

ANNUAL REPORT 2011-2012



Indian Institute of Science Education and
Research(IISER) Mohali

March 31, 2012

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1 Preface

The Indian Institutes of Science Education & Research (IISERs) were established by the Ministry of Human Resource Development (MHRD), Government of India, based on the recommendation of the Scientific Advisory Council to the Prime Minister. Five IISERs have been created and are functioning at Pune, Kolkata, Mohali, Bhopal and Thiruvananthapuram. The basic mandate of the IISERs is to carry out research in frontier areas of science and to provide quality science education at the undergraduate and the postgraduate level. Each IISER is an autonomous institution and will award its own degrees.

The major focus at IISER Mohali is to create a world class scientific institution with an intellectually alive research atmosphere.

IISER Mohali's fully residential campus is coming up on 125 acres of land in the Knowledge City at Sector 81 Mohali. During 2011-12, much of the teaching and research activity shifted from the transit campus in Sector 26, Chandigarh to the campus at Knowledge City. Residential blocks and the shopping centre with the post office became operational on the campus. Construction of academic block I, lecture hall complex, guest house, auxiliary apartments and the engineering building is nearing completion. Construction work of academic block II, informatics centre and two more hostels is in progress. Work on animal house, sports complex, health center, workshop and administrative building is expected to start in coming months. All in all, we expect that the intensity of the academic and research program will pick up as more facilities become available in coming months. Some of the research laboratories continue to operate from the transit campus of the institute.

IISER Mohali started functioning in 2007 with the first batch of the five year BS-MS dual degree students. The first batch is expected to graduate in May 2012. The program has been structured to promote interdisciplinarity and a significant research component. The core part of the program provides comprehensive training in all basic sciences during the first two years. Students are expected to choose a subject to major in for the remaining three years where the curriculum is divided between mandatory courses, subject electives and open electives. Open electives can be taken in any subject and allow students to fashion their own programs. Apart from courses in specific subjects, some inter-disciplinary courses are also offered on a regular basis. These courses are in areas that are useful to multiple branches of science, or are in distinct areas like earth, planetary and environmental sciences, computational sciences, etc. Courses in humanities & social sciences are also offered. With 137 courses on offer during the academic year 2011-12, there is clearly no dearth of choices for the students. The students are expected to work on short research projects during summer vacations, either at IISER Mohali or at research laboratories and institutes elsewhere. The students spend much of their time during their final

year on a research project. The project culminates in a thesis and is expected to contain at least some original work. It is expected that some of the projects will lead to publications in peer reviewed journals.

The number of students in the BS-MS program is 319 at present. KVPY scholars, those appearing in IIT-JEE merit list and those who meet the eligibility criterion for INSPIRE scholarship of DST by scoring good marks in various board exams are eligible to apply for admission to BS-MS Dual Degree programme of IISERs. The BS-MS graduates of IISER Mohali are expected to take up science as a career, although the diverse skills gained will equip them to pursue high-profile careers in any field, including industry and government.

IISERs have a PhD program and the first batch of research scholars at IISER Mohali are expected to submit their thesis during the coming year. At present we have 89 student at various levels in the PhD program in biology, chemistry, mathematics, physics, earth and environmental sciences, and, humanities and social sciences. The PhD program at IISER Mohali involves course work, a qualifying examination, thesis work and a thesis examination, leading to the award of a PhD degree. Besides research, the scholars are involved in several activities such as helping the faculty in laboratory sessions, seminars, journal clubs, workshops and review meetings.

IISER Mohali has a faculty strength of around 50 spread over different disciplines. The faculty is selected on a highly competitive basis. Faculty members are given adequate support for setting up their laboratories. They have been getting significant support for their research program from funding agencies.

Research infrastructure available at the institute includes a modern library with access to many research journals and online databases, a high performance computing facility and a number of instruments. New facilities are added on the basis of requirements of the faculty.

IISER Mohali is active in science outreach activities in the region. An outreach committee comprising of Professor Arvind (Coordinator), Professor J S Bagla, Professor K S Viswanathan, Dr. N G Prasad, Dr. Amit Kulshreshtha, Dr. Anu Sabhlok and Dr. Vinayak Sinha has been setup to plan and execute outreach activities for a period of 3 years. The institute is setting up an outreach center which will be a unique center of its kind and in this context, a presentation was made to the board of governors.

The institute is collaborating with the government of Himachal Pradesh, where a *Centre for Science Learning and Creativity* is coming up. IISER Mohali is providing technical inputs and in this context Professor J S Bagla, Dr. Amit Kulshreshtha, Dr. N G Prasad, Dr. Vinayak Sinha and Professor Arvind have helped to organize two science camps in Himachal Pradesh during this year. The group also participated in a brainstorming session on formation of the centre in Shimla.

IISER Mohali aims to be the leading centre for research and education in basic sciences in the northern region. The institute is developing a synergetic network with other academic institutions both in India and abroad, and holds regular conferences, seminars and symposia in research areas as well as workshops aimed at addressing fundamental issues in science education in India.

2 Board of Governors

- Dr. R A Mashelkar (Chairman)
National Professor, CSIR Bhatnagar Fellow, National Chemical Laboratory,
Pune 411 008.
- Ms. Vibha Puri Das, IAS (Member)
Secretary (HE),
Department of Higher Education,
Ministry of Human Resource and Development,
Shastri Bhavan,
New Delhi 110001.
- Shri S C Agarwal, IAS (Member)
Chief Secretary
Punjab Civil Secretariat
Government of Punjab
Chandigarh 160 001
- Dr. M K Bhan (Member)
Secretary,
Department of Biotechnology (DBT)
CGO Complex, Lodi Road
New Delhi 110 001
- Ms. S Jalaja (Member)
Secretary (AYUSH),
Department of AYUSH
1, Red Cross Building
New Delhi 110 114
- Dr. S Ayyapan (Member)
Secretary,
Department of Agriculture Research and Education (DARE)
& Director General, ICAR
Krishi Bhavan
New Delhi - 110 114
- Professor P Balaram (Member)
Director, Indian Institute of Science
Bangalore 560 012

- Professor M K Surappa (Member)
Director, IIT Ropar
Nangal Road, Rupnagar
Punjab 140 001.
- Professor K N Ganesh (Member)
Director,
Indian Institute of Science Education & Research Pune
900 NCL Innovation Park
Homi Bhabha Road,
Pune 411 008
- Dr. Lalji Singh (Member)
Vice Chancellor, Banaras Hindu University, and, Bhatnagar Fellow (CSIR)
Banaras Hindu University
Varanasi - 221005
- Dr. Sibaji Raha (Member)
Director, Bose Institute
Centenary Campus
p1/12, C.I.T. Road, Scheme - VIIM
Kolkata 700 054
West Bengal
- Professor Ram Sagar (Member)
Director,
Aryabhata Research Institute of Observation Sciences (ARIES)
Manora Peak
Nanital 263 129
Uttarakhand
- Dr. S Kathiroli (Member)
Chief Scientist
National Institute of Ocean Technology NIOT Campus
Velachery - Tambaram Main Road
Narayanapuram, Pallikaranai
Chennai 600 100
Tamil Nadu
- Shri S K Ray
Joint Secretary & Financial Advisor
Ministry of Human Resources and Development

Shastri Bhawan
New Delhi 110 001

- Professor Arvind
IISER Mohali
Knowledge City
Sector 81, S A S Nagar, Mohali
P.O. Manauli 140306
Pinjab
- Professor Sudeshna Sinha
IISER Mohali
Knowledge City
Sector 81, S A S Nagar, Mohali
P.O. Manauli 140306 Punjab
- Professor N Sathyamurthy
Director, IISER Mohali
Knowledge City
Sector 81, S A S Nagar, Mohali
P.O. Manauli 140306
Punjab
- Dr. P Bapaiah (Secretary)
Registrar, IISER Mohali,
Knowledge City
Sector 81, S A S Nagar, Mohali
P.O. Manauli 140306
Punjab

3 Academic Senate

- Professor N Sathyamurthy (Chairman)
Director, IISER Mohali
Knowledge City
Sector 81, S A S Nagar, Mohali
P O Manauli 140306
Punjab
- Professor Ashok Sahni (Member)
Centre for Advanced Study in Geology
Panjab University, Chandigarh
- Professor S V Kessar (Member)
Department of Chemistry,
Panjab University, Chandigarh
- Dr. Girish Sahni (Member)
Director, IMTECH, Sector 39
Chandigarh
- Professor B N Goswami (Member)
Emeritus Professor, Panjab University
Chandigarh 160 014
- Professor M K Surappa (Member)
Director, IIT Ropar
Nangal Road, Rupnagar
Punjab -140 001
- Professor R C Sobti (Member)
Vice-Chancellor, Panjab University
Chandigarh
- Dr. Rakesh Tuli (Member)
Director, National Agri-Food Biotechnology Institute (NABI)
C-127, Industrial Area
Phase VIII, Mohali 160 071
- Professor K K Bhutani (Member)
National Institute of Pharmaceutical Education and Research(NIPER)

Sector 67, Phase X
SAS Nagar, Mohali -160062

- Professor Arvind (Member)
Dean Students, IISER Mohali
Knowledge City
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Punjab
- Professor Kapil Hari Paranjape (Member)
Dean Academics, IISER Mohali
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- Professor Sudeshna Sinha (Member)
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- Professor A K Bachhawat (Member)
Dean Faculty , IISER Mohali
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- Professor P Guptasarma (Member)
IISER Mohali, Knowledge City
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- Professor J S Bagla (Member)
Dean (Research and Development) , IISER Mohali
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- Professor Ramesh Kapoor (Member)
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- Professor C G Mahajan (Member)
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- Professor I B S Passi (Member)
Honorary Professor, IISER Mohali
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- Dr. Sanjay Mandal (Member)
Associate Professor, IISER Mohali
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- Dr. N G Prasad (Member)
Assistant Professor

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- Dr. Chanchal Kumar (Member)
Assistant Professor, IISER Mohali
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Punjab
- Dr. Anu Sabhlok (Member)
Assistant Professor
IISER Mohali
Knowledge City
Sector 81, S A S Nagar, Mohali
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Punjab
- Dr. P Bapaiah (Secretary)
Registrar, IISER Mohali
Knowledge City
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4 Research Advisory Committee

- Dr. S Sivaram, NCL Pune (Chairperson)
- Dr. S Rath, NII Delhi
- Prof. H S Mani, CMI Chennai
- Dr. Rajender Bhatia, ISI Delhi
- Prof. J S Bagla, Dean (R&D), IISER Mohali (Convenor)

5 Administration

Director	Professor N Sathyamurthy
Dean (Faculty)	Professor A K Bachhawat
Dean (Academic)	Professor Kapil Paranjape
Dean (Students)	Professor Arvind
Dean (R&D)	Professor J S Bagla
Registrar	Dr. P Bapaiah
Coordinator	Dr. Jagdeep Singh (On Deputation from Punjab Govt.)
Assistant Registrar	Sh. Sandeep Ahlawat
Deputy Librarian	Dr. P Visakhi
Executive Engineer cum Estate Officer	Mr. Praveen Kumar Srivastava
Stores & Purchase Officer	Sh. Kulwant Singh
Honorary Counsellor	Mrs. Suguna Sathyamurthy
Warden (Boys)	Dr. Arulananda Babu
Warden (Boys)	Dr. N G Prasad
Warden (Girls)	Dr. Anu Sabhlok
Security Officer cum PRO	Sh. J N Ahuja
Medical Consultant	Dr. S K Aggarwal
Lady Medical Consultant	Dr. Virpal J Singh
Advisor land Scape & Horticulture	Dr. J S Bilga
Scientific Officer	Dr. Paramdeep Singh Chandi
Assistant Engineer Electrical	Er. Atul Kadwal
Assistant Engineer Civil	Er. Rajeev Kumar

6 Academic Staff

6.1 Faculty

1. Professor N Sathyamurthy (Professor, Chemistry)
Research area: Molecular Reaction Dynamics and Potential Energy Surfaces
2. Professor R Kapoor (Professor, Chemistry)
Research area: Inorganic chemistry
3. Professor C G Mahajan (Professor, Physics)
Research area: Atomic/ Molecular Spectroscopy
4. Professor Arvind (Professor, Physics)
Research area: Quantum information theory, Quantum optics
5. Dr. Kavita Dorai (Assistant Professor, Physics)
Research area: Biomolecular NMR, Quantum computing
6. Dr. Sanjay Singh (Assistant Professor, Chemistry)
Research area: Synthetic Inorganic and Organometallic Chemistry
7. Dr. Amit Kulshrestha (Assistant Professor, Mathematics)
Research area: Quadratic forms, Central simple algebras and related structures
8. Dr. Sanjay Mandal (Associate Professor, Chemistry)
Research area: Organometallic Chemistry, Nanomaterials, and X-ray Diffraction
9. Dr. Chanchal Kumar (Assistant Professor, Mathematics)
Research area: Algebraic Geometry and Combinatorial Commutative Algebra
10. Dr. Ramandeep Singh Johal (Assistant Professor, Physics)
Research area: Statistical Physics, Thermodynamics and Quantum Theory
11. Dr. Samrat Ghosh (Assistant Professor, Chemistry)
Research area: Materials chemistry
12. Dr. R Ramesh (Assistant Professor, Chemistry)
Research area: Development of Solid-state NMR methods, Quantum mechanics
13. Dr. Lingaraj Sahu (Assistant Professor, Mathematics)
Research area: Operator Theory, Operator Algebras

14. Dr. S Mukhopadhyay (Assistant Professor, Biology/Chemistry)
Research area: Protein folding, Misfolding, Prion & Amyloid biology
15. Dr. N G Prasad (Assistant Professor, Biology)
Research area: Evolutionary genetics
16. Dr. S Arulananda Babu (Assistant Professor, Chemistry)
Research area: Synthetic organic chemistry
17. Dr. A Mukhopadhaya (Assistant Professor, Biology)
Research area: Immunology
18. Dr. K Chattopadhyay (Assistant Professor, Biology)
Research area: Structure-Function Studies on Pore-Forming Protein Toxins
19. Dr. Rajeev Kapri (Assistant Professor, Physics)
Research area: Statistical Mechanics
20. Dr. Lolitika Mandal (Assistant Professor, Biology)
Research area: Hematopoiesis, Cardiogenesis and Molecular pathways in stem and progenitor cell development in *Drosophila*.
21. Dr. Sudip Mandal (Assistant Professor, Biology)
Research area: Mitochondrial regulation of cellular function
22. Dr. Kamal P Singh (Assistant Professor, Physics)
Research area: Ultrafast Quantum Dynamics and Stochastic nonlinear dynamics
23. Dr. Pranaw Rungta (Assistant Professor, Physics)
Research area: Quantum Information and Computation
24. Dr. Angshuman Roy Choudhury (Assistant Professor, Chemistry)
Research area: X-ray Crystallography
25. Dr. K P Yogendran (Assistant Professor, Physics)
Research area: Quantum aspects of Gravity
26. Dr. R Vijaya Anand (Assistant Professor, Chemistry)
Research area: Synthetic organic chemistry
27. Professor Kapil Hari Paranjape (Professor, Mathematics)
Research area: Geometry

