

NSTX Weekly Report (July 2, 2010)

FY 2010 NSTX plasma operations

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

Completed: Base – 5.35 run week and 1020 plasma shots

Completed: ARRA -1.01run week and 171 plasma shots

American Recovery & Reinvestment Act (ARRA) Facility Upgrade Projects 3rd Quarter milestone engineering and design of the facility upgrades was complete on June 30 with the successful final design review of the 2nd Switching Power Amplifier (SPA). (T. Egebo)

Charles Skinner attended the second IAEA Research Coordination Meeting on the Characterization of Size, Composition and Origins of Dust in Fusion Devices, 21-23 June 2010 at the IAEA Headquarters in Vienna. He gave an invited talk on “Dust Detection, Migration and Transport” that presented recent PPPL advances in the first real-time detection of surface dust in a tokamak, dust mobilization from ITER-scale castellations and the generation of several hundred 3-D trajectories of Li and W particles in NSTX from observations by two fast cameras. He is the editor of the IAEA yellow report summarizing the progress made by all the meeting participants and the plans for the next 1.5 years of the coordinated research project." (C. Skinner)

N. Ashikawa from NIFS visited the laboratory June 1 - 3rd to discuss the installation on the LHD stellarator of an electrostatic dust detector that has been developed at PPPL. Both parties are preparing technical proposals for the collaboration. (C. Skinner)

Stanley Kaye attended the ITPA Coordinating Committee Meeting held in Cadarache, France on 28-29 June 2010. (S. Kaye)

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

On Monday, June 28, after argon venting to repair the Bay K Liter shutter previous week, plasma operations began with Stefan Gerhardt's XP1019 "Optimization of beta-control". The beta-feedback system worked well, but unplanned beam blocks complicated interpretation of the data. Confinement was reasonable, but there was substantial Argon in the machine from the vent and Nitrogen and Oxygen lines were also seen, although the origin of the Nitrogen is not understood at this time.

On Tuesday, June 29, we began development of shots for Ron Bell's XP1041 "Joint NSTX-DIII-D poloidal rotation experiment", based on a fairly old shot designed to match a DIII-D shape. Plasma shape, was reproduced and toroidal field and current adjusted to match the recent DIII-D parameters for comparison. The uncertainty in the impurity profile however precludes comparison with neoclassical calculations of poloidal velocity. An interesting observation was, however, made in the course of this experiment. It was necessary to increase the plenum pressure over the course of the later shots to maintain constant density from shot-to-shot. Following XP1041, we spent the rest of the day on Egemen Kolemen's XP1003 "Combined X-point height and outer strike point control". Some progress was made.

On Wednesday, June 30, we started Ahmed Diallo's XP1044 "Increasing the Range of

Achievable Pedestal Height" to study the scaling of pedestal height, and to reach higher pedestal pressures. The XP was nearly finished, but requires a couple more hours.

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

NSTX plasma operations continued this past week after replacing the damaged bay K shutter and installing two freshly refilled lithium evaporator (LITER) probes. Experiments utilizing beta-feedback control, Resistive Wall Mode (RWM) error field correction, dual probe lithium evaporation, neutral beam heating, and machine fields to 5.5 kG were performed until Thursday, when operations were halted to address an intermittently weeping fitting at the bottom of the OH assembly. Operations are planned to resume after testing on Tuesday, July 6th. Also this week, the final design review of plans to install a second Switching Power Amplifier (SPA) supply to provide individual RWM coil power feeds was successfully held.

Access to the NSTX test cell will be restricted this coming week during plasma operations. Access is expected to be available each evening.

Research Operations (M. Bell)

Boundary Physics Operations (H. Kugel)

- Lithium Evaporators (LITERs)

- LITER unit F2 was reloaded with 81.87 g. LITER unit K1 was reloaded with 82.40g.
- LITER units F1 and K2 supported plasma experiments.
- LITER provided lithium edge conditions for XP1041 on plasma rotation.

- Divertor Sample Probe

- Prof. J. P. Allain, Purdue University visited NSTX to review plans for conversion of the Sample Probe to the Materials Analysis Particle Probe (MAPP) during the 2010 Outage. The NSTX /Purdue collaboration also reviewed plans for using the Divertor Sample Probe during the present Experimental Campaign.

American Recovery & Reinvestment Act (ARRA) Facility Upgrade Projects (T. Egebo)

The 3rd Quarter milestone engineering and design of the facility upgrades was complete on June 30 with the successful final design review of the 2nd Switching Power Amplifier (SPA).

- Additional Multi-Pulse Thomson Scattering (MPTS) channels - All long lead procurements are in place. Work continues in the PPPL machine shop on modifying the Polychromator box side plates to meet specifications. Optical components are scheduled for delivery later this month to support the polychromator box assembly.

- Enhanced Liquid Lithium Divertor (LLD) - Liter Fill System and LLD cameras are complete.

- Implementation of the 2nd SPA - Shipment of the SPA has been delayed to mid-July to allow the vendor to correct non-conformances identified by PPPL engineering inspections, this delay will not impact installation or commissioning as planned. A successful final design review for the 2nd SPA was held on June 30th. Contracts are for ancillary hardware including Disconnect

& Ground Switches and DC Circuit Transducers are in place with delivery scheduled to support installation during the Fall 2010 NSTX Outage.

- The Motional Stark Effect measurement based on Laser Induced Fluorescence (MSE-LIF) diagnostic - The fabrication the new (MSE-specific) Bay G port cover is progressing on schedule drawings are being updated to provide additional clarity for machining port holes. The machine shop continues to make progress on the MSE-LIF components, the shop is mobilizing to fabricate a set of alignment fixtures to support installation. Electrical design continues.