

ICTS Fluid Seminar (HYBRID)

Title : Pathways to Planetesimal formation: New Insights from Turbulent clustering

Speaker : Vishnu Prasath Thulasiraman (ICTS – TIFR, Bengaluru)

Date : Friday, 22nd September, 2023

Time : 11:00 AM (IST)

Abstract : Protoplanetary disks are gaseous systems revolving around young stars in Keplerian rotation, marked by turbulence. They contain a small fraction of dust particles, the raw material for planets. These dust particles coalesce, gradually transitioning from micron-sized grains to centimeter-sized pebbles.

However, gravitational collapse requires pebbles to grow into kilometre-sized planetesimals. How this transformation occurs is unclear, with various obstacles such as fragmentation, bouncing, and radial drift. Proposed mechanisms include streaming instability, vortex trapping and turbulent clustering. This discussion provides an overview of the current understanding of planetesimal formation through these mechanisms, with a focus on turbulent clustering.

The recent work of Fabiola et al used 2D simulations to study inertial particle dynamics in turbulent flows with Keplerian rotation and shear. Their findings show that shear promotes the survival of anticyclones, leading to particle concentration in clusters or fractal arrangements, depending on the rotation rate. These results have significant implications for understanding planetesimal formation

Venue : **Offline:** Chern Lecture Hall (ICTS)

Online: Please click the below link to join the seminar

<https://icts-res-in.zoom.us/j/88972429854?pwd=ewK24vmpuFf27aC8exbaTLRhgDrc1U.1>