

Seminar

Institute for Plasma Research

- Title:** Optical diagnostics of different plasmas through collisional radiative models with the self-calculated fine structure resolved electron impact excitation cross-sections
- Speaker:** Dr. Shubham Singh Baghel
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- Date:** 18th August 2023 (Friday)
- Time:** 02.00 PM
- Venue:** Seminar hall, IPR

Abstract

The collisional radiative (CR) models coupled with suitable optical measurements offer a non-invasive way for the diagnostics of different types of plasmas. In the CR models, the dominant collisional and radiative processes affecting the optical emissions from the plasmas viz. electron impact excitation/de-excitation, radiative decay, electron impact ionization, two/three body recombination, diffusion, quenching, self-absorption etc. are considered efficiently. The CR models are then coupled with optical measurements to extract the different plasma parameters viz. electron temperature (T_e), electron density (n_e), population of excited levels and line emission intensities of the emitting atom/ion, electron energy distribution function (EEDF) etc.

In my presentation, I will discuss about the development of CR models for the optical diagnostics of differently produced magnesium, silicon, neon and its mixture (neon-argon, neon-oxygen/hydrogen) plasmas. Among the different collisional and radiative processes, the electron collisions with the atoms/ions are dominant in plasmas, and their inclusion in the CR model needs the reliable fine structure resolved electron impact excitation cross-sections for a significant number of transitions from ground as well as excited states of the emitting specie. These electron excitation cross-sections of have been calculated using relativistic distorted wave (RDW) approach. The developed CR model are coupled with optical measurements for the diagnostics and various plasma parameters have been extracted. The methods and results related to CR modeling, electron impact excitation cross-sections and plasma diagnostics will be presented and discussed.
