGATION INTO THE ROLE OF ALTERNATIVE SPLICING IN CELLULAR DIFFERENTIATION TISSUE REGENERATION DISEASES AND EVOLUTION	DR. SHASHI BHUSHAN PANDIT	DBT	2023-2028	4319000
3	SERB-23-0302	EXTRACELLULAR ELECTRON TRANSFER (EET) IN EXTREMOPHILES: UNRAVELING THE EET PATHWAY OF A METABOLICALLY VERSATILE NOVEL HALOALKALIPHILIC GEOALKALIBACTER HALELECTRICUS STRAIN CAPABLE OF RESPIRING ON INSOLUBLE ELECTRON ACCEPTORS	DR. SUNIL ANIL PATIL	DST-SERB	2023-2026	7145339
4	SERB-23-0303	UNDERSTANDING THE ROLE OF RALF27 PEPTIDE IN REGULATION OF THE PLANT IRON DEFICIENCY RESPONSES IN ARABIDOPSIS AND TOMATO: BASIC AND APPLIED INSIGHTS	DR. SANTOSH B. SATBHAI	DST-SERB	2023-2026	3996000
5	SERB-23-0304	INVESTIGATION OF THE ROLE OF DOPAMINE IN GROUP I MGLUR TRAFFICKING AND MGLUR-DEPENDENT AMPA RECEPTOR ENDOCYTOSIS	PROF. SAMARJIT BHATTACHARYYA	DST-SERB	2023-2026	5683120
6	BIRAC-23-0305	VALIDATION OF THE MICROBIAL ELECTRO-ACETOGENESIS TECHNOLOGY FOR BIOGAS UPGRADATION	DR. SUNIL A PATIL	BIRAC	2023-2025	4955000
7	STARS-23-0306	CHARACTERIZATION OF HOST GENETIC AND METABOLIC FACTORS THAT MODULATE THE EFFICACY OF THE CANCER DRUG FLOXURIDINE	DR. JOGENDER SINGH	STARS-MHRD	2023-2026	4700000
8	SERB-23-0307	DESIGNING LOW-COORDINATE SINGLE-ION MAGNETS FOR HIGHER BLOCKING TEMPERATURES	DR. VIGNESH KUDUVA RADHAKRISHNAN	DST-SERB	2023-2026	3025000

S. No.	Project No.	Name of Project	Principal Investigator	Funding Agency	Duration	Total Sanctioned Cost
9	DST-23-0308	SURFACE GROUPS AND GEOMETRIC STRUCTURES	PROF. K. GONGOPADHYAY	DST	2023-2025	616000
10	SERB-23-0309	SERB RESEARCH SCIENTIST	DR. SHARMILA BHATTACHARYA	DST-SERB	2023-2025	4600000
11	STARS-23-0310	METAL-FREE MULTICHROMOPHORIC FRET MACROCYCLES AS MULTISTIMULI RESPONSIVE SMART MATERIALS FOR MULTIFUNCTIONAL SENSING AND VISIBLE AND NIR PHOTOCATALYSIS	DR. SANCHITASEN GUPTA	STARS-MHRD	2023-2026	4000000
12	CSIR-23-0311	CHEMICAL AND GENETIC SCREENS FOR IMPROVING ENDOPLASMIC RETICULUM PROTEOSTASIS	DR. JOGENDER SINGH	CSIR	2023-2026	2350000
13	STARS-23-0312	CYCLOPROPENIUM-BASED CHIRAL ORGANO-SUPERBASES AND THEIR CONJUGATE ACIDS FOR ENANTIOSELECTIVE TRANSFORMATIONS	PROF. R VIJAYA ANAND	STARS-MHRD	2023-2026	3500000
14	STARS-23-0313	A MECHANISTICALLY-DRIVEN, PHOTOCHEMICAL APPROACH TOWARDS THE SUSTAINABLE USE OF HYDROGEN FEEDSTOCKS AND CARBON-DIOXIDE	DR. DEBASHIS ADHIKARI	STARS-MHRD	2023-2026	400000
15	KWEEF-23-0314	A NOVEL MODEL FOR WATER QUALITY PREDICTION ON SOCIOECONOMIC INDICATORS, SATELLITE IMAGING AND MACHINE LEARNING	DR. YUNUS ALI POLPADAN	KWEEF	2023-2024	220000
16	STARS-23-0315	LITHOGRAPHICALLY PATTERNABLE MESOSCOPIC OXIDE ELECTRONICS ON SURFACE DOPED SRTIO ₃	DR. ANANTH VENKATESAN	STARS-MHRD	2023-2026	4917000
17	SPARC-23-0316	ASSEMBLING THE CITY: GENDER AND UTILITY INFRASTRUCTURES IN NORTHERN INDIA	PROF. ANU SABHLOK	MoE-SPARC	2023-2025	7582320
18	SERB-23-0317	SERB RESEARCH SCIENTIST	DR. ARU BERI	DST-SERB	2023-2025	4600000
19	GVF-23-0318	SMALL TOWN AQ: RESEARCH, COLLABORATION AND COMMUNITY ENGAGEMENT AROUND AIR	PROF. ANU SABHLOK	GVF	2023-2025	8480000
20	SERB-23-0319	DECIPHERING THE ROLE OF MAJOR VAULT PROTEIN (MVP) IN INFLUENZA A VIRUS INFECTION	DR. INDRANIL BANERJEE	DST-SERB	2023-2026	6279500
21	SERB-23-0320	PLASMONIC NANOSTRUCTURES DERIVED FROM METAL ORGANIC FRAMEWORKS FOR PHOTO-THERANOSTIC APPLICATIONS	DR. SAMIR KUMAR BISWAS	DST-SERB	2023-2026	1241307

S. No.	Project No.	Name of Project	Principal Investigator	Funding Agency	Duration	Total Sanctioned Cost
22	DBT-23-0321	ENDOPLASMIC RETICULUM STRESS-MEDIATED TRANSCRIPTIONAL REPROGRAMMING OF AN SCF UBIQUITIN LIGASE COMPLEX	DR. JOGENDER SINGH	DBT	2023-2026	6154480
23	SERB-23-0322	J C BOSE FELLOWSHIP	PROF. S MUKHOPADHYAY	DST-SERB	2023-2028	9500000
24	ISRO-23-0323	RSINFSL INDUCED SOIL AND BEDROCK LANDSLIDES: VOLUME ESTIMATES AND UNCERTAINTIES WITH THE EXISTING SCALING EXPONENTS	DR. YUNUS ALI POLPADAN	IIRS-ISRO	2023-2026	3300000
25	SERB-23-0324	POLARITRONICS: CONTROLLING ELECTRON/ENERGY TRANSPORT THROUGH STRONG LIGHT-MATTER COUPLING"	DR. JINO GEORGE	DST-SERB	2023-2026	7886714
26	SERB-23-0325	LIGHT MODULATION OF CATALYSIS: TOWARDS TEMPORAL AND STEREO CONTROL OF THE REACTIONS AND RECOVERABLE CATALYSTS USING AZOHETEROARENE PHOTOSWITCHES	DR. SUGUMAR VENKATARAMANI	DST-SERB	2023-2026	5159254
27	SERB-23-0326	MICROBIAL DIET-MEDIATED LIFESPAN ENHANCEMENT VIA HOST LIPID METABOLISM	DR. JOGENDER SINGH	DST-SERB	2023-2026	7050945
28	STARS-23-0327	MOLECULAR GENETIC DISSECTION OF THE INTERORGAN COMMUNICATION BETWEEN THE HEART AND FAT CELLS IN REGULATING OBESITY IN DROSOPHILA	PROF. SUDIP MANDAL	STARS-MHRD	2023-2026	4700000
29	SERB-23-0328	STUDY OF INFLAMMATORY CELL DEATH MECHANISM INDUCED BY THE PORE-FORMING TOXIN VIBRIO CHOLERAE CYTOLYSIN AND ITS IMPLICATION FOR THE CELL-KILLING PATHOPHYSIOLOGICAL FUNCTION OF THE TOXIN	PROF. KAUSHIK CHATTOPADHYAY	DST-SERB	2023-2026	6196054
30	SERB-23-0329	RIGIDITY PROPERTIES OF HENON MAPS	DR. RATNA PAL	DST-SERB	2023-2025	955009
31	SERB-23-0330	RIGIDITY PROPERTIES OF HENON MAPS	DR. RATNA PAL	DST-SERB	2023-2026	660000
32	DST-23-0331	FREQUENCY TUNABLE HIGHER ORDER HARMONIES WITH ORBITAL ANGULAR MOMENTUM USING IR-IR PULSES	DR. NIKITA DHANKHAR	DST	2023-2026	3486400
33	SERB-23-0332	SSR	DR. TAMANNA/ PROF. SSV RAMASASTRY	DST-SERB	2023-2025	2673600
34	SERB-23-0333	NPD	DR. SUMIT CHABDRA MISHRA/ PROF. AMIT KULSHRESTHA	DST-SERB	2023-2025	2673600

12 ACADEMIC PROGRAMS



ACADEMIC PROGRAMS

The academic year 2023-24 has started as per the Senate approved Academic Calendar. While there was a slight delay in the start of the session for the new BSMS batch, the delay was shorter than in the last few years (which were affected due to COVID). With a suitably tuned academic calendar we enabled these students to complete the academic year 2023-24 on time. The Academic year completed smoothly, and all students had a proper winter and summer break. All classes were regular, and no online classes were held.

The Senate of IISER Mohali has adopted guidelines pertaining to ethics in research and teaching. These guidelines cover many aspects of interactions in the institute and highlight the fact that ethical behaviour is expected from everyone, and coercion, bullying and harassment have no place in the institute. A committee to address violations of these guidelines has also been recommended by the Senate and was approved.

As a practice of previous years, we continued efforts to incorporate additional aspects of NEP-2020 in the academic programs at IISER Mohali, the institute has working on uploading the data on the academic bank of credits. The Senate recommended the exit option after 3 years and also after 4 years to BSMS students to the BoG. The BoG approved the both the exit option after 3 years and after 4 years to BSMS students. As a practice of previous years, students are allowed to take some courses on the NPTEL-SWAYAM platform. With this as well as permission to take additional courses by students who are performing well, we continued to enable several students to work for MS thesis in any institution in the world.

As a general practice, the BS-MS program offered at IISERs is intended to be highly interdisciplinary and students are encouraged to get involved with research projects and internships at an early stage. As a practice, IISER Mohali has now made at least one summer internship mandatory for the BSMS students. This internship is a zero-credit requirement for graduation and should be of at least eight weeks duration.

With deliberations in the Senate, the institute has revised the course structure in the BS-MS program in order to incorporate experience from the last fifteen years. The Senate IISER Mohali has approved the offering of major in the Earth and Environmental Sciences. The Senate IISER Mohali has approved the offering of premajors to BSMS students in the 2nd year. A BSMS student now can choose any two subjects out of PHY, CHM, MTH, EES, BIO as premajor subjects in his 2nd year and then move on to choose one subject to do his major (out of the two subjects he/she chosen during the premajor year). The new course structure has been implemented starting with the new batch joined in August 2023. The Senate IISER Mohali approved the mode of conducting the supplementary exams for students to clear the pending grades during summer.



13 INSTITUTE LIBRARY

INSTITUTE LIBRARY

Situated in the Informatics Centre, IISER Mohali Library epitomizes the spirit of the institute, i.e., the pursuit of knowledge. The library is a space for creative and innovative exchange of scholarly information and also a place for peaceful learning and collective voice reading. The library houses electronic and print versions of books (general, text, and reference books), e-journals, and databases from various fields of study, namely, Mathematics, Physics, Chemistry, Biology, Computer Science, Earth/Environmental Sciences, and Humanities and Social Sciences. The library provides unfailing access to essential and specialized library resources that aid teaching, learning, and research activities. In tune with the recent advancement in the field of Information and Communication Technology (ICT), IISER Mohali has set up a library with state-of-the-art technology and world-class infrastructure. The library space of IISER Mohali is applauded not only for its aesthetic ambiance but also for its astonishing infrastructure. This exemplary building implements the theme “Learning Commons” with the mission to provide effective, informal, and efficient use of the library resources. The user-friendly space of the library helps the users to be creative and collaborative with their peers, and such an atmosphere inspires students to be industrious and efficacious. IISER Mohali is proud to introduce the first library in India to implement the theme, “Learning Commons.”

MISSION:

The library's mission is to provide access to rich, relevant, and high-quality resources in all available formats to the IISERM community. In doing so, the library aligns itself with the teaching, learning, and research missions of the institute, which is committed to excellence and innovation.

Library Timings: The Library works all 365 days except for 3 National holidays and 4 Gazetted holidays.

Monday - Saturday:

Reference: 9.00 am - 6.00 am

Circulation (Check-In and Check-Out): 9.00 AM - 8.00 PM (Opens during LUNCH & DINNER)

Sunday:

Reference: 10.00 am - 6.00 pm on normal Sundays (No Circulation – Only Reference) and 10.00 AM to 6.00 AM before and during exams. Closes during LUNCH i.e 1.00 PM – 2.00 PM

LIBRARY FACILITIES:

The inclusion of the Learning Commons theme as a vital element in the present library design offers an opportunity to transform the library's role on campus from a provider of information to a facilitator of learning. The new library space is now commonly repurposed to bring students together to work, study, and socialize. The Learning Commons throws open an arena of new learning practices to aid education and research: comfortable furniture for both individual and group study, modular furnishings that allow users to customize their learning ambiance to suit their needs, access to wireless networks and electrical outlets, multimedia labs, etc.

Under this Learning Commons concept, IISER Mohali provides the following facilities in the library:

- **Discussion Room (s):** Provides space for faculty to have discussion with his/her research group. Spaces are equipped with required infrastructure and multimedia accessories for making presentations. However, one needs to reserve the space in advance.
- **Group Study Room(s):** Provides space for students to carry out group study, voice reading and discussions with their research / academic peers. Spaces are equipped with required infrastructure and multimedia accessories for presentation purpose.
- **Seminar Rehearsal Room (s):** Before facing the actual seminar delivery, the students can make use of this room to rehearse their presentations in the presence of their supervisor/ instructor/research team. This helps in boosting up the students' confidence level. The room is equipped with multi interactive functionalities such as interactive/smart boards. An advance booking of the room is appreciated.
- **Smart /Interactive Room (s):** A space for readers to exchange academic and research dialogues with other group/institute/university through online interview/interactions. One needs to reserve the space in advance.
- **Podcast Room:** A Space for recordings of audio and video talks of faculty and students.
- **Lecture Recording Room:** Space for recording of Lectures by faculty and students.

- **Audio-Visual Zone:** A space for e-learning through installed documentary film on science and technology. The readers need to bring their headsets to use these resources
- **Research Scholar's Zones:** Study carrels with electrical outlets and Wi-Fi for research scholars
- **Knowledge Exchange:** A place where one can leave unsolved subject related questions. This gives an opportunity for others to exchange their knowledge by attempting to provide potential answers to the question.
- **Thought Provoking:** An opportunity to have offline debate on current affairs. This is an area where one can start a debate by leaving a topic. Other users can express their written opinion/views on the topic.
- **Sky Library:** A space on top of the building replete with pleasure reading materials (mostly fiction). One can enjoy reading in the presence of natural light with the panoramic view of the city at its backdrop.
- **Institute Publications Zone:** As soon as any research paper or book is published by faculty/students of IISER Mohali, it will be displayed in this zone. One can have a look at the full text of these documents.
- **Latest News on LED Screens:** Flashing news on the latest publications of IISER Mohali, regular scientific news, institute events with photographs, new arrivals with the book image etc.
- **Information Kiosks:** Online library catalogue with touch screen and multimedia effects
- **Digital Zone:** Computers with network in all floors for accessing digital content, i.e, e-journals and database
- **Faculty Corner, Student Corner, Alumni Corner:** The achievements, posters, projects, awards etc. of faculty/ students/ alumni of IISER Mohali will be displayed. Floor maps are available at the entrance of every floor
- **Walk-Through Institute:** Space for display of posters on Projects going on in the Institute from each department. One can view the general, academic, and research oriented activities of IISER Mohali in a single frame.
- **Showcasing Research:** Space for display of research output of Institutes in the form of Scientometrics- Projection of Institute Research, Publications, h-index, subjectwise & departments wise contribution, National & International Collaboration, h-index of prolific authors of Institute and many more.
- **Institute Awards:** Space for display of Awards received by IISER Mohali.
- **Journey of IISER Mohali:** Depiction of Institute's Journey from 2006 (Foundation Ceremony) till date by portraying important events of Institute in the form of photographs, Videos etc.
- **Faculty Corner:** Space for display of faculty Profile- Their achievements, posters, projects, etc from each department and also Awards/ honours received by Researchers and faculty members of Institute.
- **Student's Corner:** Space for display of students profile/ Photos for those who have achieved Academic excellence, Awards or Sports activities etc.
- **Alumni Corner:** Space for Alumni to display photos of students who made achievements/ brought laurels to the Institute.
- **Institute News:** Space for display of News Clipping of Institute ie. Institute wise, Under-Graduates, Post-Graduates, Researchers, Faculty wise etc.,
- **Wi-Fi Space:** Wi-Fi is available in all eight floors of the Informatics Building (library) for seamless access to e-resources of library
- **Cafe:** A space for relaxing and socializing with Coffee/Tea/drinks
- **Centralized Air-Conditioning:** Centralized AC is available in all floors of the library

LIBRARY SERVICES:

All housekeeping activities of the library, viz., cataloguing, circulation, renewal, reservation, Over Dues, etc. have been computerized and bar-coded using the library management software "Koha." The users can browse, retrieve, and cart the received information regarding books housed in the library. Information regarding the number of copies available, the shelf location of a book, virtual shelving with the image of the book, and link to the full text of books etc. are also available on the online catalogue. The profile of the borrower, borrowing capacity, borrowing history, due date of issued books, over dues, overdue amount etc. can be viewed on the online catalogue after the member logs in to his/her account.

