

**Abstract Submitted for the 54th Annual Meeting  
Division of Plasma Physics  
October 29 through November 2, 2012  
Providence, Rhode Island**

Category Number and Subject: 5.6.2. DIII-D Tokamak

Theory      Experiment

**Phase Contrast Imaging Measurements of Short Wavelength Turbulence Generated by Shear in the QH-mode Edge on DIII-D,\*** J.C. Rost, M. Porkolab, J.R. Dorris, A. Marinoni, *MIT*; K.H. Burrell, *GA* – The Phase Contrast Imaging (PCI) diagnostic on DIII-D provides a line-integrated measurement of density fluctuations covering wavenumbers 2 to 30 cm<sup>-1</sup>. An outer gap scan during QH-mode with stationary plasma parameters allowed the PCI to sample a large range in  $k_r/k_e$ . A narrow peak in turbulence amplitude is seen near the LCFS. The ExB Doppler shift allows the location to be determined precisely, showing two distinct regions of turbulence at 0.5 and 0.2 cm inside the LCFS with  $k_r > 0$  and  $k_r < 0$  respectively, consistent with the expected effects of shear in the Er well. PCI measurements at 200 kHz show that  $k_e = 0.8$  cm<sup>-1</sup> with poloidal correlation length  $L_e = 6$  cm. Using a simple non-isotropic turbulence model, we find that  $|k_r| = 3$  cm<sup>-1</sup> and  $L_r = 0.5$  cm, with  $\tilde{n}/n \sim 25\%$  in the pedestal for this high- $k_r$  turbulence. These fluctuations, which are outside the parameter range accessible to most turbulence diagnostics, are large enough in amplitude to play a role in setting the pedestal structure. These PCI observations are qualitatively similar to those made in ELM-free H-mode and between ELMs suggesting that similar large  $k_r$  turbulence may be important.

\*This work supported in part by the US DOE under DE-FG02-94ER54235, DE-FG02-94ER54084 and DE-FC02-04ER54698.