

PHYSICAL MATHEMATICS SEMINAR

Non-equilibrium Structures in Passive and Active Nematic Fluids

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ABSTRACT:

Structure of the orientational order in nematic liquid crystals is of great importance for their functionality and emergent behavior. I will discuss properties of nematic structures that are distinctly out of equilibrium in the context of two model systems — nematic microfluidics and active nematics. Microchannels are an appropriate environment for *controlled* flow-induced transitions between nematic structures. By proper design of a microfluidic network, defects in the nematic order can be tuned by the stagnation points in the flow field, demonstrating an effective cross-talk between the two topological entities. I will also show how laser-induced deformation of nematic orientational profile can generate flow and act as a local fluid pump. On the other hand, active nematics are known to form ordered and disordered regimes that can be tuned by activity and confinement. I will show interesting dynamics that emerges when active nematic shells are in contact with a passive nematic. I will also demonstrate the structure of 3D active nematics, where for confined systems defects in the orientational order appear in the form of closed loops subjected to topological dynamics. The results are a contribution towards understanding active or driven artificial and biological materials with underlying anisotropic order.

TUESDAY, DECEMBER 4, 2018

2:30 pm

Building 2, Room 136

*Reception following in Building 2, Room 290
(Math Dept. Common Room)*

<http://math.mit.edu/seminars/pms/>