Seminar

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Institute for Plasma Research

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Title: Plasma Dynamics in VHF Capacitive Discharges Operated in the Kilovolt-Regime at Sub-Millitorr Pressures

Speaker: Dr. Sarveshwar Sharma
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Date: 07th October 2025 (Tuesday)

Time: 04:30 PM

Venue: Seminar Hall, IPR

Abstract

In recent years, very high frequency (VHF) capacitively coupled plasma (CCP) discharges have gained significant importance for their role in advanced plasma technologies. This study explores plasma characteristics in the collisionless regime, where electron and ion mean free paths surpass system dimensions, under sub-millitorr pressures and kilovolt-range potentials driven by a 60 MHz VHF source. Understanding and characterizing the plasma parameters that enable discharge sustainment under such extreme conditions is of significant industrial interest. The present study shows the formation of high plasma densities even in this collisionless limit, which could be advantageous for various applications. The study further reveals the emergence of higher harmonics at the discharge center, which markedly influence bulk plasma analysing. This effect is corroborated by analysing the shape of the *electron energy distribution function* (EEDF). Additionally, the electron heating mechanisms and *ion energy distribution function* (IEDF) are examined in detail. The analysis is conducted using a 1D-3V electrostatic Particlein-Cell (PIC) simulation for argon discharges.