

Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

CXRS-based diagnostic for fast ion detection in the core of the Alcator C-Mod Tokamak¹ K.T. LIAO, W.L. ROWAN, I.O. BESPAMYATNOV, Institute for Fusion Studies, The University of Texas at Austin — Charge exchange recombination spectroscopy (CXRS) will be used to measure the spatial and temporal distribution of fast ions within the core plasma. Fast ions are generated in C-Mod by minority absorption of injected waves in the ion cyclotron range of frequencies. Typically, the minority is H in a D plasma or possibly He3 in D. Emission from the fast ions is excited by charge exchange with the neutral atoms in a diagnostic neutral beam. [see W.W. Heidbrink, et al., Plasma Phys. Control. Fusion 47, 1855 (2004)] In the new diagnostic, the spectra are captured with 1 cm spatial resolution into approximately 30 poloidal or toroidal channels, spectrally analyzed with a high throughput spectrograph that is modified to reduce scattered light from edge emission lines, and detected with a camera with 10 ms temporal resolution. The capabilities of the diagnostic are explored through simulation of the spectrum and measurements of the emission background. For C-Mod, the diagnostic is uniquely capable of detecting fast ions in the plasma core and thus contributing to RF physics as well as to fast ion transport. Expected fast ion “signal-to-noise” will be presented.

¹Supported by US DoE awards DE-FG03-96ER54373 and DE-FC02-99ER54512.

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Date submitted: 16 Jul 2010

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