

Seminar

Institute for Plasma Research

- Title:** Investigation of Anomalous Intensity of VUV Line at 18.03 nm of Ar¹³⁺ ion in ADITYA-U tokamak
- Speaker:** Dr. Gajendra Singh
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- Date:** 26th April 2024 (Friday)
- Time:** 11.00 AM
- Venue:** Committee Room 4, IPR

Abstract

Vacuum ultraviolet (VUV) spectroscopy on ADITYA-U tokamak is carried out to understand the impurity behavior in the plasma. Argon impurity transport study in ADITYA-U tokamak has revealed the role of inward pinch in the core argon transport. To carry out such study, the observed VUV lines from Ar¹³⁺ ions at 18.79 nm ($2s^2 2p^2 P_{3/2} - 2s 2p^2 P_{3/2}$) and Ar¹⁴⁺ ions at 22.11 nm ($2s^2 1S_0 - 2s 2p^1 P_1$) are utilized. However, it has been observed that the intensity of the 18.79 nm line of Ar¹³⁺ ions is orders of magnitude greater than the resonance lines at 18.03 nm ($2s^2 2p^2 P_{1/2} - 2s 2p^2 P_{3/2}$). However, no attempts have been made to explain this anomaly till now, although a similar feature has also been observed in few other tokamaks.

The anomaly associated with the non-resonant spectral line (at 18.79 nm) as compared to the resonance line (at 18.03 nm) is explained theoretically through the fundamental atomic data. This is done by estimating theoretical line intensity of those lines of Ar¹³⁺ ion and comparing it with experimental spectral lines. To calculate the spectral line intensity, photon emission coefficients (PEC) are generated from ADAS using its program modules and basic atomic data as these were not readily available. It has been found that oscillator strength plays an important role in this anomaly and this will be discussed in this presentation.

This presentation will also include the relativistic atomic structure calculations of Li-like ions used for plasma diagnostic applications using GRASP2K code and the progress has been made for coupling the Grazing Incidence Monochromator with tokamak for measuring temporal evolution of VUV line emanating from tokamak plasma core.
