Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Experimental Study of Density Gradient Stabilization Effects on High-k Turbulence in NSTX[1] J. RUIZ RUIZ, PSFC-MIT, Cambridge, MA 02139, USA, W. GUTTENFELDER, Y. REN, PPPL, Princeton, NJ 08543, USA, A. WHITE, PSFC-MIT, Cambridge, MA 02139, USA, 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 — Electron scale (high-k) ETG-turbulence is diagnosed in NSTX using a high-k microwave scattering system. We report on the stabilization effects of electron density gradient on electron-scale density fluctuations in a set of neutral beam injection (NBI) heated H-mode plasmas. The absence of high-k density fluctuations is correlated with large equilibrium density gradient, consistent with linear stabilization of ETG modes due to density gradient using the ETG linear threshold. The observed scattered power is anti-correlated with equilibrium density gradient. Corresponding linear gyrokinetic simulations using GS2 show that larger equilibrium density gradient leads to higher wavenumbers at the maximum linear growth rate. Real frequencies calculated by GS2 and experimental Doppler-subtracted plasma frame frequencies both decrease with density gradient. Nonlinear electron-scale gyrokinetic simulations were carried out with GYRO: high electron density gradient is shown to reduce electron density fluctuations, heat flux and stiffness, and to increase the ETG nonlinear threshold, reinforcing the experimental observations of density gradient stabilization of high-k turbulence.

[1]Work supported by D.O.E. contract DE-AC02-09CH11466.

Juan Ruiz Ruiz
PSFC-MIT, Cambridge, MA 02139, USA

Date submitted: 24 Jul 2015 Electronic form version 1.4