Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

2D Core Turbulence Properties on DIII-D[1] M.W. SHAFER, G.R. MCKEE, R.J. FONCK, D.J. SCHLOSSBERG, Z. YAN, U. Wisconsin-Madison, C. HOLLAND, UCSD, A.E. WHITE, ORISE — Quantitative measurements of the inherently 2D turbulence characteristics in magnetized plasmas are compared with nonlinear simulation. This comparison substantiates key aspects of the $E \times B$ shear model of turbulence suppression that explains enhanced confinement. The critical dynamics underlying turbulent transport occur in the plane perpendicular to the magnetic field ($k_{\|} \ll k_{\perp}$). These localized long-wavelength ($k_{\perp}\rho_i < 1$) density turbulence measurements are obtained in the core ($0.3 < r/a < 0.9$) of DIII-D L-mode plasmas with a 2D rectangular array of Beam Emission Spectroscopy channels. Radial and poloidal correlation lengths are found to scale with the ion gyroradius and demonstrate a poloidally elongated eddy structure. $S(k_r, k_\theta)$ spectra are compared with GYRO simulations: key features (wavenumber peak, correlation lengths) compare well, however the simulations indicate a sheared eddy structure at outer radii that is not observed. Measured local decorrelation and shearing rates are also compared.

[1]Work supported by the US DOE under DOE under DE-FG02-89ER53296, DE-FG02-08ER54999, DE-FG02-07ER54917, and DE-AC05-06OR23100.

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Date submitted: 16 Jul 2009 Electronic form version 1.4