Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Initial UF-CHERS Measurements of Ion Temperature Fluctuations as a Function of Electron Temperature Gradient[1] D. TRUONG, R.J. FONCK, G.R. MCKEE, Z. YAN, U. Wisc-Madison, S.P. SMITH, GA — The Ultra Fast CHarge Exchange Recombination Spectroscopy (UF-CHERS) diagnostic on DIII-D measures local, long-wavelength ion temperature and toroidal velocity fluctuations at turbulence-relevant spatiotemporal scales. The optical system consists of 2 spatial channels, with 8 spectral channels each, set 1 cm apart radially (within a turbulence correlation length). UF-CHERS measures photons emitted from the n=8-7 transition of C VI at 529.05 nm during the charge exchange recombination reaction between injected neutral beam deuterium atoms and intrinsic carbon ions. Unique features include high optical throughput, low-noise, high-gain, high efficiency APD detectors, and a 1 MHz sampling rate; all designed to measure turbulent ion thermal fluctuations. In an experiment exploring the calculated shortfall of transport and turbulence at high gyroBohm normalized flux in L-mode plasmas, varying ECH power was applied between ρ=0.6 and ρ=0.8 to change the gradient scale length and local heat flux to examine transport behavior near ρ=0.7. This experiment provided a suitable test case for UF-CHERS and measurements were obtained as a function of electron temperature gradient; initial results will be presented.

[1]Work supported by the US DOE under DE-FG02-89ER53296, DE-FG02-08ER54999, DE-FC02-04ER54698, and NSF GRFP grant DGE-1256259

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Date submitted: 12 Jul 2013 Electronic form version 1.4