

NSTX Weekly Report (April 7, 2006)

FY2006 weeks of research operations

Planned: 11 weeks

Completed: 3.76 weeks

- There will be an NSTX Physics meeting on Monday, 4/10 at 1:30 pm in LSB318. The agenda: "Summary of TTF Meeting," by D. Mikkelsen, "High-k scattering logistics and results," by H. Park, and "High-k vector calculations" by E. Mazzucato. (S. Kaye)
- The April NSTX Team Meeting was held on Wednesday, April 5, 2006. The presentation material is available on the NSTX Web page.

NSTX Publications (S. Kaye)

Three NSTX papers were accepted for publication. The first paper for Nuclear Fusion, "New capabilities and results for the National Spherical Torus Experiment" by M. Bell et al., is an overview of recent NSTX results presented at the ST Workshop which was held in St. Petersburg, Russia in October 2005. The second paper for Nuclear Fusion, "Resistive wall stabilized operation in rotating high beta NSTX plasmas" by S.A. Sabbagh et al., was work presented at the Fusion 2004 conference in Vilamoura, Portugal. It includes several important results including the attainment of $\beta_N = 7.2$, the lack of dependence of maximum β_N on I_p in the wall stabilized region, the first identification of unstable RWMs with $n=1$ to 3 in a tokamak device, the dependence of the critical plasma rotation frequency profile for RWM stabilization vs. q , demonstration of resonant field amplification on NSTX using the initial non-axisymmetric field coil pair, qualitative comparison of experimental plasma rotation damping to NTV theory (trapped particle effects excluded), and NSTX EFIT reconstructions self-consistently including plasma rotation and flux-isotherm constraints. The third paper for Physics of Plasmas, "The effect of plasma shaping in NSTX" by D. Gates et al., was work presented in an Invited talk at the 2005 APS-DPP meeting. It discusses the beneficial effects of shaping (high elongation and triangularity) on plasma stability and performance, the latter including increased non-inductive current drive. (S. Kaye)

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

The NSTX test cell remained open this past week for system maintenance and for integrated system testing of the new lithium evaporator (LITER 1). After vacuum, interlock, and controls testing, the LITER probe was introduced to NSTX vacuum and into its operational position. Heating cycles and the deposition of lithium in support of NSTX experiments will continue into next week. Preparations were also made this week for upcoming 2kV Coaxial Helicity Injection (CHI) experiments, and for new gas injection system capability at the lower dome and at bay J top. maintenance was completed on the OH current limiting reactors, and on the RWM switching power amplifier ground switches.

Plasma operations will resume on Monday this coming week, and the test cell will be locked-up until 5 PM each day. Access to the test cell will be available from 5PM to

9PM each evening except Thursday, 4/13, for vacuum conditioning of the HHFW system. (A. von Halle)

Research Operations (M. Bell)

Diagnostic Operation (R. Kaita)

- Changes have been made to improve the “optical” X-ray (OSXR) array for measurements under NSTX plasma conditions. The 0.5 mm beryllium foil was replaced by a 0.3 mm beryllium foil in the OSXR head. The fiber optic bundle and detector hardware were also temporarily removed for tests to determine the effectiveness of band-pass filters in reducing radiation-induced noise. This is a collaborative effort involving Johns Hopkins University and PPPL.

- The diode array that was used as a multi-channel tangential bolometer on CDX-U is being moved to NSTX. A new flange with a pump-out port has been fabricated, and it is being readied with the vacuum enclosure for the diode array in the NSTX vacuum prep lab. This is a collaborative effort involving the Lawrence Livermore National Laboratory and PPPL

Boundary Physics Operations (H. Kugel)

- The LITER-1 Preliminary Test Procedure (PTP) and the Integrated Systems Test Procedure (ISTP) were completed. LITER-1 was moved into the vessel and to its operating position behind the Bay F Upper Divertor gap. Initial LITER-1 test operations evaporated ~ 10 – 20 mg of lithium on NSTX plasma facing surfaces.

- A LITER cartridge-C fabrication was completed, and assembly is in progress for high deposition rate testing off-line.

- An A10 infrared camera purchased by ORNL was received at NSTX. It was calibrated with an IR source and is performing according to specifications. (R. Maingi, ORNL)