28. Professor Sudeshna Sinha (Professor, Physics)
Research area: Nonlinear Dynamics, Chaos, Complex Systems, Networks, Computation
29. Dr. Anu Sabhlok (Assistant Professor, Humanities)
Research area: Postcolonial studies, feminist geography, Political-economy of contemporary India, Globalization , Identity (gender and nation), Participatory Action Research, Ethnography
30. Dr. Samarjit Bhattacharyya (Assistant Professor, Biology)
Research area: Neurobiology
31. Dr. Ananth Venkatesan (Assistant Professor, Physics)
Research area: Mesoscopic Electronic & Electromechanical systems
32. Prof. Jasjeet Singh Bagla (Professor, Physics)
Research area: Cosmology, Astrophysics
33. Dr. Krishnendu Gongopadhyay (Assistant Professor, Mathematics)
Research area: Groups, Geometry & Dynamics
34. Dr. Vinayak Sinha (Assistant Professor, Earth Sciences & Chemistry)
Research area: Environmental Science: Atmospheric Chemistry Field Experiments
35. Prof. Anand K Bachhawat (Professor, Biology)
Research area: Glutathione and Sulphur Metabolism in Yeasts
36. Prof. Purnananda Guptasarma (Professor, Biology)
Research area: Protein Engineering & Structural Biochemistry
37. Dr. Sanjeev Kumar (Assistant Professor, Physics)
Research area: Condensed Matter Theory: Correlated electron systems, disordered systems
38. Dr. Santanu Kumar Pal (Assistant Professor, Chemistry)
Research area: Liquid Crystals, Interfacial Phenomena, Colloid and Gel Chemistry, Chemical and Biological Sensing, Nanoscale Science and Engineering
39. Dr. Yogesh Singh (Assistant Professor, Physics)
Research area: Experimental Condensed Matter Physics
40. Dr. Harvinder Kaur Jassal (Assistant Professor, Physics)
Research area: General Relativity and Cosmology

41. Dr. K R Shamasundar (Assistant Professor, Chemistry)
Research area: Quantum Chemistry
42. Professor Sudesh Kaur Khanduja (Professor, Mathematics)
Research area: Valuation theory
43. Dr. Kavita Babu (Assistant Professor, Biology)
Research Area: Neurobiology
44. Professor K S Viswanathan (Professor, Chemistry)
Research Area: Spectroscopy
45. Dr. S V Rama Sastry Sripada (Assistant Professor, Chemistry)
Research Area: Synthetic Organic Chemistry
46. Dr. Bärbel Sinha (Assistant Professor, EES)
Research Area: Environmental Science
47. Dr. Mahak Sharma (Assistant Professor, Biology)
Research Area: Cell Biology
48. Professor Somdatta Sinha (Professor, Biology)
Research Area: Mathematical & computational Biology
49. Dr. Yashonidhi Pandey (Assistant Professor, Mathematics)
Research Area: Algebraic Geometry
50. Dr. Rachna Chaba (Assistant Professor, Biology)
Research Area: Bacterial Genetics and Physiology
51. Dr. Ram Kishor Yadav (Assistant Professor, Biology)
Research Area: Plant Developmental Genetics

6.2 Honorary Faculty

1. Professor I B S Passi (Professor, Mathematics)
Research area: Algebra
2. Professor Ashok Sahni (Professor, Earth Sciences)
Research area: Earth Sciences
3. Professor Anil Kumar (Professor, Physics)
Research area: NMR Spectroscopy

6.3 Visiting Faculty

1. Professor T R Rao (Visiting Professor, Biology)
2. Professor H L Vasudeva (Visiting Professor, Mathematics)
3. Professor K K Sharma (Visiting Professor, Physics)
4. Professor Shobha Madan (Visiting Professor, Mathematics)
5. Dr. Meera Nanda (Visiting Professor, History & Philosophy of Science)
6. Dr. Bhas Bapat (Visiting Faculty, Experimental Atomic & Molecular Physics)
7. Dr. S K Arun Murthi (Visiting Faculty, Philosophy of Science)
8. Dr. Adrene Freeda D'cruz (Visiting Faculty, English Literature)

6.4 Adjunct Faculty

1. Dr. Girish Sahni (Biology), Director, IMTECH, Chandigarh
2. Dr. Jagdeep Singh (Biology), Punjab Government
3. Dr. S A Ramakrishna (Physics), Associate Professor, IIT Kanpur
4. Professor Dhruv Raina (Social Science), Professor, JNU, New Delhi
5. Professor Amitabh Joshi (Biology), Professor, JNCASR, Bangalore
6. Dr. Rakesh Tuli (Biology), Executive Director, NABI Mohali
7. Dr. Amitabha Chattopadhyay (Biology), Deputy Director, CCMB Hyderabad
8. Professor Abhay Bhat, Mathematics, ISI New Delhi
9. Professor V Arvind, Mathematics, IMSc, Chennai
10. Dr. Arvinder Singh Sandhu, Physics, University of Arizona, Tucson AZ, USA
11. Dr. Sundar Sarukkai, Philosophy Humanities, Manipal University, Manipal
12. Professor Rajendra Bhatia, Mathematics, ISI New Delhi

7 Events: 2011-12

- Independence day (August 15 2011) was celebrated at IISER Mohali's new campus. The CNR Rao Foundation award was shared by Mr. Samant Manas Arun, Mr. Sumit Chandra Mishra and Ms. Tanya Kaushal Srivastava. Academic excellence awards were given to Mr. Rishi Raj Trivedi, Ms. Amita Agarwal, Mr. Dharmendra Kumar, Ms. Rajni Ranjan, Mr. Amol A Deshmukh, Mr. Mohit Satish Tanga, Ms. Kasturi Banerjee, Mr. Kapil Dave, Mr. Jithin Paul M, Ms. Anshu Gupta and Mr. Agatsya P Bhati.
- IISER Mohali Foundation Day was celebrated on 27th September 2011. This was the first foundation day to be celebrated in the upcoming lecture hall complex at the Mohali campus. The Foundation Day Lecture was given by Prof. R A Mashelkar (National Research Professor and CSIR Bhatnagar fellow), the Chairman of the Board of Governors, IISER Mohali.
- Republic Day was celebrated on Jan 26, 2012 at the IISER Mohali campus. Ms. S. Shwetha received the CNR Rao foundation prize for the 2011-2012 I Semester. Ms. Debanjana Kundu, Mr. Sumit Chandra Mishra, Ms. Tanya Kaushal Srivastava, Ms. Kanwal Puneet Kaur, Mr. Agastya P Bhati, Mr. Debdatta Sinha Roy, Ms. Abhilasha Joshi, Mr. Kapil Dave, Mr. Keshav Aggarwal, Mr. Rishi Raj Trivedi, Ms. Rajni Ranjan and Ms. Amita Agarwal were given the academic excellence prize for the best performing students.

7.1 Meetings of the Institute Bodies

During 2011-2012, various administrative bodies of the Institute met for deliberations.

Meeting of the Registered Society

2 nd meeting of Society	: 28/03/2012
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Board of Governors Meeting

10 th meeting of BOG	: 12/05/2011
11 th meeting of BOG	: 27/11/2011
12 th meeting of BOG	: 28/03/2012

Finance Board Meeting

8 th meeting of the Finance Board	:	12/05/2011
9 th meeting of the Finance Board	:	27/11/2011
10 th meeting of the Finance Board	:	28/03/2012

Academic Senate Meeting

9 th meeting of Academic Senate	:	06/05/2011
10 th meeting of Academic Senate	:	16/12/2011

Research Advisory Committee Meeting

4 th meeting of Research Advisory Committee	:	26/03/2012
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7.2 Foundation Day Celebrations

The sixth Foundation Day of IISER Mohali was celebrated on September 27, 2011 in the lecture hall complex in the new campus. The foundation day lecture was delivered by Prof. R A Mashelkar (National Research Professor and CSIR Bhatnagar fellow). Prof. Mashelkar is the president of Global research alliance, a network of publicly funded R&D institutes from Asia-Pacific, Europe and USA with over 60,000 scientists. He is also the chairman of India's National innovation foundation. Prof. Mashelkar is the chairman of the board of governors of IISER Mohali.

The foundation day lecture was entitled *More for less for more* and it focussed on what Prof. Mashelkar termed as an emerging revolution. He noted that global realities are forcing business to come up with innovative ideas that allow them to reach out to a large fraction of the population. Inclusive and sustainable growth are the modern avatar of the Gandhian approach where the underlying theme is to innovate so that we can achieve more, at a lower cost, for more people. Prof. Mashelkar illustrated this thesis with a variety of examples. He also exhorted the large gathering of students to realise that innovation is essential for progress and that the study of basic sciences must be accompanied by a clear vision of how we can make use of research in sciences for improving our lives. Knowledge must be converted into practical ideas for it to be relevant, and it is essential that we complete the process in order to exploit the full potential of basic ideas.

7.3 Session on Nobel prizes

A set of popular lectures were organized around the theme of the 2011 Nobel prizes in Science on October 22, 2011 at IISER Mohali. Six lectures were arranged in two sessions to highlight the work and discoveries that led to the award. The lectures were as follows:

- Dr. Anu Sabhlok: *The peace prize.*
- Dr. Adrene Freeda D’cruz: *The prize in literature.*
- Prof. Sucha Singh Gill (CRRID, Chandigarh): *The economics prize.*
- Dr. Sanjay Mandal: *The chemistry prize.*
- Dr. Arunika Mukhopadhyay: *The prize in medicine.*
- Prof. J S Bagla: *The physics prize.*

7.4 Celebration of Science Day

Science Day was celebrated this year on February 28, 2012 with a program organized by our students for the school students of the region. This time the program took place in our new lecture hall complex and a variety of events were organized. A stimulating science quiz which also included a component for citizens was organized. The programme also involved taking the school students through demonstrations of experiments in various science laboratories of the Institute. An open session of school students with scientists from IISER Mohali was organized where questions from students were answered by the faculty. A photography exhibition was also organized by the Photography and Videography club of IISER Mohali on this day.

8 Meetings/Conferences/Workshops organized

- **ATM Workshop in Group Theory :** The advanced training workshop was held at IISER Mohali during May 16–21, 2011. The workshop was sponsored by the National Board of Higher Mathematics and IISER Mohali. The meeting was organized by Prof. I B S Passi and Dr. Amit Kulshrestha. Main themes of the workshop were *Gromov’s theorem on growth of groups* and *the theory of Braid groups*. The workshop was aimed at PhD students and young researchers.

- **KVPY Camp:** KVPY Summer Camp at IISER Mohali was organized during June 6–10, 2011. In this camp more than 100 KVPY scholars from all over the country spent a week at IISER Mohali learning about science through lectures, demonstrations and experiments.

The talks were organized so as to expose the KVPY scholars to a variety of themes including social sciences. The camp was inaugurated by Director IISER Mohali Prof. N Sathyamurthy and the KVPY national convener Professor Chandrasekaran delivered the first lecture on "Chemistry for Sustainable development". The speakers were chosen from diverse fields of science and social science and included Prof. G Srinivasan (IITB), Prof. Dhruv Raina (JNU), Prof. Harjinder Singh (IIIT), Prof. Mohan Ram (Delhi), Prof. Umashaankar (GKVK), Prof. D V S Jain (PU), Dr. D Raghunandan (CTD-DST) and Dr. Jaspreet Takhar (Chandigarh). Faculty members from IISER Mohali also delivered lectures during the camp.

The entire IISER faculty played a crucial role by volunteering in various capacities. The chemistry demonstrations were organized by Dr. S A Babu and Dr. R Vijay Anand. The biology demonstrations were organized by Dr N G Prasad and Dr. Kausik Chattopadhyay. The physics demonstrations were organized by Dr. K P Singh and Dr. Sanjeev Kumar. The mathematics demonstrations were organized by Dr. Amit Kulshreshtha. Dr. Ramandeep Johal organized the film screenings. Dr. Kavita Dorai, Dr. Sanjay Mandal and Dr. Samrat Mukhopadhyay organized student visits to research facilities in CAF. The overall camp organization was coordinated by Prof. Arvind. IISER Mohali student volunteers participated in a big way in the organization of this camp and in particular in the process of showing science demonstrations to the KVPY scholars. They were guided by the faculty and the demonstrations were organized under by the Outreach Cell of the Institute.

- **ASI Symposium:** The first ASI (Astronomical Society of India) symposium titled *Cosmology and Galaxy Formation* was held at IISER Mohali during Nov.5–7, 2011. More than 40 participants attended the meeting and close to 30 talks, including six review talks were scheduled over a period of 3 days. The agenda of the meeting included two discussion sessions on the topics of galaxy formation and dark energy.
- **Emerging trends in Metabolomics Research:** A national level brainstorming session on "Emerging trends in metabolomics research" was organized during November 9-10, 2011 at IISER Mohali. Several scientists from across disciplines and institutions, and from both academia and industry participated in the meeting. Prof. Uma Shanker (GKVK, Bangalore), Dr. Venkatachalam

Suri (CEO, Connexios Ltd. Bangalore), Dr. Sheeba Vasu (JNCASR, Bangalore) and Dr. Yash Pal Singh (FRI, Dehradun) participated as experts from outside the institute. The core group of faculty from IISER Mohali comprised of Dr. Kavita Dorai (Convenor), Dr. N G Prasad, Dr. Vinayak Sinha and Dr. Baerbel Sinha.

- **Junior National Organic Symposium Trust (J-NOST) Conference:** The 7th Junior National Organic Symposium Trust (J-NOST) Conference was held at IISER Mohali during 15-18th December 2011. Many research scholars from India and the UK participated in the conference. The conference was inaugurated by Prof. N Sathyamurthy (Director, IISER Mohali), Prof. Vinod Singh (Chairman, NOST) and Prof. G S R Subba Rao (Chairman, NOST Board of Trustees). There were 3 plenary lectures and 60 oral presentations. The plenary lectures were given by Prof. T K Chakraborty (Director, CDRI Lucknow), Prof. Sandeep Verma (IIT Kanpur) and Prof. Javed Iqbal (Director, ILS Hyderabad). Prof. N Sathyamurthy was the patron of the meeting and Drs. R Vijaya Anand & S Arulananda Babu were co-convenors.
- **IISER-MPIC meet :**In 2011, the Department of Science and Technology, the Max Planck Institute for Chemistry in Mainz, Germany and the Indian Institute of Science Education and Research Mohali (IISERM) set up a joint Partner Group on "Tropospheric OH reactivity and volatile organic compound (VOC) measurements for validation of atmospheric chemistry-climate models and satellite retrievals". The Partner group collaborators are Prof. Jos Lelieveld (Director, Max Planck Institute for Chemistry (MPIC), Mainz, Germany) and Dr. Vinayak Sinha (Assistant Professor, IISER Mohali). On March 5-6, 2012, IISER Mohali and MPIC Mainz organized a 2-day workshop on "Atmospheric Chemistry in South Asia: Progress and Emerging Issues" to mark the formal inauguration of the Partner group and to initiate new bilateral projects. About 20 eminent German and Indian scientists participated in the workshop along with the faculty and students from IISER Mohali.

9 Faculty Activity

9.1 Research Activity

9.1.1 Dr. Amit Kulshrestha

The article (Kulshrestha & Singh, 2011) explores the relation between real conjugacy classes and real characters of finite groups at more refined level. This refinement

is in terms of properties of groups such as strong reality and total orthogonality. Some part of the article is expository in nature. However, we also present some calculations which support our hypothesis that strong reality and total orthogonality should coincide for many classes of groups.

9.1.2 Dr. Lolitika Mandal

In our recent paper (Cell, Dec 2011) we show that striking the right balance between blood cells and hematopoietic stem cells requires a complex *talkback* mechanism. Involvement of several proteins in this conversation was dissected out genetically.

Notch signalling plays many important roles during development of multicellular organism. The binding of the Notch receptor to its ligands results in transcriptional activation of downstream target genes. Our work published in Science (May, 2011) demonstrate the first in vivo example of Notch activation in a ligand independent manner.

How does the release of blood cells from the Drosophila hematopoietic organ compare to the similar process in vertebrate. In a paper (Development, Genes and Evolution, 2011) we have addressed the morphological changes that the hemocyte and its extracellular membrane undergo during the process.

Blood progenitors in embryo arise from a group of pluripotent stem cells known as hemangioblast. Using Drosophila, we have dissected out the signalling network that is involved in specification of these pluripotent stem cells (Developmental Biology, 2011).

