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

Seminar

Active Polar suspensions - stability and turbulence

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The theory of active matter is the framework of choice for understanding the collective behaviour of motile particles, and some of its most dramatic consequences are seen in “wet active matter”, where the dynamics takes place in a bulk fluid. A central feature of such systems is the low-Reynolds number turbulence, locally organized but globally chaotic motion as seen in swimming microbes and motorized bio filament extracts. In this talk, I will first illustrate using the hydrodynamic model (Simha & Ramaswamy, 2002), that how self-propulsion combined with fluid inertia, at the linearized level, can lead to a threshold for the instability of such systems to spontaneous distortion, with a diffusive growth rate at small wavenumber. I will then discuss our numerical findings on some novel regimes of active turbulence. I will further show how incompressibility of the polar orientation field drastically affects the hydrodynamic stability of a uniaxial ordered state. Finally, I will discuss our findings on how this turbulent-like collective motion affects the dynamics of colony growth in motile bacteria.

Friday, Feb 21st 2020

4:00 PM (Tea/Coffee at 3:30 PM)

Seminar Hall, TIFR-H