

## **NSTX Weekly Report (April 2, 2004)**

FY 2004 weeks of operation planned: - 18 weeks, Completed: - 6.6 weeks

### **Department, Project, Program (M. Ono, M. Peng, M. Williams, E. Synakowski)**

- UCSD Team (J. Boedo, R. Hernandez, and L. Chousal) arrived and performed upgrades and maintenance on the Fast Probe in preparation for testing next week. (H. Kugel)
- Yasushi Ono (University of Tokyo) arrived on March 30, 2004 under the US-Japan exchange program to discuss the possible FRC formation physics on NSTX. Stewart Zweben is the NSTX host. (J. Savino)
- No NSTX Physics meeting on Monday, April 5.

### **Run Coordination (S. Kaye, J. Menard)**

Plasma operations began on Monday 3/29 following a three week outage to install optical dumps for the CHERS diagnostic, replacement of the MPTS window, and other assorted diagnostic tasks. The outage culminated with bakeout and a hot boronization. The machine condition during the first day of operation was very good, as evidenced by the observation of several Ohmic-heating only H-modes. Filters to suppress the RF noise pickup were installed at several locations and tested in order to understand the source of the low frequency rectifier noise caused by these same filters. Neutral beam operation began on Wednesday, with the beam voltage at 80 kV. Many H-modes were observed, with stored energies reaching the 200 kJ level with beta-n of 5.5 (according to EFIT). The O/C ratio, a good indicator of machine condition, was observed to be from 0.1 to 0.2, also indicating a well conditioned machine. Gap and triangularity control was worked on with rtEFIT, with good progress being made on this. Finally, XP426, which studies fast ion loss associated with TAE modes was run, with the current scan portion of the XP being completed. Of note during this XP was the achievement of a high power double null ELM-free H-mode discharge with a current flattop of over 400 msec and stored energies relatively constant during the course of the flattop. This discharge will serve as a basis for several XPs to be run soon. Another notable accomplishment was uncovering, and solving, the issue affecting the CHERS diagnostic data reduction. Once this issue was understood and corrected, the CHERS data looked excellent.

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

- NSTX plasma operations resumed this past with magnetic diagnostic calibrations (XMP-9) and a detailed assessment of neutral beam heated plasmas after the recent hot boronization. Additional experiments on rt-EFIT plasma control (XMP-32) were performed, as well as on fast-ion induced MHD and particle loss (XP-426). SPRED was brought on line this week and took data in support of the post-boronization assessment.

Access to the NSTX test cell will be restricted during plasma operations this week. Test cell access will be available from 5:00PM to 10:00PM each evening. The next maintenance week is scheduled for May 3rd-7th. (A. von Halle)

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

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

- XMP-009, Evaluation of Hot Boronization, was completed. The Ohmic fiducial discharges exhibited the most favorable Ohmic performance to date. The second Ohmic fiducial discharge, and those thereafter, transitioned into the H-mode. The SPRED luminosity ratio OV/CIII at 0.2 sec was about 0.39, and the VIPS H/D ratio at 0.2 sec was 0.06-0.07. The base pressure was comparable to that near the end of the FY02 Run. Neutral Beam fiducial discharges exhibited the most promising first-day-NBI operation to date. During the initial NBI fiducial discharge, the SPRED ratio OV/CIII at 0.2 sec was about 0.19, and decreased to 0.1 during a later discharge. Initial H/D ratios at 0.36 sec were about 0.25, and then decreased to about 0.12 after 10 fiducial discharges, and were at about 0.08 the following day for similar discharges. This level of hydrogen may be attributable to the decomposition of water released during the initial NB duct conditioning. Two styles of NBI fiducial discharges were employed; there were indications that a comparison of these fiducials may be useful for development of the control system software.

- The Surface Particulate Detector was opened to the vessel. Commissioning was initiated, and signal counts were detected. (C.H. Skinner)

- 3 cylinders of Deuterated Trimethyl Boron (TMB) were received. (J. Winston)

### Diagnostic Operation (R. Kaita)

- The SPRED VUV spectrometer was reinstalled on NSTX. It is now operating properly, and providing information on impurities and hydrogenic species ratios.
- A new detector array was installed in the tangential bolometer system on the NSTX midplane. All channels are operational, and radiated power profiles are being obtained.
- With alignment problems largely corrected, initial data are being obtained with the fast tangential soft X-ray pinhole camera. Initial indications are that their intensities are correlated with ultrasoft X-ray array signals during MHD events in NSTX plasmas.

### Diagnostic Upgrades (D. Johnson)

- The primary cause of the discrepancy between the carbon emission signals during beam notches from the CHERS background view compared to the view across the beam trajectory was determined to be improper phasing of the mechanical choppers which blank the CCD sensors during readout. This has now been corrected, and, following some minor calibration work, this system should be operational.