9.1.3 Dr. Samrat Mukhopadhyay

This paper provides structural and dynamical description of a partially unfolded state of a protein that assembles into ordered amyloid fibrils under a carefully controlled laboratory condition. Additionally, our fluorescence spectroscopic readouts allow us to unravel the role of water molecules in protein conformation (Bhattacharya & Mukhopadhyay, 2012).

This paper aims at deciphering intriguing conformational properties of a natively unfolded or intrinsically disordered protein that aggregates to form amyloid fibrils. Here we have shown for the first time that pyrene-excimer formation can be used as a powerful readout of polypeptide chain collapse since the excimer fluorescence reports the proximity of two points in the polypeptide chain (Jain, Bhattacharya & Mukhopadhyay, 2012).

This paper describes the study of pH-induced conformational changes using a number of fluorescence spectroscopic readouts (Bhattacharya *et al.* 2011).

9.1.4 Dr Anu Sabhlok

The chapter forms part of the Sage Handbook of Qualitative Research (fourth edition) which is a peer reviewed research reference for traditional and newer qualitative methodologies. In this chapter (Brydon-Miller *et.al.*), we present a history of Participatory Action Research (PAR), a methodology that evolved in solidarity with broader efforts to create new forms of inquiry deeply connected to collective action for social justice. The historical overview is followed by elaborating the methodological frameworks, theories and methods that constitute PAR and we discuss particular research projects to raise questions within PAR. Sabhlok's ethnographic research with the Self Employed Women's Association in Gujarat is discussed and issues of insider/outsider, power differentials, academic/NGO collaborations and the intersections of research and activism are debated.

9.1.5 Dr. Kavita Dorai

We study multiple-spin coherence transfers in linear Ising spin chains with nearest-neighbor couplings. These constitute a model for efficient information transfers in future quantum computing devices and for many multidimensional experiments for the assignment of complex spectra in nuclear magnetic resonance spectroscopy. We experimentally implement the derived pulse sequences in three- and four-spin systems and demonstrate that they are applicable in realistic settings.

A novel diffusion-edited 3D NMR experiment that incorporates a SOFAST-HMQC pulse sequence in its implementation is presented. The present 3D SOFAST-DOSY pulse sequence provides a more sensitive and less time-consuming alternative to standard 3D HMQC-DOSY experiments. The feasibility of the technique is demonstrated on a mixture of amino acids, on a mixture of small molecules with similar diffusion coefficients, and on a complex mixture with large dynamic range (commercial gasoline).

The structural characterization of different kinds of zigzag and chiral single-walled carbon nanotubes (SWNTs) has been investigated theoretically using ^{19}F NMR spectroscopy. A set of fluorine chemical shift anisotropy (CSA) parameters comprising the span, skew and isotropic chemical shift is computed for each form of the fluoronanotubes and multi-dimensional CSA parameter correlation maps are constructed. We show that these correlations are able to clearly distinguish between the chiral and zigzag forms of fluorinated carbon nanotubes.

9.1.6 Professor Sudeshna Sinha

In Singh & Sinha (2011) it was shown that, when one presents two inputs to a bistable optical system, the response of the system can produce a logical OR/NOR

output, namely, the optical system behaves as a logic gate. The reliability of the logic operation is dependent on the noise intensity. As one increases the noise, the probability of the output reflecting the desired OR/NOR operation increases to nearly unity and then decreases. Further, changing the bias morphs the output into another logic operation, AND/NAND, whose probability displays analogous behavior. Thus the interplay of nonlinearity and noise yields flexible and robust logic behavior in this optical system.

In Gupta et al (2011) the intriguing possibility of obtaining dynamical behaviour equivalent to Logical Stochastic Resonance (LSR) in a noise-free bistable system, subjected only to periodic forcing, such as sinusoidal driving or rectangular pulse trains, was examined. It was found that such a system, despite having no stochastic influence, also yielded phenomena analogous to LSR, in an appropriate window of frequency and amplitude of the periodic forcing. The results were corroborated by circuit experiments.

In Storni et al (2012) the LSR results were extended and a simple dynamical system capable of yielding XOR logical outputs was suggested. This widened the scope of LSR, as XOR forms the basis of bit-by-bit addition, an operation that underlies arithmetic operations ubiquitous in computing devices. From a conceptual point of view, this extension demonstrates the ability of LSR to yield a non-monotonic input-output association.

In Kohar and Sinha (2012) it was demonstrated how noise allows a bistable system to behave as a memory device, as well as a logic gate. Namely, in some optimal range of noise, the system can operate flexibly, both as a NAND/AND gate and a Set-Reset latch, by varying an asymmetrizing bias. Thus it was shown how this system implements memory, even for sub-threshold input signals, using noise constructively to store information. This can lead to the development of reconfigurable devices, that can switch efficiently between memory tasks and logic operations.

9.1.7 Professor J S Bagla

The theme of the paper (Mitra *et al.*, 2011) is to study the formation rate of dark matter halos. A prescription for such a calculation was provided by Sasaki (1994) but it fails for models that fit data from N-Body simulations. The failure is embarrassing in that it predicts negative formation rates for halos of some masses. We have revisited the prescription and have understood the main reason for this failure. We have also replaced the incorrect step in the prescription with a calculation based on a more robust formalism. The proposed method of calculation is somewhat more complicated than the Sasaki prescription and requires numerical evaluation of an integral. The integrand contains conditional probabilities that the Sasaki formalism

attempted to approximate by a mass independent expression and thereby completing the integral analytically.

We have shown that the results are in agreement with N-Body simulations. Our approach also permits us to differentiate between major mergers that lead to sudden changes in masses of halos and more gradual changes. This is in contrast with most other work on this problem that uses the net rate of change in number density of halos as a proxy for the formation rate.

9.1.8 Dr. Pranaw Rungta

In this rapid communication we proposed an iterative algorithm to simulate the dynamics generated by any n-qubit Hamiltonian. The simulation entails decomposing the unitary time evolution operator U (unitary) into a product of different time-step unitaries. The algorithm product-decomposes U in a chosen operator basis by identifying a certain symmetry of U that is intimately related to the number of gates in the decomposition. We illustrate the algorithm by first obtaining a polynomial decomposition in the Pauli basis of the n-qubit quantum state transfer unitary by Di Franco *et al.*, [*Phys. Rev. Lett.* 101 230502 (2008)] that transports quantum information from one end of a spin chain to the other, and then implement it in nuclear magnetic resonance to demonstrate that the decomposition is experimentally viable. We further experimentally test the resilience of the state transfer to static errors in the coupling parameters of the simulated Hamiltonian. This is done by decomposing and simulating the corresponding imperfect unitaries.

9.1.9 Dr. Angshuman Roy Choudhury

Fluconazole, known since 1983, as an antifungal drug has been found to form a number of polymorphs and salts. In the recent publication, we have described the structures of four new polymorphs of fluconazole using single crystal X-ray diffraction. These polymorphs were grown in the presence of the one or the other cocrystal formers. The interactions of fluconazole molecules with the cocrystal former in the solution have possibly directed the crystal nucleation and growth of these new polymorphs. Although all the polymorphs have strong O-H \cdots N hydrogen bonds forming chain or dimers, the nature of the packing of the molecules is found to be a cumulative effect of a number of weaker intermolecular interactions such as C-H \cdots O, C-H \cdots N, and C-H \cdots F and the strong hydrogen bond.

9.1.10 Dr. S Arulananda Babu

The 1,3-dipolar cycloaddition reactions of azomethine ylides with unactivated norbornene dipolarophiles were reported in this communication. Our procedure has led

to the synthesis of a new class of norbornane-fused- spirooxindolopyrrolidines, spiroacenaphthylenolypyrrolidines, spiro-1,3-indandionolypyrrolidines and spirooxindolopyrrolidines having a fascinating architecture consisting of an array of stereocenters with an excellent degree of stereocontrol.

9.1.11 Dr. Bärbel Sinha

Sulfate aerosol plays an important but uncertain role in cloud formation and radiative forcing of the climate, and is also important for acid deposition and human health. The oxidation of SO_2 to sulfate is a key reaction in determining the impact of sulfate in the environment through its effect on aerosol size distribution and aerosol chemical composition. The oxidation pathway of SO_2 to sulfate aerosol determines the magnitude of the sulfate aerosol radiative forcing.

In a series of three papers Harris et al. 2012 presents a laboratory investigation of sulfur isotope fractionation during SO_2 oxidation. The first paper investigates sulfur isotope fractionation during SO_2 oxidation by the most important gas-phase and aqueous phase oxidation pathways occurring in the atmosphere. The fractionation factors determined are useful to examine the role of sulfate aerosol formation in environment.

The second paper investigates oxidation of SO_2 on mineral dust aerosol, which represents a large fraction of the global aerosol burden. Oxidation on dust particles can occur in the aqueous phase or on the surface of dust following SO_2 chemisorption. Although the former is much faster, dust originates from arid regions and clouds are usually first encountered after several days of transport, thus surface oxidation can be important in arid regions. Sahara dust was used to examine the staple isotope fractionation during both processes and the results will allow quantifying the role of surface oxidation and aqueous oxidation by dust leachate in environment.

The third paper investigates the oxidation on sea salt aerosol. This process contributes a large fraction of the total heterogeneous SO_2 oxidation on a global scale. It shifts the size distribution of sulfate towards coarse particles and limits H_2SO_4 (g) production and new particle formation in the marine environment. The alkalinity of sea salt aerosols is critical to many reactions on sea salt, which has made it difficult to assess the importance of different oxidation pathways under ambient conditions using traditional methods. We demonstrated that a clear separation of all oxidation pathways using stable sulfur and oxygen isotope measurements is possible.

9.1.12 Dr. Kausik Chattopadhyay

Vibrio cholerae cytotoxin (VCC) is a potent cytolytic toxin that induces colloid osmotic lysis of its target eukaryotic cells by forming transmembrane oligomeric-

barrel channels. VCC is secreted by the bacteria as an inactive precursor (Pro-VCC) and is subsequently activated by proteolytic removal of an N-terminal “Pro-domain”, thus generating the active form of the toxin (Mature-VCC). In this study, we have employed an array of biophysical methodologies to characterize the physicochemical properties that distinguish Pro-VCC from the Mature-VCC protein.

9.1.13 Dr. Krishnendu Gongopadhyay

We investigate when two isometries of the n -dimensional complex hyperbolic space commute.

We obtain algebraic criterion to classify the isometries of the two dimensional quaternionic hyperbolic space. As a corollary algebraic characterization of isometries of the two dimensional complex hyperbolic space is also obtained.

We classify orientation-preserving isometries of the real hyperbolic 4-space by their conjugacy classes of centralizers.

9.1.14 Dr. Sanjay Singh

We have reported a polymeric complex of mercury $[\text{Hg}_3(\text{tot})_2(\mu\text{-SCH}_3)_4]_n$ (1) and a dimeric complex of manganese $[\text{Mn}_2(\text{Hmbhe})_2(\mu\text{-mbmst})_2]\text{CHCl}_3$ (2), prepared by the reaction of N'-(2-methyl-benzoyl)-hydrazinecarbodithioic acid methyl ester (H_2mbhe) with HgCl_2 and $\text{Mn}(\text{OAc})_2 \cdot 4\text{H}_2\text{O}$ respectively. Complex 1 shows the presence of tetrahedral as well as linear $\text{Hg}(\text{II})$ in the same molecule. The dimeric complex 2 contains thiadiazolyl hydrazide moiety (mbmst) formed from H_2mbhe which is bonded in a tetradentate manner by two nitrogens and one bidentate bridged oxygen between two $\text{Mn}(\text{II})$ centers. In the solid state both complexes are stabilized by intermolecular hydrogen bonding and form supramolecular architecture.

9.1.15 Dr. Sanjeev Kumar

Using a hybrid method based on fermionic diagonalization and classical Monte Carlo, we investigate the interplay between itinerant and localized spins, with competing magnetic interactions, on a honeycomb lattice. For moderate superexchange, a geometrically frustrated triangular lattice of hexagons forms spontaneously. For slightly larger superexchange a dimerized groundstate is stable that has macroscopic degeneracy. Triangular arrangement and macroscopic degeneracy are both features of a frustrated magnetic lattice. However, in this work we show that these frustration effects can spontaneously emerge in a many-body problem where different degrees of freedom, namely electrons and magnetic moments, are coexisting. The presence of these states on a non-frustrated honeycomb lattice highlights a novel phenomenon of emergent geometrical frustration in this itinerant electron system.

9.1.16 Professor Somdatta Sinha

Pathogens like HIV-1, which evolve into many closely related variants displaying differential infectivity and evolutionary dynamics in a short time scale, require fast and accurate classification. Conventional whole genome sequence alignment-based methods are computationally expensive and involve complex analysis. Alignment-free methodologies are increasingly being used to effectively differentiate genomic variations between viral species. Multifractal analysis, which explores the self-similar nature of genomes, is an alignment-free methodology that has been applied to study such variations. However, whether multifractal analysis can quantify variations between closely related genomes, such as the HIV-1 subtypes, is an open question. Here we address the above by implementing the multifractal analysis on four retroviral genomes (HIV-1, HIV-2, SIVcpz, and HTLV-1), and demonstrate that individual multifractal properties can differentiate between different retrovirus types easily. However, the individual multifractal measures do not resolve within-group variations for different known subtypes of HIV-1 M group. We show here that these known subtypes can instead be classified correctly using a combination of the crucial multifractal measures. This method is simple and computationally fast in comparison to the conventional alignment-based methods for whole genome phylogenetic analysis. This method is simple and computationally fast in comparison to the conventional alignment-based methods for whole genome phylogenetic analysis (Pandit, Dasanna & Sinha, 2012).

Host-pathogen interactions underlie one of the most complex evolutionary phenomena resulting in continual adaptive genetic changes, where pathogens exploit the host's molecular resources for growth and survival, while hosts try to eliminate the pathogen. Deciphering the molecular basis of host-pathogen interactions is useful in understanding the factors governing pathogen evolution and disease propagation. In host-pathogen context, a balance between mutation, selection, and genetic drift is known to maintain codon bias in both organisms. Studies revealing determinants of the bias and its dynamics are central to the understanding of host-pathogen evolution. We considered the Human Immunodeficiency Virus (HIV) type 1 and its human host to search for evolutionary signatures in the viral genome. Positive selection is known to dominate intra-host evolution of HIV-1, whereas high genetic variability underlies the belief that neutral processes drive inter-host differences. In this study, we analyze the codon usage patterns of HIV-1 genomes across all subtypes and clades sequenced over a period of 23 years. We show presence of unique temporal correlations in the codon bias of three HIV-1 genes illustrating differential adaptation of the HIV-1 genes towards the host preferred codons. Our results point towards gene-specific translational selection to be an important force driving the evolution of HIV-1 at the population level. Our results point towards gene specific

translational selection to be an important force driving the evolution of HIV-1 at the population level (Pandit & Sinha, 2011).

9.1.17 Dr. R Vijaya Anand

The oxidative organocatalysis by N-heterocyclic carbenes has been emerging as an important methodology in organic synthesis. Recently, we have explored the organocatalytic behavior of N-heterocyclic carbenes in the aerobic oxidation of aromatic aldehydes to esters with boronic acids. This transition metal-free protocol allows access to a wide variety of aromatic esters in good to excellent yields under mild reaction conditions (*Org. Biomol. Chem.* **2012**, **10**, 848).