The library creates and maintains the Repository of thesis, Dissertations, Institute articles, Institute Publications, Institute event images, News clipping and films published by IISER Mohali as well as published on IISER Mohali by using Open source digital Software 'Dspace'.

The online catalogue (Web OPAC) services and resources of the library can be accessed through the library website. <http://www.library.iisermohali.ac.in>. It is library webpage or a hub of information services like Online catalogue (Web OPAC) of Print books, e-books, e-Journals, On-line Full text Databases, Online Bibliographic Service, Abstracting Databases, e-mail Alert Service, Current Awareness service, Document Delivery Service, Inter-Library Loan facility DELNET Services, Photocopying facilities, Reference Service, New Paper Clipping, Personalized services, S&T News Services, Institutional Repository and so on.

LIBRARY RESOURCES:

Being IISER Mohali is one of the core members of e-Shodhsindhu (MOE Project) and IISER Library Consortium, it has seamless access to thousands of renowned electronic journals in the field of basic and applied sciences. (Paid by e-Shodhsindhu) such as

APS, AIP, Annual Reviews, EPW, JSTOR, MathScinet, DrillBIT anti-plagiarism software, OUP, Project MUSE, SIAM, Springer Nature and many more.

- **E-Journals:** Library subscribed the following e-resources (Journals Packages) through various Consortia with maximum discounted prices. Some of the Online full text journals / databases available under the period report are Science On-line, American Chemical Society (ACS - Web Edition), American Physical Society (APS), American Institute of Physics (AIP), American Mathematical Sciences (AMS), American Meteorological Society, American Society for Cell Biology (ASCB), American Society for Microbiology (ASM), American Society for Biochemistry and Molecular Biology (ASBMB), American Society of Hematology (ASH), American Society of Plant Biologists (ASPB), Canadian Science Publishing (NRC), Cell Press, Chemical Society of Japan, Cold Spring Harbor Press, Company of Biologists, Elsevier's ScienceDirect, Cell Press, Institute of Physics (IoP), Journal of Visualized Experiments (JoVE) Unlimited Package of Journals, National Academy of Sciences, Nature Publishing Group, Oxford University Press, Project Euclid Prime, Rockefeller University Press, Royal Society London, Royal Society of Chemistry (RSC), Society of Neuroscience, Thieme Medical Publishers (IISER C), The Royal Soc. Publishing, Taylor & Francis, Wiley, World Scientific etc. It also added new subscription to some of the journals from American Economic Association, SEG Millennium + Archive from GeoScience World, Chicago University Press etc.
- **e- Books:** Springer Lecture Notes Series Maths & Physics series from Vol.1 to 2022, Cambridge University Press, AMS Memories, Current Developments in Mathematics book series from 1995 to 2020 and World e-Book library and South Asian Archives through NDLI
- **Bibliographical, Abstracts Databases and Citation Databases:** Math Sci Net, Sci Finder Scholar and Scopus, J-STORE, Project MUSE, Project Euclid etc.,
- **Research & Writing Tools:** Academic Writing Tools such as Grammarly, Overleaf, Library App MyLOFT (Remote Access Tool), anti-plagiarism software DrillBIT, Press Readers, Edzter-Online News Papers, Magazines database.

During the period 2022-23, the library added the subscription to IndiaStat.com and CMIE's Consumer Pyramids Household Survey DX databases for 2024 and library has taken LIFETIME Subscription to print versions of CURRENT SCIENCE Journal.

• **As Nodal Centre of Institute, the Library attended the following MOE Projects:**

1. Shodhganga
2. Indian Research Information Network System (IRINS)
3. National Digital Library of India (NDLI)
4. e-Shodhsindhu
5. National Institutional Ranking Framework: Provides Publications data, citation etc to the Institute Coordinator of NIRF

• **Institutional Archives and Walkthrough Institute**

- **The Institutional Repository** of IISER Mohali is in the public domain from 14th Feb 22 through the following URL <http://210.212.36.82:8080/jspui/>
- **Annual Report of IISER Mohali:** The Library collects, compiles, edits, and organizes the Publications of the Institute for Annual Report.

Open Access Publishing Initiative: In order to initiate and promote Open Access Publishing, the Library, IISER Mohali entered 'Read & Publish' agreement with various Publishers. It negotiated for either Discounted or free Article Processing Charges (APC) through 'IISER Library Consortium' to publish in Hybrid or Open Access Journals by authors of IISER Mohali in 2023. As negotiated by IISER Library Consortium,

1. **American Association for the Advancement of Science (AAAS):** Science Advances: The publisher offers a special discount of 15% on APC for publishing articles in the Science Advances (Gold OA Journal) for the corresponding authors from IISER Mohali
2. **Company of Biologists (CoB):** Upon subscription to the following three Journals, without any additional payment, the IISER Mohali will get the free unlimited article token to APC (Article Processing Charges) for publishing the article in OPEN ACCESS in the following three Hybrid Journals under CC BY Version 4.0 terms (see Creative Commons CC-BY Terms version 4.0 at <https://creativecommons.org/licenses/by/4.0/>).
 - 1) Development
 - 2) Journal of Cell Science (JCS)
 - 3) Journal of Experimental Biology (JEB).

However, the IISER Mohali author should be the corresponding author, and also the official email of the author (IISER Mohali email) has to be used while communicating with the publisher. The publisher also offers an APC fee waiver for India for the following gold open-access journals of CoB.

1. **Biology Open**
2. **Disease Models and Mechanisms.**



3. **Geological Society of America (GSA) –Geology:** The publisher offers two free Gold Open Access vouchers for corresponding authors from IISERs for publishing articles in Geology Journal on a first-come-first-serve basis.
3. **Rockefeller University Press:** Renewal cost of 3 titles package includes unlimited papers publishing in Open Access with no additional cost.

THE BEST LIBRARY USER AWARD 2022 – 23 : The Library has conceived the idea of giving the Best User of the Library award and initiated the process to identify a student who has a good track record - the highest user of the library with no adverse record of his behavior either with library users and staff, etc . Accordingly, **Mr. Prakhar Mathur (MS20034)** was the winner of this Award for 2022-23. This award was conferred to **Mr. Prakhar Mathur (MS20034)g** by Chief Guest of Institute Foundation Day on 27th Sept. 2023 with **“THE BEST USER of LIBRARY (2022-23) AWARD”**.



THE BEST USER of LIBRARY (2022-23) Award received by Prakhar Mathur on 27/9/2023

However as Mr Shreyas Jain (MS20098) secured his position above Mr Prakhar Mathur's position. But since Mr Shreyas was already awarded in 2022 for 2021-22, the Committee felt that some recognition should be showered on him certificate in the form of "Appreciation".

THE BEST USER of LIBRARY Award received second time by Shreyas Jain on 27/9/2023

OUTREACH PROGRAMMES:

One-day outreach program focusing on "INFLIBNET Services and ORCID for Scholarly Communities." This program aims to empower Faculty, Researchers, Scientists, and Scholars with valuable insights and knowledge about the services offered by INFLIBNET (Information and Library Network) and the importance of ORCID (Open Researcher and Contributor ID) in the scholarly community. The event was held on 7/11/2023 LH-7 (Auditorium) IISER Mohali



The event was inaugurated by Chief Guest Prof. Gowrishankar, Director IISER Mohali, at 10.00 AM. Mr. Pallab Pradhan, Scientist-C(LS), and Mr Hiteshkumar Solanki, Scientist-C(CS), were resource persons for the program from the INFLIBNET Centre, around 100+ participants from Punjab, Haryana, and Chandigarh.

The library organized training programs for its users every year after the renewal of their subscription to e-Resources.

A. User Orientation Programme:

1. Held library Orientation programs for Int & Ph.D. students in the Library Committee Room.
2. Held library Orientation programs for MS23 batch students in the Lecture Hall Complex
3. Annual Workshop & hands-on training on the GRAMMRLY Writing Tool
4. Annual Workshop & hands-on training on the WRITEFUL Writing Tool
5. Annual workshop & hands-on training on MyLOFT
6. Webinar on -Preprints: A new way to publish your research results
7. MyLOFT user onboarding and training session
8. Training on SciFinder
9. Hands -on training on Plagiarism checking tool "DrillBit"

Professional Development Programme / Capacity Building of Staff: The following training were conducted for Library professional Staff:

- Three days hands-on training programmes was conducted on Library Management Software "Koha" and Digital Library Management Software "DSpace" 26th to 28th July 2023
- Training and on boarding session was conducted on MyLOFT Admin and User Modules
- Training session was conducted on GRAMMRLY Writing Tool
- Training programme was conducted on DrillBit - similarity checking tool
- Training Programme was conducted on IRINS



View of different Library Floors at night



14 COMPUTER CENTER



COMPUTER CENTER

The computer center oversees several services such as network, Computer Laboratory, High-end computing, ERP, Moodle, and Email services. Any related support services for these are provided to the community through online ticketing system. There are three computer labs dedicated primarily to teaching. Of these, two also serve as a general computer lab for students, and the third is a center for NKN-related activities, which, for instance, can host inter-institute courses. During semesters of the academic year 2023-24, the computer labs were used to teach various courses. The computer labs were kept open for students and faculty to print and other services.

The computer center manages the campus-wide WiFi network and connectivity to the Wide Area Network ('Internet') and provides seamless connectivity within the institute intranet. We have two concurrent 1Gbps network connections from BSNL and NKN to cater to internet requirements. The computer center continues to support ERP-related services, regular updates on the Institution's website, and management of Moodle services for teachings. The email facility is provided through Google Workspace, and there is a single sign-on for multiple other services such as Moodle and CC-ticket. The computer center provided necessary logistics and network support for the 13th convocation. The event was a Live webcast and made available through the official YouTube channel.



15 NIRF RANKING



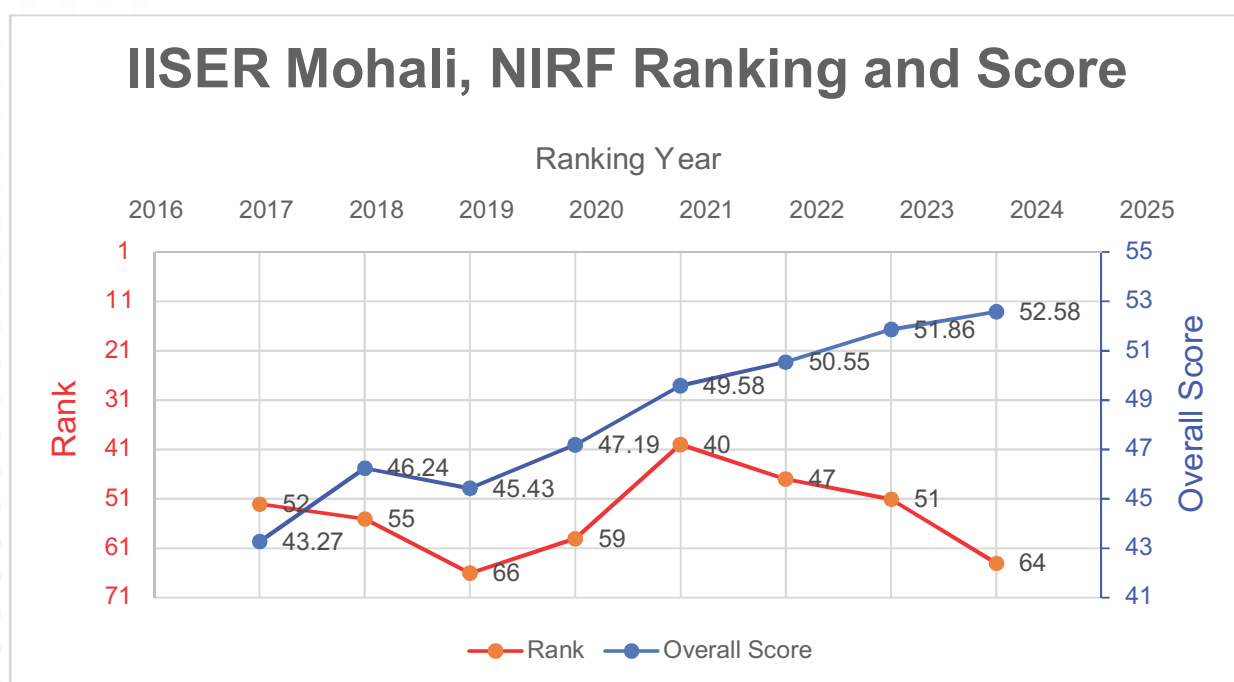
NIRF RANKING

National Institutional Ranking Framework (NIRF) rank

In 2024, IISER Mohali participated in the Overall as well as in the Research category of NIRF. The institute was ranked 64 in the Overall category of the National Institutional Ranking Framework and ranked 49 in the Research category. The results were announced online on August 12, 2024. The ranking required the submission of an enormous amount of data that related to the faculty and student strength, expenditures on infrastructure, equipment, and library and various other operational expenditures, external funding received, placement of students, and fellowship drawn by students. The collation of the data from the different sections of the institute and its submission to the NIRF was done by Dr. Satyajit Jena, the Nodal Officer in consultation with the Director, Heads of the Departments, and the Deans of the institute.

The assessment process of ranking is heterogeneous for different categories and considers different time frames for which we had to submit our data. For student strength, the data required was for the period of 1st April 2022 to 31st March 2023, whereas for the publication details, external funding, and financial resource utilization, the time frame was for the previous three years.

The NIRF ranks are the outcome of the National Ranking system established by the Ministry of Human Resource Development (MHRD) in September 2015. In 2016, during the first rounds of ranking, IISER Mohali was ranked 43rd amongst institutes in the engineering category, along with other institutes such as IISc, IITs, NITs, IISERs, and other Engineering Universities/Institutes/Colleges in the country. In 2017, IISER Mohali was considered under the overall category, which included all Universities/Institutes/Colleges and was ranked 52nd. In 2018, IISER Mohali was ranked 55th in the overall category, in 2019 IISER Mohali was ranked 66th in the overall category, in 2020 IISER Mohali was ranked 59th in the overall category, in 2021 IISER Mohali was ranked 40th in the overall category, in 2022 IISER Mohali was ranked 47th in the overall category, in 2023 IISER Mohali was ranked 51st in the overall category, and 2024 IISER Mohali was ranked 64th in the overall category and 49th in the research category.



16 TECHNOLOGY BUSINESS INCUBATOR

i-RISE

RAISING INNOVATIVE & SUSTAINABLE ENTERPRISES
TECHNOLOGY BUSINESS INCUBATOR-IISER MOHALI
SUPPORTED BY: NOTED DIVISION - DEPARTMENT OF SCIENCE & TECHNOLOGY
GOVT. OF INDIA

प्रौद्योगिकी व्यवसाय इन्क्यूबेटर - भारतीय विज्ञान शिक्षा और अनुसंधान संस्थान, मोहाली
राष्ट्रीय विज्ञान और प्रौद्योगिकी राजमित्र विकास बोर्ड, विज्ञान और प्रौद्योगिकी विभाग
भारत सरकार द्वारा समर्थित

TECHNOLOGY BUSINESS INCUBATOR

i-RISE Technology Business Incubator was founded in 2018 to encourage innovation and entrepreneurship in the field of science and technology with the support of the Department of Science and Technology and IISER Mohali.

i-RISE, with a 10,000 sq ft facility dedicated to office and lab space, houses 36 lab equipment valued at Rs 1.9 Cr. The infrastructure includes 11 dedicated office spaces and 12 co-working stations for incubated start-ups, along with activity, seminar, and conference room. TBI IISER Mohali received a corpus of three crores from **DPIIT** under the **Startup India Seed Fund Scheme**. i-RISE has supported **six startups with funding support of up to 1.2 crore**.

Key Initiatives of i-RISE

The **IISER Start-up Incubation Program** has supported over **40 start-ups** in the past three years, with 16 currently incubated across various sectors like Agritech, Food Tech, Biotech, Nanotech, Healthtech, Logistics Mobility, Waste Management, and IT/IoT/AI. i-RISE has an annual newsletter **Innobytes** keeps the community informed about TBI activities and initiatives.

