Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Global Gyrokinetic Electron Temperature Gradient Turbulence and Transport in NSTX Plasmas. S. ETHIER, W.X. WANG, PPPL, F. POLI, U. of Warwick, T.S. HAHM, S.M. KAYE, W.W. LEE, E. MAZZUCATO, G. REWOLDT, W.M. TANG, PPPL — Global, nonlinear simulations of electron temperature gradient (ETG) turbulence for experimental discharges have been carried out for the first time for direct validation against high-k scattering measurements of electron gyroradius scale fluctuations in NSTX. Qualitative agreement in the density fluctuation spectra and overall density fluctuation levels between the experiment and the simulation is obtained. The nonlinear generation of zonal flows with fine radial scale is observed during ETG turbulence development although they are too weak to break up the radially-elongated streamers during the nonlinear phase of ETG turbulence, leading to anisotropic fluctuations in the perpendicular wave number space. Comparison of density fluctuation amplitudes based on synthetic diagnosis between simulations and measurements are discussed. Also reported are sensitivity studies of simulated ETG-driven electron thermal transport with respect to the local profiles of electron temperature gradient, effective charge number Zeff, and safety factor, which are subject to significant experimental errors. Work supported by U.S. DOE Contract DE-AC02-09CH11466 and the SciDAC GPS-TTBP project. F. Poli is funded by UK EPSRC.

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Date submitted: 17 Jul 2009 Electronic form version 1.4