

NSTX Weekly Report (May 23, 2008)

FY 2008 NSTX plasma operations

Planned: 15 weeks

Completed: 10.84 weeks, 1617 plasmas (through May 21, 2008)

No Physics meeting this week due to the Memorial Day holiday.

The May NSTX Team Meeting will be held on Wednesday, May 28, 2008, at 1:30 P.M., in B318. We will give you the status of the NSTX operations and plans. We will also discuss the upcoming NSTX Five Year Review planned in end of July. The remote participation is available by contacting Joanne Savino: jsavino@pppl.gov.

Run Coordination (M. Bell, R. Raman)

Four experiments received run time in the three days of operation, May 19-21.

On Monday 5/19, the experiment "LITER Characterization" [XP-827, H. Kugel] was continued to investigate if sufficient lithium deposition would allow elimination of HeGDC wall conditioning and shorter machine cycles. Using a 9.5 min HeGDC followed by lithium deposition at a rate of 70 mg/min for 10 min, previous Li edge conditions were recovered immediately. The HeGDC was then eliminated and the subsequent discharges continued to achieve the H-mode. The deposition rate was then reduced to 20 mg/min for 10 min and the subsequent discharges were successful. Finally, the plasma conditions were maintained as the deposition time was reduced to 8 min. As performance improved, the NB power was reduced by pulse width modulation to maintain the plasma stored energy.

On Tuesday 5/20, we continued the experiment "ELM mitigation with midplane coils using different RMPs" [XP-818, S. Sabbagh]. At the outset, apparently as a result of the lithium applied on the previous day, we achieved a normalized beta of 6.6%.m.T/MA. We then passivated the lithium by brief periods of deuterium-GDC to reestablish the ELMing discharges. By applying very modest lithium evaporation at rates of 15 to 7 mg/min, the ELMs were suppressed again but on one shot reappeared when a programmed RMP was applied. At the end of this day, we performed some shot development for the experiment "High elongation plasmas" [XP-836, D. Gates].

On Wednesday 5/21 we ran the experiment "High-k turbulent fluctuations in HHFW heated plasmas" [XP-821, E. Mazzucato] with the goal to compare high-k fluctuations in helium and deuterium plasmas. The first part of the run was used to reproduce the 2007 results in helium, which was quite successful. When we switched to deuterium, the plasma developed a reversed shear configuration that prevented a direct comparison with the helium case. However, in both cases, the HHFW heating produced NSTX-record electron temperatures in excess of 5 keV.

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

NSTX plasma operations continues this past week with extensive use of the two lithium evaporator (LITER) probes. The use of lithium evaporation proved successful in eliminating the need for between shot HeGDC, and time was spent evaluating optimum deposition rates.

Lithium deposition was also used in conjunction with the machine's error field coils in continuing experiments on ELM mitigation, and with HHFW/NB heating to study high-k turbulent fluctuations. In the latter set of experiments, the HHFW systems operated routinely and reliably at >3MW this week. Late in the week, the neutral beam system experienced a vacuum leak in the calorimeter assembly, presumably at the calorimeter bellows. The neutral beam is isolated from the torus, and experiments will continue on NSTX without the use of NBI. Upon conclusion of the warm-up of the NB cryo-systems by early next week, a repair of the leak will be completed (needed spares are on site), and the neutral beam returned to service.

There will be no access to the NSTX test cell early next week during NSTX plasma operations. Access to the test cell is expected at the latter half of the week during the neutral beam calorimeter repair activities.

Research Operations (M. Bell)

Diagnostic Operations (R. Kaita)

- The prototype neutron collimator assembly has been installed in the NSTX Test Cell.
- The second laser for the multipoint Thomson scattering diagnostic has been repaired and is operational. Alignment issues remain, however. Present plans are to address them with dedicated Ohmic plasma shots next week.

Boundary Physics Operations (H. Kugel)

• Lithium Evaporator (LITER)

LITER was used to support 3 XPs . LITER-F has 33.5 g of Li remaining, and LITER-K has 30.3 g of Li remaining, for a total of 63.8 g of Li remaining.

*Liquid Lithium Divertor (LLD)

The paper "Simulations of NSTX with a Liquid Lithium Divertor Module", D. Stotler et al., was prepared for presentation at the 18th Int. Conference on Plasma Surface Interactions in Controlled Fusion Devices, May 26-30, 2008 Toledo, Spain.