# NSTX Weekly Report (April 22, 2011)

**FY 2011 NSTX plasma operations started on October 4, 2010**
**FY 2011 NSTX Outage started on October 25, 2010**
**Planned Run Weeks: TBD**
**Run Weeks Completed: 4.21 run weeks and 839 plasma shots**

A manuscript "Density Gradient Stabilization of Electron Temperature Gradient Driven Turbulence in a Spherical Tokamak" by Y. Ren (PPPL) et al. has been published in Physical Review Letters **106**, 165005 (2011). In this paper, the first clear experimental observation of density gradient stabilization of electron-gyro scale turbulence in a fusion plasma is reported. This observation, coupled with linear gyro-kinetic calculations, leads to the identification of the observed instability as toroidal ETG modes. Furthermore, it is also observed that longer wavelength modes, with normalized perpendicular wavenumber less than 10 (normalized with ion gyro-radius with electron temperature), are most stabilized by density gradient, and the stabilization is accompanied by about a factor of 2 decrease in the plasma effective thermal diffusivity. (Y. Ren)

Jon Menard (PPPL) visited Culham, UK April 12-19 to participate in the MAST PAC-5 meeting and to discuss collaboration opportunities on MAST and the research needs for ST-based fusion nuclear science facilities. (J. Menard)

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

The NSTX outage continued this week with the ongoing in-vessel spatial and white plate calibrations of diagnostics. A technical representative of SpectraPhysics performed the annual testing and restart of the MPTS diagnostic lasers. The new ORNL fast thermocouple tile was assembled, potted and installed, and the LITER drip pans and shutters are in place on the vessel. A new support stand for the supersonic gas injector is under fabrication and nearing completion. Also this week, the neutral beam calorimeter, complete with newly designed bellows, was installed in the beam-line. Good progress was made on the pre-operational testing of the new Switching power Amplifier (SPA) supplies.

Access to the NSTX test cell will be available this coming week.

## Research Operations (M. Bell)

### Boundary Physics Operations (H. Kugel)

- Liquid Lithium Divertor (LLD)
  - The assembly of the ORNL Fast Thermocouples was completed.
  - The LLD, Bay-H, Row-1, Gap tile containing the ORNL Fast Thermocouples was installed. All wires for the existing slow Type-K thermocouple (TC) and Mirnov coils in the tile were re-connected, and the fast TC wires were routed around the passive plate. All the Mirnov and thermocouple wires passed continuoty checks. Prior to installation of the tile, a SS armor conduit was also added to each of the fast TC wire

lengths for additional noise rejection.
  - Preparations are underway to connect the cabling for the Fast Thermocouples to a thermocouple feedthrough in the LLD J2 tree trunk. (A. McLean, ORNL)

- Lithium Evaporators (LITERS)
  - The machining and welding for 4 new LITER ovens was completed.
  - The machining of wire channels in the cylindrical ceramic casings of the oven and snout heaters for 4 units was completed.
  - The 6-axis controller used for controlling the LITER bellows motion drive was repaired and was received from the vendor. It has been installed in the Test Cell for integrated systems testing.

Diagnostic Operations (R. Kaita)

Progress this week in diagnostic calibrations for the upcoming NSTX run includes completing the checkout of the "shunt" tiles for halo current measurements. The spatial calibrations were also finished for the tangential and poloidal charge-exchange recombination spectroscopy (CHERS and pCHERS) arrays, the edge rotation diagnostic (ERD), and the new real-time velocity (RTV) measurement system.