

Seminar

Hydrodynamics and fluctuations in models of active particle motion

Stephy Jose

TIFR, Hyderabad

Active matter comprises self-propelling entities equipped with internal engines, kept out of equilibrium through external or internal energy inputs, which enables them to perform work. In this talk, I will present models of active matter ranging from the single-particle scale to multiple non-interacting particles, as well as coarse-grained hydrodynamic descriptions of interacting active particles. At the single-particle level, I will demonstrate the interesting features exhibited by an active particle, which distinguish it from a passive particle, such as large deviation functions with different cross-over regimes and enhanced first passage probabilities. Moving to multi-particle systems, I will introduce generalised disorder averages in terms of the initial conditions for both the density and the order parameter fields, showing how slight changes in initial conditions can influence the transport properties of self-propelling particles over time. At the coarse-grained hydrodynamic level, I will focus on interacting active matter from the perspective of fluctuating hydrodynamics and macroscopic fluctuation theory. Specifically, I will discuss an interacting active lattice gas and the related diverging fluctuations near a motility-induced phase separation critical point.

Tuesday, Oct 22nd 2024

11:30 Hrs (Tea / Coffee 11:15 Hrs)

Auditorium, TIFR-H