

Seminar

Institute for Plasma Research

- Title :** Experiments in Large Size DC Dusty Plasma
Experimental setup
- Speaker:** Dr. Saravanan A
Institute for Plasma Research, Gandhinagar
- Date :** 22 November 2019 (Friday)
- Time :** 10.30 AM
- Venue :** Seminar Hall, IPR

Abstract:

In dusty plasma, the length scale of dust crystal and the mode of plasma sustaining mechanism has significant influence on the dust particle dynamics and its characteristics. For the study of particle level dynamics of dust crystal in plasma, a typical crystal size of few μm^2 is sufficient. On the other hand, to study the dynamics, which involves macroscopic quantities such as void generation, phase coexistence, phase transitions, wave studies, effect of spatial inhomogeneity of dust density on its dynamics, thermodynamics of finite systems etc., a stable dust crystal of larger dimension is needed. To study some of these above phenomena, we have developed a new experimental facility at IPR to investigate the dust dynamics in a large size DC dusty plasma crystal. The new set-up is designed, procured and installed in BETA lab. After its commissioning, the first DC plasma is produced and later it is characterised using various diagnostics system such as single and double Langmuir probe, emissive probe and spectroscopic technique along radial and axial direction over a range of discharge parameters. The plasma parameters e.g. plasma density and electron temperature are measured to be $1-10 \times 10^{14} / \text{m}^3$ and 2-5 eV. Further, a 2D dusty plasma crystal with a size 10 cmx10 cm is produced above the cathode plate and it is characterised by measuring the pair-correlation function, inter-particle distance, dust density, and dust temperature by tracking individual particles using an IDL based particle tracking code. We have already observed void structure, void rotation, phase-coexistence etc, over the range of discharge parameters which will be carried out in future.
