

Seminar

Institute for Plasma Research

Title : Investigating Runaway Electron Dynamics and Hard X-ray Emission in ADITYA Tokamak Plasma: A Limiter-Based Analysis

Speaker: Dr. Kajal Garg
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Date : 23rd June 2023 (Friday)

Time : 10.30 AM

Venue : Online - Join the talk:

https://meet.ipr.res.in/join/4590147943?bea_uth=MzEzNDA3

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Abstract:

The runaway electrons in tokamak plasmas is a well-known phenomenon across various operational regimes. These runaway electrons play a significant role in the emission of hard X-rays (HX) from the plasma, both when confined within the plasma volume and when de-confined and interacting the limiter. Particularly, de-confined REs are of concern due to their interaction with the vacuum vessel wall and the limiter, making the limiter a prominent source of HX emission. This study focuses on the ADITYA tokamak, a mid-sized limiter device with an aspect ratio of 3. The aim is to analyze the interaction between runaway electrons and a circular carbon limiter in the ADITYA tokamak, by examining the emitted HX from the limiter. To achieve this, an advanced LaBr₃ (1.5 inches x 1.5 inches) HX detector system is employed, allowing tangential viewing of the carbon limiter. The simulation has been conducted using the GEANT4 platform, considering a range of runaway electrons energies spanning from 500 keV to 7 MeV. The study presents detailed and systematic analysis results of the HX spectra detected by the LaBr₃ detector system, corresponding to the given RE energy and flux. Moreover, the investigation of the Compton-to-photoelectric process ratio has been conducted for this specific geometry through the variation of runaway electron energy and flux. This study offers valuable insights into the distinctive characteristics of the ADITYA plasma.