9.1.18 Dr. Adrene Freeda D’Cruz

Ecocide, the widespread annihilation of nature, constitutes the principal theme in Douglas Trumbull’s *Silent Running* (1972) and Richard Fleischer’s *Soylent Green* (1973). Seeking recourse to one of the major film genres, namely, science fiction, these films emphatically disclose an inconvenient truth, the imminent extinction of the ecosystem. Set in a dystopian world, *Silent Running* uncovers an already depleted biosphere while *Soylent Green* examines the road to ecological perdition. Drawing the title from Davis Guggenheim’s *An Inconvenient Truth*, a documentary on global warming, this essay, in analyzing the environmental apocalypse in *Silent Running* and *Soylent Green*, reveals how the cinematography weaves an ecocentric discourse to promote the inevitable truth that ecosphere is intrinsic to human survival.

9.1.19 Dr. Vinayak Sinha

In this work (Williams *et al.*, 2011), an overview of the background, instrumentation, goals, and regional influences prevalent during the HUMPPA-COPEC intensive field measurement campaign, conducted at the Boreal forest research station SMEAR II (Station for Measuring Ecosystem-Atmosphere Relation) in Hyytiälä, Finland from 12 July – 12 August 2010 is presented. Specific tracers have been used here to identify the time periods when different sources impacted the site namely: biomass burning (acetonitrile and CO), urban anthropogenic pollution (pentane and SO₂) and the nearby Korkeakoski sawmill (enantiomeric ratio of chiral monoterpenes). None of these sources dominated the study period, allowing the Boreal forest summertime biogenic emissions to be assessed.

The first direct OH reactivity measurements from Spain are detailed in this work (Sinha *et al.*, 2012). Using such measurements the reactive pollutant loading of different air masses impacting the site even in the absence of comprehensive of VOC

speciation was quantified. By combining OH reactivity measurements with measurements of nitrogen oxides and radicals, instantaneous ozone production regimes and rates have been derived. This new approach for constraining instantaneous ozone production rates will significantly improve analyses of upwind point sources and their impact on regional ozone levels and help in policy decisions for urban planning and validation of photochemical models.

Interactions between atmospheric boundary layer (ABL) dynamics and atmospheric chemistry are studied using a mixed-layer model (MXLCH) coupled to chemical reaction schemes by Stratum et al, 2012. By focussing on the budget equations of chemical species in the mixed-layer model, we show that for species like O₃, NO and NO₂, the influence of entrainment and boundary layer growth is of the same order as chemical production/loss. This indicates that an accurate representation of ABL processes is crucial in understanding the daily cycle of chemical species and that an integrated approach, simultaneously solving the ABL dynamics and chemical reactions, is important to understand chemical pathways and processes in the troposphere.

In the work by Noelscher *et al.*, 2012, ambient air total OH reactivity was measured both inside (18 m) and directly above a boreal forest canopy (24 m). The budget of reactive hydrocarbons was constrained and the vertical degree of photochemical processing due to hydroxyl radicals examined for the first time. Under *stressed* conditions the boreal forest seems to emit reactive hydrocarbons that are not normally emitted. For *normal* boreal conditions a missing OH reactivity of 58%, whereas for *stressed* boreal conditions a missing OH reactivity of 89% was determined. Sources of not quantified OH reactive species are proposed as possible explanation for the high missing OH reactivity.

9.1.20 Dr. Yogesh Singh

Using resonant X-ray magnetic scattering on single crystals of Na₂IrO₃ we showed that this materials undergoes an unconventional magnetic order below the transition temperature T = 15 K. Combining these experimental results with density functional calculations we further proposed a zig-zag magnetic structure putting restrictions on the microscopic models which can be used to explain the magnetism of this and related systems.

Using thermodynamic measurements of the magnetic, transport, and thermal properties we established that the layered iridates A₂IrO₃ (A = Li, Na) are strongly correlated Mott insulators where the magnetism is driven by a competition between conventional Heisenberg-like interactions and a novel spin-orbit coupling induced Ising-like ‘Kitaev’ interactions. By using theoretical DFT and renormalization group calculations we further showed that depending on the relative strength of the inter-

actions, unconventional order or an unordered spin-liquid ground state is expected. Comparing the above experimental results with the theory we suggest that Na_2IrO_3 lies in the magnetically ordered state while Li_2IrO_3 is close to a spin-liquid state.

Using single crystal X-ray and powder inelastic neutron scattering measurements on Na_2IrO_3 we showed that the crystal structure was such that the Ising-like ‘Kitaev’ interactions could not be significant for this material. Additionally we showed that the dispersion of the spin-wave excitations could be accounted for only by including substantial further nearest-neighbor Heisenberg-like interactions.

9.1.21 Dr. N G Prasad

Plasticity in reproductive investment is an adaptive trait and has been extensively investigated in females. However, male reproductive behaviour is much more complex and offers ample opportunities for the evolution of plasticity. This paper (Nandy & Prasad, 2011) explored the relationship of male reproductive behaviour and the conditions experienced by a male early in its life time. This paper for the first time reports a non linear reproductive investment of male in response to variation in early life conditions. Further, the paper shows that such behaviours are adaptive.

Sperm competitive ability is an important component of male competitive fitness. However, its evolution is fairly inconsistent. Using an ingenious technique of male limited evolution of genomes, we explored the evolution of male fitness and sperm competitive ability in *Drosophila*. We found that male fitness can evolve independent of sperm competitive abilities: a result counter to expectations (Pan-Pan *et al.*, 2011).

Anti-bacterial immunity is an important component of an organism’s fitness and is hence expected to evolve rapidly. However most studies do not consider the possibility that the effects of a given pathogen might be sex specific and more interestingly, might affect different components of fitness in the two sexes. The present study found that infections with some bacteria affect components of fitness differentially in the two sexes thereby affecting the evolution of antibacterial immunity in the population (Imroze & Prasad, 2011).

Immunity of an organism has been considered to be a function of the genotypes of the host and the pathogen along with their interaction with the environment. In sexual organisms, sexual partners are an important component of an organism’s environment and can hence potentially influence immunity. In the present study we explored if the phenotype of a male can influence the immunity of a female. We found that mating with large males decreased the immunity of females, indicating an additional immunity cost of mating to females. This can have major consequences for the evolution of body size and male-female co-evolution (Imroze & Prasad, 2011).

Sexually antagonistic variation is a major determinant of population fitness.

Identifying sexually antagonistic traits is, however, a difficult task. One possible approach is to look at sexually dimorphic traits, especially the ones involved with sexual signalling, since they can potentially represent extant antagonistic variation. In this study we assessed the sexually antagonistic pheromonal profile of *Drosophila melanogaster* in populations subjected to male limited evolution and their controls and found no signature of antagonistic co-evolution in this trait (Bedhomme *et al* 2011).

9.1.22 Professor Anand K Bachhawat

In this manuscript (Yadav & Bachhawat, JBC,2011) we have described the identification, biochemical characterization and prevalence (among other fungi) of a novel plasma membrane cystine transporter, CgCYN1, from the pathogenic yeast *Candida glabrata*. This transporter is the first such to be described from yeasts and fungi and has no similarity to known cystine transporters of bacteria and humans. We also show that functionally similar transporters (orthologues) could be found in other pathogenic yeasts like *Candida albicans* and *Histoplasma capsulatum*, but were absent in the non-pathogenic yeasts, *Schizosaccharomyces pombe* and *Saccharomyces cerevisiae*, and suggests that these proteins might play an important role in pathogenesis, and might have evolved owing to the relatively higher concentrations of cystine in blood plasma in mammals.

In this manuscript (Desai *et.al.*, JBC, 2011) we have examined how the pathogenic yeast *Candida albicans* which lacks the ability to survive within its mammalian host in the absence of endogenous glutathione biosynthesis, obtains its glutathione requirements. We observed that glutathione is utilized efficiently by the alternative pathway of glutathione degradation (DUG pathway), after being taken up through OPT7, an unusual glutathione transporter. Despite OPT7-like proteins being primarily present among pathogenic yeasts and fungi, experiments done in mice to examine if glutathione utilization had a role in pathogenesis (by knocking out these proteins and pathways) failed to show any effect on virulence.

9.1.23 Professor Arvind

In this paper, we discuss extremal extensions of entanglement witnesses based on Choi's map. The constructions are based on a generalization of the Choi map due to Osaka, from which we construct entanglement witnesses. These extremal extensions are powerful in terms of their capacity to detect entanglement of positive under partial transpose (PPT) entangled states and lead to unearthing of entanglement of new PPT states. We also use the Cholesky-like decomposition to construct entangled states which are revealed by these extremal entanglement witnesses. The

work is an exploration in the context of finding bound entangled states whose entanglement is revealed by witnesses based on positive maps that are not completely positive. Furthermore, we have generated a family of extremal extensions of Choi's original map and shown that these extremal extensions are capable of revealing the entanglement of new classes of entangled states (Sengupta and Arvind 2012).

9.2 Research Publications

1. **Amit Kulshrestha** and Anupam Singh, *Real Elements and Schur Indices of a Group*, Mathematics Student **80**, 73-84 (2011)
2. R. Mikhailov, **I. B. S. Passi** and Jie Wu, *Symmetric ideals in group rings and simplicial homotopy*, J. Pure Appl. Algebra **215**, 1085-1092 (2011).
3. **I. B. S. Passi**, Gurmeet K. Bakshi and Shalini Gupta, *Semisimple metacyclic group algebras*, Proc. Indian Acad. Sci. (Math Sci) 121, 379-396 (2011).
4. *Symmetry: A multi-disciplinary perspective*, Ramanujan Lecture Notes Series, Vol. 16, Ed. **Prof I B S Passi**, (2011).
5. *Chitin; formation and diagnosis series* **Neal S Gupta**, Topics in Geobiology, Vol. 34 (2011).
6. *Design, Synthesis, and Self-assembly of Functionalized Soft Materials: Discotic Liquid Crystals: Science and Applications*, **Santanu K. Pal**, publ. VDM Verlag Dr. Müller (2011).
7. M. Grigorian, **L. Mandal**, M. Hakimi, I. Ortiz and V. Hartenstein, *The convergence of Notch and MAPK signaling specifies the blood progenitor fate in the Drosophila mesoderm*, Dev Biol. **353**(1):105-18 (2011).
8. B. C. Mondal, T. Mukherjee, **L. Mandal**, C. J. Evans, S. A. Sinenko, J. A. Martinez-Agosto, U. Banerjee, *Interaction between differentiating cell- and niche-derived signals in hematopoietic progenitor maintenance.* , Cell Dec 23;147(7):1589-600 (2011).
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9.3 Patents

Dr S Arulananda Babu and **Nayyar Ahmad Aslam** have filed for a patent titled *Stereoselective preparation of functionalized beta, beta'-disubstituted- and beta, beta', beta''-trisubstituted alpha-amino acid derivatives at least with two contiguous stereocenters* in Sep. 2011.

9.4 Guided Research

- **Paramdeep Singh** completed his PhD under the guidance of **Prof. Arvind** and received his degree from Guru Nanak Dev University, Amritsar on Feb 02, 2012.
- Girish Kulkarni completed his PhD under the guidance of **Prof. J S Bagla** and received his degree from Harish-Chandra Research Institute (HBNI), Allahabad in October 2011.

9.5 Awards & Honors

- **Prof. I B S Passi:**
 - Member of the apex committee and chairman of selection committee (mathematics) for the INSPIRE Faculty Programme.
 - Awarded *Prasanta Chandra Mahalanobis Medal* (2011) by the Indian National Science Academy.
 - Awarded the *Khosla National Award* (2011) by the Indian Institute of Technology, Roorkee.
- **Prof. Anand K Bachhawat:**

- Elected fellow of the Indian National Science Academy.
- Awarded the J C Bose fellowship from DST.
- **Prof. Somdatta Sinha:**
 - Has been awarded the J C Bose fellowship from DST.
 - Member of the selection committee (Biomedical Sciences) for the IN-SPIRE Faculty Programme.
- **Prof. Sudeshna Sinha** has been nominated member of the *National Board of Higher Mathematics*.
- **Prof. J S Bagla** is a member and secretary of the National Committee of IAU (ICSU-IAU) for a period of four years starting January 1, 2012. This committee is constituted by the Indian National Science Academy.
- **Dr. Vinayak Sinha** is the topical Editor in Atmospheric Chemistry and Physics for the journal Earth System Science Data.
- **Dr. Kavita Babu** has been given the *Innovative Young Biotechnologist Award*.
- **Dr. Ram Kishor Yadav** has been given the *Innovative Young Biotechnologist Award*.
- **Dr. J S Bilga** has been awarded the fellowship of the Indian Society of Ornamental Horticulture (2011).
- **Dr. Sanjeev Sharma** has been awarded the National Young Geographer (First **Dr. Saminderjeet Singh** Young Geographers National Award for 2011) by the association of Punjab Geographers.

9.6 Conferences & Invited Talks

- **Professor N Sathyamurthy:**
 - Delivered a lecture at INSPIRE camp, University of Kashmir, Srinagar, July 27, 2011.
 - Delivered a talk at ATOMS2011, Indian Institute of Chemical Technology, Hyderabad, November 2, 2011.
 - Delivered an invited talk as a part of the International Year of Chemistry, National Chemical Laboratory, Pune, Nov. 24, 2011.

- Delivered an invited talk at the International Conference on Innovations in Chemistry for Sustainable Development, Panjab University, Dec. 1, 2011.
- Delivered an invited talk at Celebration of Chemistry, IIT Kanpur, Dec. 4, 2011.
- Delivered two seminars at the Nepal Academy of Science and Technology, Kathmandu, April 7-8, 2011.
- Delivered a seminar on *Indian Initiatives in Science Education*, Bangladesh Academy of Sciences, Dhaka, Bangladesh, May 9, 2011.

• **Professor I B S Passi:**

- Delivered a series of lectures at a workshop on Group Theory held at IISER Mohali during May 16–21, 2011.
- Delivered a series of lectures at the Annual foundation school held at the Department of Mathematics, Panjab University, Chandigarh, June 2011.
- A lecture at the Symposium on History of Mathematics during the Annual conference of the Ramanujan Mathematical Society, HRI, Allahabad, Oct.5, 2011.
- A lecture on careers in Mathematics at MDU university, Rohtak, Dec.3, 2011.
- Delivered an inaugural lecture at a symposium organized by Department of Mathematics, Panjab University, Chandigarh.

• **Professor Anand K Bachhawat:**

- Delivered an invited talk at the Indo-German conference on pathogenic fungi at the JNCASR, Bangalore from 1st-3rd August, 2011.
- Delivered an invited talk at the JNU National Symposium on Microbes in Health and Agriculture, 12th -13th March, 2012
- Delivered an invited talk at the UGC-SAP symposium entitled Microbes: A source of value added products for 21st century organized by the Department of Microbiology, Panjab University on March 24, 2012.
- An invited talk at the UGC-SAP symposium entitled Current Scenario of Microbiology organized by the Department of Microbiology, GNDU on March 19, 2012.

• **Professor Arvind:**

- Delivered an invited talk in UGC sponsored workshop cum seminar titled Physics Education Research (PER): Research Based Reforms at St. Bede's College Shimla, May 22-29, 2011.
- Delivered an invited talk in the state level INSPIRE program at at Beas Sadan Mandi, July 14-15 2011.
- Delivered an invited talk in DST-INSPIRE camp at HNB Garhwal University Srinagar (Garhwal), September 18-22, 2011.
- Delivered an invited talk during the State Level Children Science Congress at D.A.V. Senior Secondary School, Una, November 25-26, 2011.
- Delivered an invited talk in INSPIRE camp at RIMT-IET Gobindgarh, February 6-10, 2012.
- Conducted a session on Science in the Children's Science Congress Program in the Punjab Science Congress at GNDU Amritsar, February 7-9, 2012.
- Delivered an invited talk in INSPIRE camp at the University of Jammu, March 17-21, 2012.