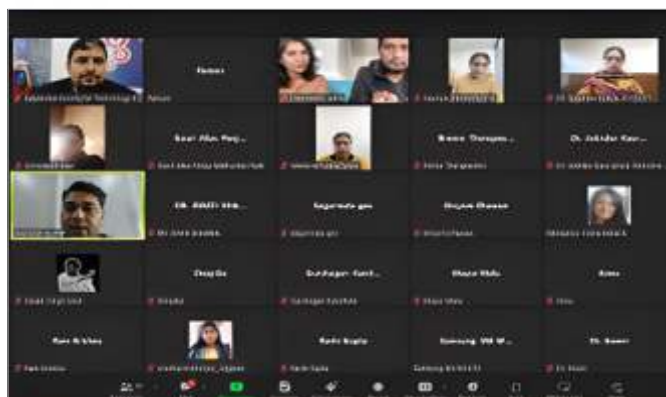
i-RISE also hosts the **Open Knowledge Session Series** in collaboration with partners such as Punjab State Council for Science and Technology, Innovation Mission Punjab, Chandigarh Angels Network, TiE Chandigarh, WeFounder Circle, and Rotary Club Chandigarh. **Seven sessions have been conducted this year**.



TBI IISER Mohali conducted an **Ideaphied 2.0 event to foster** innovation-led entrepreneurship and business planning among researchers and students. 100 plus teams applied for Idea-phied 2.0. 80 plus teams got shortlisted for a three-day mentoring workshop. 35 finalists pitched their innovative ideas to the jury. The winners in different categories received cash along with incubation support.



i-RISE conducted a Tech Startup Mentoring Workshop under the SHE 2.0 Program in association with the Punjab State Council for Science and Technology, which focuses on women entrepreneurs. A two-week extensive mentoring program was conducted featuring 24 mentoring sessions and 30 plus mentors and industry experts. This was followed by a pitch day in March 2024, providing incubation and funding support to 20 women-led tech startups.



i-RISE's incubated startup achievements include filing **12 patents with 9 patents** granted to start-ups such as Advanced Research Material and Solutions (Founder: Dr. Sanjeev Bhardwaj), Breww Therapeutics Pvt Ltd (Founder: Dr. Sudip Ghosh), and JV Scan Pvt Ltd (Founder: Dr. Maheish Hukmani). **Eighteen incubated start-ups** have received project support grants under various government schemes like BIRAC BIG, RVKY RAFTAAR. With Rs 4.2 Cr, the total Cumulative Funding of TBI Incubates by different funding agencies.



Incubated Start-ups had opportunities for networking and showcasing at events like Startup Synergy in Ludhiana, Life Sciences Startup Meet in Chandigarh, The Bhartpreneurs Conference and Exhibition Event in New Delhi, Samridhi Conclave by IIT Ropar, BIRAC Biotech Startups Expo in Jammu & Kashmir, TiE CON Chandigarh 2024, Startup Samagam 2024 in Ludhiana and **Startup Mahakumbha by DPIIT. Breww Therapeutics Pvt Ltd- Got selected among 1500+ startups to interact with the Prime Minister of India at Startup Mahakumbha 2024**



TBI IISER Mohali's Partnerships and collaborations have been formalized through MoUs with **Innovation Mission Punjab, i-HUB AwaDH IIT Ropar, Sri Guru Govind College, Chandigarh, Post Graduate Government College for Girls, Sector-11 Chandigarh.**



These extensive activities and achievements highlight i-RISE's commitment to fostering innovation, supporting start-ups, and contributing to the entrepreneurial ecosystem, by providing a robust infrastructure, diverse programs, and numerous networking opportunities. i-RISE continues to empower start-ups, drive technological advancements, and facilitate economic growth. As i-RISE moves forward, it remains dedicated to nurturing the next generation of entrepreneurs and innovators, ensuring sustainable development and prosperity.

i-RISE Team

Prof. J. Gowrishankar, Director IISER Mohali & Chairman TBI- IISER Mohali

Executive Board Members

Mr. Satyendra S. Choudhary CEO, TBI-IISER Mohali

Prof. Jagdeep Singh Registrar, IISER Mohali

Dr. Sharvan Sehrawat Faculty, Biological Sciences, IISER Mohali

Dr.R. Vijaya Anand Dean R & D, Faculty, Biological Sciences, IISER Mohali

Prof. Amit Kulshrestha Faculty, Mathematical Sciences, IISER Mohali

Prof. Kamal Priya Singh Faculty, Physical Sciences, IISER Mohali

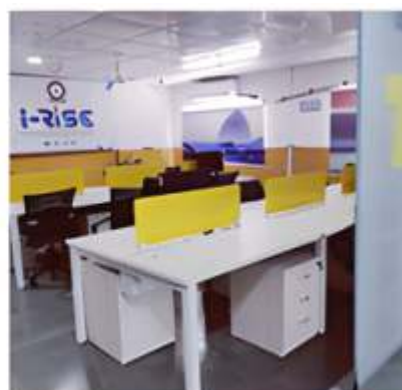
Dr. Sunil Patil Faculty, Earth and Environmental Sciences, IISER Mohali

Operational Team Members

Mr. Satyendra S. Choudhary- CEO

Ms. Anshika Bansal- Manager

Current Infrastructure at the TBI-



17 LECTURES BY VISITORS



LECTURES BY VISITORS

Public Lectures

1. 11 Dec 2023 - 10:30AM: Live Webcast of Hon'ble Prime Minister's Address on Viksit Bharat @ 2047
2. 28 Sep 2023 - 09:00AM: Molecularly Designed Functional Materials 2023
3. 27 Sep 2023 - 04:00PM: Foundation Day Lecture - Ethics and Academic Integrity, Professor Uday Maitra, IISc, Bangalore
4. 27 Sep 2023 - 08:30AM: Foundation Day 2023
5. 26 Sep 2023 - 06:30PM: Drug Design - Is it really that easy? Prof. Uday Maitra (IISc Bangalore)
6. 02 Sep 2023 - 08:00PM: Orbital Engineering: Cyclopropenium cation to A Unified Structural chemistry of Boron, Prof. E. D. Jemmis, (IISc, Bangalore)
7. 01 Sep 2023 - 03:00PM: RSC India Activities and Membership Benefits, Dr. Rajdip Roy
8. 30 Aug 2023 - 03:00PM: Minimal models of synthetic cells, Prof Nicolas Martin Centre de Recherche Paul Pascal
9. 07 Aug 2023 - 02:00PM: Rheology and Dynamics of Red Blood Cells through Probing Force, responses at Micro and Nano Scales, Dr. Chetna Devarakonda
10. 02 Aug 2023 - 03:00PM: PTR-TOF: Real Time Analysis of Volatile and Condensed Organics Dr. Tobias Reinecke; R&D Scientist, Ionicon Analytik GmbH
11. 19 Apr 2023 - 10:00AM: "Quantum Materials by Computation: Challenges & Opportunities", Prof. Tanusri Saha-Dasgupta, Director, S. N. Bose National Centre for Basic Sciences, Kolkata, India

Institute Colloquia Conference/Workshop 2023:

1. Quantum Science in Visible Range: Prof. Yogesh K Vijay, IAPT and IIS University, Jaipur
2. 03 Jul 2023 - 09:00AM: Vigyan Pratibha Workshop, Vigyan Pratibha (VP) Teachers' Workshop IISER Mohali (July 3 - 7, 2023)
3. 26 Jun 2023 - 09:00AM: DBT-BIC Workshop on R for Biologists, Organizing committee: Dr. Kuljeet Sandhu, IISER-Mohali, Dr. Shashi B Pandit, IISER-Mohali Conference Page

Institute Seminars

1. 28 Mar 2024 - 04:00PM: Holistic Analysis of Lake Ecosystems: Integrating Heavy Metal Analysis, Paleoclimatology and Geochemistry, Dr. Pranaya Diwate
2. 28 Mar 2024 - 04:00PM: Big Universe of Small Neutrinos, Deepika Jena (Fermilab)
3. 28 Mar 2024 - 12:00PM: From Molecular Core to Star and Planet Formations, and Our Astrochemical Origin Dipen Sahu (PRL Ahmedabad)
4. 27 Mar 2024 - 05:00PM: The emerging interface of mass spectrometry with molecular and supramolecular materials, Dr. Papri Chakraborty (Faculty Candidate), Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany
5. 27 Mar 2024 - 04:00PM: Hunting for Beyond the Standard Model Higgs at the CMS experiment Pallabi Das (Princeton University),
6. 27 Mar 2024 - 12:00PM: Catalytic Transformations at the Interface of Chemistry and Energy, Dr. Akash Kaithal (Faculty Candidate), Cl Green Chemicals AG, Berlin
7. 27 Mar 2024 - 12:00PM: Aspects of spin hydrodynamics of strongly interacting plasma produced in heavy-ion collisions, Arpan Das (BITS Pilani)
8. 27 Mar 2024 - 11:00AM: Primordial differentiation to modern continents: Isotopic record of Earth's chemical evolution through time, Dr. Nikitha Susan Saji
9. 26 Mar 2024 - 04:00PM: Exploring the non-equilibrium and non-Hermitian topology beyond the static Hermitian limit,

Tanay Nag (BITS Pilani)

10. 26 Mar 2024 - 04:00PM: Electron backscattered diffraction and rock deformation, Dr. Dripta Dutta
11. 26 Mar 2024 - 12:00PM: Hydrodynamic transport with broken translation invariance, Ashish Shukla (Ecole Polytechnique, France)
12. 26 Mar 2024 - 10:00AM: Emergent properties in quantum materials: Inverse Faraday effect and orbital magnetization, Saikat Banerjee (Rutgers University)
13. 26 Mar 2024 - 09:00AM: Emerging Trends in Photodynamics and Photochemistry, ETPP-2024 Weblink to the conference
14. 22 Mar 2024 - 05:00PM: Twists and turns around the path of my research in the field of catalysis, Dr. Raj Kumar Tak (Faculty Candidate), University of St. Andrews, Scotland, UK
15. 22 Mar 2024 - 04:00PM: Development of Renewable and sustainable biorefineries utilizing waste feedstocks: Life Cycle Analysis and techno-economic Assessment, Dr. Geetanjali Yadav
16. 22 Mar 2024 - 04:00PM: Novel role of Endothelial cell protein C receptor (EPCR) and Grb2 associated binder 2 (Gab2) in the bleeding and thrombotic disorders: Implications for Therapy, Dr. Jhansi Lakshmi Magisetty, Postdoctoral Researcher, University of Texas Health Science Center, USA. Current position: Ramanujan Fellow at ICMR-National Institute of Nutrition, Hyderabad
17. 22 Mar 2024 - 04:00PM: Frictional Granular Matter: Protocol Dependence of Mechanical Properties, Chandana Mondal (UGC-DAE Consortium for Scientific Research, Indore)
18. 22 Mar 2024 - 12:00PM: Stimuli-induced transformations in confined systems, Dr. Hema Kuntrapakam (Faculty Candidate), City University of New York, USA
19. 22 Mar 2024 - 12:00PM: Inferring dense matter equation of state through neutron star observational insights Tuhin Malik (University of Coimbra)
20. 21 Mar 2024 - 10:00PM: Design principles of epidermal morphogenesis, Dr. Nitya Ramkumar, Senior Research Associate, Duke University Medical Center, USA
21. 21 Mar 2024 - 05:00PM: Exploring the Dark Sector: in the Lab, in the Sky, Anirban Das (Seoul National University)
22. 21 Mar 2024 - 04:00PM: Exploring Earthquake Rupture Dynamics, Ground Shaking, and Variability, Dr. Jagdish Vyas
23. 21 Mar 2024 - 12:00PM: Examining primordial correlations, Debika Chowdhury (IISc Bengaluru)
24. 20 Mar 2024 - 05:00PM: Engineering Membrane Division: A Short-Cut Strategy, Dr. Rikhia Ghosh (Faculty Candidate), Icahn School of Medicine Mount Sinai, New York, USA
25. 20 Mar 2024 - 04:00PM: What is the simplest massive quantum field theory? Subramanya Hegde (IMSc Chennai)
26. 20 Mar 2024 - 04:00PM: Development of cost-effective and sustainable treatment technologies for safe disposal and reuse of wastewater and polluted stormwater, Dr. Rajneesh Singh
27. 20 Mar 2024 - 12:00PM: Towards Machine Learning Plasmon Driven Photocatalysis and Spectroscopy, Dr. Sajal Kumar Giri (Faculty Candidate), Northwestern University, USA
28. 20 Mar 2024 - 12:00PM: Charge effects on phase interfaces, Arghya Majee (Max Planck Institute for the Physics of Complex Systems, Dresden, Germany)
29. 9 Mar 2024 - 05:00PM: Hamiltonian techniques for asymptotic symmetries, Sucheta Majumdar (Centre de physique théorique, Marseille)
30. Mar 2024 - 04:00PM: Weather extremes across the Indian region: Understanding, Forecasting, and Climatic Patterns, Dr. Rohit Chakraborty
31. Mar 2024 - 12:00PM: Precision measurement of the W-boson mass and operation of the CMS silicon tracker, Suvanker Roy Chowdhury (INFN, Sezione di Pisa)
32. Mar 2024 - 10:00AM: Structural basis of the inhibition of cytoplasmic DNA sensor cGAS by KSHV tegument protein KicGAS, Dr. Debipreeti Bhowmik, Assistant Academic Research Scientist, Emory University, USA
33. 18 Mar 2024 - 06:15PM: Knocking at the interface: Why you should not listen to people sometimes
34. Prof. Somdatta Sinha
35. Dec 2023 - 09:30AM: Totally positive matrices and Pólya frequency sequences
36. Professor Apoorva Khare Indian Institute of Sciences, Bengaluru. Poster
37. 20 Dec 2023 - 11:00AM: INQUA in India: Some reminiscences and some anticipations, Prof. A. K. Singhvi
38. 19 Dec 2023 - 11:20AM: Controlling quantum dynamics through electronic entanglement in molecules pumped by ultrashort optical pulses, Professor Dr. Françoise Remacle (University of Liège, Belgium)

39. 18 Dec 2023 - 03:00PM: Inter IISER Cultural Meet, Event Schedule
40. 15 Dec 2023 - 02:30PM: Prevention, prohibition, and redressal of sexual harassment of women employees and students in higher educational institutions., Prof.(Dr): Rajesh Gill, an Advocate.
41. 11 Dec 2023 - 11:30AM: Bhartiya Bhasha Utsav 2023, The institute will organize a day-long programmes focussing on multilingualism to mark the culmination of Bhartiya Bhasha Utsav 2023
42. 09 Dec 2023 - 09:00AM: XIV Fluorescence meeting, Click here for Conference Website
43. 06 Dec 2023 - 05:00PM: Revitalization Movements in Prehistory: Introducing self determined cultural change among two Native American groups, Prof. Bruce Bradley
44. 06 Dec 2023 - 11:00AM: Smart worms: Decision-making in *C. elegans*, Dr. Jagan Srinivasan, Department of Biology and Biotechnology, Worcester Polytechnic Institute, USA
45. 05 Dec 2023 - 04:00PM: Noise-adapted Quantum Error Correction and Fault Tolerance, Dr. Prabha Mandayam, Department of Physics, IIT Madras
46. 30 Nov 2023 - 12:00PM: Extremely magnified stars in cluster lenses, Ashish Kumar Meena (Ben Gurion University, Israel)
47. Nov 2023 - 03:30PM: AWARENESS / SENIORIZING PROGRAMME FOR TEACHING & NON-TEACHING STAFF OF IISER MOHALI, "Prevention, prohibition, and redressal of sexual harassment of women employees and students in higher educational institutions" Sh. Surender Kumar, Additional District & Sessions Judge
48. 20 Nov 2023 - 04:00PM: DUKH, BHAARV, ISHQ, PRAGATI: FRANTZ FANON IN PUNJAB, 1970 Aditya Bahl is a PhD candidate, Johns Hopkins University.
49. 17 Nov 2023 - 04:30PM: FPGA based multi-Channels High speed DAQ for studying 3D Bio System. Dr. Pratap Khuntia, IISER Mohali Bio Nano Photonics Lab
50. 17 Nov 2023 - 04:00PM: "History-writing, rewriting: The Relevance of the History We Have Studied", Prof. Amar Farooqui, Professor (Retired) at the Department of History, University of Delhi.
51. 15 Nov 2023 - 05:00PM: Fundamental solutions to PDEs and inverse problems, Dr. Manmohan Vashisth (IIT Ropar)
52. 10 Nov 2023 - 05:30PM: Biological Phase Transitions: Where Chemistry and Physics Meet Biology Dr Samrat Mukopadhyay, Professor of Biology and Chemistry, Head, Department of Biological Sciences, Indian Institute of Science Education and Research, Mohali, Visiting Professor, Indian Institute of Technology, Bombay, Mumbai
53. 10 Nov 2023 - 04:00PM: Green Chemistry and Heterogeneous Catalysis for Energy and Environmental Applications, Prof. Venkata Krishnan, School of Chemical Sciences, Indian Institute of Technology Mandi
54. 10 Nov 2023 - 03:00PM: "The Relevance of Caste in Census for Labour and Social History", Sumeet Mhaskar, Professor of Sociology, Jindal School of Government and Public Policy, O. P. Jindal Global University, Sonapat, Haryana.
55. 10 Nov 2023 - 02:30PM: Insights into Roaming Radical Reactions, Prof. G Naresh Patwari, Department of Chemistry, Indian Institute of Technology Bombay, Research group website
56. 08 Nov 2023 - 04:00PM: Visualizing Fast Molecular Movies using Ultrashort Laser Pulses, Prof. Sayan Bagchi, Physical and Materials Chemistry Division, CSIR-National Chemical Laboratory, Pune, Research group website
57. 08 Nov 2023 - 11:00AM: Engineering thermostability in elongation factor EF-Tu with the lessons from its billion year old ancestors, Prof. Suparna Sanyal, Department of Cell and Molecular Biology,ppsala University, Sweden
58. 07 Nov 2023 - 05:00PM: Cosmic Rays and Star Clusters, Professor Biman Nath (Raman Research Institute, Bengaluru),
59. 07 Nov 2023 - 04:00PM: Energy-driven self-assembly of functional chemical systems, Prof Leonard Jan Prins, Department of Chemical Sciences, Università di Padova, Italy, Research group website
60. 07 Nov 2023 - 03:30PM: 2-TIPS and ordering in various active matter systems, Prof. Prabal K Maiti, Department of Physics, Indian Institute of Science, Bangalore.
61. 06 Nov 2023 - 05:00PM: Computational Modeling of a few Homogeneous and Heterogeneous, Catalytic Reactions, Prof. Swapan K Pati Theoretical Sciences Unit School of Advanced Materials (SAMat) Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bangalore
62. 06 Nov 2023 - 03:00PM: "'Conservation refugees' to partners: A brief story of India's wildlife conservation" Ambika Aiyadurai, Associate Professor, Humanities and Social Sciences, IIT Gandhinagar.
63. 03 Nov 2023 - 02:15PM: "Opportunities for higher education and research grants with France: Cefipra, CNRS and beyond!", Dr Srinivas Kaveri, Director, CNRS Office in India, Embassy of France
64. 02 Nov 2023 - 05:00PM: Probing non-classicality of macroscopic mass and field, Dr. Debarshi Das, Royal Society - Newton International Fellow & Honorary Research Fellow Department of Physics and Astronomy, University College London
65. 20 Oct 2023 - 11:00AM: Analytic primary scalar hair-charged black holes and their thermodynamics in AdS, Supragyan Priyadarshinee, NIT Rourkela. 18 Oct 2023 - 05:00PM: False head: evolution of another head in butterflies, Tarunkishwor

