**NSTX Weekly Report (Mar. 20, 2009)**

**FY 2009 NSTX plasma operations**

**Planned: 16 run weeks**

**Completed: 1.13 run weeks**

The ReNeW Theme 5 workshop was held at PPPL, March 16-19. NSTX researchers actively participated in the workshop. White papers were submitted and presented by several members of the NSTX Research Team. Informative status and update presentations were given for Themes 1 - 4 and the international ST program, with particular focus on MAST and the proposed MAST-U was given by Brian Lloyd. S. Sabbagh (Columbia University), lead of the ST Panel, gave several talks, including a summary of ST Panel tasks to date, including the development of draft research thrusts. The ST Panel's present development of initial draft research thrusts was included in a summary presentation. S. Sabbagh attended a Theme 5 panel leader's meeting held on Friday, March 20th. Discussion at this meeting, combined with the Theme 5 Thursday PM ST Panel breakout session discussion, provides direction for next steps, which includes drafting of the full research thrusts. Theme 5 has presently proposed three "theme-level" research thrusts, with the individual Theme 5 panels proposing several elements (or "panel-level" thrusts, and sub-thrusts) of the theme-level thrusts. The meeting material can be found at the following link: http:/www.pppl.gov/conferences/ReNeW/T5Workshop/index.html. (S. Sabbagh)

NSTX received the State of New Jersey safety award "Commissioner of Labor and Workforce Development Continued Excellence Award for working 8 consecutive years (1,495,489 hours) without an away from work lost time injury/illness case" for performance in Calendar Year 2008. These awards will be presented at an upcoming Governor's Occupational Safety and Health Awards Program Area dinner. (J. Levin, ES&H)

The paper entitled "Momentum transport in electron-dominated spherical torus plasmas", based on the oral presentation at the 22$^{nd}$ IAEA Fusion Energy Conference by S.M. Kaye et al has been published in Nuclear Fusion **[Nucl. Fusion 49 (2009) 045010]** and is available online at http://stacks.iop.org/0029-5515/49/045010. The paper addresses several facets of rotation and momentum transport using magnetic braking to change the plasma toroidal rotation and rotation shear. The level of ion transport relative to neoclassical levels is seen to depend on rotation shear, with local transport levels getting higher as the local rotation shear decreases. Perturbative experiments have allowed the determination of inward momentum pinch velocities, which can be significant and which generally agree with estimates from theories based on low-k turbulence induced momentum transport. (S. Kaye)

There will be an NSTX Physics Meeting on Monday, March 23 at 1:30 pm in LSB318. Pat Diamond (Professor, UCSD) will give a talk entitled "Non-Diffusive Transport of Toroidal Momentum and the Origins of Intrinsic Rotation in Tokamaks". Remote connection is available. (S. Kaye)

**Run Coordination (R. Raman , University of Washington, Deputy: E. Fredrickson)**

March 12-13: March 12 [XP904, Strike Point Dynamics, E. Kolemen] - The aim of this experiment was to study the dynamics of the lower strike point so as to be able to design a new controller algorithm to change the location of the strike point and to stabilize it at the new location. For this work, several step variations in the PF2L coil current were imposed to the reference discharge developed on March 11. The changes to the strike point location and the response time were measured. This data will now be used for the development of the control algorithm.
March 13 [XP903, Error Field Threshold Study in High-beta Plasmas, J-K. Park] - The goal of the experiment was to study *static locking* (error field penetration) phenomena driven by external non-axisymmetric fields in high- NSTX plasmas by extending the parametric space of the present error field threshold database to high beta discharges. Some progress was made but difficulties in reproducing discharges due to changing wall conditions precluded the collection of an adequate data set. The experiment will be completed after Li capability is available for 2009.

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

NSTX began a two-week maintenance period this past week. Work is in progress on the installation of the wave-guides for the HHFW balanced power feed upgrade, and the two LITER evaporators have been loaded with lithium and installed on the NSTX vessel. In the test lab, the lithium droppers are undergoing vacuum preparations, and testing of the of the heaters for the future Liquid Lithium Divertor (LLD) system continues. Also this week, calibrations of the vacuum vessel pressure gauges and gas valves were performed, and vessel pumping speed measured in preparation for an upcoming gas balance experiment. Access to the NSTX Test Cell will be available during planned maintenance this coming week.

**Research Operations (M. Bell)**

Boundary Physics Operations (H. Kugel)

• Liquid Lithium Divertor (LLD) (M.Viola)
A teleconference was held with SNL and PPPL to discuss LLD progress and planning:
SNL Status:
- Control Rack assembly is in progress. Status photos were received. Candidate wiring lengths are being measured for a cabling vendor requisition.
- Control Rack LabView programming has progressed to controlling a heater output into a resistive dummy load.
- The divertor plate molybdenum coating vendor has recommended an outside test vendor for measuring the strength of the final coating bond.

PPPL Status
- Panel mount connectors were sent to SNL for the Control Rack-to-NSTX interface assembly.
- A requisition was submitted to the molybdenum coating vendor to coat a PPPL step-bent, brazed, copper test sample for off-line testing.

• Lithium Evaporator - LITER 2009

- LITER-F and LITER-K were each loaded with 46g of lithium, and installed on NSTX. Leak checking and cabling is in progress. (J. Winston)

• Lithium Dropper (D. Mansfield)

-Lithium Dropper unit-1 vacuum testing qualified it for installation on NSTX. Loading unit-1 with lithium powder has started, and calibrations will be performed this weekend prior to installation next week.

• Edge Sample Probe (C. H. Skinner)

- The machining and brazing of probe parts is scheduled for completion this weekend.
- Preparations to begin laboratory testing next week prior to final assembly and installation are in progress.

• FUEL GAS RETENTION (C. H. Skinner)

-Comprehensive calibrations of NSTX vessel pressure gauges, Residual Gas Analyzer, and Neutral Beam cryopanel pumping speeds started, and are in progress.