

Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Advanced Ion Temperature and Velocity Fluctuation Diagnostic Design and Preliminary Measurements¹ I.U. UZUNKAYMAK, R.J. FONCK, G.R. MCKEE, D.J. SCHLOSSBERG, M.W. SHAFER, G. WINZ, Z. YAN, U. Wisconsin-Madison — A high-efficiency, high-throughput custom spectroscopic system is being designed and implemented at DIII-D to measure localized, long-wavelength ion thermal fluctuations associated with drift wave turbulence. A high-transmission grism (prism-coupled transmission grating) and high-throughput collection optics are employed to observe Doppler-shifted emission from the $n = 8-7$ transition of C VI centered near $\lambda = 529$ nm. The diagnostic achieves 0.25 nm resolution for 2.0 nm spectral band using eight discrete spectral channels. A turbulence-relevant time resolution of 1 μ s will be achieved using high-speed photodiodes and low-noise preamplifiers. The system sensitivity should allow for measurements of normalized ion temperature fluctuations on the order of $\tilde{T}_I/T_I \leq 1\%$. These measurements will be combined with 2D BES measurements to determine the local multi-field turbulence dynamics. The predicted signal-to-noise for turbulence measurements, signal analysis techniques, and preliminary data will be presented.

¹Work supported by the US DOE under DE-FG02-89ER53296, DE-FG02-09ER54999, and DE-FC02-04ER54698.

I.U. UzunKaymak
University of Wisconsin-Madison

Date submitted: 17 Jul 2009

Electronic form version 1.4