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# Nonequilibrium Semiflexible Network and the Mechanics of the Cell


## Presented by:
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Transiently cross linked networks of semiflexible filaments make up the principal structural component of the cell — the cytoskeleton. This intracellular network, along with molecular motors, forms the basis for cellular control of morphology and force generation. Understanding how to relate the complex and nonequilibrium dynamics of this semiflexible polymer network at the molecular scale to its collective mechanical and dynamical properties is at once a forefront problem in statistical mechanics and cellular biophysics. In this talk, I introduce the cytoskeleton from a physical perspective, and address a few surprising features of its collective properties. Through a combination of inherent elastic nonlinearities of its constituent filaments, orientational order, and motor activity, cytoskeletal networks can dynamical control their linear response properties through molecular motor activity, dynamically reorganize in response to applied loads, and spontaneously "heal" locally damaged regions of the network. In this talk I will report on work addressing these intriguing features cytoskeletal networks. I will also discuss the role of Casimir (fluctuation-dependent) interactions between cross linkers in bundles of cytoskeletal filaments and propose that, due to these entropic forces, the system admits a first-order bundling transition in which small changes in linker concentration lead to large-scale topological reorganizations of the network.

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