Polymer models for chromatin domain structure and dynamics: *Interplay between cohesin kinetics, polymer relaxation, and nonequilibrium switching of segmental states.*

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The three-dimensional organization of chromatin into domains and compartments leads to specific scaling of contact probability and compaction with genomic distance. However, chromatin is also dynamic, with active loop extrusion and chemical modifications playing crucial roles. While extrusion of loops by cohesion like proteins ensures a specific spatial organization, how it affects the dynamic scaling of measurable quantities is an open question. Similarly, the existing models of chromatin assume the chemical states and protein organization along chromatin to be static. The effect of dynamic assembly and disassembly of nucleosomes on the compaction of chromatin is largely unexplored.

Using polymer simulations with active loop extrusion and dynamic switching of segmental states, we demonstrate that the interplay between these timescales and polymer relaxation can influence the 3D organization of chromatin polymer.

Related articles.

1. S Sahoo et al. *Soft Matter*, 2024, 20, 4621
2. S. Kadam et al. bioRxiv, 2024.05. 07.592992