Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad - 500107

Colloquium

Active liquid crystals with tunable elasticity and dynamics

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Active matter refers to systems driven out of equilibrium by the uptake and dissipation of energy directly at the level of individual constituents. This local injection of energy often results in a collective behavior which is evocative of phenomena of flocking of animals ubiquitous in the natural world. However, its effects on mechanical properties of actual materials remain unexplored. In this talk, I will present our experimental results on quasi-two-dimensional nematic liquid crystals (LC) composed of short actin filaments (≈ μm) driven by myosin motors. I will first elucidate a direct relationship which exists between the shape of topological defects and elastic moduli making them an ideal system to investigate the effects of activity on materials. I will then show that the activity leads to peculiar phenomena like defect generation, propagation, and repulsion, all of which are quantifiable by the motor concentration as the activity parameter. I will also show that the activity lowers the effective ratio of bend-to-splay elasticity evident from the changes in the shape of topological defects. Altogether, these results demonstrate control over complex flows, defect dynamics and elastic properties of active nematic LCs thus advancing our understanding of the effects of activity on materials.

Wednesday, Jan 23rd 2019

11:30 AM (Tea/Coffee at 11:00 AM)

Auditorium, TIFR-H