



## ICTS Synopsis Seminar

**Title** : Inertial particles in unsteady hydrodynamic environments: theory & numerics

**Speaker** : Divya Jaganathan (ICTS-TIFR, Bengaluru)

**Date** : Wednesday, 24<sup>th</sup> July 2024

**Time** : 3:00 PM (IST)

**Abstract** : Inertial particles move differently from the suspending flow due to finite-time hydrodynamic response to perturbations. While viscosity-dominated Stokes flows are well-studied under steady conditions, their unsteady route to the steady state is not. We examine particle transport using the *unsteady* Stokes model, capturing the non-instantaneous relaxation. We revisit the classical problem of a settling sphere in the unsteady Stokes model to highlight emergence of *memory effects*, and include comparisons with experiments. To address the computational challenges of memory effects in general flows, we develop a *memoryless* framework which leads to an explicit integrator to solve the *Maxey-Riley-Gatignol (MRG) equation*. We show how the approach may be generalized to other nonlocal evolutionary equations. We numerically investigate memory effects on non-interacting particles in rotating vortical flows. Finally, we describe a 2D multi-particle model with fluid-mediated interactions in the unsteady Stokes regime, setting the framework for future development of an MRG analogue that includes interactions.

**Venue** : Emmy Noether Seminar Room

Zoom link: <https://icts-res-in.zoom.us/j/92198823133?pwd=aPecflW5tNFs0FXTWA5EHMy2kDgfyJ.1>

Meeting ID: 921 9882 3133

Passcode: 242425