# Seminar

# Institute for Plasma Research

**Title : Experimental Study on ETG Turbulence Induced Plasma Transport in Large Volume Plasma Device**

**Speaker : Mr. Prabhakar Srivastav**
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**Date : 12th June, 2019 (Wednesday)**

**Time : 11.00 AM**

**Venue : Seminar Hall, IPR**

## Abstract:

We present the experimental results on Electron Temperature Gradient (ETG) turbulence induced particle and electron thermal transport observed in the finite beta laboratory plasma of Large Volume Plasma Device (LVPD). ETG turbulence is considered as one of the importanat cadidate to understand the physics of anomalous electron thermal energy loss in fusion devices. The small scale nature of ETG mode inhibits its direct measurement in fusion devices and inferences are drawn largely from the indirect measurements and theoretical models. Basic plasma devices come handy in bringing these scales to measurement limits of conventional probe diagnostics but the plasma produced in them suffers from the very process of plasma production. This makes unambiguous identification of ETG difficult in such devices. The removal of responsible unutilized primary ionizing electrons and control of electron temperature gradient are achieved by placing a large Electron Energy Filter (EEF) in the middle of the LVPD and this makes plasma suitable for carrying out ETG turbulence studies.

We have identified the ETG turbulence by measuring the fluctuations in density, potential, temperature, magnetic field and by investigating its various spectral characteristics viz., power-spectra, correlation, phase angle, propagation, and wavenumber-frequency spectrum respectively. Experiments are carried out in detail on the measurement of turbulent particle and heat flux and results are compared with theoretical predications of ETG driven turbulent transport. It is observed that the non-adiabatic ion response is responsible for plasma particle transport and the phase velocity opposite to electron diamagnetic drift direction is responsible for inward particle flux. In addition to this, electromagnetic radial particle flux is also measured which is induced by finite electromagnetic fluctuations. The conductive and convective heat flux measurements provide estimation of ETG turbulence induced heat flux in LVPD. It is observed that despite having convective flux radially inward, the net energy flux remains directed radially outward. Detailed results highlighting significance of this study will be presented.