

NSTX Weekly Report (Apr. 2, 2010)

FY 2010 NSTX plasma operations

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

Completed: 0.17 run week and 26 plasma shots

On Wednesday March 31st Patrick Ross successfully defended his Ph.D. thesis entitled "Ion Power Balance in Neutral Beam Heated Discharges on the National Spherical Torus Experiment (NSTX)". In his thesis he experimentally demonstrated that an ion heating mechanism outside the classical collisional heating paradigm was required in order to explain the observed ion temperatures on NSTX. In addition, he showed that the observed heating could be explained within error bars of the measurements by a model based on stochastic heating of thermal ions by fast-ion driven Compressional Alfvén eigenmodes proposed by Gates, Gorelenkov, and White in 2001. Congratulations to Dr. Ross. (D. Gates)

S. Kaye and D. Mikkelsen attended the 4th ITPA Topical Group Meeting on Transport and Confinement, which was held at Culham Laboratory, UK from March 22 to 25 2010. S. Kaye is the Chair of the group. S. Kaye gave two talks, one for H. Yuh (Nova Photonics) on ITBs in NSTX, and another on L-H/H-L hysteresis and the accessibility of H~1 regimes at heating powers just above the threshold power. D. Mikkelsen gave a talk on Physics Model Validation, and he is coordinating the Joint Activity on this subject. L. F. Delgado-Aparicio made a remote presentation of a talk entitled "Observations of Impurity Transport in NSTX." (S. Kaye)

The paper "Lithium Coatings on NSTX Plasma Facing Components and Its Effects On Boundary Control, Core Plasma Performance, and Operation", H. W. Kugel, et al has been accepted for publication in Fusion Engineering and Design. (H. Kugel)

The NSTX received the Commissioner of Labor and Workplace Standards Continued Excellence Award from the State of New Jersey for working nine (9) consecutive years (1,740,427 hours) without an away from work lost time injury/illness case. The award will be presented at an upcoming Governor's Occupational Safety and Health Awards Program Area dinner. (J. Levine)

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

NSTX experimental operations began this week with the completion of machine proposals (XMP's) to evaluate machine conditions and to establish plasma strike point control. Lithium evaporation via the two LITER probes was used extensively this week, as well as neutral beam injection and machine's error field control. HHFW antenna vacuum conditioning continued, successfully restoring 20kV operations after the lithium depositions. In parallel with operations, select lower divertor Langmuir probes were commissioned in preparation for the upcoming Liquid Lithium Divertor (LLD) characterization experiment.

Access to the NSTX test cell will be restricted during plasma operations this coming week. Access will be available after 5PM each evening.

Physics Analysis (S. Kaye)

The ELVIS-based between-shot TRANSP setup code has been debugged and is being used routinely during NSTX operations. Each run setup takes only a couple of minutes. At this point, two people are using this code to prepare and submit the TRANSP runs. More people will be trained in the near future.

Research Operations (M. Bell)

Boundary Physics Operations (H. Kugel)

- Liquid Lithium Divertor (LLD)
 - LLD IR (Infrared) emissivity was measured by calibrating the Fast 2-Color IR- and Slow IR-Cameras (ORNL) against the LLD thermocouples as the LLD temperature was raised from room temp to 220°C. Simultaneously, the LLD visible reflectivity was measured using the Phantom fast cameras.
 - XP1000 "LLD Characterization" was started.
- Lithium Evaporators (LITERs)
 - LITER units F1 and K1 were used to support Machine Physics Proposals (XMPs) XMP064 and XMP066.
 - LITER units F2 and K2 were completed and delivered to the South High Bay. Preparations started for craning units F2 and K2 to their High Bay Parking Stands for lithium loading.
 - The Safety Review Committee (SRC) has accepted the updates to the "Safety Assessment Document" (SAD) and the "Failure Modes and Effects Analysis" (FMEA) for the LITER Liquid Lithium Filler (LIFTER).

Diagnostic Operations (R. Kaita)

- New diagnostics associated with the Liquid Lithium Divertor (LLD) are becoming operational. These include the Langmuir probes installed with the divertor biasing electrode (BEaP) system, and the high spatial density array instrumented in collaboration with the University of Illinois at Urbana-Champaign.
- Recent work on spectroscopic diagnostics includes the repair of the controller for the visible survey spectrometer (VIPS2), and the re- installation of the high-resolution extreme ultraviolet spectrometer (XEUS) after calibration. Both instruments involve collaborative activities with the Lawrence Livermore National Laboratory.