Seminar

Institute for Plasma Research

Title : Towards a new (toroidal drift mode) theory of small-ELMs

Speaker: Dr. Arka Bokshi
Culham Centre for Fusion Energy, UK

Date : 27th July 2018 (Friday)

Time : 11:00 AM

Venue : Seminar Hall, IPR

Abstract :

The onset of the big Type-I ELMs is well explained by the EPED model which couples the linear stability theory of MHD peeling-ballooning modes with Kinetic Ballooning Mode (KBM) constrained transport. However, a theory to explain the intrinsic small-ELM types (typically as extensions to the peeling-ballooning paradigm) has remained elusive. A new theory is under development which posits that certain small-ELM regimes may be a result of a burst in transport when the underlying linear instabilities (e.g. ITG, KBM) undergo a transition between their relatively benign (General Mode [GM]) and strongly unstable branches (Isolated Mode [IM]) under certain conditions, such as an externally imposed critical flow-shear.

At this seminar talk, we will present our understandings from the analysis of the linear physics and report on the progress of the nonlinear gyrofluid extensions using the BOUT++ framework. Further efforts are underway in order to incorporate an important piece of physics into this picture: whilst the violent IM exists under special conditions, it is a poloidally symmetric mode; the relatively benign GM, which is postulated to be more readily accessible by the plasma, is however, poloidally asymmetric. How does the intrinsic torque associated with asymmetric modes influence the equilibrium/external flow shear to determine the GM-IM transition, and therefore, the accessibility to small-ELM regimes?