• **Professor P Guptasarma:**

- Delivered an invited talk at the Gordon Research Conference on Proteins, June 18-24, 2011, New Hampshire, USA.
- Delivered a seminar at the Department of Biochemistry, University of Georgia, Athens, USA, June 28, 2011.
- Delivered a seminar at the Department of Chemistry, University of Wisconsin, Madison, USA, June 30, 2012.
- Delivered an invited talk at the Symposium on *Proteins shaped his life : In memory of Vinod Bhakuni*, Central Drug Research Institute (CDRI), Lucknow, Aug. 24, 2011.
- Delivered an invited talk at the Department of Biochemistry, University of Delhi, South Campus, Sep. 21, 2011.
- Delivered an invited talk at the Department of Biology, Massachusetts Institute of Technology (MIT), Massachusetts, USA, Oct. 10, 2011.
- Delivered invited lectures in the *Training Course on Advanced analytical techniques: Basic principles & application for quality assessment of drugs and pharmaceuticals* at National Institute of Pharmaceutical Education and Research (NIPER), Oct.14, 2011.

- Delivered an invited talk at the Chandigarh Science Congress, Panjab University, Feb.26, 2012.
- Delivered an invited talk at the National Science Day seminar at the Govt. College, Karnal, Feb.28, 2012.
- **Dr. Kavita Dorai:**
 - Delivered an invited lecture at the National Symposium on Magnetic Resonance, IISc Bangalore, February 06-08 2012.
 - Delivered an invited lecture at the Indo-Swiss Symposium on NMR at NCL Pune January 23-25 2012.
 - Delivered an invited lecture on NMR at Sardar Bhagwan Singh PG Institute of Biomedical Sciences and Research Dehradun, September 20 2011.
 - Delivered an invited lecture on NMR at the DST INSPIRE Camp invited lecture at Central University Srinagar Garhwal, September 19 2011.
- **Professor Sudeshna Sinha:**
 - Delivered an invited talk in the Diamond Jubilee International Conference on Theoretical and Applied Physics (ICTAP), IIT Kharagpur (December 1–2, 2011)
 - Delivered a special Lecture in SERC School on Nonlinear Dynamics, on December 19, 2011, in IISER Pune
 - Delivered an invited talk in the 'International conference on Complex dynamical systems and applications' (CDSAI), held in the Presidency University, Kolkata during Jan. 9–11, 2012.
 - Delivered an invited talk in the International Conference on Statistical Physics and Nonlinear Dynamics (CSPND), Kolkata March 12–16 2012.
- **Professor Somdatta Sinha:**
 - Co-organised, along with Prof. R. Bertram, Florida State University, USA, the Indo-US Bilateral Workshop on "Modelling Electrical Activity in Physiological Systems" supported by the Indo-US Science Technology Forum (IUSSTF) during March 5-9, 2012 at Agra, UP.
 - Delivered an invited talk at the DST-SERC school on Non-linear Dynamics, Dec.12, 2011.
 - Delivered an invited talk at the conference on Informatics and Integrative Biology (CIIB-2011) at Bose Institute, Kolkata, Dec. 14–16, 2011.

- Delivered an invited talk at the SMB-IISER Pune International Conference on Mathematical and Theoretical Biology, Jan.23–27, 2012.

- **Professor Kapil Paranjape:**

- Two lectures on *Arithmetic Algebraic Geometry* in NBHM Winter School and Conference on Algebra and Number Theory, Dept. of Math., Tezpur University, Dec 26-29, 2011.
- Four lectures on ‘Mathematical Enquiry’ in course TDC 202 at IISER Pune, Mar 4-9, 2012.

- **Professor S K Khanduja:**

- Delivered an invited lecture in the 77th Annual Conference of Indian Math Society held at SRTM University, Nanded (Maharashtra) during December 27-30, 2011.
- Delivered two lectures in the INSPIRE programmes sponsored by DST at Sri Mata Vaishnu Devi University, Kakrial during May 28 to June 1, 2011.
- Delivered eight lectures in the annual foundational school II held in the department of mathematics, panjab university, Chandigarh during June 2- 29, 2011
- Delivered an invited lecture in the Second International Conference and Workshop on Valuation Theory held at University of Valladolid, Segovia, (Spain) during July 18-29, 2011.
- Delivered a lecture in the INSPIRE Programme of DST in the RIMT-Institute of Engineering & Technology, Mandi Gobindgarh, Punjab on Feb. 9, 2012.
- Delivered lecture in the Department of Mathematics, University of Delhi on Mar. 6, 2012.
- Delivered a lecture in the International Conference on Group Theory and Lie Theory during March 19-21, 2012 at Harish Chandra Research Institute, Allahbad.
- Delivered a lecture in National Conference on Algebra held at Himachal Pradesh University, Shimla during March 27-28, 2012

- **Professor K S Viswanathan:**

- Delivered a set of invited lectures at Stella Maris College, Chennai, Feb.20, 2012.

- Delivered an invited talk at the Raja Ramanna Centre for Advanced Technology, Indore, on March 5, 2012.

- **Dr Chanchal Kumar:**

- Delivered a set of lectures at the Annual Foundation School held at the Department of Mathematics, Panjab University (June 2011).
- Delivered an invited talk at the 77th annual meeting of Indian Mathematical Society held at SRTM University, Nanded (Dec. 2011).
- Delivered a set of lectures at the Advanced training in Mathematics school for college lectures held at Kumaun University, Almora (February 2012).

- **Professor J S Bagla:**

- Delivered an invited talk in the ASI Symposium on Cosmology and Galaxy Formation, IISER Mohali, Nov.5–7, 2011.
- Delivered an invited talk at the DST INSPIRE Science Camp on January 5, 2012 at the A.S. College, Khanna.
- Delivered an invited talk at a Science Camp on Feb.27, 2012 at Govt. P. G. College Karnal.
- Delivered an invited talk at the Chandigarh Science Congress on Feb. 26, 2012.
- Delivered an invited talk at the Workshop on High Performance Computing at the Department of Physics, Punjab University on March 2, 2012.
- Delivered an invited talk at the ASI Symposium on Astronomy outreach and education, Nehru Planetarium, Delhi, March 4, 2012.

- **Dr Lolitika Mandal:**

- Delivered an invited talk in 11th EMBO Young Investigator Meeting, Heidelberg.
- Attended 35th All India Cell Biology Conference at NISER , Bhubaneswar.

- **Dr Ramandeep S Johal:**

- Poster presented at Joint European Thermodynamics Conference-2011, June 27-July 01, 2011, Chemnitz, Germany.
- Invited talk at 'Sigma Phi', International Conference in Statistical Physics, July 10-15, 2011, Larnaca, Cyprus.

- Poster presented at Frontiers of Quantum and Mesoscopic Thermodynamics-2011, International Conference at Prague, Czech Republic, July 24-29, 2011.

- **Dr Jagdeep Singh:**

- Delivered an invited talk at Department of Biotechnology, SUS College of Engineering & Technology, Tangori (Mohali). September 6, 2011
- Delivered an invited talk at Prakriti Utsav in MCM DAV College for Women, Chandigarh . January 21, 2012.
- Delivered an invited talk at UGC conference on *Intellectual Property Rights: Research & Development* at Government PG College for Girls, Sector 42, Chandigarh. January 31, 2012.
- Delivered an invited talk at Department of Pathology, PGIMER, Chandigarh. February 23, 2012.

- **Dr Arunika Mukhopadhyay:**

- Delivered a lecture in the DST-INSPIRE camp held at HNB Garhwal University Srinagar (Garhwal) Uttarakhand on November 13, 2011.
- Delivered a lecture in IRIS (Initiative for Innovation and Research in Science) National Fair organized at the PEC, Chandigarh on November 18, 2011.
- Delivered a lecture in BPS Mahila Vishwavidyalaya Khanpur Kalan on November 22, 2011.

- **Dr Sanjeev Kumar:**

- Delivered an invited talk in the conference on functional materials, HRI Allahabad (India) - April 2011.
- Delivered a talk in the conference on novel and emergent materials, IACS Kolkata (India) - November 2011.
- Delivered a talk at the DAE symposium on solid state physics, SRM University (India), December 2011.
- Delivered a contributed talk at the APS March meeting 2012, Boston (USA), March 2012.

- **Dr K P Yogendran:**

- Attended "Workshop on Higher Spin Gravity", November 21-26, 2011 at HRI, Allahabad.
- Attended the "National String Meeting", Dec 6-10, 2012 at University of Delhi.
- Delivered an invited talk at RRI, Bangalore in Jan. 2012.

- **Dr Angshuman Roy Choudhury:**

- Presented a poster at a conference entitled International Conference on the Chemistry of the Organic Solid State (ICCOSS) held at IISc Bangalore during June 25–30, 2011.
 - Presented a poster at the XX Congress and General Assembly of the International Union of Crystallographic at Madrid, Spain, during 22-29 August 2011
 - Delivered an invited talk in the international conference entitled Small Molecules in Interactions held at Ruhr University, Bochum, Germany during 26-27 April, 2012.
- Dr Rajiv Kapri delivered an invited talk in International Conference on Mathematical and Theoretical Biology at VITS Hotel Pune, India (January 23-27, 2012).
 - Dr Pranaw Rungta was an invited speaker at the International School and Conference on Quantum Information (ISCQI) held at IOP Bhubaneswar during Dec. 13 – 22, 2011.
 - Dr K Chattopadhyay delivered an invited talk at the DST INSPIRE Science Camp on January 5, 2012 at the A.S. College, Khanna.
 - Dr Yogesh Singh delivered a contributed talk at the international conference on *Strongly Correlated Electron Systems* held in Cambridge, UK between Aug.29 – Sep.3, 2011.
 - Dr Mahak Sharma delivered an invited talk for the Yellapragda Subbarow Memorial Lecture held at Guru Gobind Singh Indraprastha University (GGSIPU) campus, New Delhi on Jan. 12, 2012.
 - Dr Rama Sastry Sripada delivered an invited talk at NIPER, Mohali on Feb.22, 2012.

- Dr Rachna Chaba delivered an invited talk at the UGC-SAP sponsored symposium *Microbes: A source of value added products for 21st century* organized by the Department of Microbiology, Punjab University on March 24, 2012.
- Dr Yashonidhi Pandey attended a conference in Chennai Mathematical Institute in honour of Seshadri during Jan.23–27, 2012.
- **Dr Sanjay Singh:**
 - Attended conference and presented poster in 3rd Asian Conference on Coordination Chemistry, October 17-20, 2011 at New Delhi.
 - Presented poster in 14th Modern Trends in Inorganic Chemistry, Dec. 10-13, 2011 at University of Hyderabad.
- **Dr Samrat Mukhopadhyay:**
 - Delivered an invited talk at the Intrinsically Disordered Protein Subgroup Symposium during the Biophysical Society meeting held in San Diego, CA in February 2012.
 - Delivered an invited seminar at the Scripps Research Institute, La Jolla, USA in March 2012.
 - Was an invited speaker at the Department of Biochemistry Golden Jubilee Symposium at Punjab University in February 2012.
 - Was an invited speaker at the Regional Center for Biotechnology (RCB) in November 2011.
 - Was an invited speaker at the National Fluorescence Workshop (FCS-2011) held at ICGEB, JNU, IIT Delhi, New Delhi, November 2011.
 - Delivered an invited talk at the Department of Chemical Sciences, Tata Institute of Fundamental Research (TIFR), Mumbai in July 2011.
- **Dr S Arulananda Babu:**
 - attended a symposium entitled *Chemical Technology in Drug Discovery* jointly organized by Merck and Co., Inc. and The Institute of Life Sciences (Hyderabad, India) during April 22–24 2011.
 - a symposium entitled *Antimalarials: Current Approaches and New Directions* organized by CDRI, Lucknow on 16th Nov 2011.
- **Dr K R Shamasundar:**

- Delivered an invited talk at a workshop on *Advanced Methods and Applications in Quantum Chemistry* at University of Stuttgart, March 2012.
- Delivered an invited talk at a conference on *Recent advances in many-electron theories (RAMET) -II*, Puri, Orissa.

• **Dr Sudip Mandal:**

- Attended the XXXV All India Cell Biology Conference, NISER, Bhubaneswar, Dec 16 to 18, 2011.
- Attended the 8th Indo Australia Biotechnology Conference on *Stem Cell Biology* at JNCASR, Bangalore, Dec. 7–9, 2011.

• **Dr Vijaya Anand:**

- Participated and gave an invited seminar in the Gregynog Workshop, Newtown, Powys, UK during Sep. 23–25, 2011.
- Delivered an invited lecture at the University of Bath, UK on Sep.26, 2011.
- Delivered an invited lecture at the University of Leicester, UK on Sep.27, 2011.
- Participated in *Conference on Advanced Pharmaceutical Research and Chemistry* organized by NITTTR, Bhopal and gave a lecture. Mar. 24, 2012.

• **Dr Anu Sabhlok:**

- Delivered an invited talk in Seminar on Social Science Research in India. Institute of Advanced Studies, Shimla on April 5, 2011.
- Presented a paper and art installation at the 6th international conference in Critical Geography, Frankfurt Germany, Aug. 18, 2011.
- Delivered an invited lecture at Khanpur Women’s University on Nov.22, 2011.
- Delivered an invited lecture at DAV College, Yamunanagar on Feb.10, 2012.
- Delivered an invited talk at Seminar on Science, Nature and Society in MCM DAV, Chandigarh, Feb. 15, 2012.
- Invited talk in the India Reawakening Series at IIT Gandhinagar, Mar. 23, 2012.

- **Dr Baerbel Sinha:**

- Presented a poster during the American Geophysical Union Meeting.
- Invited talk presented at the Indo-German workshop on Chemical Processes in the Troposphere November 28th-December 2nd 2011 at TERI University, New Delhi, India.
- Invited talk during the Hill Cap Cloud Thurengia Campaign Meeting Febuary 15–16, 2012, Leipzig, Germany.

- **Dr Kamal P Singh:**

- Delivered an invited talk at the 6th International Conference on Unsolved Problems on Noise, Feb. 2012, SINP, Kolkata.
- Delivered an invited talk at the School of Physical Sciences, JNU, Delhi, March 2012.

- **Dr Krishnendu Gongopadhyay:**

- Attended the Borel Seminar: Topics in real and complex hyperbolic geometry, Les Diablerets, Switzerland, August 22-16, 2011.
- Attended a conference: Surface Groups in Paris, IHP, March 4-9, 2012.
- Attended an International Conference in Group Theory and Lie Theory, March 19-21, 2012.
- Delivered a lecture on *Recent progress on Gromov's theorem* at ATM workshop on Geometric Group Theory at IISER Mohali, May 2011.
- Contributed a talk to the International Conference on Group Theory and Lie Theory, HRI Allahabad, March 18-21, 2012.

- **Dr Vinayak Sinha:**

- Invited talk at workshop on Air Pollution and Climate Change at the Indian Institute of Technology, Roorkee, April 30, 2011.
- Invited talk at DST Inspire Camp organized by HNB Garhwal University, Srinagar Sep. 17-18, 2011.
- Invited talk at TERI University, Delhi during Indo- German Atmospheric Chemistry Workshop, Nov. 28, 2011.
- Invited talk at Aryabhata Research Institute of Observational Sciences (ARIES), Nainital during Ganges Valley Aerosol Experiment and Regional Warming of Atmosphere Experiment (GVAX-RAWEX) workshop organized by ARIES-ISRO-IISc Bangalore, Oct. 4, 2011 .

- Conference paper presented at the American Geophysical Union Fall Meeting in San Francisco, Dec. 5-9, 2011.
- **Dr Meera Nanda:**
 - Delivered an invited lecture titled *Illusions of Harmony: Indian responses to Darwinism*, Homi Bhabha Center for Science Education, Mumbai, March 7, 2012.
 - Delivered an invited lecture titled *Ethics of Belief: right and wrong ways to believe*, Center for Basic Sciences, Mumbai, March 9, 2012.
 - Delivered an invited lecture on *Two Cultures: What humanities can bring to science education in India*, Indian Institute of Space Science and Technology, IISST, Trivandrum, Dec. 17, 2011.
- Dr Sanjay Mandal delivered an invited talk in 3rd Asian Conference on Coordination Chemistry at New Delhi, October 17-20, 2011.
- Dr Arun Murthi delivered an invited talk in a conference on Perspectives on Subjectivity, Punjab University, March 1-2, 2012.

