

Students' Annual Webinar

Concentration-driven instability in polar active fluids

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Polar active fluids consist of head-tail asymmetric self-propelled particles (SPPs) suspended in a fluid medium, for example, bacterial suspensions and fish schools. In the Stokesian regime, the flocking state is unstable to small perturbations leading to complex spatiotemporal flows also known as Active Turbulence. Recent works have shown that inertia can stabilize the ordered state and drives a flocking transition from defect turbulence to noisy but aligned states. However, these results are limited to the regime where concentration is not a hydrodynamic variable of the system. We show that when concentration fluctuations are taken into account, a hitherto unseen instability of the ordered state arises. Using high-resolution direct numerical simulations, we show that it leads to new kinds of non-equilibrium steady states which are absent in the concentration-free limit.

Friday, Mar 3rd 2023

10:00 AM (Tea / Coffee 9.45 AM)

Seminar Hall, TIFR-H