

Seminar

Institute for Plasma Research

Title : Collective structures in strongly coupled dusty plasmas

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Date : 18th September, 2018 (Tuesday)

Time : 10.00 AM

Venue : Seminar Hall, IPR

Abstract :

Dusty plasma can be viewed as a three-component plasma consisting of electrons, ions, embedded solid (dust) particles (which gets negatively charged by the mobile lighter electron species which strikes its surface and gets attached to it). The neutrals can often also be present which makes it a four-component plasma. Due to high charge on the dust grains ($\approx -10,000e$), the dusty plasmas can be easily found in the strongly coupled state (i.e. their electrostatic average potential energy can be made comparable to or higher than the average kinetic energy of particles and does not require extreme conditions of temperature and/or density). In addition to dusty plasmas many other systems viz. Inertial confinement fusion (ICF) plasmas, colloidal suspensions, ultracold-neutral plasmas, and warm dense matter can also show strong coupling behavior. Due to longer response times (10 to 100's of milliseconds) and length (100's of micrometer) scales strongly coupled dusty plasmas offer a model system to study generic phenomena such as self-organization and transport at individual particle level which is of relevance in regular liquids, charged colloids, polymers, electrolytes, and condensed matter systems.

The collective structures provide important insight into the behavior of any medium. The talk will present a detailed study on collective structures in the strongly coupled dusty plasma using molecular-dynamics (MD) and visco-elastic fluid simulations. In particular, collective structures such as KdV solitons and their collisions, multiple solitons, and the excitation and propagation of spiral waves will be discussed in detail.
