Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

**Investigations of pedestal turbulence and ELM bursts in NSTX H-mode plasmas**[1] D. SMITH, R. FONCK, G. MCKEE, UW-Madison, W. WAN, S. PARKER, UC-Boulder, A. DIALLO, W. GUTTENFELDER, S. KAYE, PPPL —
The spherical torus H-mode pedestal is a challenging validation regime due to gradient scale lengths comparable to the ion gyro-radius, large $\rho^*$, and strong shaping. Here, we investigate the spatial and temporal properties of pedestal turbulence and ELM bursts in NSTX H-mode plasmas. First, we present measurements, scalings, and simulations of pedstal turbulence correlation lengths and fluctuation amplitudes with $k\theta\rho i<1.5$ and $0.8<r/a<0.95$. Fluctuation amplitudes are in the range $\delta n/n\approx$1-5%. Parametric dependencies among turbulence quantities and transport-relevant plasma parameters indicate $\delta n/n$ scales positively with $\nabla ne$, collisionality, and poloidal beta, and scales negatively with $\nabla Ti$. The scalings are most consistent with trapped electron mode, kinetic ballooning mode, or microtearing instabilities, but, notably, least consistent with ion temperature gradient turbulence. Gyrokinetic simulations with realistic pedestal profiles show collisional instabilities with growth rates that increase at higher $\nabla ne$ and decrease at higher $\nabla Ti$, in qualitative agreement with observed scalings. Finally, we investigate the radial structure and temporal dynamics of ELM bursts in NSTX. Measurements show multiple intermittant radial structures that evolve on timescales of 10 $\mu$s during a single ELM burst. The observations illustrate the nonlinear dynamics of ELM bursts for simulation validation efforts.

[1]Supported by U.S. Department of Energy Grants DE-FG02-89ER53296, DE-SC0001288, and DE-AC02-09CH11466.

David Smith
UW-Madison

Date submitted: 12 Jul 2013 Electronic form version 1.4