ICTS | INTERNATIONAL CENTRE for THEORETICAL SCIENCES

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

ICTS Fluid Dynamics Seminar

Title : Vortex Dynamics and Regime Transitions in Rotating Convection

Speaker : Veeraraghavan Kannan (Carnegie Institution for Science, USA)

Date : Friday, 06 March 2026

Time : 11:30 AM (IST)

Abstract : Rotating convection is a fundamental mechanism that shapes flow organization across a wide range of natural systems, from planetary atmospheres and oceans to deep planetary interiors. A central challenge is to identify the physical principles that govern how such flows generate coherent vortical structures and transition between distinct dynamical regimes.

This talk presents an approach that combines idealized modeling with observational relevance to develop a mechanistic understanding of rotating convection. Using Rayleigh–Bénard–type configurations as physically interpretable idealized frameworks, three related problems are examined: the emergence of tropical cyclone-like vortex, the formation of large-scale vortex dipole condensates relevant to both oceanic and Jovian flows, and regime transitions in thermochemical convection with implications for planetary dynamos. Together, these studies demonstrate how idealized models can isolate essential physics, reveal general scaling behavior in complex geophysical and astrophysical turbulence, and provide a framework for interpreting observations.

Venue : Online

Zoom Link: https://icts-res-in.zoom.us/j/97487692611?pwd=kMDz9wdnQOBfSWzeZZtaZ5RnKaJ4sd.1

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