Seminar

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Institute for Plasma Research

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Title: Theoretical Modelling of Electrostatic Waves in a Magnetized Dusty Plasma

Speaker: Dr. Anshu Dahiya
Delhi Technological University, New Delhi

Date: 17th May 2024 (Friday)

Time: 10.30 AM

Venue: **Online**

Join the Talk: https://bharatvc.nic.in/join/1527393128

(Conference ID: 1527393128, Password: 730126)

Abstract:

Our work aims to understand the intrinsic behaviour of electrostatic waves in a magnetized dusty plasma. We examine the propagation of electrostatic waves and instabilities within a plasma as well as the mechanisms that generate these waves, delving into the complex nature of electrostatic waves and instabilities. The main goal of our work is to understand the intricate interactions between charged dust particles, the plasma environment, and the magnetic field to collectively influence the characteristics of electrostatic waves. In our work, different theoretical models have been developed with the help of the basic equations i.e., the Vlasov Equation, the Equation of Continuity and Motion and Poisson's Equation to govern the behaviour of waves and instabilities. With the help of these equations, the expressions of frequency and the growth rate have been discovered. The effect of these has been analyzed on different plasma parameters like the gyroradius parameter, temperature, and relative density ratio etc. The studies on these waves and instabilities have been done in collisionless and collisional plasma. Collisions increase the interactions between charged particles and dust particles, changing the dispersion relation of the waves and exhibiting distinct characteristics. Moreover, these waves can be studied in the presence of the transverse direct current electric field. This electric field changes the dispersion characteristics of waves and the wave behaviour can be studied with different plasma parameters. The investigation of electrostatic waves in magnetized dusty plasmas and the analysis of the impacts of various plasma parameters on wave dispersion characteristics are the main objectives of our present work. Our analytical model and the results from numerical calculations would help in understanding the experimental results from several leading groups worldwide.