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 biofilament extracts. In this talk I will first discuss our findings on the effects of this turbulent-like collective motion on the dynamics of bacterial colony growth. I then illustrate, using the hydrodynamic model (Simha & Ramaswamy, 2002), that how self-propulsion combined with fluid inertia, at the linearised level, can lead to a threshold for the instability of such systems to spontaneous distortion, with a diffusive growth rate at small wavenumber. I then discuss our numerical findings on some novel regimes of active turbulence. I will conclude by explaining how incompressibility of the polar orientation field drastically affects the hydrodynamic stability of an uniaxial ordered state.

Tuesday, Jan 29th 2019

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

Auditorium, TIFR-H