MONDAY

COLLOQUIUM

Non-equilibrium self-assembly for living matter-like properties

Dibyendu Das (IISER, Kolkata)

02 Feb 2026 (Monday) | 16:00 Hrs (Tea / Coffee 15:45 Hrs) | Venue: TIFRH Auditorium

Life's soft and wet machinery arose from spatially confined assemblies of biomolecules capable of replication, integrated with metabolic reaction cycles that function far from equilibrium. By methodically synthesizing and integrating these key elements, i.e., replication, metabolism, and confinement under non-equilibrium conditions, we can begin to explore how chemically constructed systems might acquire life-like, evolving properties. This ambitious goal lies at the heart of systems chemistry. In this talk, I will outline recent insights into how reaction networks, self-reproduction, and compartmentalisation can be brought together under non-equilibrium settings. I will also delve into the interplay between reaction dynamics and transient compartmentalisation, and explore the development of self-replicating systems capable of sustained operation in far-from-equilibrium conditions.

tifr HYDERABAD | TATA INSTITUTE OF FUNDAMENTAL RESEARCH