

## **NSTX Weekly Report (June 18, 2010)**

### **FY 2010 NSTX plasma operations**

**Planned: Total - 15 run weeks (Base - 14 run weeks, ARRA - 1 run week)**

**Completed: Base - 3.52 run week and 664 plasma shots**

**Completed: ARRA - 1.01 run week and 171 plasma shots**

The NSTX Beam Emission Spectroscopy (BES) diagnostic took its first data on June 15, completing the milestone for installation and commissioning of this diagnostic. This project is a collaboration between the University of Wisconsin-Madison and PPPL. The signal amplitudes were as expected and signatures of coherent MHD modes with frequencies up to 100 kHz were seen that correlated with Mirnov coil data. Further commissioning of the BES diagnostic is underway. (B. Stratton)

Dr. Vijay Surla has arrived as a collaborator from the University of Illinois at Urbana-Champaign (UIUC) on long-term assignment to NSTX. He will be supporting the UIUC effort on the instrumentation for the new divertor high-density Langmuir probe array, and physics investigations related to the Liquid Lithium Divertor. (R. Kaita)

### **Run Coordination (E. Fredrickson, S. Sabbagh - Columbia University)**

Operations were suspended for Thursday and most of Friday, June 10 & 11, due to a higher leakage current observed in the OH high-pot. The problem cleared up by Friday afternoon and XMP26 "RF Plasma Conditioning" was started to condition the HHFW antenna's. Conditioning continued through Monday, June 13 in Helium and Deuterium plasmas, and some progress was made on Joel Hosea's XP1017 "RF Heating at Divertor / SOL regions" to study divertor heating and on Gary Taylor's XP1009 "HHFW heating at low  $T_e$ ,  $I_p$ " to study RF heating of low current / temperature plasmas. About 1.4MW of RF power was coupled to a 300kA plasma and significant heating was seen.

On Tuesday, June 14, the PF4/PF5 ISTP was completed. After 10:30 we began the second day of XP1043 "Measurements of Heat flux profiles for the FY2010 Joint Research Milestone" (R. Maingi) to continue documentation of the scaling of divertor heat flux profiles. Detailed scans of the plasma current, and then the toroidal field were completed with interesting results for the scaling of confinement with toroidal field. The BES shutters were operated manually on Tuesday, and the BES diagnostic acquired its first data. Coherent MHD activity was visible in spectrograms and cross-correlations of the BES data. On Wednesday, June 15, two experiments were run, starting with XP1003 "Simultaneous X-point height and outer strike point control" (E. Kolemen) to develop combined outer strike point and x-point height control. In XP1003, the PID (Proportional, Integral, Derivative) control was tuned to achieve lower x-point height to be controlled to within 2 cm while the outer strike point flux error is  $\sim 0.5$  mWeber/rad. Progress was made on the PDI control hand-off handling. Reproducible control shots were obtained. Then XP1005 (Jon Menard) "Modification to the early discharge evolution to reduce late impurity content" was performed. In XP1005 modifications of the early discharge were found to reduce late impurity content, but impurity accumulation in ELM-free H-modes remains a problem.

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

NSTX plasma operations continued this past week on extended run days, and utilized both HHFW and neutral beam heating as well as dual probe lithium evaporation. Commissioning of new coil protection circuitry and the integrated system testing required for combined PF4 and PF5 coil operation were successfully completed. A refurbished spare ion source was installed in the neutral beam "A" position and is currently being conditioned up for full power operation. First measurements from the new Beam Emission Spectroscopy (BES) diagnostic were attained this past week. Two LITER probes are being refilled, with plans to be installed on the vessel next week for a period of extended lithium evaporation in preparation for an upcoming Liquid Lithium Divertor (LLD) experiment.

Access to the NSTX test cell will be restricted on Monday and Tuesday this coming week during plasma operations. Access is expected to be available from Wednesday through Friday.

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

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

- Liquid Lithium Divertor (LLD)
  - Extensive preparations for XP 1059, "LLD Characterization, Part II" were in progress.
  
- Lithium Evaporators (LITERs)
  - LITER units F1 and K2 were used to support experimental operations.
  - LITER units K1 was reloaded. Preparations started for reloading unit F2.
  
- Lithium Technology R&D
  - Preparations started for the changeover in the test chamber from the heated LLD sample to a heated graphite sample for completion of the present sequence of lithium deposition, residual gas analyzer experiments.