

## **NSTX Weekly Report (June 22, 2007)**

**FY 2007 NSTX plasma operations started on Feb. 19, 2007 and completed on June 22, 2007.**

**Planned: 12 weeks**

**Completed: 12.63 weeks with 1,879 plasma discharges (through June 22, 2007)**

### **Featured Highlights:**

**On June 22, the FY 2007 NSTX plasma operation was completed successfully. 12.63 run weeks with 1879 plasma discharges (90.4% availability) were achieved which exceeded the FY 2007 DOE-OFES Joule Milestone of 12 run weeks. During the 2007 run, 40 experimental proposals were carried out yielding important experimental results in all science areas. The NSTX data will be analyzed and they will be reported at the NSTX Results Review Meeting planned on Monday-Tuesday, July 23-24, 2007 at PPPL.**

The 2007 NSTX Results/Theory Review will be held on Monday-Tuesday, July 23-24, 2007 at PPPL. As in previous years, the Results Review will give the NSTX researchers the opportunity to present results from their experiments, analysis and/or theory work over the past year. The review will be divided into various sessions according to the Experimental Topical groups, and each speaker will be given about 10-15 minutes to present their work. The Review, which is expected to take the full two days, will be followed by the Run Assessment on Wed AM, 7/25. As in previous years, there will be remote access to these meetings. (S. Kaye/D. Gates)

The following posters and papers were contributed to the 22nd IEEE/NPSS SOFE, Albuquerque, NM, June 17-21, 2007: "High Pressure Supersonic Gas Jet Fueling on NSTX" by V. A. Soukhanovskii (LLNL), et al. and "Design and Performance of NSTX Movable GDC Probe" by H. W. Kugel, et al. (H. Kugel)

There will be an NSTX Physics Meeting on Monday, 6/25 at 1:30 pm in LSB318. We will have summaries of XPs run last week by Vlad Soukhanovskii, Dave Smith, Steve Sabbagh and Patrick Ross. (S. Kaye)

### **Run Coordination (D. Gates, M. Bell)**

On Thursday June 14<sup>th</sup> XP-724 entitled "Stability and NICD limits with lower density and higher q" was run. High elongation discharges previously developed in XP-710 "High bootstrap fraction plasmas at high elongation" were coupled with early H-mode startup scenarios developed in XP-711 "Early breakdown scenarios". The new scenario entered H-mode as early as 70ms into the current ramp, and achieved elongations  $\sim 2.6$  at low li. These plasmas showed reduced beta limits with  $\beta_N \sim 4$ . LITER-1d was used during this experiment.

In the morning of Friday June 15<sup>th</sup> XP-732 entitled "Development of the Enhanced Pedestal H-mode" was run. The EP-H-mode, which had been observed previously on NSTX, was recreated. The high ion temperature gradients observed in this were diagnosed and there was evidence that they were induced by the appearance of a locked edge tearing mode.

In the afternoon on Friday XP-709 entitled “Scaling of the SOL width in NSTX and extrapolation to NHTX” was run. Very nice results were obtained using the fast probe to measure the width of the scrape-off layer on the outboard mid-plane simultaneous with measurements of the width at the divertor plate using the infra-red camera.

In the late evening XP-747 entitled “Turbulence/Intermittency Scaling and Comparison to Theory” was run. Data was obtained H-mode measuring “blobs” using the fast probe. This data was complimentary to the data previously obtained in L-mode plasmas.

On Monday the 18<sup>th</sup> of June XP-725 entitled “Coupling a Transient CHI Discharge to Ohmic Heating” was run. Data was obtained in experiments which attempted to drive additional current using the OH transformer coil following the creation of high current CHI plasmas.

In the morning of Tuesday the 19<sup>th</sup> of June XP-717 entitled “HHFW Current Drive at High B Field” was completed. The HHFW phase was varied during the discharge in order to measure the temperature dependence of the coupling efficiency of the HHFW at different parallel wave numbers. This XP will support the invited talk at the APS meeting to be given by J. Hosea on HHFW results from NSTX.

In the afternoon on Tuesday XP-734 entitled “Te gradient and magnetic shear effects on core transport” was run. Good data was obtained in plasmas with strong shear reversal and large core electron and ion temperature gradients using both the high-k scattering system and the reflectometers.

In the morning of Wednesday the 20<sup>th</sup> of June XMP-33 entitled “MSE calibration” was completed. This will enable the use of the four additional MSE channels that were added during the 2007 campaign. In the afternoon on Wednesday magnetic calibration shots were run. In the late evening a neon glow was performed for CHERS spectral calibration.

### **Physics Analysis (S. Kaye)**

Data from approximately 150 discharges is being assembled and will be included in the ITPA density peaking database. Data from NSTX was requested at the recent ITPA meeting in Lausanne, Switzerland in May, 2007. The data shows that the strongest dependences of the density peaking in NSTX are with the peaking of the electron source due to the beams, and with time from the L-H transition, indicating that the NSTX density profiles are evolving in time. A more comprehensive set of data will be prepared, along with MAST data, for developing an ST-only density profile peaking database. (S. Kaye)

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### **Engineering Operations (A. von Halle, C. Neumeyer)**

NSTX Operations continued this past week after a vacuum vessel boronization over the weekend. Systems were configured for Coaxial Helicity Injection (CHI) operations to complete two CHI experiments before reconfiguring for ohmic operations on this last scheduled week of the run. Use of the high-K scattering diagnostic, in conjunction with high harmonic fast wave heating, neutral beam injection, and machine fields to 5.5 KG continued to complete several ongoing experiments on high-k fluctuations, current drive, and core transport. The lithium evaporator (LITER) and the machine's error field coils were also used to complete other experiments on RWM active stabilization, relationships of

ELM severity and electron transport, and EBW mode conversion in H-mode plasmas. The final MSE calibration of the run was performed using neutral beam injection into a gas-filled torus, and several hours were spent on field-only shots for calibrating magnetic diagnostics. A neon glow calibration of the CHERS diagnostic was completed one evening this past week. Time was also spent this week to complete integrated system testing of the new plasma control system computers.

The vacuum vessel will be partially vented in argon and then nitrogen this coming week to complete calibration of the MPTS diagnostic. The NSTX test cell will be in restricted access during MPTS LASER operations.

### **Research Operations (M. Bell)**

#### Boundary Physics Operations (H. Kugel)

- LITER-1d1 was used to support XP-720 on EBW conversion to O-mode.

#### Diagnostic Operations (R. Kaita)

- NSTX plasma operations for FY07 are nearly completed, and diagnostic calibrations are beginning. Scheduled for the past week were beam injection into a gas-filled vacuum chamber for the motional Stark effect (MSE) current profile diagnostic, a neon glow discharge for the charge-exchange recombination spectroscopy (CHERS) ion temperature and plasma rotation diagnostic, and the energizing of magnetic field coils for calibrating magnetic sensors.