ICTS Seminar

Title : From classical to anomalous transport in weakly collisional high-β plasmas

Speaker : Prakriti Pal Choudhury (University of Oxford, United Kingdom)

Date : Friday, 16 January 2026

Time : 11:30 AM (IST)

Abstract : Classical transport theory is well established for strongly collisional, unmagnetised/magnetized plasmas since the 1960s. However, diffuse intergalactic plasmas are often weakly collisional: the Coulomb mean free path can be comparable to the characteristic gradient scales of temperature and fluid velocity. In this talk, I will argue that classical transport theory often breaks down in the weakly collisional plasmas, threaded by dynamically important, albeit energetically weak, magnetic fields. In such a regime, microscale instabilities (on the order of a species' Larmor radius) rapidly generate electromagnetic fluctuations and interact strongly with particles. These interactions regulate the effective conductivity/viscosity/resistivity of the medium and alter the macroscopic energy and momentum fluxes. These anomalous effects must be incorporated into any viable fluid-closure framework for astrophysical applications. We have recently established a new framework to model anomalous transport that enables micro-macro crosstalk effectively and uncovered new physical insights on transport processes. These have profound consequences in galaxy formation and the interpretation of astronomical observations. Beyond diffuse intergalactic plasmas, these have interdisciplinary applications - in the hot plasmas near black holes, laboratory plasmas, and inertial confinement fusion.

Venue : Feynman Lecture Hall
Zoom Link: https://icts-res-in.zoom.us/j/97074344242?pwd=QFuFyPbSmbpnSUK2rbTTn2z81If5ke.1
Meeting ID: 970 7434 4242
Passcode: 151516