9.7 Faculty Visits

- Prof. Kapil Hari Paranjape visited:
 - IMSc, Chennai, during Aug 7–9, 2011.
 - HRI/Allahabad University, Allahabad, during Sep 30–Oct 5, 2011.
 - Dept. of Math, Tezpur Univ, during Dec 26-30, 2011.
 - School of Mathematics, TIFR, Feb 23–26, 2012 for Abel Symposium 2012.
 - IISER, Pune, during Mar 4–9, 2012.
- Prof. J S Bagla visited:
 - Harish-Chandra Research Institute, Allahabad, during May 30 – June 8, 2011.
 - Radio Astronomy Centre of NCRA-TIFR at Ooty during June 15–17, 2011.
 - Inter-University Centre for Astronomy and Astrophysics, Pune, during Oct. 14-15, 2011.
 - Harish-Chandra Research Institute, Allahabad on Oct. 17, 2011.

- Radio Astronomy Centre of NCRA-TIFR at Ooty during Dec. 18–22, 2011.
- Sri Venkateswara University, Tirupati, Feb. 13–16, 2012.
- Dr. Kamal P Singh:
 - FemtoLasers Factory, Vienna, Austria, June 2011.
 - Max Planck Institute for the Physics of Complex System, Dresden, Germany, July 2011.
- Dr. Amit Kulshreshtha visited the school of Mathematics, Tata Institute of Fundamental Research, Mumbai from Dec. 4–18, 2011.
- Dr. Yogesh Singh visited the Condensed Matter and Materials science department at TIFR during the periods May 15–30, 2011 and Dec. 4–24, 2011.
- Dr. Sanjeev Kumar visited IFW Dresden, Germany during June 15–July 15, 2011.
- Dr. K P Yogendran visited RRI Bangalore during Jan. 2–7, 2012.

10 On-going Sponsored Research Projects

1. **Project Title:** “Conformational Dynamics of Model Tripeptides using NMR and Vibrational Spectroscopic Techniques”

Funding Agency	: DST
PI	: Dr. Kavita Dorai (IISER Mohali)
Duration	: 2007-2010
Amount Sanctioned	: 5.7 Lakhs
Amount Received	: 3.57 Lakhs

2. **Project Title:** “Studies of dissipative dynamics in quantum computers using NMR techniques”

Funding Agency	: CSIR
PI	: Dr. Kavita Dorai (IISER Mohali)
Co-PI	: Dr. Arvind (IISER Mohali)
Duration	: 2007-2010
Amount Sanctioned	: 9.45 Lakhs
Amount Received	: 5.66 Lakhs

3. **Project Title:** “Exploring biomolecular dynamics using cross correlated spin relaxation in NMR”

Funding Agency	: DBT
PI	: Dr. Kavita Dorai (IISER Mohali)
Co-I	: Dr. P B Sunil Kumar (IIT-Madras)
Duration	: 2007-2010
Amount Sanctioned	: 53.04 Lakhs
Amount Received	: 42.64 Lakhs

4. **Project Title:** “Unraveling the importance of Receptor for Advanced Glycation End Products Signaling in Breast Cancer Development and Drug Resistance”

Funding Agency	: ICMR
PI	: Dr. Tapan Mukherjee (IISER Mohali)
Duration	: 2008-2011
Amount Sanctioned	: 8.47 Lakhs
Amount Received	: 8.47 Lakhs

5. **Project Title:** “Modern science in India:Colonial compulsions nationalist aspirations and global conventions”

Funding Agency	: CSIR
PI	: Dr. R Kochhar (IISER Mohali)
Duration	: 2008-2011
Amount Sanctioned	: 10.32 Lakhs
Amount Received	: 10.32 Lakhs

6. **Project Title:** “Bio-molecular Solid-State NMR-Theory, Experiments and Application”

Funding Agency	: DST
PI	: Dr. Ramesh Ramachandran (IISER Mohali)
Duration	: 2009-2012
Amount Sanctioned	: 34.80 Lakhs
Amount Received	: 19.72 Lakhs

7. **Project Title:** “Synthesis, structure, and spectroscopic studies of low valent late transition metal complexes with N-arylimidoylamidine and other neutral chelating ligands”

Funding Agency	: DST
PI	: Dr. Sanjay Singh (IISER Mohali)
Duration	: 2009-2012
Amount Sanctioned	: 19.95 Lakhs
Amount Received	: 14 Lakhs

8. **Project Title:** “Synthesis, characterization and aggregation studies on prion octapeptide and its covalently-linked oligomers”

Funding Agency	: DST
PI	: Dr. Mily Bhattacharya (IISER Mohali)
Duration	: 2010-2013
Amount Sanctioned	: 16.68 Lakhs
Amount Received	: 15.23 Lakhs

9. **Project Title:** “Co-crystallization of active pharmaceutical ingredients: Pathway for enhanced properties”

Funding Agency	: DST
PI	: Dr. Angshuman Roy Choudhary (IISER Mohali)
Duration	: 2009-2012
Amount Sanctioned	: 19.31 Lakhs
Amount Received	: 10.41 Lakhs

10. **Project Title:** “Studies on organometallic - based stereoselective noncarbohydrate synthetic strategies towards stereodivergent iminosugars, iminosugar phosphonates, iminosugar C-Glycosides and investigation of biological activities”

Funding Agency	: DST
PI	: Dr. S Arulananda Babu (IISER Mohali)
Duration	: 2010-2013
Amount Sanctioned	: 19.75 Lakhs
Amount Received	: 15.00 Lakhs

11. **Project Title:** “Quantum computing with trapped neutral atoms and cold ions: Towards fault tolerant computation”

Funding Agency	: DST
PI	: Dr. Bindiya Arora (IISER Mohali)
Duration	: 2010-2013
Amount Sanctioned	: 19.32 Lakhs
Amount Received	: 7.80 Lakhs

12. **Project Title:** “The Z-classes in classical groups”

Funding Agency	: DST
PI	: Dr. K Gongopadhyay (IISER Mohali)
Duration	: 2011-2014
Amount Sanctioned	: 3.24 Lakhs
Amount Received	: 1.80 Lakhs

13. **Project Title:** “Exploring surface polymer interaction via external forcing of the polymer”

Funding Agency	: DST
PI	: Dr. Rajeev Kapri (IISER Mohali)
Duration	: 2011-2014
Amount Sanctioned	: 5.04 Lakhs
Amount Received	: 3.70 Lakhs

14. **Project Title:** “Conformational plasticity and amyloid aggregation of human serum albumin”

Funding Agency	: CSIR
PI	: Dr. S Mukhopadhyay (IISER Mohali)
Duration	: 2011-2014
Amount Sanctioned	: 22.42 Lakhs
Amount Received	: 11.14 Lakhs

15. **Project Title:** “Structure-Function studies on vibrio cholerae cytolysin, a membrane damaging poreforming toxin”

Funding Agency	: DBT
PI	: Dr. Kausik Chattopadhyay (IISER Mohali)
Duration	: 2011-2014
Amount Sanctioned	: 62.64 Lakhs
Amount Received	: 47.74 Lakhs

16. **Project Title:** “Molecular Genetic Analysis of Mitochondrial Regulation of Cell Growth in Drosophila”

Funding Agency	: DBT
PI	: Dr. Sudip Mandal (IISER Mohali)
Duration	: 2011-2014
Amount Sanctioned	: 67.24 Lakhs
Amount Received	: 51.94 Lakhs

17. **Project Title:** “Tropospheric Oh Reactivity and VOC Measurements within India”

Funding Agency	: Max Planck & DST
PI	: Dr. Vinayak Sinha (IISER Mohali)
Duration	: 2011-2014
Amount Sanctioned	: 22.03 Lakhs
Amount Received	: 22.03 Lakhs

18. **Project Title:** “Ramanujan Fellowship”

Funding Agency	: DST
PI	: Dr. Yogesh Singh (IISER Mohali)
Duration	: 2011-2016
Amount Sanctioned	: 73.00 Lakhs
Amount Received	: 14.60 Lakhs

19. **Project Title:** “Ramanujan Fellowship”

Funding Agency	: DST
PI	: Dr. Sanjeev Kumar (IISER Mohali)
Duration	: 2011-2016
Amount Sanctioned	: 73.00 Lakhs
Amount Received	: 14.60 Lakhs

20. **Project Title:** “Metal Organic Frameworks (MOFs) comprised of dimetal units and multi-atom organic linkers”

Funding Agency	: DST
PI	: Dr. Sanjay Mandal (IISER Mohali)
Duration	: 2011-2014
Amount Sanctioned	: 36.36 Lakhs
Amount Received	: 20.76 Lakhs

21. **Project Title:** “A study of Valued fields and irreducible polynomials”

Funding Agency	: DAE
PI	: Profesor Sudesh Kaur Khanduja (IISER Mohali)
Duration	: 2011-2014
Amount Sanctioned	: 4.94 Lakhs
Amount Received	: 4.94 Lakhs

22. **Project Title:** “Quantum heat engines: work entropy and information at the nanoscale”

Funding Agency	: DST
PI	: Dr. Ramandeep Singh Johal (IISER Mohali)
Duration	: 2011-2014
Amount Sanctioned	: 13.56 Lakhs
Amount Received	: 5.00 Lakhs

23. **Project Title:** “An empirical assessment of the role of inter sexual conflict in life history evolution”

Funding Agency	: DST
PI	: Dr. N G Prasad (IISER Mohali)
Duration	: 2011-2014
Amount Sanctioned	: 33.01 Lakhs
Amount Received	: 18.50 Lakhs

24. **Project Title:** “Development of Novel N-Heterocyclic Carbenes and Their Application in Organo and Organometallic Catalysis”

Funding Agency	: DST
PI	: Dr. R Vijaya Anand (IISER Mohali)
Duration	: 2011-2014
Amount Sanctioned	: 18.05 Lakhs
Amount Received	: 11.35 Lakhs

25. **Project Title:** “Sys TB: A Network Program for Resolving the Intracellular Dynamics of Host Pathogen Interaction in TB Infection”

Funding Agency	: DBT
PI	: Profesor Sudeshna Sinha (IISER Mohali)
Duration	: 2011-2014
Amount Sanctioned	: 41.28 Lakhs
Amount Received	: 11.61 Lakhs

26. **Project Title:** “study of Vibrio cholerae porin ompU towards elucidating its role in host immunomodulation”

Funding Agency	: DBT
PI	: Dr. Arunika Mukhopadhyay (IISER Mohali)
Duration	: 2011-2014
Amount Sanctioned	: 50.20 Lakhs
Amount Received	: 29.03 Lakhs

27. **Project Title:** “Investigation into the sulphur assimilatory pathways of candida albicans”

Funding Agency	: DBT
PI	: Professor Anand K Bachhawat (IISER Mohali)
Duration	: 2011-2014
Amount Sanctioned	: 20.75 Lakhs
Amount Received	: 11.09 Lakhs

28. **Project Title:** “J.C Bose Fellowship”

Funding Agency	: DST
PI	: Professor Somdatta Sinha (IISER Mohali)
Duration	: 2011-2014
Amount Sanctioned	: 68.00 Lakhs
Amount Received	: 13.60 Lakhs

29. **Project Title:** “DBT Research Associateship”

Funding Agency	: DBT
PI	: Dr. Banani Chattopadhyay(IISER Mohali)
Duration	: 2 Years
Amount Sanctioned	: 3.66 Lakhs
Amount Received	: 3.66 Lakhs

11 Institute Colloquia

- **13 March, 2012 (Tue 5:00 pm) Prof. A K Kembhavi, IUCAA Pune**
The Detection of Gravitational Waves: A New Experiment for India
- **21 February, 2012 (Wed 5:00 pm) Prof. Geoffrey Barton, University of Dundee, Scotland**
An overview of research at the Biology/Computing interface
- **10 February, 2012 (Thu 2:30 pm) Prof. M Vijayan, IISc Bangalore**
Development of Structural Biology in India. A Personal Perspective
- **1 February, 2012 (Wed 4:00 pm) Dr. S Sridhar, Raman Research Institute, Bangalore**
Interstellar, Interplanetary and MHD Turbulence
- **25 January, 2012 (Wed 4:00 pm) Dr. Aline Bonami, Emeritus, Université d’Orleans, France**
Uncertainty Principles in the Euclidean spaces
- **9 November, 2011 (Wed 4:00 pm) Prof. Shobhona Sharma, TIFR, Mumbai**
A look at the surface of malaria parasite-infected red cells
- **28 October, 2011 (Fri 5:00 pm) Prof. Somnath Dasgupta, IISER Kolkata**
A tale of two supercontinents: The Indian connection

- **12 October, 2011 (Wed 4:00 pm)** Dr. N Krishnan, TIFR, Mumbai *Probing Gravity and Feebler Forces at Short Range*
- **23 September, 2011 (Fri 3:00 pm)** Dr. A K Grover, TIFR Mumbai *Spin-ferromagnets with zero-magnetization-Novel functional materials and their physics*

12 Faculty Seminars

These are seminars given by faculty members at IISER Mohali about their work. This series was initiated in the present year and the main motive is to apprise students and colleagues about research being carried out at the institute.

- **21 March, 2012 (Wed 4:00 pm)** Prof. A K Bachhawat, *Researching Glutathione: the cell's Redox buffer*, and, Dr. R. Vijay Anand, *N-Heterocyclic carbene (NHC) catalyzed aerobic oxidation reactions*.
- **18 January, 2012 (Wed 4:00 pm)** Prof. Arvind, *Two physics demonstrations*, and, Dr. Amit Kulshrestha, *Quadratic forms and their relatives*.
- **11 January, 2012 (Wed 4:00 pm)** Dr. S K Pal, *Dynamic Mechanical Properties of Liquid Crystalline Gels Prepared from Hydrogen-Bonded Gelators*, and, Prof. P Guptasarma, *Manipulating proteins to understand their behaviour*.
- **2 November, 2011 (Wed 4:00 pm)** Prof. Kapil H Paranjape, *Motivating Cycles*, and, Dr. Sanjay Mandal, *Role of ancillary ligands in forming supramolecular assemblies*.
- **14 September, 2011 (Wed 4:00 pm)** Dr. Yogesh Singh, *Liquids, Glasses, and Ices of Electrons in Frustrated Magnets*, and, Prof. S K Khanda, *Irreducible Polynomials*.
- **24 August, 2011 (Wed 4:00 pm)** Prof. N Sathyamurthy, *Playing with the buckyball*, and, Prof. Sudeshna Sinha, *Noisy logic*.
- **17 August, 2011 (Wed 4:00 pm)** Dr. Samrat Mukhopadhyay, *How do proteins misfold and aggregate*, and, Prof. I B S Passi, *Idempotent elements*.
- **11 August, 2011 (Wed 4:00 pm)** Dr. N G Prasad, *Why do we Age?*, and, Dr. Kavita Dorai, *Diffusion, Biomolecules & Quantum Computing: Insights from NMR*.