66. 18 Oct 2023 - 05:00PM: Asymptotic behavior of convolution integrals on homogeneous groups. Dr. Jayanta Sarkar (IISER, Kolkata)
67. 13 Oct 2023 - 03:00PM: Work extraction from thermal noise by measurements and nonlinear interactions in quantum optical setups, Dr. Avijit Misra, Dept. of Chemical and Biological Physics, The Weizmann Institute of Science, Israel.
68. 11 Oct 2023 - 03:00PM: Academic Freedom, Academic Responsibility and Academic Justice Prof. Nandini Sundar, Department of Sociology, Delhi School of Economics, University of Delhi (Nandini Sundar – Department of Sociology (du.ac.in))
69. 11 Oct 2023 - 11:00AM: Organic Photochemistry: Biomimetic Synthesis, Photosensitized Oxidation, and Mechanistic Underpinnings of Phototoxicity, Prof Alexander Greer
70. 09 Oct 2023 - 04:00PM: "Critical Caste Theory: A Debate Beyond India", Dr Suraj Yengde, Scholar at Harvard and Oxford University.
71. 06 Oct 2023 - 05:00PM: What is an argument and how to develop an argument in Academic Writing Arka Chattopadhyay is Assistant Professor, Humanities and Social Sciences at IIT Gandhinagar
72. 29 Sep 2023 - 04:00PM: 'This Land is My Land': Urban Space and Temple Politics in Late Colonial Delhi, Dr. Deepasri Baul, Andrew W. Mellon Fellow in the Humanities at the Asian University for Women in Chattogram, Bangladesh.
73. 29 Sep 2023 - 04:00PM: Engineering a platform for T cell-inspired extracellular vesicles in targeted immunotherapy for pancreatic ductal adenocarcinoma, Dr Ashwin Jainarayanan, Michael Kennedy Institute of Rheumatology, University of Oxford, UK
74. 25 Sep 2023 - 12:00PM: TBP-associated Factor 12 Doppelgangers: Defining their Specificity and Differential Control of Stress Regulated Gene Expression, M Professor K. Natarajan (JNU)
75. Sep 2023 - 03:00PM: Ferroelectric Nematic Phase and the Giant Dielectric Permittivity, Prof Jagdish K Vij, Department of Electronic and Electrical Engineering, Trinity College, The University of Dublin, Ireland
76. 15 Sep 2023 - 02:30PM: Search for Supersymmetry with a compressed mass spectrum in VBF topology using LHC Run II data collected by the CMS detector. Dr. Hajot Kaur
77. 01 Sep 2023 - 04:00PM: Divided Lives and Polluted Bodies: Casteplaining in Indian Universities, Professor N. Sukumar, Department of Political Science, University of Delhi, Abstract
78. Aug 2023 - 11:00AM: Somatic DNA aberrations in cancer: a tale of Neo-morphism and Yin/Yang, Dr Murali Dharan Bashyam, Group Leader, Laboratory of Molecular Oncology, Centre for DNA, Fingerprinting and Diagnostics (CDFD)
79. 14 Aug 2023 - 04:00PM: Stand up (comedy) and the phenomenology of teaching, Dr. Joe Varghese Yeldho, Reader-F, School of Humanities and Social Sciences, National Institute of Science Education and Research, Bhubaneswar
80. 11 Aug 2023 - 03:00PM: Interorganelle communication in plants: Chloroplast-to-nucleus retrograde signaling and cognate responses. Dr. Vivek Dogra, Biotechnology Division, CSIR-Institute of Himalayan Bioresource Technology, Palampur, India.
81. 11 Aug 2023 - 09:00AM: Art and Physical Education in School Education, Azim Premji University and IISER Mohali
82. 04 Aug 2023 - 04:00PM: Evaluating Fault-Tolerant Schemes For Noisy Hardware, Dr. Pavithran Iyer Sridharan, Senior Research Scientist, Xanadu Quantum Technologies Inc. Webpage: [Click here](#)
83. 01 Aug 2023 - 04:00PM: Modulation of TDP-43 phase transitions by α -Synuclein toward heterotypic amyloids, Prof. Vijay Rangachari, Department of Chemistry and Biochemistry, School of Mathematics and Natural Sciences, and Center for Molecular and Cellular Biosciences, University of Southern Mississippi, Hattiesburg, Mississippi, USA
84. 31 Jul 2023 - 04:00PM: Light-matter interactions in plasmonic nanostructures, Prof Parinda Vasa, Department of Physics, Indian Institute of Technology Bombay
85. 31 Jul 2023 - 04:00PM: Multi-scale characterization of a biomolecular condensate, Prof. Keren Lasker, Department of Integrative Structural and Computational Biology, The Scripps Research Institute, La Jolla, California, USA
86. 26 Jul 2023 - 04:00PM: Western disturbances and climate variability: a review of recent developments, Dr. Kieran Hunt, Department of Meteorology, University of Reading, UK
87. Jul 2023 - 04:00PM: N-Directed C-H Bond Activation in Nucleosides and a Facile Approach to Indole Derivatives, Prof Mahesh Lakshman, Department of Chemistry & Biochemistry, The City College of New York, USA
88. 21 Jul 2023 - 12:00PM: Higgs boson(s) at the current and future LHC runs, Dr. Amit Adhikari, University of Warsaw, Poland
89. 09 Jul 2023 - 02:30PM: The inaugural session of 8th International Conference on Women In Physics (ICWIP) Co-organised by IPA Gender in Physics Working Group and TIFR
90. 03 Jul 2023 - 04:00PM: Trends in Lanthanide-Based Air-Stable Molecular Magnets: Challenge and Strategy, Dr Arun

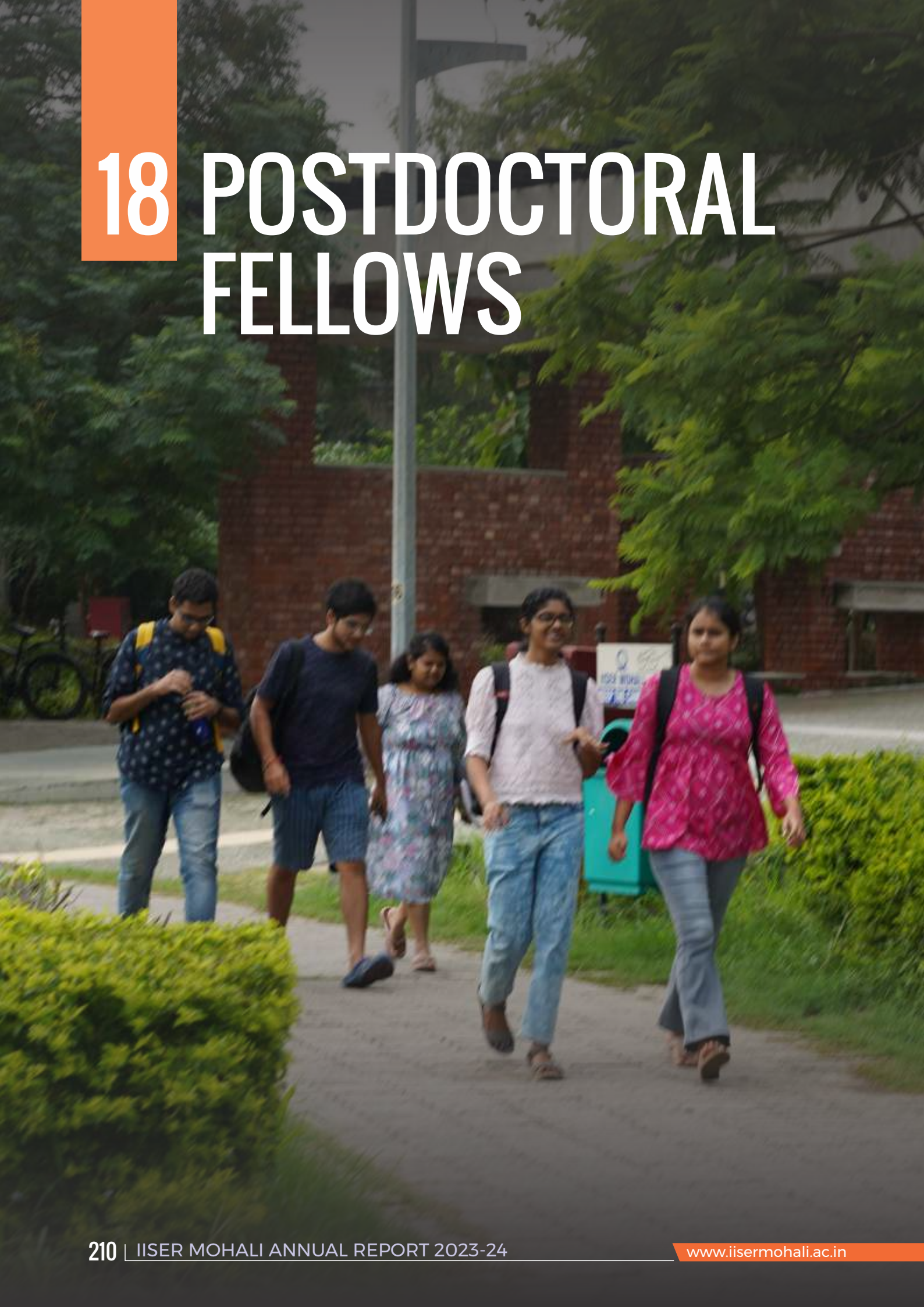
Kumar Bar, Department of Chemistry, Indian Institute of Science Education and Research Tirupati

91. 03 Jul 2023 - 11:00AM: Coordination based Metallo-Organic Assemblies: Crystals Versus Films, Dr Naveen Malik, Department of Molecular Chemistry and Materials Science, Weizmann Institute of Science, Israel
92. 13 Jun 2023 - 11:00AM: Molecular Design and synthesis of new TADF emitters for highly efficient solution-processed TADF OLEDs, Prof Sivakumar Vaidyanathan, Department of Chemistry, Indian Institute of Technology Hyderabad
93. 02 Jun 2023 - 04:00PM: Redox Mediated Synthesis of Main-Group Based Closed- and Open-Shell Compounds, Dr Anukul Jana, Tata Institute of Fundamental Research Hyderabad
94. 02 Jun 2023 - 11:30AM: Dynamical phase and quantum heat at fractional frequencies, Dr. George Thomas, QTF Centre of Excellence, Department of Applied Physics, Aalto University, Finland and VTT Technical Research Centre of Finland Ltd, Finland
95. 31 May 2023 - 04:00PM: "Thiazolo-2-pyridone molecules as an efficient Gram-Positive bactericides (GMPicides) and novel synthetic methodologies on polyols & Oxindoles" Dr. U Bhaskara Rao Vippili (Faculty Candidate), Post-Doctoral Fellow in Umeå University, Sweden.
96. 31 May 2023 - 10:00AM: Proton-Electron Synergy in Metal-Hydride Generation: Fine tuning Product Selectivity in Hostile Condition, Dr. Subal Dey (Faculty Candidate) Ex Post-Doc in Swiss Federal Institute of Technology (ETH Zurich) 8093 Zurich, Switzerland
97. 30 May 2023 - 04:00PM: Optoelectronic Properties of Donor-Acceptor Organic Semiconductors, Dr. Chandra Shekar Sarap (Faculty Candidate), Sr. Research Scientist, Saphin Group of Companies, Irving, Texas, USA & Dasceq India Pvt. Ltd, Bangalore, India. Chemical Synthesis and Bypass studies of Site-Specific Damaged DNAs
98. Dr. Pratibha P. Ghodke (Faculty Candidate), Research Instructor (non-tenure track faculty) Vanderbilt University School of Medicine, Nashville, TN, United States, Design and Understanding of Multifunctional Nanoscale Energy Materials as Electrocatalyst, Dr. Krishna Kanta Haldar (Faculty Candidate), Assistant Professor, Dept. of Chemistry, Central University of Punjab, Bathinda
99. May 2023 - 11:00AM: Superconductivity in single crystals of a quasi-one dimensional infinite chain cuprate $Sr_xCa_{1-x}CuO_2$ at 90 K, Dr. Deepshikha Jaiswal-Nagar, School of Physics, IISER TVM
100. 22 May 2023 - 04:00PM: "Bio-inspired Reactivity Landscapes of Mid/High-valent Heme-oxygen Intermediates" Dr. Pritam Mondal (Faculty Candidate), Department of Chemistry, University of Alabama at Birmingham, USA.
101. 22 May 2023 - 10:00AM: "Making and Breaking of Main Group Element Multiple Bonds Around Transition Metals" Dr. Priyabrata Ghana (Faculty Candidate), Department of Chemistry, California Institute of Technology (Caltech), USA.
102. 18 May 2023 - 06:00PM: Super-additivity of quantum information, Dr. Vikesh Sidhu, IBM Quantum
103. 18 May 2023 - 04:00PM: "Semiconductor Quantum Dots: Synthesis development and applications in optoelectronics devices" Avijit Saha (Faculty Candidate), Interdisciplinary Research Institute of Grenoble (IRIG), CEA Grenoble, France
104. 18 May 2023 - 04:00PM: Introduction to Particle Physics - from atoms to Higgs boson and beyond Prof. Gobinda Majumder, Senior Professor, DHEP, TIFR
105. 18 May 2023 - 10:00AM: May 12 Celebrating Women in Mathematics at IISER Mohali, Welcome address by: Director, Speaker: Prof. Sudesh Kaur Khanduja, INSA Senior Scientist, IISER Mohali Speaker: Prof. Gurmeet Kaur Bakshi, panjab University, For more detail click on: Poster
106. 17 May 2023 - 05:00PM: Decoherence due to spacetime curvature. Mr. Raghvendra Singh (IMSc, Chennai)
107. 17 May 2023 - 04:00PM: Theoretical predictions and explanations of structure, bonding, and reactivity Priyakumari C. P. (Faculty Candidate), Inspire Faculty at Indian Institute of Technology, Palakkad
108. 16 May 2023 - 04:00PM: "Targeting antibiotic resistance and tolerance by first-in-class inhibitors of bacterial H2S biogenesis" Dr. Ashok Nuthanakanti (Faculty Candidate), New York University School of Medicine
109. 16 May 2023 - 10:00AM: Effective Field Theories: Recent Developments and their Applications, Dr. Jacky Kumar (Faculty Candidate), Los Alamos National Laboratory, USA
110. 15 May 2023 - 04:00PM: A Journey through Asymmetric Organocatalysis: From Hydrogen Bonding to Phase-Transfer and Beyond, Dr. Satavisha Kayal (Faculty Candidate), University of Florida, USA.
111. 15 May 2023 - 12:01PM: Ultrafast Dynamics of Quantum Materials, Dr Srinivasa Rao Konda (Faculty Candidate), The GPL Photonics Laboratory, State Key Laboratory of Luminescence and Applications, Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, Changchun, Jilin, 130033, China
112. 12 May 2023 - 04:00PM: π -Acceptor Caged Phosphine Ligands: Exploration of Novel Catalytic Reactivity and Mechanism Dr. Lavneet Janagal (Faculty Candidate), Korea Institute for Advanced Study (KIAS), S. Korea
113. 12 May 2023 - 04:00PM: Novel quantum phases and non-Hermitian many-body localization in optical lattices Dr. Kuldeep Suthar (Faculty Candidate), Central University of Rajasthan

