Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally Mandal, Ranga Reddy Dist., Hyderabad – 500 046

Seminar

Diagnosing Thermalisation in Compressible and Quantum Turbulence via Spectral Energy Transfer

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The thermalisation hypothesis suggests that an isolated interacting system should eventually reach equilibrium. In this talk, we show that this is not always the case. We demonstrate that classical compressible Euler flows can remain out of equilibrium. Additionally, one and two-dimensional quantum fluids can also retain nonequilibrium states depending on their initial conditions. We compute energy transfers and fluxes to reveal the dynamical pathways that lead to these different outcomes. Persistent directional energy transfer across scales breaks detailed balance and provides direct evidence that the system remains out of equilibrium. Our results show that dimensionality, the nature of the underlying dynamics, and the initial state can determine whether an isolated nonlinear system ultimately reaches equilibrium or remains trapped in a nonequilibrium state.

Friday, Dec 4th 2026

16:00 Hrs (Tea / Coffee 15:45 Hrs)

Auditorium, TIFRH