

## NSTX Weekly Report (February 29, 2008)

### FY 2008 NSTX plasma operations

**Planned: 15 weeks**

**Completed: 1.69 weeks (through February 27, 2008)**

- Jon Menard attended several days of the joint meetings of IEA Large Tokamak workshop on "Control of ELMs and RWM" (W68), the US-Japan workshop on "MHD Behavior and Control of Burning Plasma" (FP3-3), and the 11th Meeting of the ITPA MHD Topical Group - all held at the Naka Fusion Institute on February 25-29, 2008. Jon Menard gave 3 presentations entitled: "Analysis and Optimization of RMP Effects for ITER using IPEC", "Overview of ELM stability and control results from NSTX", and "Overview of Recent NSTX Energetic Particle Research". (J. Menard)
- Stanley Kaye participated in the selection of U.S. contributions for the 22nd Fusion Energy Conference to be held in Geneva, Switzerland in October 2008. (S. Kaye)
- There will be an NSTX Physics Meeting on Monday, 3/3 at 1:30 PM in LSB318. We will have some summaries of last week's run: **S. Kaye: Effect of rotation on confinement (XP812)** and **E. Kolemen: Maximum Controllable Displacement Measurements for High Elongations (XP 811)**. The talks will be found in [http://nstx.pppl.gov/DragNDrop/NSTX\\_Meetings/Monday\\_Physics\\_Meetings/2008/3-3-08/](http://nstx.pppl.gov/DragNDrop/NSTX_Meetings/Monday_Physics_Meetings/2008/3-3-08/) (S. Kaye)

### Run Coordination (M. Bell, R. Raman)

Seven experiments were conducted in the week February 21-27, 2008.

On Thursday 2/21, we began with MP-54 "FIDA checkout" [W. Heidbrink, UC-Davis] to supplement the data obtained on the preceding Monday. By reducing the NB voltage to 60kV we obtained plasmas quiescent in the Alfvén frequency range which were needed to assess the sensitivity of the new Fast-Ion Deuterium-Alpha (spectroscopic) diagnostic. In the afternoon, we switched to XP-806 "Edge Electrode Biasing for SOL Control" [Zweben] to test the response of the plasma in the scrape-off layer (SOL) to a local poloidal electric field created by biased electrodes. A clear change in the radial distribution of plasma density between these electrodes was seen, corresponding to an increase in the local SOL width. This was seen both in NBI-heated plasmas at bias potentials of  $\pm 90\text{V}$ , and in Ohmic and RF heated plasmas (which had a smaller outer gap) at  $\pm 50\text{V}$ .

On Friday 2/22, after a delayed start due to the snowstorm, we began with XP-811 "Vertical stability" [Kolemen, Princeton U.] which was largely completed. The maximum recoverable displacement of the plasma was investigated in ohmically-heated helium plasmas. A clear difference in recovery by the feedback system was observed between upward and downward displacements as a result of asymmetries in the structure of the vacuum vessel. The last hour of operation was spent in shot development for XP-818 "ELM mitigation" [Sabbagh, Columbia U.] using the error-field correction coils and NB heating.

On Monday 2/25, we performed XP-812 "Impact of rotation on energy and impurity confinement" [Kaye] using the EF coils to apply  $n=3$  braking. Much of the time was spent optimizing the SPA current to avoid a complete collapse of the rotation and development of locked modes. Good shots were obtained eventually but the experiment was not completed.

On Tuesday 2/26 we ran MP-26 "HHFW coupling to 6MW" [Hosea]. Technically it was a very successful day, with over 50 plasma shots run in a normal shift, most of them at 0.5T field. In deuterium plasmas, both the heating and current-drive phasings of the antenna were used and the coupled HHFW power reached about 1.2MW. Later in the day, helium plasmas were used and in these, the HHFW power reached about 1.8MW.

On Wednesday 2/27, we spent most of the day continuing XP-812 "Impact of rotation on energy and impurity confinement" [Kaye] and essentially finished the scan started on Monday using the EF coils to apply  $n=3$  braking. Good data were obtained. The last 1-1/2 hours was spent beginning XP-820 "Modulation of core rotation using beam blips" [Kaye].

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

NSTX Plasma operations continued this week using neutral beams and high Harmonic Fast Wave (HHFW) heating systems. Ohmically driven helium plasmas were generated in an experiment on vertical stability, and the machine's error field coils were used in conjunction with beam heating for an experiment on ELM mitigation, and on another to manipulate plasma rotation to measure effects on energy and impurity confinement. Modulated neutral beam pulses or "beam blips" were also used this week to control plasma core rotation. The HHFW system successfully coupled 1.2 MW into deuterium and 1.8 MW into helium plasmas at machine fields to 5kG. On one evening this week, a vacuum vessel boronization was performed using ~ 5g of trimethylboron.

The NSTX test Cell will be in restricted access this week during plasma operations to 5PM each evening.

### **Research Operations (M. Bell)**

#### **Diagnostic Operations (R. Kaita)**

- A new extreme ultraviolet spectrometer (XEUS) from the Lawrence Livermore National Laboratory (LLNL) has arrived at PPPL, and arrangements are being made for its installation. This high-resolution instrument is able to make measurements at longer wavelengths than the XEUS originally implemented by LLNL on NSTX.