

INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE

2A & 2B, Raja S.C. Mullick Road, Jadavpur, Kolkata-700032, India

Seminar Notice

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School of Physical Sciences

Title:	Recurrence in Navier-Stokes-Maxwell equations - a surprising trap in continuum limit
Speaker:	Rupak Mukherjee, Princeton Plasma Physics Laboratory
Date:	August 14, 2019 (Wednesday)
Time:	15:30
Venue:	Physics Seminar Room (C-406), 3rd Floor, Centenary Building, IACS
Abstract:	In astrophysical plasmas, because of very high kinetic energy, the fast motion of any charged particle, generate a magnetic field which in turn crucially governs the dynamics of the particle itself as well as the other particles in the vicinity. Since plasma is a charged gas, it can be modelled as a fluid on which electromagnetic body forces act. The motion of the charged-fluid element in presence of self-generated magnetic field, gets primarily governed by the Maxwell's equations coupled with the equations of <i>hydro-dynamics</i>. The subject that studies the self-consistent evolution of such a magnetised plasma-fluid is known as Magneto-Hydro-Dynamics (MHD). The magnetised fluid model (MHD) in the continuum limit poses a very challenging question in anticipating the future, starting from any given initial state. This talk addresses this question and poses an answer of this problem within very restricted parameter sets. Because of the extra dimensionality introduced by the magnetic variables, within the premise of the MHD model, the magnetic field coupled with the fluid variables offer energy to get exchanged between the fluid and the magnetic modes. One such phenomena which is extensively discussed in this Talk, is the nonlinear coherent oscillations of energy between the kinetic and magnetic scales thereby periodically destroying and re-constructing the fluid and magnetic flow profiles with time. Such periodical reconstruction helps in predicting the long time behaviour of the plasma under the MHD approximations. Thus the extra dimensionality of the problem helps trapping in phase-space of the system and offers completely new physics results full of surprises within the premise of MHD model.

All are cordially invited to attend the seminar