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# Seminar

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## Institute for Plasma Research

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**Title :** Experiments in DC Dusty Plasma Experimental Setup

**Speaker:** Dr. Saravanan A  
Institute for Plasma Research, Gandhinagar

**Date :** 26th November 2020 (Thursday)

**Time :** 10.30 AM

**Venue :** Online - Join the talk:  
[https://meet.ipr.res.in/PDF\\_Extension\\_Talk\\_Saravanan](https://meet.ipr.res.in/PDF_Extension_Talk_Saravanan)

### **Abstract :**

A newly designed dusty plasma experimental device is built at IPR with its unique characteristics for performing experiment with dusty plasma crystals in a DC glow discharge plasma. This device facilitates to conduct experiment from single particle system to many particle systems (with thousands of particles) based on the experimental requirements. The DC glow discharge plasma is characterized using a variety of diagnostic techniques such as single and double Langmuir probe, emissive probe and spectroscopy over a range of discharge parameters. The dusty plasma with few hundred particle is characterized by pair correlation function, Voronoi diagram, Delauney triangulation by tracking the individual particle over the time using IDL based sPIT code. Recently a variety of interesting experiments e.g. phase co-existence, demonstration of Feynman ratchet and forced harmonic oscillator have been carried out in this dusty plasma device to understand aforementioned standard physics problems. In the first set of experiments, we examine the co-existence of different phases of dusty plasma, which essentially explains the non-equilibrium features of dusty plasma medium. Next, we attempt to demonstrate the Feynman ratchet experiment in dusty plasma using a specially designed confinement structure. Further, we have also investigated the dynamical characteristics of forced harmonic oscillator with the combination of harmonic confinement and pulsating laser force with 50% dusty cycle on a single charged dust particle. The average displacement from the solution of equation of forced harmonic oscillator with given duty cycle agrees well with the experimentally obtained displacement. The variation of average displacement with different duty cycles will be carried out for better understanding.

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