13 Technical Seminars

- **28 March, 2012 (Wed 10:00 am)** Dr. S. Kathioli, Member BOG, IISER Mohali *Low temperature thermal desalination*
- **27 March, 2012 (Tue 3:00 pm)** Dr. Rishi Khatri, Max-Planck institute of Astrophysics, Garching *Bose-Einstein condensation of CMB and damping of sound waves in the early Universe*
- **13 March, 2012 (Tue 5:00 pm)** Dr. Abhijnan Rej, Institute of Mathematics and Application, Bhubaneswar *Motivic geometry of Feynman amplitude*
- **7 March, 2012 (Wed 3:00 pm)** Dr. Saibal Chatterjee, Friedrich Miescher Institute for Biomedical Research, Switzerland *miRNA turnover: an emerging new sub-discipline in the field of (mi)RNA research*
- **27 February, 2012 (Mon 5:00 pm)** Dr. Nitin Patel, University of Southern California, USA *Placenta Growth Factor in Pathophysiological Complications of Sickle Cell Disease*
- **24 February, 2012 (Fri 5:00 pm)** Dr. Gagandeep Gahlay, University of Wyoming, USA *Evolving Paradigms in Sperm-Egg Recognition*
- **23 February, 2012 (Thu 5:00 pm)** Dr. Varadharaj Srinivasan, Catholic University of America *Liouvillian extensions and the Galois theory of Linear differential equations*
- **8 February, 2012 (Wed 5:00 pm)** Dr. Prasun Mukherjee, University of Pittsburgh, USA *Lanthanide Sensitization in Semiconductor Nanoparticles*
- **3 February, 2012 (Fri 5:00 pm)** Dr. Rajakumara Eerappa, Memorial Sloan-Kettering Institute, New York, USA *Mechanism of cytosine methylated DNA and the histone code read-out and interpretation by chromatin associated modules*
- **3 February, 2012 (Fri 4:00 pm)** Dr. Apurba L Koner, University of Oxford, UK *Non-Covalent Chemistry in a Confined Nanospace and its Applications*
- **3 February, 2012 (Fri 11:00 am)** Dr. Ayan Mahalanobis, IISER Pune *The discrete logarithm problem*

- **2 February, 2012 (Thu 4:00 pm)** Dr. **Khushwinder Kaur**, Panjab University, Chandigarh *Effect of additives on the microstructure and properties of reverse micelles*
- **2 February, 2012 (Thur 3:00 pm)** Dr. **Purusharth Rajyaguru**, University of Arizona, Tucson Arizona *To translate, remain silent or get destroyed: How are mRNA fate decisions made?*
- **1 February, 2012 (Wed 4:00 pm)** Dr. **S Sridhar**, Raman Research Institute, Bangalore *Interstellar, Interplanetary and MHD Turbulence*
- **31 January, 2012 (Tue 5:00 pm)** Dr. **Mahender Singh**, Institute of Mathematical Sciences, Chennai *The Borsuk-Ulam theorem: Applications and Generalizations*
- **31 January, 2012 (Tue 4:00 pm)** Dr. **Priyadarshi Satpati**, Ecole Polytechnique, France *A MD study for a GTP binding protein : Archaeal Initiation Factor 2*
- **31 January, 2012 (Tue 3:00 pm)** Dr. **Sunanda Chatterjee**, Laboratoire de Chimie et Biochimie, CNRS, France *Peptides: Conformational Analysis and Applications in Biological Systems*
- **27 January, 2012 (Fri 4:00 pm)** Dr. **Chandra Sekar Rout**, Purdue University, USA *Molecular charge transfer and surface enhanced Raman scattering studies of few layer graphene*
- **27 January, 2012 (Fri 3:00 pm)** Dr. **Madhusudan Singh** *Sustainable device-based strategies - some results and future directions*
- **25 January, 2012 (Wed 5:00 pm)** Dr. **Debabrata Biswas**, The Rockefeller University *Functional Characterization of Leukemogenic MLL Fusion and Fusion Partner Protein Complexes*
- **25 January, 2012 (Wed 4:00 pm)** Dr. **Aline Bonami**, Emeritus, Université d'Orleans, France *Uncertainty Principles in the Euclidean spaces*
- **25 January, 2012 (Wed 3:00 pm)** Dr. **Ullasa Kodandaramaiah** *From pattern to process: eyespots and sexual parasites in butterflies*
- **24 January, 2012 (Tue 4:00 pm)** Dr. **Angshuman Nag**, University of Chicago, USA *Colloidal Quantum Dots to Nanocrystal Solids: Lighting, Doping, and Charge Transport*

- **23 January, 2012 (Mon 3:00 pm)** Dr. **Abhimanew Dhir**, **Guru Nanak Dev University, Amritsar** *Fluorescent Switches, Logic Gates and Devices to Metal Organic Frameworks*
- **20 January, 2012 (Fri 4:00 pm)** Dr. **Dwaipayan Chakrabarti**, **Indian Institute of Technology Delhi, Hauz Khas, New Delhi** *Engineering anisotropic interactions for soft materials*
- **19 January, 2012 (Thu 4:00 pm)** Dr. **Jeet Kalia**, **National Institutes of Health, Bethesda, MD, U.S.A** *Chemistry, Biology and the Interface*
- **18 January, 2012 (Wed 3:00 pm)** Dr. **Dhirendra K Simanshu**, **Memorial Sloan-Kettering Cancer Center New York, NY 10065, USA** *Molecular machineries involved in trafficking of signaling lipids and small RNA-mediated gene silencing*
- **17 January, 2012 (Tue 4:00 pm)** Dr. **Suman Chakrabarty**, **University of Southern California, USA** *The curious case of Cytochrome c Oxidase: Elusive mutational effects on proton transport pathways*
- **16 January, 2012 (Mon 11:00 pm)** Dr. **Iftikhar Burhanuddin**, **University of California, Los Angeles** *Some computational problems motivated by the Birch and Swinnerton-Dyer conjecture*
- **13 January, 2012 (Fri 4:00 pm)** Dr. **Raghav Rajan**, **University of California at San Francisco, USA** *Initiating a complex motor sequence: lessons from a song bird*
- **13 January, 2012 (Fri 3:00 pm)** Dr. **Varadharajan Sundaramurthy**, **Zerial group, Max Planck Institute-CBG, Germany** *Boosting cellular trafficking machinery to get rid of /M. tuberculosis*
- **12 January, 2012 (Thu 5:00 pm)** Dr. **Tirumala Chowdary**, **Tufts University, USA** *Passing The Baton: Structure Reveals Regulatory Role Of gH/gL Complex In Herpesvirus Entry*
- **11 January, 2012 (Wed 3:00 pm)** Dr. **Divya Uma** **University of Maryland, USA** *Multi-sensory communication between predators and prey: from behavior to neurons*
- **10 January, 2012 (Tue 4:00 pm)** Dr. **Guru Raj**, **University of Rochester, USA** *Group 4 Metal Oxide Catalysts for Olefin Polymerization and Copolymerization and Low Coordination Iron Complexes for Nitrogen Activation*

- **9 January, 2012 (Mon 5:00 pm)** Dr. **D. Suryaramana**, HRI, Allahabad *Additive Energy of Large Sets of Primes and Monochromatic Representation*
- **6 January, 2012 (Fri 3:00 pm)** Dr. **Bushra Ateeq**, University of Michigan, Ann Arbor, MI 48109, USA *Characterization and Therapeutic Targeting of ETS Negative Prostate Cancer*
- **4 January, 2012 (Wed 3:00 pm)** Dr. **Deepa Subramanyam**, University of California at San Francisco, San Francisco, CA -94143, USA *Cell fate transitions in development and cancer: regulation by microRNAs and epigenetic mechanisms*
- **3 January, 2012 (Tue 4:00 pm)** Dr. **Ram Sagar**, University of Oxford, UK *Exploring and exploiting the carbohybrids towards biological application*
- **29 December, 2011 (Thu 10:30 am)** Dr. **Rahul Roy**, Sunney Xie Lab, Harvard University, USA *Single Molecule Biology and Super-Resolution Optical Microscopy*
- **20 December, 2011 (Tue 12:00 am)** Dr. **Alok Kumar Maharana**, McGill University, CANADA *Cyclic multiple planes of non-general type*
- **20 December, 2011 (Tue 11:00 am)** Dr. **Vivek Mohan Mallick**, Centre de Recerca Mathematica, Barcelona SPAIN *wo results : On Roitman? theorem and on spectrums of triangulated categories*
- **12 December, 2011 (Mon 3:00 pm)** Dr. **Rudresh Acharya**, Department of Biochemistry and Biophysics, University of Pennsylvania, Philadelphia PA *Structural basis for the function and inhibition of an influenza A virus M2 proton channel (AM2)*
- **1 December, 2011 (Thu 4:00 pm)** Dr. **Prasenjit Bhaumik**, National Cancer Institute - Frederick, Frederick, MD 21702-1201 *Development of antimalarial inhibitors targeting Plasmodium parasite plasmepsins*
- **1 December, 2011 (Thu 3:00 pm)** Dr. **Montu K. Hazra**, University of California, San Diego, USA *Laser Induced Fluorescence Spectroscopy of Selected Nucleic Acid Base-Pair Analogues and Overtone Spectroscopy of Atmospherically Related Molecules*
- **24 November, 2011 (Fri 5:00 pm)** Dr. **Dipak Dutta**, Department of Biochemistry, New York University School of Medicine, NY 10016, USA *Linking RNA Polymerase Backtracking to Genome Instability in E. coli*

- **18 November, 2011 (Fri 4:00 pm) Dr. Kuljeet Singh Sandhu, Genome Technology and Biology Genome Institute of Singapore** *Chromatin Interaction Networks: Presenting the Genomic Cosmos*
- **17 November, 2011 (Thu 3:00 pm) Dr. Sayan Bagchi, Stanford University, USA** *Structural and Conformational Dynamics in Peptides, Proteins, and Enzymes: A 2D-IR Spectroscopic Approach*
- **11 November, 2011 (Fri 5:00 pm) Dr. Benu Brata Das, NCI/NIH, Bethesda, USA** *A Novel Nuclear and Mitochondrial DNA repair enzyme Tyrosyl-DNA phosphodiesterase (TDP1): Insights into Topoisomerase1-induced DNA Damage and Human disease*
- **11 November, 2011 (Fri 3:00 pm) Dr. Debabani Ganguly, Kansas State University, USA** *Atomistic and coarse grained simulation of intrinsically disorder proteins*
- **10 November, 2011 (Thu 3:00 pm) Dr. Sukanta De, Trinity College Dublin, Ireland** *Transparent Electrodes from Nanomaterials for Flexible Devices*
- **8 November, 2011 (Tue 3:00 pm) Dr. V G Vaidhyanathan, University of Rhode Island, USA** *Role of aminofluorene-induced conformational heterogeneity in translesion synthesis*
- **8 November, 2011 (Tue 11:00 am) Dr. Somnath Bhattacharjee, Michigan State University, USA** *Affinity Membrane with Functionalized Polymer Brushes or Polyelectrolyte Films for High Capacity Purification of Histidine-Tagged Proteins, Protein Sorption Modalities on Comb-Like Polymer Multilayer*
- **3 November, 2011 (Thu 12:00 pm) Prof. D. Balasubramanian, L. V. Prasad Eye Institute, Hyderabad** *The Greek Key motif in the beta-gamma crystallins is vital for central eye lens transparency*
- **31 October, 2011 (Mon 3:00 pm) Dr. Sukhendu Mandal, Pennsylvania State University, USA** *Controlling Band Gap Energies in Cluster-Assembled Materials*
- **24 October, 2011 (Mon 3:00 pm) Dr. Radha Chauhan, The Rockefeller University, New York USA** *Insight into Structure and Versatility of the Transport Channel of the Nuclear Pore Complex*

- **21 October, 2011 (Fri 4:00 pm) Dr. Ashish Arora, Senior Scientist, Molecular and Structural Biology CSIR-CDRI** *Understanding the Soft-Skills of Drug Target Proteins using NMR Spectroscopy*
- **18 October, 2011 (Tue 3:00 pm) Dr. Abhijit Roy, University of East Anglia, Norwich, UK** *Harnessing natural product biosynthesis/privilege molecules: In search of novel bioactive compounds*
- **13 October, 2011 (Thu 3:00 pm) Dr. Prashant Singh** *Unseen beauty of hydrogen bonding: study from gas phase to interface*
- **10 October, 2011 (Mon 3:00 pm) Dr. Santanu Bag, IBM T. J. Watson Research Centre, New York, USA** *Solution Processed Chalcogenides: Mesostructured Semiconductors, Chalcogels & Thin-film Solar Cells*
- **5 October, 2011 (Wed 4:00 pm) Dr. Shraavan Kumar Mishra, Deptt. of Molecular Cell Biology, Max Planck Instt. of Biochemistry, Germany** *Regulation of Alternative RNA Splicing by Ubiquitin-Like Modification*
- **5 October, 2011 (Wed 3:00 pm) Dr. Srinivasa M. Srinivasula, National Cancer institute, National Institutes of Health, Bethesda MD 20892** *Autophagy in host defense: Role of p62 in TLR4 signaling*
- **29 September, 2011 (Thu 4:00 pm) Dr. Sudipta Dutta, IIT Kanpur** *Structures and Saturations in Banach spaces*
- **9 September, 2011 (Fri 4:00 pm) Dr. Jamuna R. Subramaniam, Deptt. of Biological Sciences & Bioengineering, IIT Kanpur** *Neural plasticity induced lifespan extension and alleviation of amyloid beta toxicity*
- **7 September, 2011 (Wed 3:00 pm) Dr. Ravi Muddashetty Emory University, Atlanta, USA** *Micro manipulation in Neurons, microRNAs, dynamic modulators of Neuronal activity*
- **6 September, 2011 (Tue 3:00 pm) Dr. Anup Som, Institute for Biostatistics and Informatics in Medicine, University of Rostock, Germany** *E-PluriNetWork: An interaction/regulation network underlying pluripotency in mouse, and its applications*
- **5 September, 2011 (Mon 3:00 pm) Dr. Supratim Giri, University of Toronto, Canada** *Nanotechnology: some aspects and application in biomedicine*

- **1 September, 2011 (Thu 2:00 pm) Dr. Bidisha Sinha, Institut Curie, Paris** *Understanding mechanosensing by caveolae*
- **26 August, 2011 (Fri 4:00 pm) Dr. Shashi Pandit, Genscope, CEA** *TASSER based protein tertiary structure prediction*
- **24 August, 2011 (Wed 3:00 pm) Dr. Sanjib Bhattacharyya, Mayo Clinic, Rochester, USA** *Nanomaterials at the Biological Interface: Tailoring Endocytotic Mechanism to Target Specific Intracellular Pathways*
- **16 August, 2011 (Tue 3:00 pm) Dr. Dulal Senapati, Jackson State University, Jackson, USA** *Multipodal Plasmonic Nanomaterials: Growth Mechanism and their Applications*
- **16 August, 2011 (Tue 3:00 pm) Dr. Narendrakumar Ramanan, Anatomy and Neurobiology Washington University School of Medicine** *Transcriptional control of axon growth in mammalian central nervous system*
- **12 August, 2011 (Fri 3:00 pm) Dr. Sunita Verma, BITS Jaipur** *Analysis of Aerosols and Trace Gases using Global Climate Model and Observations*
- **9 August, 2011 (Tue 3:00 pm) Dr. Yashonidhi Pandey, CMI, Chennai** *Parahoric G- bundles on a compact Riemann surface : the case of G - a classical group*
- **26 July, 2011 (Tues 4:00 pm) Dr. N Arul Murugan, Royal Institute of Technology, Stockholm, Sweden** *Multiphysics, multiscale modeling of molecular probes*
- **22 July, 2011 (Fri 4:00 pm) Dr. Beena Krishnan, Univ Massachusetts, Amherst, USA** *Unraveling the Mechanisms of Folding and Function of Serpins: In Vitro and In Vivo*
- **20 July, 2011 (Wed 4:00 pm) Dr. Kalyanasis Sahu, University of South Carolina, Columbia, USA** *Heterogeneous reaction rates in ionic liquid and electron trapping in CdSe quantum dot measured by 2D-MUPPETS*
- **19 July, 2011 (Tue 4:00 pm) Dr Tushar Kant Beuria, Univ. Texas Health Science Centre, USA** *Targeting cell division in bacteria: A novel approach to develop new antibacterials*
- **18 July, 2011 (Mon 4:00 pm) Dr. Dipankar Das, Univ of Otago, New Zealand** *High precision atomic and molecular spectroscopy*

