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Progress Toward a Technique for Measuring Electric Field Fluctuations in Tokamak Core Plasmas[1] D.S. THOMPSON, M.R. BAKKEN, M.G. BURKE, H.P. COUTO, R.J. FONCK, B.T. LEWICKI, G.R. WINZ, University of Wisconsin-Madison — Measurements of electric field fluctuations in magnetic confinement experiments are desired for validating turbulence and transport models. A new diagnostic to measure $E_z(r,t)$ fluctuations is in development on the Pegasus Toroidal Experiment. The approach is based on neutral beam emission spectroscopy using a high-throughput, high-resolution spectrometer to resolve fluctuations in wavelength separation between components of the motional Stark effect spectrum. Fluctuations at mid-minor-radius, normalized to an estimated MSE field, are estimated to be $\delta E/E_{MSE} \approx 10^{-3}$. In order to resolve fluctuations at turbulent time scales ($f_{Ny} \approx 500$ kHz), beam and spectrometer designs minimize broadening and maximize signal-to-noise ratio. The diagnostic employs a Fabry-Pérot spectrometer with étendue-matched collection optics and low noise detectors. The interferometer spacing is varied across the face of the etalon to mitigate geometric Doppler broadening. An 80 keV H^0 beam from PBX-M with a divergence $\Omega<0.5$ degrees is being refurbished for this project. The beam includes a new ion source to maximize full energy species fraction and is designed to provide $\approx$ 2 cm spatial resolution and 50 ms of 6 mA/cm^2 current density at the focal plane. Successful development and demonstration on Pegasus will guide future deployment on larger fusion facilities.

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