



अंतर्राष्ट्रीय सैद्धांतिक विज्ञान केंद्र
International Centre for Theoretical Sciences

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भारत सरकार के परमाणु ऊर्जा विभाग की एक स्वायत्त संस्थान एवं समविश्वविद्यालय

An Autonomous Institution of the Department of Atomic Energy of Government of India and a Deemed to be University

ICTS Synopsis Seminar

Title : New dynamics in microscopic and macroscopic geophysical flows

Speaker : Rajarshi Chattopadhyay (ICTS-TIFR, Bengaluru)

Date : Thursday, 16 July 2026

Time : 05:00 PM (IST)

Abstract : We explore two different challenges in geophysical flows. The first concerns the collision of particles in a turbulent background that determines whether raindrops will form in clouds or whether plankton blooms will survive in the ocean. The second concerns energy interactions in the ocean that ultimately determine turbulent mixing of energy, temperature, salinity, and nutrients throughout the ocean abyss. Both these problems suffer from enormous scale separation. In this thesis, we distill the problems down to their most relevant dynamics and analyze them. Doing so, we uncover new phenomena.

While it is known that regions of high strain trigger particle collision in turbulence, we show that the kind of strain matters. Particles can avoid collisions despite encountering high strain if they originate from extensive strain regions. We also find detailed pathways for energy to cascade from internal tides to dissipative scales by forming an internal wave continuum at small submesoscales. This behavior departs from the traditional large-scale mesoscale behavior where tide-eddy interactions are insufficient to form a continuum.

Venue : Feynman Lecture Hall

Zoom link: <https://icts-res-in.zoom.us/j/94670543229?pwd=y81bHU7FmZcRuycMWRUfti94BKKoQj.1>

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