- **13 July, 2011 (Wed 4:00 pm) Dr. Samir H. Chikkali** *Strategic designing of phosphorus ligands and their applications in organometallic catalysis*
- **4 July, 2011 (Mon 3:00 pm) Dr. Pooja Singla, Centre for Advanced Studies in Mathematics, Be'er Sheva Israel** *Representations of linear groups over local rings*
- **1 July, 2011 (Fri 4:00 pm) Dr. Subhash Banerjee, University of South Dakota, USA** *Sustainable Development of Catalysts for Green Synthesis & Nano-Sensors for Detection of Analytes*
- **30 June, 2011 (Thu 3:00 pm) Dr. Mrigank Srivastava, CDRI, Lucknow** *Role of Chemokines and Mononuclear Phagocytes in Infectious Diseases*
- **29 June, 2011 (Wed 4:00 pm) Dr. Milan Surjit, IGBMC, Strasbourg** *How do we respond to stress! A new insight into the mechanism of action of a stress hormone*
- **29 June, 2011 (Wed 3:00 pm) Dr. Deepak Kumar Sinha, Laboratoire de Physique Statistique, Ecole Normale Supérieure, Paris** *Photocontrol of protein activity in a single cell of a live organism*
- **23 June, 2011 (Thu 11:00 am) Prof. Subramanian Yashonath, SSCU, IISc Bangalore** *Insights into Breakdown of Walden's Rule: Implications in Physical Chemistry and Electrochemistry*
- **22 June, 2011 (Wed 4:00 pm) Prof. Tejinder Neelon, California State University, USA** *Reduction Theorems for functions and power series in several variables*
- **21 June, 2011 (Tue 4:00 pm) Dr. Bhabani Shankar Mallik, University of Notre Dame, Indiana, USA** *Computational Studies of Complex Chemical Systems: From Water to Energy Materials*
- **20 June, 2011 (Mon 4:00 pm) Dr. Tanmay Mandal, University of Leipzig, Germany** *Organocatalytic asymmetric synthesis, and design and synthesis of histone deacetylase inhibitors*
- **16 June, 2011 (Thu 4:00 pm) Dr. Akash Gulyani, University of North Carolina, USA** *Imaging protein activity in living cells: Src kinases at the leading edge*

- **15 Wed, 2011 (Tue 4:00 pm) Dr. Amit Paul, University of North Carolina Chapel Hill, USA** *Electrochemistry: From Fundamental Charge Transfer to Molecular Catalysis*
- **June, 2011 (Tue 4:00 pm) Dr. Manoj Kumar Nayak, Texas A&M Univ. at Qatar/ Deptt of Chemistry, McGill University, Montreal, Canada** *Luminescent Nanospheres for Biodetection and Signal Amplification*
- **14 June, 2011 (Tue 3:00 pm) Dr. Anchal Vishnoi, University of Pennsylvania, USA** *Selection pressure analysis of genes at different evolutionary time*
- **8 June, 2011 (Wed 4:00 pm) Dr. Uttamkumar Samanta, KIIT University, Bhubaneswar** *LpPLA2: Its role in Human Health and Structural Insight*
- **2 June, 2011 (Thu 4:00 pm) Dr. Shilpee Dutt, Tata Memorial Centre/ACTREC** *Lymphoma and Leukemia: The role of aberrant DNA damage response and p53 pathway*
- **2 June, 2011 (Thu 3:00 pm) Dr. Amit Dutt ACRETC, Tata Memorial Cancer Centre** *Translating Cancer Genomics to Medicine*
- **1 June, 2011 (Wed 4:00 pm) Dr. M M Balamurali, University of Medicine and Dentistry of New Jersey, Newark, USA** *Single Molecule Force Spectroscopy of Bio-elastomers*
- **May 31, 2011 (Tue 4:00 pm) Dr. Sudipta Basu, Brigham and Women's Hospital** *Simplifying the Complexity*
- **May 16, 2011 (Mon 4:00 pm) Dr. Mahak Sharma, Harvard Medical School** *Uncovering the molecular mechanisms regulating protein sorting in the endosomal/lysosomal system: implications in microbial clearance*
- **May 13, 2011 (Wed 1:00 am) Dr. Biswarup Pathak, Uppsala University, Uppsala, Sweden** *Atomistic Modeling of Nanomaterials for Renewable Energy and Bio-Applications*
- **May 05, 2011 (Thu 3:00 pm) Dr. Sourav Banerjee, Univ. California, Santa Barbara, USA** *Micromanaging neuronal network: Regulatory control of neuronal development and plasticity by microRNAs and piRNAs*
- **May 04, 2011 (Wed 4:00 pm) Dr. R Natarajan** *Crystal Engineering of Functional Organic Nanotubes based on Cholapods*

- **April 21, 2011 (Thu 4:00 pm) Dr. Rajesh Ramachandran, Univ. Michigan, USA** *Molecular Mechanisms Underlying Retina Regeneration*
- **April 21, 2011 (Thu 3:00 pm) Dr. Ponnusamy Babu, Centre for Cellular and Molecular Platforms, Bangalore** *Sweet side of the Neutrophils: Functional Glycomics*
- **April 20, 2011 (Wed 3:00 pm) Dr. Subhrajit Biswas, Vanderbilt Univ. Medical Center** *Alteration of metabolic pathways driven by pro-apoptotic Bax and Bak in early thymopoiesis initiates the stage specific T-cell Leukemias*
- **April 19, 2011 (Tue 4:00 pm) Dr. Pallavi Debnath** *Polymer friction by stochastic bond rupture and Cooperative dynamics of polymer melts*
- **April 18, 2011 (Mon 4:00 pm) Dr. Sarada Prasad Mishra, Naval Materials Research laboratory, Ambernath, Mumbai** *The Future Prospective of Organic Electronics*
- **April 15, 2011 (Fri 4:00 pm) Dr. Debarshi Dasgupta, Eindhoven University of Technology, The Netherlands** *Functional Self-Assembled Architectures: From Molecules to Materials*
- **April 14, 2011 (Thu 4:00 pm) Dr. Debashree Bandyopadhyay, Bioinformatics Institute, Singapore** *Elucidation of protein structure and function using computational structural biology*
- **April 13, 2011 (Wed 4:00 pm) Dr. Sanjib K. Patra, University of Bristol, UK** *Functional Metal-Containing Block Copolymers Through Photocontrolled Living Polymerizations*
- **April 13, 2011 (Wed 3:00 pm) Dr Amit Arora, Univ of St Andrews, Scotland** *From Gene expression to Gene regulation to Gene interactions*
- **April 13, 2011 (Wed 12:00 pm) Dr. Amit Kumar, University of Regensburg, Germany** *Integer Quantum Hall Effect in Trilayer Graphene Under High Magnetic Field*
- **April 11, 2011 (Mon 4:00 pm) Dr. Ujjal Das, Massachusetts Institute of Technology, USA** *Computational investigations of CO₂ capture sorbents and steam reforming catalysts*

- **April 8, 2011 (Fri 4:00 pm) Dr. Sougata, Department of Animal Biology, University of Pennsylvania, USA** *Phase-fluctuations driven pseudogap state in a strongly disordered conventional superconductor: NbN*
- **April 7, 2011 (Thu 11:00 am) Dr. Sougata, Department of Animal Biology, University of Pennsylvania, USA** *Arginylation: A new look at an old protein modification*
- **April 6, 2011 (Wed 4:00 pm) Dr. Kavita Babu, Dept. of Molecular Biology, Massachusetts General Hospital, Boston, USA** *Synaptic plasticity at the C. elegans Neuromuscular Junction*
- **April 6, 2011 (Wed 3:00 pm) Dr. Bhaskar Dutta, Missouri State University, USA** *Nucleic Acids as Probes, Sensors and Scaffolds*
- **April 5, 2011 (Tue 4:00 pm) Dr. Tharamani Chikka Nagaiah, Ruhr-Universitt Bochum, Germany** *Design of Active Catalysts for Tomorrow's Energy Claim*
- **April 4, 2011 (Mon 4:00 pm) Dr. Venkata Krishnan, NIMS, Japan** *X-ray Scattering and X-ray Spectroscopic Studies on Bio-inspired Hierarchical Functional Materials and Metal Oxide Nanomaterials*
- **April 1, 2011 (Fri 4:00 pm) Dr. Murali Gururajan, Cedars-Sinai Medical Center, LA, USA** *MicroRNAs: Role in normal B cell differentiation and B cell derived diseases*
- **April 1, 2011 (Fri 3:00 pm) Dr. Ankush Gupta, Cornell University, USA** *Anisotropic Etching of Si(100) and The Production of Near-Atomically-Flat Surface*

14 Report from the Library

The Library of IISER Mohali is a unique place with its rich collection of monographs and Journals in Mathematics, Physics, Chemistry, Biology, Computer Science, Humanities, Earth/Environmental Science , Astrophysics etc., The collection includes textbooks for the UG & PG courses in the basic sciences as well as applied sciences. The Library stands as a unique Knowledge Center that offers access to essential and specialized information resources and services to meet the growing information needs of the User. It is a host of information services , like Online catalogue (WebOPAC), 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, Photocopying facilities, Reference Service, and so on. The house keeping activities of Library has been computerised by implementing Open Source Library Management Software “Koha”.

The library at IISER Mohali currently houses over 6250 monographs which are classified as per DDC 22nd edition Classification Scheme and catalogued as per AACR2 revised edition. The library subscribes more than 20 learned and Scholarly print journals and also 10000+ e-journals with full text access in both transit Campus as well as Mohali Campus.

14.1 Library Automation

During the Period under Report the Library has Catalogued newly procured books in Open Access Library Management Software “Koha”.

Made the computerized catalogue online through WebOPAC so that users of the library can search the catalogue from outside the campus. Profile of Newly joined Bonafide members has also been computerized Circulation Process (Borrowing & Lending of Books) has been fully computerized.

14.2 E-Resources

The IISER Mohali Library is one of the core members of INDEST as well as IISERs Consortia, and also Associate Member of UGC-Infonet Digital Library Consortium . Under these Consortia, library has seamless access to thousands of renowned electronic journals in the field of basic sciences. Some of the Online full text databases available during under report for access are Science On-line, ACS (Web Edition), Nature Online, APS, AIP, AMS, MAA, RSC, IOP, International press, Annual Reviews, JSTOR, Project Muse, Project Euclid, Sciencedirect, Springer-online, T&F, Wiley, World Scientific, etc. and Bibliographical & Abstracts databases are Math-SciNet, SciFinder, Scopus and DELNET.

15 Report from the Computer Centre

15.1 Computing

IISER Mohali has setup its first High Performance Computer. The cluster consists of 24 nodes Intel(R) Xeon(R) CPU X5670 2.93GHz with a total of over 288 processor cores. All nodes connected via 1Gbit Ethernet and QDR Infiniband interconnect. The Operating system is Debian GNU/Linux. Primary Storage is in the form of

a 20 TB FS2 NAS. The batch system is TORQUE and separate batch queues for sequential, shared memory and distributed memory programming are available to users. Facility is being used by several faculty members engaged in computing oriented work. In particular faculty members who work in astrophysics, statistical mechanics and quantum chemistry are main users of the system.

15.2 NKN Connectivity

During this year, IISER Mohali has become part of National Knowledge Network. A dedicated NKN line has been deployed on campus which is expected to provide 1Gbps bandwidth to IISER Mohali. Apart from other things, this bandwidth will be utilized for virtual classrooms where we will be able to share courses with other institutions such as the other IISERs. The IISER Mohali E-classroom is expected to become operational in the early part of next year.

15.3 Automation

The campus automation project entered its next phase, with several modules becoming operational during the past year. The academic module was completed and the processes like course registration for MS and PhD students and uploading of grades for all courses is now fully automated and incorporated into the system. Student academic grade cards were also generated with the ERP system. The PhD and summer applications were handled online on this automated system, and faculty members were able to select their summer candidates online as well. All selected students were entered into the IISERM student Database in ERP. The salary preparation and other accounts are also being handled on the system. The library module based on Koha software has become fully operational.

15.4 Moodle

Moodle Education Server was hosted and implemented to replace the Intranet Server for course related material during November 2011. Faculty members were able to login and upload their course materials themselves on Moodle, and students can access course related material.

15.5 IISERM Servers

IISERM ERP Server has been shifted from MGSIPAP to Sector 81 during May 2011. The Web/Email server has been shifted from MGSIPAP to Sector 81 during

November 2011. The BSNL fiber optics connection was moved to to Sector 81 Mohali.

16 Account Statement

The Annual Statement of Accounts of the Institute for the Financial Year 2011-12 has been finalized and prepared in the prescribed format (Form of Financial Statement Non-Profit Organization) provided by MHRD. This includes the Balance Sheet, Income & Expenditure Account and Receipt & Payment Account. The Accounts have been prepared on accrual basis. The Statement of Account of the Institute is audited by a Chartered Accountant firm of Chandigarh (Prem Garg & Associates), who had been appointed as internal auditor of the Institute. Final Accounts are audited by C.A.G. of India / PAG (Punjab & UT).

16.1 Plan Grant

The Institute received a sum of Rs. 13800.00 Lakh as Grant-in-Aid from MHRD in the Year 2011-12. As per utilization certificate on account of 2010-11, there is an opening balance of Rs. 241.34 Lakh. Out of the total amount of Rs. 14041.34 Lakh available under plan grant, the following expenditure has been made under different budget heads in 2011-12.

[h]	Budget Head	(Rs. in Lakh)
(i)	Salary Component	840.50
(ii)	Non- Salary Component	1419.89
(iii)	Purchase of Equipment	2376.89
(iv)	Purchase of Furniture	57.63
(v)	Purchase of Vehicle	4.40
(vi)	Construction of Building (Including Deposit money)	8628.56
(vii)	Library Books	47.06
(viii)	Computers Accessories & Peripherals	47.11
(ix)	Kitchen Utensils	3.24
	Total	11394.20

The Institute has its internal receipts of Rs. 174.72 Lakh from Interest on Fixed Deposits, Rs. 92.90 Lakh from Student Fee and Rs. 51.66 Lakh from other resources under Plan Head (in 2011-12).

16.2 Research & Development Grant

In addition to the Plan Grant, the Institute also received a sum of Rs. 650.07 Lakh (in 2011-12) under Research & Development Account (with an opening balance of Rs. 166.96 Lakh carried over from the year 2010-11). In case of Research and Development (R & D A/c) account, the details are as follows:

Income:

	(Rs. in Lakh)
(i) Opening Balance as on 01.04.2011	166.96
(ii) Grant received in 2011-12	650.77
Total	817.73

Expenditure:

	(Rs. in Lakh)
(i) Pay and Allowances	19.44
(ii) TA	5.35
(iii) Scholarship	203.09
(iv) Purchase of Equipment	229.28
(v) Contingency	5.04
(vi) Consumables	19.49
(vii) Overheads	38.56
(viii) Books	0.29
(ix) Other Expenditure	14.72
Total	535.30

Thus, the total amount available was Rs. 817.73 Lakh, out of which Rs. 535.30 Lakh was spent under R & D A/c with a closing balance of Rs. 282.43 Lakh.

16.3 Endowment Fund

The Board of Governors had approved to open an Endowment Fund Account in its 5th meeting held on 30.04.2009. Balance available under this account is Rs. 498.54 Lakh as on March 31, 2012.

16.4 Student Welfare Account

In addition to the above, there is a Student Welfare Account with a closing balance of Rs. 58.94 Lakh at the end of financial year 2011-12.