

## NSTX Weekly Report (Feb. 27, 2009)

### FY 2009 NSTX plasma operations

**Planned: TBD**

**Completed: 0 run weeks**

David Smith successfully defended his PhD thesis from Princeton University, entitled "Investigation of electron gyro-scale fluctuations in the National Spherical Torus Experiment". David's research employed coherent scattering of 1-mm electromagnetic waves to measure short-scale density fluctuations under a variety of NSTX plasmas. Results indicate the existence of turbulent fluctuations when the electron temperature gradient is near the ETG critical gradient. Of particular interest is the observation that the amplitude of fluctuations decreases when the ExB flow shear rate exceeds the ETG linear growth rate. (E. Mazzucato)

A paper entitled 'Correlation between Electron Transport and Shear Alfvén Activity in NSTX', by D. Stutman, et al., has been accepted for publication in Physical Review Letters. The paper reports the first observation of a correlation between fast ion driven GAE modes and thermal electron transport in a fusion experiment. This correlation is also supported by theory, which indicates that overlapping modes can resonantly couple to the bulk thermal electrons and induce their stochastic diffusion. The proposed effect is potentially important for future STs as well as for any burning plasma where the alphas can drive the GAEs. (D. Stutman, Johns Hopkins University)

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

NSTX plasma operations continued this past week in support of the experimental machine proposal (XMP) to evaluate machine conditions before beginning actual experiments. Machine conditions are still poor, limiting the plasma pulse length and current, and periods of argon, neon and helium glow discharge cleaning are being performed in the off-hours. Also this week, testing of the proposed heaters for the new Liquid Lithium Divertor (LLD) system continued in the vacuum chamber in the lithium test lab. The NSTX Test cell will be in restricted access this coming week during plasma operations. Limited access will be available after 5PM each evening.

### 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:

- 5 plates are completed. The 6th plate is scheduled for completion this week. All 6 plates will be

- shipped to the molybdenum coating vendor by 2/3/09.
- Updated information on the control rack fabrication was received
  - The LabView control rack software is now able to use SPECVIEW to run a snap shot at end of day that can be used for full reconstruction of system performance.

PPPL Status:

- An aluminum test plate and a brazed copper test plate were sent to the vendor for step-bending
- The D-site Assembly area (Upper DARM) is complete and awaiting connection to the computer network.
- The LLD candidate heater was vacuum tested for outgassing. Its vacuum performance was found to be satisfactory, and it was successfully controlled using either the embedded heater thermocouple or a thermocouple embedded in the copper test plate.

- Lithium Evaporator - LITER 2009 (T. Provost)

- 2 spare LITER 2009 versions have been completed. Parts for the 3rd unit are completed, but assembly will be postponed until other work is completed.
- Preparations started for loading the LITER 2008 units presently in the Test Cell

- Edge Sample Probe (C. H. Skinner)

- A teleconference was held with Purdue collaboration team to review work in progress.
- Drawings of the final assembly were reviewed.
- A Final Design Review has been tentatively scheduled for 9:30am, Tuesday 3/10/09.

- Lithium Powder Dropper (D. K. Mansfield)

- A new supply of fresh lithium powder was received.
- The mechanical assembly of Dropper-1 has been completed. Preparations are to progress to load and calibrate Dropper-1 prior to installation on NSTX.