

Polymer Physics at Mesoscopic Scale:

a Field-Theoretic Study of Fluctuation Effects in Charged Systems

Abstract:

During most of the history of science, polymers were mainly viewed as a subject for chemical or biological research. Once polymer physics stepped in a few decades ago, it brought rigorous mathematical tools, new theoretical methods, and cross-references from other sub-fields of physics. One of the recent advances for bulk polymer systems was the introduction of a field-theoretic framework, which gave rise to a new class of theoretical and computational methods for dense many-chain systems. This framework proved particularly useful for systems with long-range interactions, such as charged polymer systems. In this talk, I will give an introduction to the field-theoretic approach in polymer physics and outline our recent results on complexation of oppositely-charged polyelectrolytes and our ongoing work on dipole interactions.