ICTS | INTERNATIONAL CENTRE for THEORETICAL SCIENCES

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

ICTS Synopsis Seminar

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

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

Date : Friday, 24th February 2023

Time : 02:00 PM (IST)

Abstract : Finite dimensional inviscid hydrodynamical equations have solutions which eventually thermalize with a Gibbsian distribution and energy equipartition 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 thermalisation 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 thermalised fluids are an ideal candidate to study classical many-body chaos and in particular, by using decorrelators, show that the Lyapunov exponent scales as the square-root of the temperature, consistent with recent studies and conjectures from other condensed matter systems. Finally, if time permits, we (a) discuss extensions of these ideas to fully-developed turbulence and (b) show how closure models are useful to understand the dynamo problem in d dimensions.

Venue : Online & Emmy Noether Seminar Room (ICTS)
Zoom link: https://icts-res-in.zoom.us/j/84690389264?pwd=Y3NOTFFWWkNwaTB2THlGSW9NWmI0UT09
Meeting ID: 846 9038 9264
Passcode: 242423

International Centre for Theoretical Sciences - TIFR
Survey No. 151, Shivakote Village, Hesaraghatta Hobli, Bengaluru (North) - 560089
Tel: +91 80 4653 6000 Fax: +91 80 4653 6002
Email: academicoffice@icts.res.in **Website:** www.icts.res.in