

NSTX Weekly Report (Mar. 19, 2010)

FY 2010 NSTX plasma operations

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

Completed: 0 run week and 0 plasma shot

The US Burning Plasma Organization published an article in the March Edition of eNews highlighting recent "snowflake" divertor experiments in NSTX that provided support for this plasma-material interface (PMI) concept (<http://burningplasma.org/home.html>). A recent theoretical idea and supporting calculations by D. D. Ryutov (LLNL) indicated that the "snowflake" divertor configuration may be a viable PMI solution for future conventional and spherical tokamaks. Initial NSTX experiments demonstrated encouraging results, namely, impurity control and divertor heat flux reduction while maintaining good core energy confinement. Further studies of the "snowflake" divertor configuration and its impact on pedestal stability and scrape-off layer heat and particle transport are planned on NSTX in 2010. (V. Soukhanovskii, LLNL)

R. Kaita gave a seminar entitled "The National Spherical Torus Experiment: Physics and Engineering Challenges in a Low Aspect Ratio Magnetic Fusion Device" in the Department of Nuclear Engineering at the University of Michigan on Friday, March 12. The presentation was directed toward nonspecialists in magnetic confinement research. The audience included several undergraduate men and women who were considering graduate studies in engineering areas related to fusion. (R. Kaita)

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

The NSTX start-up activities continued this week with the completion of the machine area "scrubs", and the start of individual field coil power testing. HHFW antenna and neutral beam ion source power conditioning was performed in parallel with the coil system power testing. The new liquid lithium fill system was commissioned this week and successfully filled the Bay F and Bay K LITER probe assemblies to about 80 grams each of lithium, more than doubling the inventory reached in past fills. Both probes will be installed on the NSTX vacuum vessel next week to evaporate and deposit lithium on the Liquid Lithium Divertor (LLD) plates before the start of plasma operations. Also this past week, the interlock system for combined PF4/PF5 operations was commissioned as part of the NSTX fault chain, and will remain in the "Bypass" mode until needed.

Access to the NSTX test cell will be restricted during first shift next week for combined field coil power testing. Access will be available after 5PM each evening.

Research Operations (M. Bell)

Boundary Physics Operations (H. Kugel)

- Liquid Lithium Divertor (LLD)
- M.A. Jaworski presented the talk "Plasma Heating and Thermal Response Modeling of the LLD".

- LLD Diagnostics
 - The Phantom fast camera fields of view were tested and showed very useful views of the LLD.
 - White plate calibrations of the Phantom cameras are in progress.

- Lithium Evaporators (LITERS)
 - A successful Peer Review of "Liquid Lithium Filling of LITER (LIFTER)" was presented by J.R. Timberlake.
 - LIFTER was applied to fill LITER units Bay F1 and Bay K1 with 85g and 72g of lithium, respectively, about twice the amount that had been previously loaded using solid pellets.
 - The mechanical assembly and electrical testing of the new LITER unit Bay-F2 was completed, and preparations started for its leak checking.

- Plasma Materials Interaction (PMI) Probe
 - J. P. Allain (Purdue U) will provide Purdue samples of the LLD material that are already of an appropriate size for the PMI probe. These will be sent to NSTX for installation on the PMI. These samples will be exposed during the initial LITER coating of the LLD, and then shipped back to Purdue for analysis of the lithium wetting.

- Materials Analysis Particle Probe (MAPP):
 - The MAPP design and fabrication is on schedule.