Abstract Submitted
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Measurements of low-wavenumber turbulence in NSTX H-mode plasmas[1] DAVID R. SMITH, R.J. FONCK, G.R. MCKEE, D.S. THOMPSON, I.U. UZUN-KAYMAK, University of Wisconsin-Madison — New Beam Emission Spectroscopy (BES) measurements provide the first radially and poloidally-resolved measurements of low-k turbulence in a fusion-grade spherical torus plasma in the National Spherical Torus Experiment (NSTX). Measured broadband turbulence with $k_\perp \rho_i \lesssim 1$ and frequencies up to 100 kHz is qualitatively similar to higher-field tokamak turbulence. Multi-point correlation analysis indicates poloidal and radial correlation lengths are on the order of 10 cm at r/a$\sim$0.85. The correlation lengths are larger than those in higher-field tokamaks, but consistent with a rho-star scaling of turbulence. In stationary H-mode phases, longer poloidal correlation lengths correlate with higher density, density gradient, and electron temperature, suggesting a connection to instability drive mechanisms. Eddy poloidal velocities are about 10 km/s, consistent with equilibrium E$\times$B dominated flow. Poloidal flow fluctuations from time-delay estimation calculations will be discussed. The measurements and calculations motivate the inclusion of low-k turbulence in transport models of spherical torus plasmas.

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