ICTS Ph.D. Thesis Defense Seminar

Title : Implications of inviscid hydrodynamics and its variants for turbulence and statistical physics

Speaker : Sugan Durai Murugan (ICTS -TIFR, Bengaluru)

Date : Friday, 17th November 2023

Time : 2:00 PM (IST)

Abstract : Finite-dimensional inviscid hydrodynamical equations have solutions that eventually thermalize with a Gibbsian distribution and energy equilibrium across Fourier modes. We examine the route to thermalization in the Galerkin-truncated three-dimensional Euler equation and show how this phenomenon can be effectively reduced to a one-dimensional problem. We also discuss strategies to prevent thermalization, which are essential but elusive so far, to numerically obtain dissipative (weak) solutions and discuss their importance for conjectures on the blow-up problem. We then show how thermalized fluids are an ideal candidate to study classical many-body chaos, and in particular, by using decorrelators, we show that the Lyapunov exponent scales as the square root of the temperature, consistent with recent studies and conjectures from other condensed matter systems.
In the end, we present a local multifractal characterization of turbulent structures and a novel attempt to study the dynamo problem in the framework of the EDQNM closure model.

Venue : Chern Lecture Hall & Online
Zoom link: https://zoom.us/j/92814844619?pwd=TlNhWHhCZkNIb0t2Tkh0bmswTmJxdz09
Meeting ID: 928 1484 4619
Passcode: 577640