ICTS Mathematics Seminar

Title : Landau damping around inhomogeneous stationary states of the Vlasov-HMF model

Speaker : Tooryanand Seetohul (University of Rennes, France)

Date : Tuesday, 10 March 2026

Time : 11:00 AM (IST)

Abstract : Plasma dynamics, often modeled by Vlasov equations, have interactions encoded by a potential kernel. A striking phenomenon in such systems is Landau damping whereby particles relax back to a natural equilibrium state when slightly perturbed. In this talk, we investigate Landau damping around inhomogeneous (spatially-dependent) steady states, focusing on the Vlasov-HMF (Hamiltonian Mean-Field) model, a simplified model of the known Vlasov-Poisson interaction. We first present the linearized analysis, showing how Landau damping emerges via an action-angle formulation. The talk addresses the passage from this linear picture to a nonlinear result for initial data with Sobolev regularity. This step is complicated by plasma echoes: nonlinear particle interactions that can destabilize the system. Using compact support hypotheses for symmetric perturbations, we close a bootstrap argument coupling high and low regularity norms, guaranteeing that Landau damping holds for long but finite time.

Venue : Nambu Discussion Room (Left)
Zoom Link: https://icts-res-in.zoom.us/j/97265822684?pwd=yonlcV4k2suyEjLHDJ1I8te0VKwnII.1
Meeting ID: 972 6582 2684
Passcode: 002729