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Category Number and Subject: 5.6.2. DIII-D Tokamak

☐ Theory ☒ Experiment

Localized Measurement of Short Wavelength Plasma Fluctuations Using the DIII-D Phase Contrast Imaging Diagnostic,* J.R. Dorris, J.C. Rost, M. Porkolab, *MIT*, K.H. Burrell, *GA* – The DIII-D phase contrast imaging (PCI) turbulence diagnostic measures density fluctuations in two operational configurations: (1) line-integrated over the entire viewing chord, or (2) using a rotating mask system that takes advantage of the vertical variation of the radial magnetic field to make localized measurements along the PCI chord. The localized length of chord is inversely proportional to wavenumber, making this technique more favorable for short wavelength modes ($k > 15/\text{cm}$). In 2006, the PCI S/N was improved by an order of magnitude by a redesigned data transmission system based on fiber optic links. This allowed measurements to be obtained showing broadband turbulent fluctuations to 20/cm. Rigorous analysis of such a localized measurement requires accurate modeling of the focused laser diffraction through the thin masking slit. Recent calibrations successfully validated our model and results will be presented. Measured evolution of turbulence will be characterized in terms of changes in global plasma parameters.

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