Seminar

Institute for Plasma Research

Title : Developments of Laser Photo-detachment experiment for the detection of O^- and H^- density in the SPIN-X plasma device

Speaker: Dr. Nageswara Rao Epuru
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Date : 11th February 2021 (Thursday)

Time : 03:30 PM

Venue : Online - Join the talk:
https://meet.ipr.res.in/Nageswara_Rao_PDF_extension_talk

Abstract :

Electron temperature (Te), plasma density (n0), electron density (ne), ion temperature (Ti), negative ion density (n-) and electronegativity ($\alpha\alpha$ are the important plasma parameters in an electronegative plasma. In this work, laser photodetachment in conjunction with a Hairpin/Langmuir probe is envisioned to estimate the electron and negative ion densities for in-house developed plasma sources. Presently, the study is focussed on oxygen plasma to detach the electrons from the negative ions. Nd:YAG Laser (EKSPLA NL300) at 532 nm (10 Hz, 6 ns FWHM, ~400 mJ), suitable for laser photodetachment in oxygen plasma is used for the experiments. 6 mm diameter of a laser beam is flashed in electronegative plasma for a few nanoseconds while the Hairpin/Langmuir probe measures the change in Resonance frequency or electron saturation currents to detect the level of electronegativity in the plasma. In this talk, we will discuss the preliminary laser experimental set up details for photodetachment studies. External synchronization mode (laser is triggered from the external signal) developed in the time-resolved studies for measuring the electron number densities in plasmas. In future we intend to implement the Laser photodetachment experiment to measure the negative ion densities and temperatures in the hydrogen plasmas using laser fundamental frequency at 1064 nm (~800 mJ).