Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Studying high-k turbulence with microwave scattering in NSTX[1]

J. RUIZ, PSFC, MIT, Cambridge, MA 02139, USA, Y. REN, PPPL, Princeton, NJ 08543, USA, A.E. WHITE, PSFC, MIT, Cambridge, MA 02139, USA, W. GUTTENFELDER, S.M. KAYE, B.P. LEBLANC, E. MAZZUCATO, PPPL, Princeton, NJ 08543, USA, K.C. LEE, NFRI, Daejeon, 305-806, Korea, C.W. DOMIER, UC-Davis, Davis, CA 95616, USA, D.R. SMITH, U. Wisconsin-Madison, Madison, WI 53706, USA, H. YUH, Nova Photonics, Inc., Princeton, NJ 08540, USA, PSFC, MIT, CAMBRIDGE, MA 02139, USA TEAM, PPPL, PRINCETON, NJ 08543, USA TEAM — Understanding electron thermal transport is important for achieving predictive capability for the performance of future fusion devices such as ITER. In NSTX, electron thermal transport is found to dominate energy loss. Numerical simulations and experiments have shown that electron temperature gradient (ETG) turbulence on the electron gyro-scale, $k_\perp \rho_e \leq 1$, can be responsible for anomalous electron thermal transport in NSTX. Electron scale (high-k) turbulence with $k_\perp \rho_e \leq 0.6$ was measured with a high-k microwave scattering system in NSTX. Enhanced high-k fluctuations have been previously observed when electron ETG exceeds critical gradient, and are affected by ExB shear flows, reverse magnetic shear, electron density gradient and electron collisionality. A description of the NSTX high-k scattering diagnostic will be presented, as well as the effect of magnetic field curvature and turbulence anisotropy on the spatial localization and k-resolution. Analysis of high-k turbulence measurements during plasma current ramp-down in a set of NSTX H-mode plasmas will also be presented.

[1]Work supported by US DOE.

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Date submitted: 11 Jul 2014 Electronic form version 1.4