114. 11 May 2023 - 11:00AM: Lessons from computational modeling: Role of cell adhesion and cell deformations in malaria blood-stage infection, Dr. Anil Kumar Dasanna (Faculty Candidate), Leibniz Institute of New Materials and Theoretical Physics, Germany.
115. 10 May 2023 - 05:00PM: Cross-correlation between lattice and magnetic properties of functional magnetic oxides Dr. Prativa Pramanik (Faculty Candidate), Uppsala University, Sweden
116. 09 May 2023 - 05:00PM: Chern-Simons-Matter Duality and Large-N Phase Diagram Dr. Anshuman Dey (Faculty Candidate), Universidad de Santiago de Compostela, Spain
117. 08 May 2023 - 12:01PM: lassifying and constraining local four photon and four graviton S-Matrices
118. Dr. Lavneet Janagal (Faculty Candidate), Korea Institute for Advanced Study (KIAS), S. Korea
119. 05 May 2023 - 03:00PM: Kite and Triangle diagrams through Symmetries of Feynman Integrals
120. Dr. Subhajit Mazumdar, Center for Theoretical Physics, Seoul National University. Seoul, Republic of Korea
121. 04 May 2023 - 12:01 PM: Particle energization, particle distribution, and modeling of the spectral energy distribution of blazars, Dr. Sunil Chandra (Faculty Candidate), South African Astronomical Observatory, Cape Town, South Africa
122. 03 May 2023 - 05:00PM: Topological transport in Weyl semimetal, Dr. Banashree Sadhukhan (Faculty Candidate) KTH Royal Institute of Technology, Sweden
123. 03 May 2023 - 04:00PM: The Eisenstein ideal of weight k and ranks of Hecke algebras, Dr. Shaunak Deo (IISc Bangalore)
124. 01 May 2023 - 03:00PM: What were the calendrical features in 14th century Tamil region – exploring the Vijayanagara epigraphy, Dr. T.V Venkateswaran (Vigyan Prasara)
125. 01 May 2023 - 12:01PM: Quantum Hall Thermal Conductance of an Isolated Edge Channel, Dr. Bivas Dutta (Faculty Candidate), Weizmann Institute of Science, Rehovot, Israel
126. 28 Apr 2023 - 04:00PM: Interaction-driven metal-insulator Transitions and quantum criticality N. S. Vidhyadhiraja, JNCASR, Bangalore, India.
127. 21 Apr 2023 - 05:00PM: Optical information processing and imaging, Dr. Ravi Kumar (Faculty Candidate), SRM University
128. 21 Apr 2023 - 04:00PM: Role of big data analytics in exploring antibiotic resistance. Dr. Akanksha Rajput, Department of Bioengineering, University of California San Diego, La Jolla, California.
129. Zoom Link
130. 21 Apr 2023 - 11:00AM: Grasses: Systematics and Evolution. Dr. Alok Chorgha, National Museum of Natural History, Sawai Madhopur
131. 20 Apr 2023 - 03:00PM: Nationalism, Separatism and Cultural Assertions in Contemporary India, Prof. G. Aloysius, Formerly Scholar-in-Residence, English and Foreign Languages University (EFLU), Hyderabad.
132. 20 Apr 2023 - 11:00AM: Ubiquitin-dependent protein degradation to ubiquitin degradation - An emergency role of Proteasomes under physiological stress. Dr. Indrajit Sahu, Postdoctoral Researcher, Dana-Farber Cancer Institute Harvard Medical School, USA
133. 19 Apr 2023 - 05:00PM: Biomedical imaging and inverse problems, Dr. Meghdoot Mozumder (Faculty Candidate), University of Eastern Finland, Finland.
134. 19 Apr 2023 - 11:00AM: Rules and impacts of RNA quality control in health and diseases. Dr. Anand Kumar Singh, Ramalingaswami Re-entry Fellow at Interdisciplinary School of Life Sciences, Institute of Science, Banaras Hindu University, India
135. 17 Apr 2023 - 04:00PM: Limited availability of nutrients rewires NK cell metabolic signaling and depends on one carbon non-canonical pathway to target cancer cells in the Tumor Microenvironment. Dr. Srinadh Choppa, Staff Postdoctoral Research Fellow, Tumor Immunometabolism Lab, University of Michigan, USA
136. 17 Apr 2023 - 12:01PM" Neutrino Mysteries and the Quest for New Physics, Dr. Newton Nath (Faculty Candidate), INFN Bari, Italy
137. 17 Apr 2023 - 11:00AM" Dissecting the role of RNA toxicity in repeat expansion disorders, Dr. Indranil Malik, Research Fellow, Department of Neurology, University of Michigan Health System
138. 17 Apr 2023 - 09:00AM: Random directed trees and their applications, Dr. Kumarjit Saha is a faculty at the Department of Mathematics at Ashoka University
139. 13 Apr 2023 - 04:00PM: Bio-attenuation of arsenic and other oxyanions from water in a sulfidogenic bioreactor, Dr. Arvind Kumar Shakya, School of Science, Indira Gandhi National Open University, New Delhi
140. 13 Apr 2023 - 04:00PM: Structural insights into the mechanism of viral entry into host cells: a co-complex of host receptors and viral proteins, Dr. Ashish Kumar, Affiliation: National Institute of Health (NIH), USA

141. 13 Apr 2023 - 03:00PM: Higher order quantum maps and indefinite causal orders, Kaumudibikash Goswami, Department of Computer Science, The University of Hong Kong.
142. 13 Apr 2023 - 11:00AM: Studying structural and functional evolution of toll proteins from insects to human and environmental stress adaptive strategies - Drosophila as a model, Dr. Poonam Ranga, ICAR-Central Institute for Cotton research, Sirsa, India
143. 12 Apr 2023 - 08:00PM: Analytic continuations of hypergeometric functions in Feynman Integral Calculus -- Automatization and Numerical Implementation, Prof. B. Ananthanarayan, CHEP, Indian Institute of Science Bangalore
144. 12 Apr 2023 - 06:00PM: Decolonising Feminism through 'Dalit Difference', Sunaina Arya, JNU Delhi
145. 12 Apr 2023 - 05:00PM: GTS Poset and Laplacian Immanants of Trees, Dr. Mukesh Kumar Nagar (PEC Chandigarh)
146. 12 Apr 2023 - 04:00PM: The role of soil carbon in natural climate solutions, Dr. Sanjay Kumar, ICAR Research Complex for NEH Region, Nagaland
147. 11 Apr 2023 - 04:00PM: Dynamics of suspended sediment concentrations and chlorophyll_a dynamics over inland, coastal and open ocean waters, Sravanthi N, Marine Science and Technology, Zhejiang Ocean University, China
148. 08 Apr 2023 - 04:00PM: Joy of Discovery and Career in Research, Prof. B. Ananthanarayan, CHEP, Indian Institute of Science Bangalore
149. 06 Apr 2023 - 05:00PM: Lower dimensional cohomologies of homogeneous spaces of Lie groups, Dr. Chandan Maity (IISER Mohali)
150. 06 Apr 2023 - 04:00PM: Microphysics of Dense Fog in Polluted Urban Boundary Layer, Dr. Sandeep Wagh Indian Institute of Tropical Meteorology, Pune, India
151. 06 Apr 2023 - 04:00PM: Mitochondrial structure-function in cell cycle regulation and its implications in health and disease Dr Kasturi Mitra, Associate Professor of Biology, DBT Wellcome Trust Senior Fellow, Ashoka University, Adjunct Faculty, Genetics Department, University of Alabama at Birmingham
152. 06 Apr 2023 - 03:00PM: Millets and its Bioactives for mitigating obesity and comorbidities, Dr. Kanthi Kiran Kondepudi (NABI, Mohali..)
153. 06 Apr 2023 - 03:00PM: Feeding the 10 billion by 2050 : a genomics perspective, Prof. Manoj Prasad (NIPGR, New Delhi)
154. 06 Apr 2023 - 03:00PM: Revisiting Bourdieuan Idea of Reflexivity, Dr. Sanil Malikappurath Neelakandan (PhD in Sociology from the Centre for the Study of Social Systems, Jawaharlal Nehru University) is an independent researcher based in New Delhi.
155. 06 Apr 2023 - 11:00AM: Applications of solution-state NMR: From metabolomics to understanding RNA-protein interactions, Dr Jeetender Chugh (IISER Pune)
156. 05 Apr 2023 - 04:00PM: Geothermal energy resources of India, Dr. Hemant Kumar Singh, School of Environmental Sciences, JNU
157. 05 Apr 2023 - 03:00PM: High-precision Faraday rotation and Zeeman spectroscopy investigations on 2D materials, Dr. Ashish Arora, Department of Physics, Indian Institute of Science Education and Research, Pune
158. 05 Apr 2023 - 11:00AM: Inflammasome regulation in health and diseases. Dr. Savita Devi, Cedar Sinai Medical Center, Los Angeles, USA.
159. 03 Apr 2023 - 05:15PM: On magnetogenesis in inflationary models leading to non-trivial dynamics Prof. L. Sriramkumar, Department of Physics, Indian Institute of Technology, Madras
160. 03 Apr 2023 - 04:00PM: Behaviour of pre-monsoon extreme weather events in a changing climate Dr. G. China Satyanarayana, Center for Atmospheric Science, Dept. of ECE, K L University, Andhra Pradesh, India
161. 03 Apr 2023 - 04:00PM: The Brain Circuits of Food Addiction-Like Behaviors, Dr. Hasan Mohammad, Inserm U1114, Center Research Biomedicine De Strasbourg (CRBS), France

18 POSTDOCTORAL FELLOWS



POSTDOCTORAL FELLOWS AT THE INSTITUTE

1. Kamlesh K Bajwa (Bology)

2. Baheerathan Murugavel (Bology)

3. Reena Thankur(Biology)

4. Dipankar Bhowmik (Biology)

5. Swarupa Mallick (Biology)

6. Kamlesh K Bajwa (Biology)

7. Nidhi Krishna (Biology)

8. Nirja (Biology)

9. Rajesh Kumar Mishra(Bology)

10. Gagandeep Kaur (Bology)

11. Papri Basak (Bology)

12. Apuratha Pandiyan (Biology)

13. Manjula Ekka (Biology)

14. Poonam Sharma (Biology)

15. Yogesh Dahiya (Biology)

16. Shikha Gupta (Biology)

17. Priya Battu (Biology)

18. Vibhuti Sharma (Biology)

19. Baheerathan Murugavel(Chemistry)

20. Avik Kumar Das(Chemistry)

21. Bikramaditya Mandal (Chemistry)

22. Kirtika Mishra (Chemistry)

23. Mithilesh Kumar Nayak (Chemistry)

24. Kamal Saravanan (Chemistry)

25. Anirban Sen(Chemistry)

26. Manpreet Kaur(Chemistry)

27. Gaurav Jhaa(Chemistry)

28. Vierandra Kumar (Chemistry)

29. Brahmaiah Kommula (Chemistry)

30. Anannya Saha (Chemistry)

31. Ben Johns (Chemistry)

32. Bikramaditya Mandal (Chemistry)

33. Riya Sinha(Chemistry)

34. Akash Mondal(Chemistry)

35. Jhuma Dutta (Chemistry)

36. Srinatha .M.K (Chemisrty)

37. Nitin Yadav (Chemisrty)

38. Archana Velloth (Chemisrty)

39. Abhishek Swarnkar (Chemisrty)

40. Aditya Naik (EES)

41. Pawan Kumar Chaubey(EES)

42. Sandeep Panda (EES)

43. Aninet Mitra (EES)

44. Amita Kumari (EES)

45. Dibyojyoty Nath (EES)

46. Hemantika Basu (HSS)

47. Shriya Bandyopadhyay (HSS)

48. Nishant (Mathematics)

49. Ramanpreet Kaur (Mathematics)

50. Ayush Udeep (Mathematics)

51. Sudip Pandit (Mathematics)

52. Visakh Narayanan (Mathematics)

53. Chaitanya J. Kulkarni (Mathematics)

54. Shashank Vikram Singh (Mathematics)

55. Ranadip Gangopadhyay (Mathematics)

56. Sudipta Mukherjee (Mathematics)

57. Rachna Aggarwal (Mathematics)

58. Neha Malik(Mathematics)

59. Sumit Chandra Mishra (Mathematics)

60. Pokale Poonam Ramnath

61. Arup Kumar Maity

62. Gurleen Kaur (Mathematics)

63. Apeksha Sanghi (Mathematics)

64. Neeraj Kumar Dhanwani
(Mathematics)

65. Pooja (Physics)

66. Komal Kumari (Physics)

67. Deena Nath (Physics)

68. Bhavesh Kumar Dadhich (Physics)

69. Brij Mohan (Physics)

70. Joseph Johnson (Physics)

71. Priyanka Yadav (Physics)

72. Pratap Khuntia (Physics)

73. Supragyan Priyadarshinee (Physics)

74. Shally Sharma (Physics)

75. Indrajith V.S (Physics)

76. Harsh Jain (Physics)

77. Harjot Kaur (Physics)

78. Naveen Kumar (Physics)

79. Rajbinder Kaur Virk (Physics)

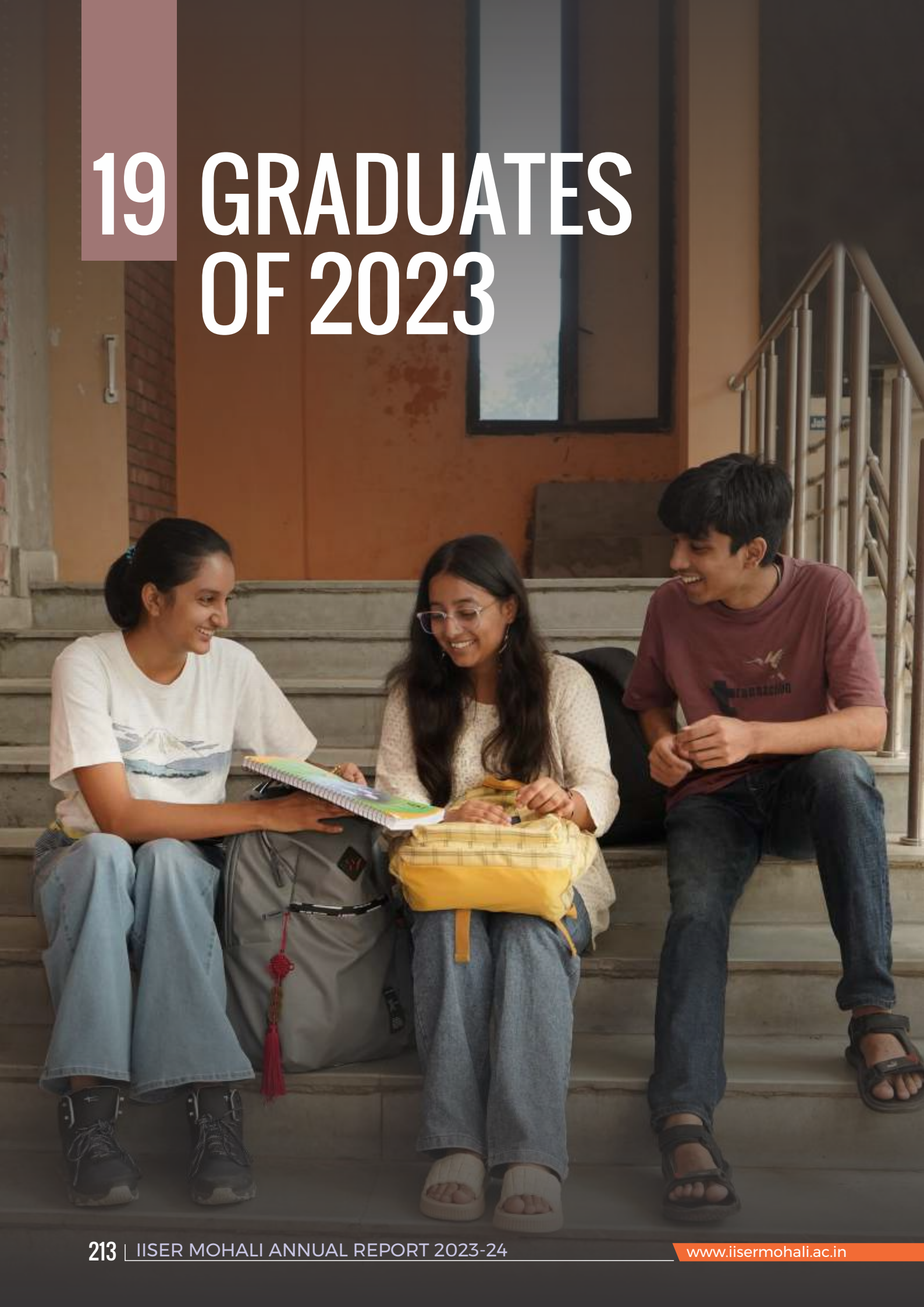
80. Anupama Roy (Physics)

