

Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Beam diagnostic innovations to deepen understanding of pedestal and edge phenomena such as the onset and evolution of transport barriers and ELMs¹ P.J. FIMOGNARI, T.P. CROWLEY, D.R. DEMERS, Xantho Technologies, LLC — Deeper understanding of the onset and evolution of transport barriers as well as MHD stability and transport, including edge localized modes (ELMs), is possible with direct measurements throughout the pedestal and edge regions. We are pursuing interrelated diagnostic beam innovations to improve diagnosis of these regions of magnetically confined plasmas. The common thread among the innovations is the non-perturbing determination of spatially localized quantities from measurement of secondary particles created by interaction of a diagnostic beam with the plasma. The (typically alkali metal) beam diagnostic technique uses the conservation of energy and angular momentum to infer the fluctuations in electron density, and the electric and magnetic fields at locations where secondary particles are created. We will discuss several areas of measurement innovation including determination of a component of the magnetic vector potential in a magnetically confined plasma using a singly charged alkali ion beam (enabling inference of the edge current density profile and, correspondingly, evolution of transport barriers and ELMs) and simulations of the ability of neutral alkali beams to probe the edge of large toroidal devices.

¹This work is supported by US DoE awards DE-SC0006077 and DE-SC0017998.

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Date submitted: 03 Jul 2019

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