CXRS-based diagnostic for fast ion detection in the core of the Alcator C-Mod Tokamak

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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.

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