81. Manish Kumar (Physics)

82. Komal Kumari (Physics)

83. Pratap Khuntia (Physics)

19 GRADUATES OF 2023



GRADUATES OF 2023

BS Graduates

S. No.	Name	Reg. No.
1	SACHU SANAL	MS16123
2	SUBRAHMANYAM CHIVUKULA	MS17139
3	PAWAN KUMAR YADAV	MS17203
4	ANKIT PHUTELA	MS18130
5	ARCHITA BAGRI	MS18141

BS-MS Graduates

S. No.	Name	Reg. No.	Subject
1	SANAT KUMAR GHOSH	MS16117	PHYSICS
2	SARBOJOY DAS	MS16139	PHYSICS
3	SACHIN BHATT	MS16153	CHEMISTRY
4	JASHANPUNEET KAUR	MS17012	BIOLOGY
5	SOURAV DHANIA	MS17015	PHYSICS
6	ASWIN DEV	MS17023	PHYSICS
7	LINGALA KSHITESH	MS17053	CHEMISTRY
8	UTKARSH DIWAKAR	MS17079	PHYSICS
9	SHREYA GANGWAL	MS17084	BIOLOGY
10	SHOUNAK KISHOR HINGE	MS17093	CHEMISTRY
11	VAIBHAV KUMAR	MS17111	CHEMISTRY
12	ANKIT	MS17112	PHYSICS
13	SHUBHAM KUMAR SINHA	MS17127	PHYSICS
14	AJINKYA SAKHARE	MS17129	BIOLOGY
15	SHALIKA	MS17137	BIOLOGY
16	SARVESH KUMAR	MS17167	PHYSICS
17	HEMANT SHARMA	MS17177	BIOLOGY
18	BOBBY	MS17189	PHYSICS
19	MEENAKSHI ROUT	MS18001	BIOLOGY
20	HARSHIT KUMAR	MS18004	PHYSICS
21	SANKALP AGRAWAL	MS18005	CHEMISTRY
22	SHIV SHANKAR SINGH	MS18006	PHYSICS
23	HIMANSHU NIRANKARNATH TIWARI	MS18007	MATHEMATICS
24	HARSIMRAN KAUR	MS18008	BIOLOGY
25	MANISH	MS18009	PHYSICS
26	VINEET GAURAV	MS18010	PHYSICS
27	SARAGADAM JEEVAN LAKSHMI RAJ	MS18011	CHEMISTRY

S. No.	Name	Reg. No.	Subject
28	NARAYAN PRASAD GUPTA	MS18012	PHYSICS
29	ARKA DUTTA	MS18013	PHYSICS
30	MUNNU KUMAR	MS18014	CHEMISTRY
31	DHEERAJ KUMAR MEENA	MS18015	CHEMISTRY
32	DHEERAJ JANGID	MS18017	CHEMISTRY
33	GOTTUMUKKALA YUDISH SAI VARMA	MS18018	BIOLOGY
34	NEERAJ SAINI	MS18019	PHYSICS
35	PUSHPENDRA MAWAI MS18020	BIOLOGY	
36	MEGHA	MS18021	PHYSICS
37	ABIR GHOSH	MS18022	PHYSICS
38	ABHILASHA JAKHAR MS18023	BIOLOGY	
39	RITVIK GUPTA	MS18024	BIOLOGY
40	PRINCE JHANDAI	MS18025	BIOLOGY
41	MOHAMMED QASIM	MS18027	BIOLOGY
42	PRADHYUMAN MEENA	MS18028	CHEMISTRY
43	HEMRAJ MEENA	MS18029	BIOLOGY
44	MAHIMA SAMRAIK	MS18030	BIOLOGY
45	ABHINANDAN PRAKASH	MS18031	CHEMISTRY
46	ADITYA ANKUR PATEL	MS18032	PHYSICS
47	ATHIRA SREEJITH	MS18033	PHYSICS
48	ABHISHEK KUMAR SINGH	MS18034	BIOLOGY
49	SWAPAN SASMIT	MS18035	PHYSICS
50	DIVYA	MS18036	BIOLOGY
51	SOURABH	MS18037	PHYSICS
52	KUNAL PRIYADARSHI CHHATRIA	MS18040	PHYSICS
53	MEHAK	MS18041	BIOLOGY
54	ANIRUDH M KRISHNA	MS18042	BIOLOGY
55	JYOTIRANJAN MOHANTA	MS18044	CHEMISTRY
56	NIKITA	MS18045	BIOLOGY
57	MAYUKH CHAKRABARTY	MS18046	MATHEMATICS
58	ANURAAG MUKHERJEE	MS18047	BIOLOGY
59	GOPAL CHAKRABORTY	MS18048	MATHEMATICS
60	TUTIKA THANVITA SAI SREE	MS18052	BIOLOGY
61	ANANYA NATARAJAN	MS18053	BIOLOGY
62	MUSKAAN	MS18054	BIOLOGY
63	AYUSHMAN SRIVASTAVA	MS18056	PHYSICS
64	GARIMAN SINGH	MS18057	PHYSICS
65	POOJA DHAYAL	MS18058	CHEMISTRY
66	LOKESH KUMAR MEENA	MS18059	BIOLOGY
67	VISHNU SOMAN	MS18060	BIOLOGY
68	MAYANK YADAV	MS18062	MATHEMATICS
69	JISHNU KUNDU	MS18064	MATHEMATICS
70	DHANANJAY JOSHI	MS18065	PHYSICS
71	DISHANT SISODIA	MS18066	PHYSICS

S. No.	Name	Reg. No.	Subject
72	DHANASEKHAR V K	MS18067	BIOLOGY
73	PRANJAL MEEL	MS18068	BIOLOGY
74	BHAVNEET SINGH SAINI	MS18069	MATHEMATICS
75	MOIRANGTHEM SADANANDA SINGH	MS18072	BIOLOGY
76	SARTHAK GROVER	MS18073	BIOLOGY
77	ARKOPAL NANDY	MS18074	CHEMISTRY
78	ARYA	MS18076	BIOLOGY
79	SHWETA SONI	MS18077	PHYSICS
80	DHEERAJ CHAUDHARY	MS18078	BIOLOGY
81	SUHAAS SEHGAL	MS18082	BIOLOGY
82	POONAM DHIMAN	MS18083	BIOLOGY
83	SOURAV SURESH	MS18084	PHYSICS
84	PRASAD HANUMANT PADHYE	MS18085	PHYSICS
85	SWAROOPA N	MS18086	BIOLOGY
86	DIKSHA GAUR	MS18087	BIOLOGY
87	KIRANDEEP KAUR	MS18089	BIOLOGY
88	MUNISH	MS18090	BIOLOGY
89	SAGAR MALHOTRA	MS18091	PHYSICS
90	TANVI MADAAN	MS18092	BIOLOGY
91	LEKSHMI DATHAN	MS18093	PHYSICS
92	ABINEETPARICHHA	MS18094	PHYSICS
93	AMAN ARYA	MS18095	PHYSICS
94	MAHIMA	MS18096	BIOLOGY
95	BHAVIK KUMAR	MS18098	PHYSICS
96	MAIA LISA D'SOUZA	MS18099	BIOLOGY
97	K PRIYA	MS18100	BIOLOGY
98	NAVEEN KUMAR BAGHEL	MS18102	PHYSICS
99	SAKSHI	MS18103	BIOLOGY
100	MONAL YADAV	MS18104	PHYSICS
101	HARI PRASAD POILATH	MS18106	MATHEMATICS
102	NEERAJ PRATAP SINGH	MS18107	CHEMISTRY
103	AARADHANA KAUL	MS18108	BIOLOGY
104	ADARSH BATHULA	MS18109	PHYSICS
105	ANSHUL SRIVASTAVA	MS18110	PHYSICS
106	ARSHDEEP SINGH BAINS	MS18111	CHEMISTRY
107	SUBHADEEP MANDAL	MS18112	PHYSICS
108	SIMRANJEET KAUR	MS18113	PHYSICS
109	PRANAV GULATI	MS18114	BIOLOGY
110	ARSHDEEP SHARMA	MS18115	PHYSICS
111	AKSHAY SHANKAR	MS18117	PHYSICS
112	AALHAD ABHAY BHATT	MS18118	PHYSICS
113	ABHIRAMI S A	MS18119	BIOLOGY
114	JIVJOT SINGH	MS18121	PHYSICS

S. No.	Name	Reg. No.	Subject
115	ANJNA	MS18122	BIOLOGY
116	AYUSHI MAHAJAN	MS18123	BIOLOGY
117	SWASTIKA RUPAL	MS18124	BIOLOGY
118	ANIKET SHARMA	MS18126	PHYSICS
119	RUPALI SHARMA	MS18127	PHYSICS
120	SHIVALI SINHMAR	MS18129	BIOLOGY
121	HARSH VARDHAN SINGH	MS18132	CHEMISTRY
122	RIMJHIM GOEL	MS18133	MATHEMATICS
123	AMISH DUA	MS18134	BIOLOGY
124	RAJAT SUBHRA JENA	MS18135	BIOLOGY
125	CHHAVI CHAHAR	MS18136	PHYSICS
126	DEVRAJ SANTOSH PARANDE	MS18138	BIOLOGY
127	ASHMEET SINGH DOSANJH	MS18139	BIOLOGY
128	DHEER TARAK MANKAD	MS18140	PHYSICS
129	SMRITI CHHIBBER	MS18142	PHYSICS
130	SHWETA SAINI	MS18143	BIOLOGY
131	K V AMRUTHA	MS18144	BIOLOGY
132	PRABHAT SHARMA	MS18145	BIOLOGY
133	RATTAN KAUR	MS18146	BIOLOGY
134	SARGAM SAINI	MS18147	BIOLOGY
135	KUNAL VERMA	MS18148	PHYSICS
136	MIHIR SINGH	MS18149	PHYSICS
137	YASHVI BHAT	MS18150	BIOLOGY
138	AABHAS GULATI	MS18151	PHYSICS
139	RUTVIK RAMESHBHAI KAYASTHA	MS18152	PHYSICS
140	DIVYANSHU SAHU	MS18153	BIOLOGY
141	ABHISHEK PAUL	MS18156	PHYSICS
142	SHREYAS RAVINDRA GADGE	MS18157	PHYSICS
143	SOHAM MORESHWAR KOR	MS18158	MATHEMATICS
144	RITIK SAREEN	MS18160	PHYSICS
145	DHRUVA SAMBRANI	MS18163	PHYSICS
146	MANSI	MS18164	BIOLOGY
147	SRISHTI	MS18165	BIOLOGY
148	HARSHITA SAWDEKAR	MS18167	CHEMISTRY
149	GAURAV KISHOR	MS18168	PHYSICS
150	PRANAV KUMAR SONI	MS18169	PHYSICS
151	AMITABHA SATYAJEET GOVANDE	MS18170	BIOLOGY
152	MITRA JAYANT KULKARNI	MS18171	BIOLOGY
153	HIMANSHI SINGH	MS18172	BIOLOGY
154	AVANTIKA	MS18173	BIOLOGY
155	Shashi Balhara	MS18174	PHYSICS
156	Disha Nareda	MS18175	PHYSICS
157	Vivek Kumar	MS18177	PHYSICS
158	Vaibhav Gaur	MS18179	BIOLOGY

S. No.	Name	Reg. No.	Subject
159	Aastha	MS18180	CHEMISTRY
160	Rituparna Nayak	MS18181	BIOLOGY
161	Srijan Srivastava	MS18182	PHYSICS
162	Aarju Parashar	MS18184	BIOLOGY
163	Piyush Saini	MS18185	CHEMISTRY
164	Arunima Jain	MS18186	BIOLOGY
165	Nitika	MS18187	CHEMISTRY
166	Jadhav Atharva Sanjay	MS18188	CHEMISTRY
167	Rohan Awasthi	MS18189	PHYSICS
168	PokheeSaharia	MS18190	PHYSICS
169	Kamal Pany	MS18191	BIOLOGY
170	Komal Bali	MS18192	PHYSICS
171	Anshul	MS18193	CHEMISTRY
172	Mirudula. E	MS18194	BIOLOGY
173	Avinandita Mukhopadhyay	MS18196	BIOLOGY
174	Amlan Nayak	MS18197	PHYSICS
175	Pravita Rajeev Hallur	MS18198	PHYSICS
176	Saloni Sahu	MS18199	BIOLOGY
177	Arya Santosh Padhye	MS18200	BIOLOGY
178	Navjot Kaur	MS18201	BIOLOGY
179	Atharva Sachin Deshpande	MS18202	BIOLOGY
180	Kartikey Awasthi	MS18203	BIOLOGY
181	Gowri A	MS18204	PHYSICS
182	Sagnik Chakraborty	MS18205	CHEMISTRY
183	Rahul Sharma	MS18206	BIOLOGY
184	Pratibha Jakhar	MS18207	CHEMISTRY
185	Aditya Pawan	MS18208	PHYSICS
186	Suhasi Gupta	MS18210	PHYSICS
187	Sanskar Mishra	MS18211	BIOLOGY
188	Muskan Kalra	MS18212	BIOLOGY
189	Madekar Sakshi	MS18213	PHYSICS
190	Dhriti Maity	MS18214	CHEMISTRY
191	Bharathraj K	MS18215	BIOLOGY
192	Akshit Nanda	MS18216	MATHEMATICS
193	Tejprakash Sharma	MS18217	PHYSICS
194	Aarya Makarand Joshi	MS18218	BIOLOGY
195	Maithily Somesh Hingmire	MS18219	BIOLOGY
196	Ruben Aju George	MS18220	BIOLOGY
197	Suroj Dey	MS18221	PHYSICS
198	Gurjinder Kaur	MS18222	BIOLOGY
199	Khandare Mihir Madhav	MS18223	BIOLOGY
200	Anfas Arif D	MS18224	BIOLOGY

PhD Graduates

S. NO.	NAME	REG. NO.	DEPT.	TITLE OF THE THESIS
1	MISHU PAL	MP14003	CHEMISTRY	DYNAMICAL MOLECULAR ELECTRON MOMENTUM DENSITIES, SYMMETRY OF MOLECULAR DRESSED STATES AND MOLECULAR PLASMONS
2	SURBHI GARG	MP14004	CHEMISTRY	IN SEARCH OF A BIOPHYSICAL MODEL FOR AGE-RELATED HEARING LOSS (ARHL) FOR PRECISION THERAPEUTIC STUDIES
3	VIKASH MITTAL	MP14011	PHYSICS	GEOMETRIC PHASE AND ITS APPLICATIONS: TOPOLOGICAL PHASES, QUANTUM WALKS AND NON-INERTIAL QUANTUM SYSTEMS
4	SUNIL	MP14014	PHYSICS	DEVELOPMENT OF ULTRATHIN DELAY LINE FOR ATTOSECOND RESOLVED HIGH HARMONICS AND INTERFEROMETRIC APPLICATIONS
5	VIDHIKA PUNJANI	MP14017	CHEMISTRY	STUDIES OF THE MESOMORPHIC AND ELECTRO-OPTIC BEHAVIOUR IN CHOLESTEROL-BASED BENT-SHAPED MESOGENS
6	SUPREET KAUR	MP14019	CHEMISTRY	UNCONVENTIONAL BEHAVIOR OF ASYMMETRIC BENT-CORE MESOGENS: CHEMICAL AND PHYSICAL ASPECTS
7	IPSITA PANI	MP15002	CHEMISTRY	DYNAMIC ORDERING TRANSITIONS OF LIQUID CRYSTALS AT BIOMOLECULAR INTERFACES
8	ANJALI SRIVASTAVA	MP15010	CHEMISTRY	AZOBENZENE-BASED SUPRAMOLECULAR SYSTEMS FOR LIGHT CONTROLLED AND REVERSIBLE FLUORESCENCE MODULATION OF GUEST, HYDROGELATION, AND MULTIANALYTE PROBES
9	MAMTA	MP15011	CHEMISTRY	SYNTHESES, REACTIVITY AND CATALYTIC APPLICATIONS OF ELECTRONICALLY UNSATURATED CATIONIC ALUMINUM COMPLEXES INCLUDING REDOX ACTIVE BIS(IMINO)ACENAPHTHENE (BIAN) ALUMINUM COMPLEXES
10	VINAY	MP16022	MATHEMATICS	PROPERTIES OF GLUED KNOTS
11	SANDEEP RAWAT	MP15013	CHEMISTRY	COVALENT AND CATIONIC MAIN-GROUP (B, AL, MG) AND ZN COMPLEXES SUPPORTED BY MONOANIONIC N/P LIGANDS FOR CATALYTIC HYDROSILYLATION AND HYDROBORATION REACTIONS INCLUDING DETAILED MECHANISTIC INSIGHTS
12	VARUN RANADE	MP15016	PHYSICS	EXPERIMENTAL INVESTIGATION OF MAGNETISM IN NATURAL SILK POLYMERS

