

## **NSTX Weekly Report (June 6, 2008)**

### **FY 2008 NSTX plasma operations**

**Planned: 15 run weeks**

**Completed: 12.14 run weeks, 1857 plasmas (through June 4, 2008)**

There will be an NSTX Physics Meeting on Monday, 6/9 at 1:30 PM in LSB318. We will have XP updates from the following: S. Zweben, J. Hosea, and C. Bush. (S. Kaye)

Members of NSTX Research Team attended the 18th International Conference on Plasma Surface Interactions in Controlled Fusion Devices, held in Toledo, Spain, May 26-30. An oral talk entitled "Suppression of Large Type I ELM Activity by the Deposition of Lithium on the NSTX Graphite Divertor Surfaces" was given by D. K. Mansfield and the following sixteen NSTX and NSTX related posters were presented: "Electrostatic Dust Detector with Improved Sensitivity" by D. P. Boyle et al., "Lithiated Graphite as Hydrogen-Pumping Surface for Improved Plasma Performance", by J. P. Allain et al., "The Lithium Tokamak eXperiment (LTX)" by R. Majeski", et al. "Evaporated Lithium Surface Coatings in NSTX" by H. W. Kugel et al., "Lithium Deposition in NSTX as measured by Quartz Microbalance" by C. H. Skinner et al., "Measurement of Lithium and Deuterium on NSTX Carbon Tiles" by W. R. Wampler et al., "Simulations of NSTX with a Liquid Lithium Divertor Module" by D. P. Stotler et al., "Electrode Biasing for SOL Control in NSTX" by S. J. Zweben, et al., "Investigation of SOL widths with plasma parameters in NSTX H-mode plasmas" by J.-W. Ahn et al., "ELM Filaments in the Scrape-off layer of the national Spherical Torus Experiment" by R. J. Maqueda, et al., "MARFE Stability Analysis of an ELMy H-mode Discharge in the national Spherical Torus Experiment" by F. Kelly, et al., "The Enhanced Pedestal H-mode in the National Spherical Torus Experiment" by R. Maingi, et al., "Structural studies of Carbon Dust Samples Exposed to NSTX Plasma", by Y. Raites, et al., "A Study of the Role of particle Sources in Secular Density Rises in NBI-heated H-mode plasmas in NSTX" by V. A. Soukhanovskii, et al., "Measurements of Accumulated Metallic Impurities During LITER Operation in NSTX" by S. F. Paul et al., "2D Divertor Design Calculations for the national High-power Advanced Torus Experiment" by J. M. Canik et al., and "An Experiment to Tame the Plasma Material Interface" by R. J. Goldston, et al. The papers and presentations will be placed in a web folder at [http://nstx.pppl.gov/DragNDrop/Scientific\\_Conferences/PSI/2008/](http://nstx.pppl.gov/DragNDrop/Scientific_Conferences/PSI/2008/). The PSI-18 Review, Invited and Oral presentations are now available at the conference website <http://psi2008.ciemat.es>. (V. Soukhanovskii, LLNL, H. Kugel)

### **Run Coordination (M. Bell, R. Raman)**

Two experiments were conducted in the three days of operation June 2 - 4.

On Monday and Tuesday, June 2-3, we began with the experiment "Flux savings from inductive drive of a Transient CHI started plasma" [XP-817, R. Raman]. First, previous discharge scenarios were reproduced without the benefit of cryopumping or boronization. As a result of the higher prevailing vessel base pressure, these plasmas were more resistive and ramped only to about 400kA when induction was applied. Then, lithium evaporation was introduced which both improved the discharge reproducibility and increased the plasma current achieved to 600kA. A

test on the use of helium for CHI discharge initiation showed that breakdown was more difficult. Tests were also conducted on using HHFW for heating CHI-started discharges during the coupling phase to induction.

On Wednesday June 4, we continued the experiment "HHFW Phase Scan & Current Drive in Deuterium L-Mode" [XP-825, P.M. Ryan] using modulation of the RF to determine the heating efficiency. At the outset, the antennas were conditioned to couple up to 3 MW in deuterium under the machine proposal XMP-26 [J. Hosea]. Without NB cryopumping, the heating was lower than previously achieved for antenna phasings  $-90^\circ$  and  $-150^\circ$  consistent with an observed increase in edge density. By applying lithium at a rate of 20 mg/min rate, the edge density was reduced and the HHFW power then raised the central temperature to  $\sim 3$  keV for both  $-150^\circ$  and  $-90^\circ$  phasings. A significant increase in electron temperature and stored energy were also observed at  $-30^\circ$  phasing for first time in deuterium plasmas. Heating of impurity ions, including lithium, by the parametric decay instability was observed in the periphery of the plasma.

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

NSTX plasma operations continued during part of this past week in parallel with investigation and repair of the vacuum leak in the neutral beam calorimeter. The calorimeter assembly has been decontaminated and moved outside the test cell to allow experiments utilizing the new lithium evaporator (LITER) to continue. The repaired calorimeter will be re-installed during the scheduled June 9th maintenance week.

There will be no access to the NSTX test cell during plasma operations this coming week. Access to the test cell is expected to be available during 2nd shift each evening.

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

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

- Lithium Evaporator (LITER)

- The LITER system was used to support CHI, RF, Ohmic H-mode, and gas balance experiments (H. Schneider).

- Preparations for reloading the LITER system during the next maintenance week were initiated. These included preparation of the required lithium and fabrication of an additional LITER support stand. ( J. Timberlake, G. Labik)

- Liquid Lithium Divertor (LLD) (R. Ellis, III)

- The draft Statement of Work for mechanical fabrication of the LLD was sent to SNL for the LLD procurement preparations in progress.

- The completed mechanical drawings were approved, and the drawings were sent to SNL for the LLD procurement package.

- The final specifications for the copper material needed for fabrication of the LLD were completed, and sent to SNL for procurement.