Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Investigation of Power Balance and Excess Ion Heating in the National Spherical Torus Experiment P.W. ROSS, R.E. BELL, D.A. GATES, S.M. KAYE, B.P. LEBLANC, S.S. MEDLEY, R.B. WHITE, PPPL, NSTX TEAM — Neutral Beam modulations were used to create a transient heat pulse to investigate power balance of thermal ions in NSTX discharges. The primary effect of the beam modulation is a change in the ion temperature, with very little electron response. Classical neutral beam heating is expected to preferentially heat electrons with only $\sim$1/3 of the power going to the ions. Grad-Shafranov reconstructions of the plasma were performed using Thomson scattering, CHERS and MSE to measure the plasma temperature profiles and constrain the current profile. The ion power balance was calculated using the TRANSP time dependent transport calculation code. Assuming ion neoclassical transport, TRANSP calculates excess ion heating for some plasma conditions. This heating is strongest in the presence of high frequency MHD modes. The predicted peak of these modes correlates well with the location of strongest heating. Full orbit calculations of thermal ions in the presence of these modes show that stochastic heating can be sufficient to explain the excess heating. This work was supported by DoE contract No. DE-AC02-09CH11466.

P.W. Ross
PPPL

Date submitted: 17 Jul 2009 Electronic form version 1.4