13	JASKARAN SINGH	PH13010	PHYSICS	STUDY OF THE SUPERCONDUCTING PROPERTIES OF SOME RARE EARTH AND TRANSITION METAL BORIDES WITH QUASI-LOW-DIMENSIONAL CRYSTAL STRUCTURES
14	JAYATI GERA	PH13039	BIOLOGY	UNDERSTANDING THE MOLECULAR AND GENETIC BASIS OF PERICARDIN EXPRESSION IN ADULT DROSOPHILA MELANOGASTER
15	ALOK TIWARY	PH14003	BIOLOGY	WOLBACHIA INFECTIONS IN NASONIA VITRIPENNIS: A HOST-PATHOGEN INTERACTION STUDY
16	SONAL YADAV	PH14010	BIOLOGY	A SYSTEMS BIOLOGY APPROACH TO DISCOVER NOVEL TRANSCRIPTIONAL REGULATORS THAT INFLUENCE THE SHOOT GROWTH BY REGULATING CYTOKININ SIGNAL HOMEOSTASIS IN THE SHOOT APICAL MERISTEM OF ARABIDOPSIS THALIANA
17	JYOTSANA OJHA	PH14013	PHYSICS	EXPERIMENTAL INVESTIGATIONS OF MOLECULAR DIFFUSION IN IONIC LIQUIDS, TRIBLOCK COPOLYMERS, AND BIOMOLECULES, USING PULSED-FIELD GRADIENT NMR SPECTROSCOPY
18	RAMU KUMAR YADAV	PH14019	PHYSICS	STUDY OF UNZIPPING TRANSITION OF AN ADSORBED POLYMER AND BLOCK COPOLYMER DNA BY A PERIODIC FORCE
19	APARAJITA	PH14034	BIOLOGY	INVESTIGATIONS INTO THE ECO-IMMUNOLOGICAL INTERACTIONS BETWEEN DROSOPHILA MELANOGASTER AND ITS BACTERIAL PATHOGENS USING EXPERIMENTAL EVOLUTION
20	ANIRBAN GHOSH	PH14039	PHYSICS	A STUDY OF PERSISTENCE IN DIFFERENT NON-EQUILIBRIUM SYSTEMS
21	VINICA DHAR	PH14046	BIOLOGY	STUDY OF MODULATION OF IMMUNE FUNCTION OF DENDRITIC CELLS BY VIBRIO CHOLERAЕ OUTER MEMBRANE PROTEIN OMPU
22	SUMIT MISHRA	PH14048	PHYSICS	METABOLOMIC STUDIES OF PLANT RESPONSE TO ENVIRONMENTAL CUES AND PHYTOCHEMICAL ANALYSIS OF MEDICINAL PLANTS USING NMR SPECTROSCOPY
23	SHYAM SUNDAR YADAV	PH14055	PHYSICS	STUDY OF QUASI TWO DIMENSIONALELECTRON GAS ON SURFACE DOPED SRTIO3(100)
24	ADITYA KANWAL	PH14056	BIOLOGY	EXTRINSIC AND INTRINSIC REGULATION OF HEMATOPOIETIC PROGENITORS IN THE DROSOPHILA LARVAL LYMPH GLAND
25	SOUMYADIP HALDER	PH14057	PHYSICS	ULTRA-LOW TEMPERATURE MAGNETO-TRANSPORT AND SPECTROSCOPIC IMAGING

26	GARIMA PRAZAPATI	PH14066	BIOLOGY	BEHAVIOUR, CHEMICAL ECOLOGY AND GENETIC HISTORY OF NASONIA
27	DEBSUVRA GHOSH	PH14070	PHYSICS	ROLE OF MYOSIN CONTRACTILITY IN THE REGULATION OF FOCAL ADHESION DYNAMICS
28	RITU RAI	PH14205	INS	NANOSTRUCTURED MATERIALS FOR ELECTROCATALYTIC APPLICATIONS
29	HARISH KUMAR	PH15019	BIOLOGY	GROWTH REGULATING FACTORS CONTROL THE EXPRESSION OF HOMEODOMAIN GLABROUS 12 IN LEAF EPIDERMIS TO PROMOTE CELL DIFFERENTIATION IN ARABIDOPSIS THALIANA
30	PARVATHY RAMESH	PH15029	BIOLOGY	EXPLORING THE MOLECULAR CIRCUITRY GOVERNING DROSOPHILA LARVAL HEMATOPOIESIS DURING DEVELOPMENT AND INFECTION
31	PRACHI OJHA	PH15033	BIOLOGY	NORBIN: A CRITICAL REGULATOR OF GROUP I METABOTROPIC GLUTAMATE RECEPTOR INTERNALIZATION AND SYNAPTIC AMPA RECEPTOR ENDOCYTOSIS
32	VARSHA JAIN	PH15035	CHEMISTRY	PHASE BEHAVIORS OF ASYMMETRIC BENT-SHAPED MESOGENS AND THE STUDY OF INTERFACIAL PHENOMENON INVOLVING NEMATICS
33	RANBIR SHARMA	PH15038	PHYSICS	RECONSTRUCTING COSMOLOGY USING PRINCIPAL COMPONENT ANALYSIS
34	NISHAT FIZA	PH15039	PHYSICS	EXPLORING STANDARD MODEL EXTENSION THROUGH NEUTRINOS
35	VIVEK SINGH	PH15048	HSS	ACHEULEAN LANDSCAPE AND TECHNOLOGICAL ADAPTATIONS IN THE CENTRAL NARMADA VALLEY, MADHYA PRADESH (INDIA)
36	ROHIT GUPTA	PH15049	PHYSICS	A UNIFIED DESCRIPTION OF THE PARTICLE PRODUCTION IN HEAVY-ION COLLISION
37	SOUMYA DATTA	PH15053	PHYSICS	TRANSPORT SPECTROSCOPIC INVESTIGATION OF ANISOTROPIC AND MULTIBAND SUPERCONDUCTORS
38	JASLEEN KAUR	PH15054	PHYSICS	THERMODYNAMIC STUDIES OF THERMOELECTRIC ENERGY CONVERSION: DESIGN CONSTRAINTS AND PERFORMANCE
39	TEJINDER SINGH CHECHI	PH15061	BIOLOGY	ALL'S FAIR IN LOVE AND WAR: EVOLUTION OF REPRODUCTIVE TRAITS IN POPULATIONS OF DROSOPHILA MELANOGASTER EVOLVED UNDER DIFFERENTIAL LEVELS OF SEXUAL SELECTION

40	SONAM CHOROL	PH15064	BIOLOGY	COMMUNICATIVE COMPLEXITY IN AVIAN VOCALIZATIONS
41	SHAMA	PH16003	PHYSICS	PROBING THE NON-TRIVIAL STATES OF LOW DIMENSIONAL TOPOLOGICAL MATERIALS BY MAGNETOTRANSPORT
42	SAYANTA MAHAPATRA	PH16004	BIOLOGY	MECHANISTIC INSIGHTS INTO THE ROLE OF MOLECULAR AND SMALL CHEMICAL CHAPERONES IN THE PRION-LIKE TRANSMISSION VIA YEAST PRION AMYLOIDS
43	DILEEP SINGH	PH16006	PHYSICS	EXPERIMENTAL STUDIES OF QUANTUM CONTEXTUALITY AND NONLOCALITY ON AN NMR QUANTUM INFORMATION PROCESSOR
44	KIRTI SINGH	PH16008	CHEMISTRY	DESIGN AND DEVELOPMENT OF FIRST ROW TRANSITION METAL BASED PHOTOCATALYST SUPPORTED BY REDOX-ACTIVE LIGAND
45	NISHA	PH16011	CHEMISTRY	DECIPHERING THE FORCE-DEPENDENT LIFETIME DYNAMICS OF TIP-LINKS IN INNER-EAR
46	ANKIT KUMAR GAUR	PH16012	CHEMISTRY	AZOHETEROARENE PHOTOSWITCHES: STRUCTURE-PROPERTY RELATIONSHIP TOWARDS PHOTOSWITCHING USING VISIBLE LIGHT, IN THE WATER MEDIUM, AND SOLID STATE
47	SANDEEP KUMAR THAKUR	PH16013	CHEMISTRY	WELL-DEFINED ZN-CAAC AND HG-CAAC COMPLEXES AND BICAAC COMPLEXES OF SI, NI, AND ZN: CATALYTIC ACTIVITY AND MECHANISTIC INSIGHTS OF NI(II)-BICAAC AND NI(0)-BICAAC COMPLEXES IN NEGISHI CROSS-COUPPLING REACTION
48	YACHNA JAIN	PH16014	BIOLOGY	GENOME ORGANIZATION AND THE EVOLUTION OF CANCER RESISTANCE
49	AASTHA VASDEV	PH16015	PHYSICS	INVESTIGATION OF SUPERCONDUCTIVITY IN CANDIDATE DIRAC SYSTEMS BY ULTRA-LOW TEMPERATURE STM/S
50	SHAINA DHAMIJA	PH16017	CHEMISTRY	PROBING INTRAMOLECULAR ENERGY AND CHARGE TRANSFER USING BROADBAND PUMP-PROBE SPECTROSCOPY AND IMPULSIVE STIMULATED RAMAN SPECTROSCOPY
51	BARA SINGH	PH16018	CHEMISTRY	NEW STRATEGIES TO SYNTHESIZE SMALL AND MEDIUM SIZED RINGS BEARING A STEREOGENIC CENTER
52	RADHA TOMAR	PH16020	CHEMISTRY	STUDIES ON THE B-C(SP ³)-H FUNCTIONALIZATION TOWARD THE SYNTHESIS OF B-ARYLATED UNNATURAL AMINO ACID DERIVATIVES
53	SURBHI GREWAL	PH16021	CHEMISTRY	PHOTOSWITCHABLE MOLECULAR SYSTEMS FOR SUPRAMOLECULAR ASSEMBLY & REVERSIBLE MODULATION OF CATALYSIS

54	PANKHADE YOGESH ASHOK	PH16022	CHEMISTRY	SYNTHESIS OF SUBSTITUTED FLUORENE DERIVATIVES AND RELATED NATURAL PRODUCTS FROM PARA-QUINONE METHIDES
55	JUHI TIWARI	PH16023	PHYSICS	HOT GAS AND GALAXIES IN LARGE-SCALE STRUCTURES: A CASE STUDY OF TWO CLUSTERS AND A SUPERCLUSTER
56	CHEERNENI SAI SRINIVAS	PH16024	CHEMISTRY	FUNCTIONAL AND MOLECULAR ASPECTS OF CADHERIN-23 IN THE CONTEXT OF CELL-CELL ADHESION
57	ATANU MONDAL	PH16029	CHEMISTRY	PHOSPHINE-CATALYZED ANNULATION OF DESIGNED ENONES AND YNONES
58	SOURAV PATRA	PH16035	PHYSICS	STUDY OF REAR DECAYS AND EXOTIC STATES IN QUARKONIUM AT BELLE
59	MANAS ARUN SAMANT	PH16038	BIOLOGY	"THE TIES THAT BIND": INVESTIGATING THE INTERACTION BETWEEN INTERLOCUS AND INTRALOCUS SEXUAL CONFLICT USING DROSOPHILA MELANOGASTER"
60	PRAVESH KUMAR	PH16040	CHEMISTRY	LIGHT MODULATION OF PROPERTIES OF ARYLAZOISOXAZOLE PHOTOSWITCHES AND THEIR BENZENE-1,3,5- TRICARBOXAMIDE (BTA) FUNCTIONALIZED DERIVATIVES
61	GODAVARTHI PHANI TEJA	PH16042	PHYSICS	LIGHT-MATTER INTERACTIONS: QUANTUM MEMORIES AND ATOM-PHOTON GATES
62	BASIL ALIAS	PH16043	HSS	PANCHAYAT RAJ INSTITUTIONS AND TRIBAL GOVERNANCE IN A NON- SCHEDULED REGION: A STUDY OF EDAMALAKUDY TRIBAL VILLAGE IN KERALA
63	ANKUR PARASHAR	PH16052	HSS	WATER SCARCITY AND THE PRODUCTION OF URBAN SPACE IN SHIMLA
64	MANISHA KUSHWAHA	PH16057	HSS	CASTE AND THE CITY: INTERSECTIONS OF RECENT ECONOMIC REFORMS AND DALIT POLITICS IN LUCKNOW
65	JAYASHREEMAZUMDER	PH16061	HSS	INVESTIGATING DIVERSE FACTORS AFFECTING TOOL USE IN MONKEYS THROUGH A STUDY OF WILD NICOBAR LONG-TAILED MACAQUES (MACACA FASCICULARIS UMBROSUS) IN INDIA AND CAPTIVE RHESUS MACAQUES (MACACA MULATTA) IN THE USA
66	REKHA	PH16074	CHEMISTRY	TRANSITION-METAL FREE APPROACHES TOWARD SYNTHESIS OF DIARYL- AND TRIARYLMETHANES FROM PARA- QUINONE METHIDES
67	AMREEN KAUR BAINS	PH16075	CHEMISTRY	REDOX-ACTIVE LIGAND CATALYZED BORROWING-HYDROGEN REACTIONS VIA HYDROGEN ATOM TRANSFER

68	HIMANSHU SWAMI	PH16084	PHYSICS	NEUTRINO OSCILLATIONS IN CURVED SPACE-TIME: IMPLICATIONS FOR NEUTRINO PHYSICS
69	ADITI VIJAY	PH16208	INS	INVESTIGATING THE ROLE OF STRUCTURAL PARAMETERS INFLUENCING PHOTOCATALYTIC AND ELECTROCATALYTIC BEHAVIOUR OF BINARY AND TERNARY METAL OXIDES
70	DEEPIKA GUPTA	PH16216	INS	REGULATING PEPTIDE SELF-ASSEMBLY TOWARD PRECISION & COMPARTMENTALIZATION
71	POOJA SHARMA	PH16220	INS	DEVELOPMENT OF MULTI-COMPONENT BIOACTIVE SCAFFOLDS FOR TISSUE REGENERATION
72	ANJANA SHARMA	PH16226	INS	DEVELOPMENT OF BIOACTIVE CARBON-BASED NANOMATERIALS FOR HEALTHCARE APPLICATIONS
73	AJIT SINGH	PH16228	INS	MEASUREMENT OF ELECTRICAL, THERMAL AND PHOTO-CONDUCTIVITY OF NANOMATERIALS
74	JIJO THOMAS	PH16231	INS	INJECTABLE SELF-HEALING HYDROGELS FOR CARTILAGE TISSUE ENGINEERING
75	SHAIFALI SARTRALIYA	PH16232	INS	A STUDY OF THE DESIGN AND SYNTHESIS OF POLYMERIC SMART NANOCARRIERS FOR DELIVERING DRUGS
76	VIJAY KUMAR PAL	PH16235	INS	DESIGNING BIOMOLECULAR HYDROGEL SCAFFOLDS FOR HEALTHCARE APPLICATIONS
77	ATIKUR RAHMAN	PH16238	INS	MODULATING PHOTOPHYSICAL PROPERTIES OF DYE-LOADED GOLD NANOPARTICLES THROUGH PLASMON-MOLECULE COUPLING
78	MANISH KUMAR MOHANTA	PH16239	INS	AB-INITIO INSIGHTS INTO APPLIED 2D MATERIALS FOR ENERGY HARVESTING AND NEXT-GENERATION DEVICES
79	SARDOIWALAMOHA MMEDNADIM ABDULAZIZ	PH16240	INS	EPIGENETIC REGULATION MEDIATED NANOTHERAPY FOR INHIBITION OF PARKINSON'S DISEASE
80	NEHA	PH16242	INS	DESIGNING OF HEPTAZINE AND TRIAZINE BASED POROUS ORGANIC POLYMERIC NETWORKS AND THEIR APPLICATIONS
81	ANAMIKA AVNI	PH17002	CHEMISTRY	CONFORMATIONAL FINGERPRINTING OF PHASE SEPARATION AND AMYLOID FORMATION THROUGH THE LENS OF VIBRATIONAL RAMAN SPECTROSCOPY
82	ANKIT DHANUKA	PH17006	PHYSICS	SIGNATURES OF QUANTUM EFFECTS IN LATE TIME COSMOLOGY
83	ANDRI SHARMA	PH17007	PHYSICS	POLYMER TRANSLOCATION THROUGH CONICAL PORES

