

NSTX Weekly Report (June 16, 2006)

FY2006 weeks of research operations

Planned: 11 weeks

Completed: 12.00 weeks

There will be an NSTX Physics meeting on Monday, June 19 at 1:30 pm in LSB18. The agenda is: **XP Summaries:** D. Smith – High-k scattering results. ((S. Kaye)

Run Coordination (R. Raman, S. Sabbagh)

Experiments related to the measurement of ρ_e -scale fluctuations in H-mode and reverse shear discharges were successfully completed. Good progress was made with the remaining experiments run during this week.

XP 629: Comparative study of the scattered spectra between L and H-mode confinement regime on NSTX (June 8) - H. Park: This was a continuation of the experiments conducted on June 7. It was successfully completed. The experiment started with the probe tangency of 142 cm (outside the H-mode edge pedestal) and the probe beam was moved to the tangency of 137cm (inside the H-mode edge pedestal). Bifurcation was less pronounced as the probe was moved toward the inside but the scattered signal at the highest-k increased. The outer gap was reduced (This effectively allows one to scan inner part of the pedestal) and a similar trend was observed. Additional time is needed to sort out the details and to pull together other fluctuation measurements such as from reflectometry, magnetic probes, etc. to understand the new phenomena. Two L-mode plasmas were also used to compare with the H-mode discharges. Overall, the experimental progress was quite a success.

XP 620: Shear profile effects on core high-k fluctuations (June 8, 12, 13) – D. Smith:

The purpose was to utilize the high-k system to measure ρ_e -scale fluctuations in reverse shear and conventional shear discharges by measuring fluctuations both inside and outside the knee in the radial electron temperature profile. The scattering region was positioned at three tangency radii (107, 115 and 122cm) and three discharge scenarios were studied at each location (conventional shear, reverse shear and mild-reverse shear). This experiment was successfully completed.

XP625 Thermal Electron Bernstein Wave Conversion to O-Mode at 8-40 GHz (June 8) – S. Diem:

In an effort to increase EBW emission from H-mode plasmas, 2 MW of HHFW was injected to increase the edge electron temperature near the upper hybrid resonance layer. Three phasings were tested, -7, 3.5, and 14 m⁻¹, however, no significant heating of the edge electron temperature or changes in EBW emission were observed.

Reflectometer commissioning (June 8) – S. Kubota: The 42 GHz heterodyne reflectometer was initially operated for experiments on May 19 to look at density oscillations associated with the 30 MHz HHFW. On June 8 a total of three shots were taken (5.5 kG/700 kA and 3.5 kG/400 kA with -7 m⁻¹ phasing) with the launch power of the reflectometer attenuated in order to assess the noise level in the system, especially due to external pickup of the 30 MHz RF signal. Analysis for these shots is being done in conjunction with Prof. Ejiri at the University of Tokyo.

XP601: Effect of Evaporated Lithium PFC Coatings on Density Control (June 9) – H. Kugel:

Lithium was evaporated on the vessel graphite PFC surfaces without running any preceding Helium Conditioning Discharges. Lithium coatings of 203, 295, and 440 mg were applied, respectively. The D NBI fiducial discharge following the 203 mg deposition exhibited no density change relative to the comparison discharge, but marginal increases in T_e and T_i were observed. The D NBI fiducial discharge following the 295 mg deposition exhibited a $\sim 5\%$ density reduction at the flat-top relative to the comparison discharge, and also marginal increases in T_e and T_i . The density reduction effect appeared to last for only one discharge. For the D NBI fiducial discharge following the 440 mg deposition, although there was little change in the volume-average electron density compared to a reference shot, the density profile became more peaked in the core and exhibited $\sim 17\%$ reduction at the flat-top, the central electron temperature increased by $\sim 25\%$, the central ion toroidal velocity increased $\sim 25\%$, and the central ion temperature increased by about $\sim 40\%$. Preliminary results indicate that the global energy confinement time while marginally increased, improved by about $\sim 14\%$ at the time of maximum stored energy, and that the frequency of both large and small ELMs decreased. The beneficial effect on density reduction and confinement appeared to last for only one discharge.

XP 630: Edge Turbulence in High Density Ohmic Plasmas on NSTX (June 12) - K. M. Williams:

The aim of the experiment was to characterize edge turbulence at the density limit in NSTX. The experiment, which used deuterium plasmas, obtained data at several high densities including a shot where the density reached $0.9n_G$, which is the highest density achieved in Ohmic deuterium plasmas on NSTX. This experiment was successfully completed.

Engineering Operations (A. von Halle, C. Neumeier)

NSTX plasma operations continued this past week reaching the 12 run week project goal which is one week more than the 11 run week Joule Milestone. The run was interrupted on Tuesday, June 13 due to a flash over in the OH lead bus area resulting in a minor damage in the area. The cause of the flashover was traced to a small water leak in the braze joint of the OH lead which apparently fatigued after six years of OH operation. A more mechanically sound joint design which eliminates the braze joint was developed and the repair is being performed on both leads (one which leaked and another similar joint.)

Research Operations (M. Bell)**Boundary Physics Operations (H. Kugel)**

- LITER 1C was operated to perform lithium depositions of 203, 295, and 440 mg, respectively, in support of experiments on the effect of evaporated lithium PFC coatings on density control during long pulse high performance H-mode discharges.