

NSTX Weekly Report (July 03, 2008)

FY 2008 NSTX plasma operations

Planned: 15 run weeks

Completed: 15.37 run weeks, 2344 plasmas (through July 02, 2008)

- Six papers on NSTX diagnostic work presented at the High Temperature Plasma Diagnostics Conference held in May in Albuquerque have been accepted for publication in Review of Scientific Instruments. Three other papers have been accepted pending revisions, which are in progress. (B. Stratton)
- Stanley Kaye attended the ITPA Coordinating Committee meeting held in Aix-en-Provence on 30 June -1 July 2008 as incoming Chair of the newly formed Transport and Confinement ITPA Task Group. During the course of the meeting, the outgoing Chairs gave year-end summaries of their TG activities, along with brief presentations from each Party attending on research plans for the upcoming year. There were presentations from the ITER IO on high-priority research needs, and discussions on just how to approach addressing these needs from the vantage point of each TG were held. (S. Kaye)
- There will be an NSTX Physics Meeting on Monday, 7/7 at 1:30 PM in LSB318. We will have XP updates from the following: S. Gerhardt - XP834 3/2 NTMs, XP801, 810 2/1 NTMs, D. Stutman - XP840 GAEs and electron transport, D. Mansfield - XP828 Li powder, J. Menard - XP838 Long pulse operation. Remote connection is available. The talks will be found in http://nstx.pppl.gov/DragNDrop/NSTX_Meetings/Monday_Physics_Meetings/2008/7-7-08/ (S. Kaye)

Run Coordination (M. Bell, R. Raman)

On Thursday 6/26, two experiments on 2/1 Neoclassical Tearing Modes (NTM) were continued from earlier this run. The first, "2/1 NTM self-stabilization" [XP-801, R. LaHaye] encountered difficulty when the H-mode could not be sustained while reducing the NBI power to produce self-stabilization of the NTM because the deuterium GDC used to promote the onset of the 2/1 NTM but increased the power threshold for the H-L transition. In the second experiment, "Error field sensitivity of 2/1 NTM thresholds" [XP-810, R. Buttery], reliable 2/1 NTMs were produced with various applied $n=1$ and $n=3$ fields, which slowed the plasma rotation and clearly lowered the threshold in normalized beta for mode onset.

On the morning of Friday 6/27, the experiment "RWM stabilization physics" [XP-830, J. Berkery] was completed successfully. RWMs were produced both in shots run prior to evaporating lithium, which had low ion collisionality, and those after LITER was turned on, in which the ion collisionality rose dramatically due to an increase in the Z_{eff} from carbon. Magnetic braking by an applied $n=3$ field was used to vary the plasma rotation profile. There was an anti-correlation between rotation and collisionality at the time of mode destabilization. In the afternoon technical difficulties prevented completing "Active RWM stabilization optimization" [XP-802, S. Sabbagh] although the desired high beta target conditions with low rotating MHD mode activity were achieved in both a control shot and one shot from the planned feedback phase scans which showed clear differences, as expected.

On Monday 6/30 in the experiment "Study of the 3/2 NTM" [XP-834, S. Gerhardt], we were unable to generate the 3/2 NTMs via the previously successful "NBI trigger" method originally proposed. However, by delaying the preheating and H-mode, plasmas with 3/2 modes were developed and several shots were taken with this scenario which will now be analyzed.

On Tuesday 7/1, we completed the experiment "Edge turbulence and intermittency" XP-839, R. Maqueda] in the morning. Measurements of intermittent events (blobs) were obtained in different X-point topologies to study the relationship between midplane blobs and those seen in on the divertor target plates. The elongation and triangularity of the plasma were varied, including a short scan in X-point height. Good data were obtained in all conditions, except the low triangularity case, which was unreliable. In parallel with this experiment, the Machine Proposal "Initial shake-out of the lithium powder dropper" [XMP-62, D. Mansfield] was conducted.

In the afternoon on Tuesday 7/1, we began the experiment "GAEs and e-transport" [XP-840, D. Stutman] which continued into the morning on Wednesday 7/2 to investigate a hypothesized correlation between electron transport and energetic-particle-induced Global Alfvén Eigenmode GAE activity in NSTX. To an MHD-quiescent H-mode obtained with two NB sources, we added a third source at higher injection energy, which produced stronger GAEs and a broadening of the T_e profile. We also studied plasmas with the same NBI power at different beam energies. Although the contrast in GAE activity was weaker in this case, the data appear to be consistent with the hypothesis. High-k scattering data that included the GAE modes was taken. A scan in magnetic field was also done.

The experiment "Injection of lithium powder" [XP-828, D. Mansfield] was conducted in the afternoon on Wednesday 7/2. Lithium powder was successfully injected into eleven discharges using the new "Raindrops" system which performed flawlessly. Many interesting high-speed videos of the interaction of the powder stream with the plasma were collected. Two surprising initial observations were made. (1) Even while injecting a large amount (>15 mg) of lithium, the plasma did not disrupt, in contrast to the experience with smaller lithium pellets. (2) When lithium powder injection started at the time of breakdown, an essentially square electron temperature profile with a peak value of 600eV was observed before the plasma transitioned into the H-Mode.

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

NSTX plasma operations continued this past week after the removal, reloading and reinstallation of both lithium evaporator (LITER) probes over the weekend. Also over the weekend, pre-operational testing of the new lithium powder shaker was completed. Experiments performed this week used both LITER and the lithium shaker, as well as neutral beam injection, high harmonic fast wave heating, and the machine's error field coils.

There will be no access to the NSTX test cell during plasma operations this coming week, and plasma operations will be extended to 7PM on Tuesday, Wednesday and Thursday. Access to the test cell will be available from the end of the run day to 10PM each evening.

Research Operations (M. Bell)

Boundary Physics Operations (H. Kugel)

- Lithium Evaporator (LITER) - The 2 LITER units were reloaded with lithium to final amounts of about 62 g each. The units were reinstalled, realigned, outgassed, and controls tested in preparation for operations in support of forthcoming XPs. (H. Schneider, J. Timberlake, J. Winston and team)
- Liquid Lithium Divertor (LLD) - The final LLD drawings received PPPL approval for "Release for Fabrication /Installation", and were sent to SNL for insertion in the procurement process. Work on preparations for the LLD Diagnostics FDR included completing a Table listing all wires, feedthrus and cabling required for control and characterization, adoption of a Langmuir Probe array tile concept, adoption of a bias electrode tile concept, planning for the LLD and tile Halo current Rogowski sensors, and initial analysis of port allocation. NSTX/SNL telephone and email communications were performed to coordinate work in progress. (R. Ellis III, and the NSTX and SNL LLD teams)
- Lithium Powder Dropper - The final testing was completed, and the controls were found to perform successfully in the absence and presence of vessel fields and vibrations. Lithium powder was successfully injected into eleven discharges using the new powder injection system. The system performed flawlessly and many interesting videos, as well as, other data were obtained. Data analysis is in progress. (D. Mansfield, L. Roquemore, H. Schneider)