84	SONAM SHARMA	PH17008	CHEMISTRY	EXPLORING THE VINYLOGOUS CONJUGATE-ADDITION AND RADICAL REACTIONS OF PARA-QUINONE METHIDES
85	LABHINI SINGLA	PH17013	CHEMISTRY	ORGANIC FLUORINE MEDIATED INTERACTIONS IN SMALL ORGANIC MOLECULES: A SYSTEMATIC STRUCTURAL, COMPUTATIONAL AND CHARGE DENSITY ANALYSIS
86	JYOTI	PH17015	CHEMISTRY	CAVITY CATALYSIS: CONTROLLING CHEMICAL REACTIONS THROUGH COOPERATIVE VIBRATIONAL STRONG COUPLING
87	GURDEEP SINGH	PH17019	CHEMISTRY	METAL-FREE TRANSFORMATIONS OF PARA-QUINONE METHIDES (P-QMS) TO OXYGEN-CONTAINING HETEROCYCLES AND CARBAZOLES
88	RAVI TOMAR	PH17020	MATHEMATICS	BOUNDARIES OF NEGATIVELY CURVED GROUPS AND CANNON-THURSTON MAPS
89	AABEER KUMAR BASU	PH17032	BIOLOGY	ECO-IMMUNOLOGY OF LABORATORY-ADAPTED DROSOPHILA MELANOGASTER POPULATIONS
90	SAMITA MISHRA	PH17036	CHEMISTRY	DESIGN, SYNTHESIS, AND ULTRAFAST CHARGE CARRIER DYNAMICS IN PEROVSKITES
91	KAVITA RANI	PH17048	CHEMISTRY	MULTI-STIMULI RESPONSIVE BIOMIMETIC LIGHT-HARVESTING ANTENNAE AND MACROCYCLES TOWARDS MULTIFUNCTIONAL SENSING APPLICATIONS
92	RAJAT PANDEY	PH17059	CHEMISTRY	METAL-FREE APPROACHES TOWARD N-HETEROCYCLES AND DIARYLMETHANES UNDER BATCH AS WELL AS CONTINUOUS-FLOW CONDITIONS
93	YOGENDRA NAILWAL	PH17065	CHEMISTRY	FUNCTIONAL POROUS ORGANIC POLYMERS FOR SENSING AND CATALYTIC APPLICATIONS
94	BULBUL MEHTA	PH17083	EES	MOLECULAR MARKERS FOR NATURAL AND ANTHROPOGENIC ORGANIC MATTER SOURCES AND DISTRIBUTION IN AQUATIC SYSTEMS FROM THE INDIAN SUBCONTINENT
95	VIANNI CHOPRA	PH17201	INS	FUNCTIONALISED CARBON BIOMATERIALS FOR BONE TISSUE ENGINEERING
96	GAURAV KUMAR	PH17202	INS	FUNCTIONAL ATTRIBUTES AND SELF-ASSEMBLY BEHAVIOR OF A SHELL PROTEIN FROM THE 1,2-PROPANEDIOL UTILIZATION PROKARYOTIC METABOLOSONE
97	AAKRITI SINGH	PH17203	INS	SURFACE FUNCTIONALIZED BIOCOMPATIBLE LIPID NANOCARRIERS AS AN ORAL ANTI-LEISHMANIAL THERAPY

98	GURPREET KAUR	PH17205	INS	TRACKING THE ULTRAFAST PHOTOPHYSICAL EVENTS IN ALL INORGANIC METAL HALIDE PEROVSKITES THROUGH TRANSIENT ABSORPTION SPECTROSCOPY
99	MANJU SHARMA	PH17206	INS	SMALL MOLECULE DERIVED NANOTHERANOSTICS FOR ALZHEIMER'S DISEASE
100	TANMAY GOSWAMI	PH17208	INS	SPECTROSCOPIC INVESTIGATION OF ULTRAFAST PHOTO-PHYSICAL PROCESSES IN CHALCOGENIDE BASED TWO- DIMENSIONAL (2D) MATERIALS
101	ANKUSH	PH17212	INS	NANOSTRUCTURED PHOSPHORUS- BASED COMPOUNDS AND THEIR APPLICATION TOWARDS ELECTROCHEMICAL HYDROGEN GENERATION
102	MUJEEB ALAM	PH17213	INS	AUTONOMOUS FLUID-FLOW ON SUPRAMOLECULAR INTERFACES: A STEP TOWARDS POWERLESS MICROFLUIDIC DEVICE
103	DEEPAK KUMAR CHAUHAN	PH17219	INS	SOLAR-FUELS AND VALORIZED ORGANIC PRODUCTS FROM BIOMASS-BASED PRECURSORS: BOOSTING BIO-CHEMICAL ECONOMY THROUGH CARBON NITRIDE BASED PHOTOCATALYTIC SYSTEMS
104	NAVPREET	PH17220	INS	MODULATION OF GRAPHENE AND ITS HYBRID NANOSTRUCTURES TOWARD THE DEVELOPMENT OF HYBRID ENERGY STORAGE DEVICES
105	SONALI KAKKAR	PH17221	INS	FIRST-PRINCIPLES STUDIES OF TRANSITION METAL CHALCOGENIDES AND OXIDE HETEROSTRUCTURES FOR SPINTRONIC APPLICATIONS
106	KAMALJIT KAUR	PH17225	INS	OPTICALLY ACTIVE NANOMATERIALS IN FOOD AND AGRICULTURE APPLICATIONS
107	ASHIMA	PH17226	INS	SPIN-POLARIZED ELECTRON TRANSPORT THROUGH ORGANIC MAGNETIC MOLECULES
108	RAKESH KUMAR MISHRA	PH17232	INS	BIOCOMPATIBLE NANOCARRIER- MEDIATED DRUG DELIVERY FOR THE MANAGEMENT OF DISEASE SEVERITY OF EXPERIMENTAL COLITIS
109	PRIYANKA PAL	PH17304	CIAB	SELECTIVE OXIDATION OF BIOMASS- DERIVED 5-HYDROXYMETHYL FURFURAL WITH MANGANESE OXIDE-BASED CATALYST
110	VINITA SHARMA	PH17401	NABI	CHARACTERIZATION OF WHEAT GRANULE-BOUND STARCH SYNTHASE I NOVEL ALLELES AND GBSSI-PTSTI INTERACTION AFFECTING AMYLOSE BIOSYNTHESIS

111	ARPITH KUMAR	PH18013	PHYSICS	NON-PERTURBATIVE SIMULATIONS OF QUANTUM FIELD THEORIES USING COMPLEX LANGEVIN DYNAMICS
112	NAVDEEP SINGH DHINDSA	PH18086	PHYSICS	NON-PERTURBATIVE STUDIES OF NON-CONFORMAL FIELD THEORIES
113	MD. REJAUL KARIM	PH18202	INS	DEVELOPMENT OF LOW DIMENSIONAL COBALT-IRON BASED HEUSLER ALLOY SYSTEMS FOR MAGNETIC AND MAGNETO-OPTICAL APPLICATIONS
114	RAIHAN AHAMMED	PH18203	INS	FIRST-PRINCIPLES QUANTUM MECHANICAL INSIGHTS INTO EMERGING 2D MATERIALS FOR FUTURISTIC ELECTRONICS AND ENERGY
115	MANISH	PH18210	INS	OPTO-ELECTRICAL PROPERTIES OF THE 2DEG AT THE CONDUCTING INTERFACE OF EUO-KTAO ₃
116	ASHISH GAUR	PH18212	INS	NANOSTRUCTURED MATERIALS FOR ENERGY APPLICATION
117	SONI JIGNESH MOHANBHAI	PH19206	INS	DEVELOPMENT OF A MELATONIN MEDIATED THERAPEUTIC APPROACH IN THE TREATMENT OF INFLAMMATORY BOWEL DISEASE
118	RISHU KHURANA	PH19210	INS	AB INITIO MODELING OF MOLECULAR MAGNETS

MS Graduates

S.No.	Name	Reg.No.
1	Aditya Biswas	MP19003
2	Rishov Mondal	MP20005
3	Biplab Das	MP20008
4	Barnali Jana	MP20010
5	Anunoy Chakraborty	MP20011
6	Sk Sunny Alam	MP20013
7	Syed Mohammad Hammad	MP20015
8	Aditya Biswas	MP19003

20 LIST OF PUBLICATIONS



PUBLICATIONS FOR YEAR 2023

A. Publications for the Calendar year 2023

Department of Mathematical Sciences

1. Ayan Chatterjee, K Ganesh, Michael Reigler and P °al Halvorsen (2023). Meta-Heuristic Feature Optimization for Classifying Multimodal HRV Datasets for Stress Prediction: An Explainable Approach Towards Ethical AI, Research Square (Research Square), 3114142.10.21203/rs.3.rs-3114142/v1
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Department of Chemical Sciences

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Department of Earth and Environmental Sciences

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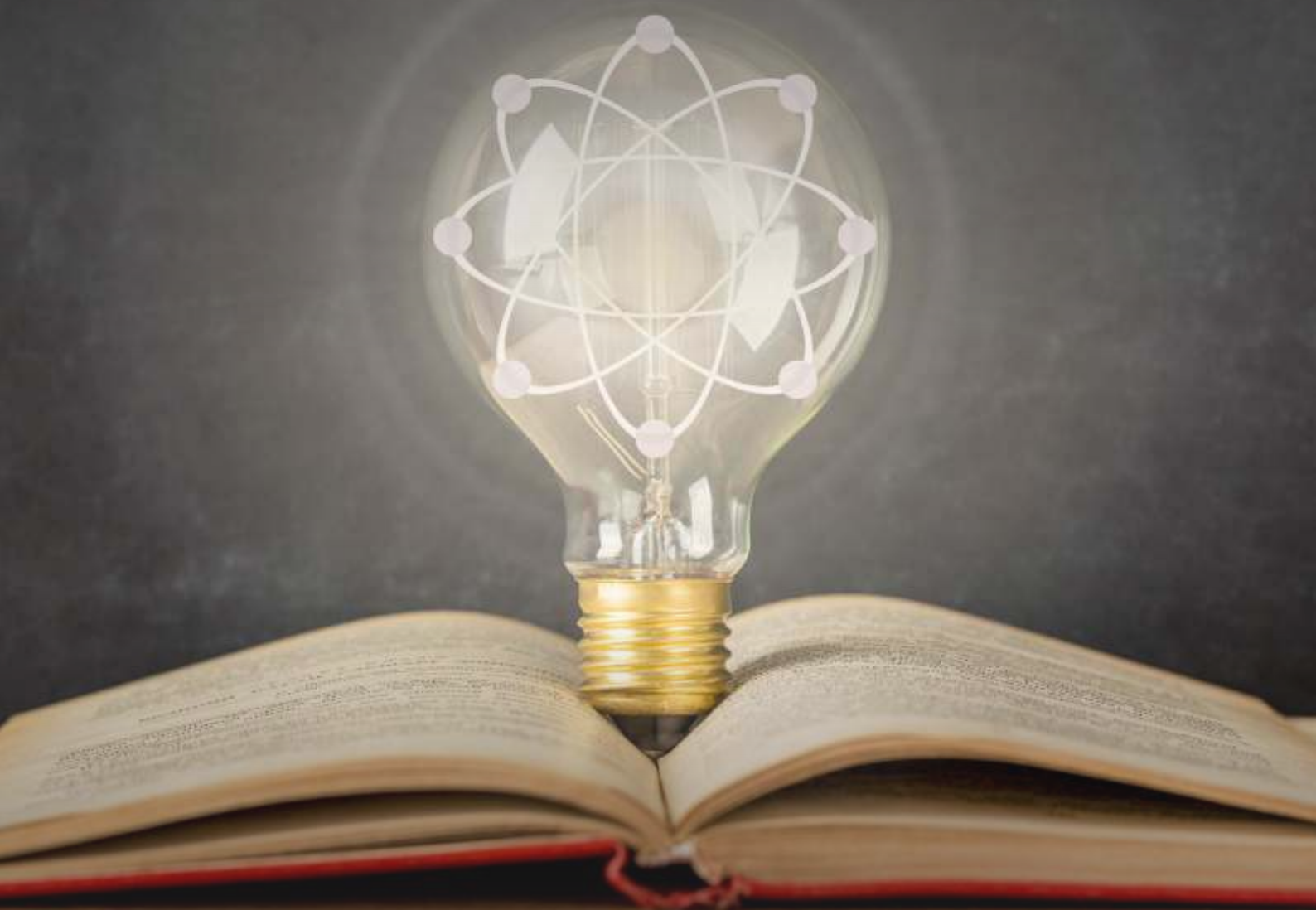
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21 PATENTS



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- Sudhakar Singh, Surbhi Dahiya and Sharvan Sehrawat (2023) ANTI-VIRAL SINGLE DOMAIN ANTIBODIES AND METHOD OF PREPARATION THEREOF. Patent application number 202211016615.

Ananth Venkatesan

- A provisional patent is up for examination. We are improving the process and diversifying its applicability to other materials.

Samir Kumar Biswas

- An Ultrasound, Thermoacoustic And Photoacoustic Transducer, Nano Fiber-Based Sensor Film And Preparation Patent Application Number 202411008234
- Multi-Bandwidth Ultrasound, Thermoacoustic and Photoacoustic Transducer, Composite Sensor Film And Preparation There of Patent Application Number 202411008237

Srinivasarao Arulananda Babu

- Inventors: Srinivasarao Arulananda Babu and Naveen
Patent Application No. 2152/DEL/2013, Date: 18th July 2013
Patent No. 491810 (Granted on 29.12.23).
Title: Novel Class of Crown Ether/Polyether Macrocyclic Compounds and the Process of Preparation Thereof
- Inventors: Srinivasarao Arulananda Babu, Ramarao Parella and Bojan Gopalakrishnan
Patent Application No. 1240/DEL/2013, Date: 26th April 2013
Patent No. 466019 (Granted on 06.11.23).
Title: Novel Di- and Trisubstituted Cyclopropanecarboxamide Compounds and the Process of Preparation Thereof

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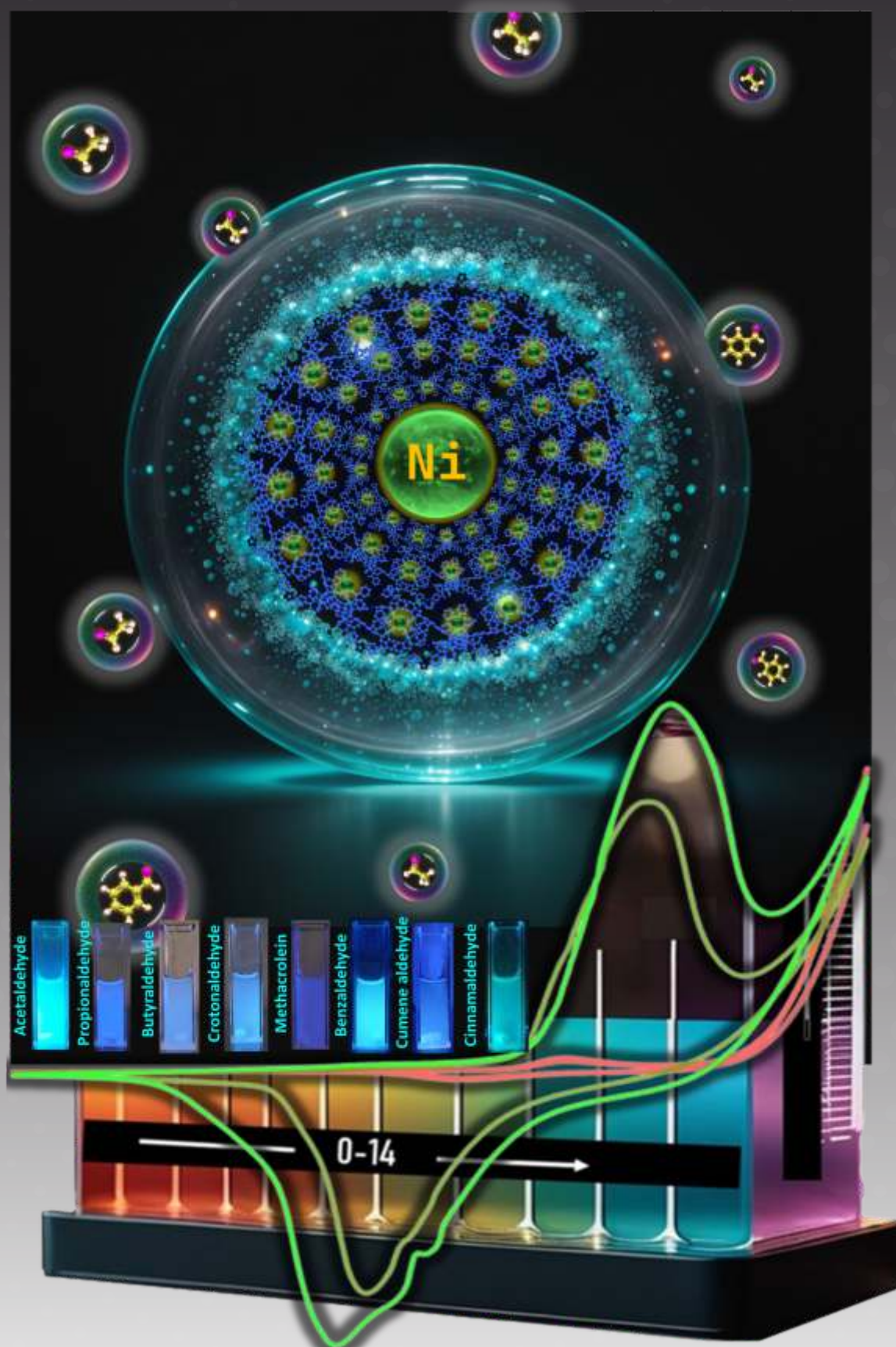
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