

NSTX Weekly Report (April 11, 2008)

FY 2008 NSTX plasma operations

Planned: 15 weeks

Completed: 6.51 weeks, 983 discharges (through April 9, 2008)

R. Maingi (ORNL) presented a seminar at the Physics Dept. of the Univ. of Maryland titled: "Characteristics of Small ELMs in NSTX". There was keen interest by the attendees, and a new collaboration between U. Md. and NSTX to identify the underlying instabilities was proposed. (R. Maingi)

The paper "Raman Spectroscopy of Carbon Dust Samples from NSTX" by Y. Raites, C.H. Skinner, F. Jiang, T.S. Duffy was published in Journal of Nuclear Materials 375 (2008) 365–369. The presented results suggest that the production of carbon dust particles in NSTX involves graphite vaporization, which is followed either by condensation or some plasma-induced processes leading to the formation of more disordered forms of carbon material than the original graphite. This work was conducted in collaboration with the PU Department of Geosciences. (Y. Raites)

There will be an NSTX Physics Meeting on Monday, 4/14 at 1:30 PM in LSB318. We will have the following presentations: R. Raman – CHI experiments (remote), E. Fredrickson – Fast ion transport (XP819), D. Smith - Existence and saturation dynamics of high-k fluctuations in H-mode plasmas. The talks will be found in http://nstx.pppl.gov/DragNDrop/NSTX_Meetings/Monday_Physics_Meetings/2008/4-14-08/ (S. Kaye)

Run Coordination (M. Bell, R. Raman)

Four experiments were conducted in the week April 3 - 9, 2008.

On Thursday 4/3, the experiment XP-825 "HHFW Phase Scan & Current Drive in Deuterium L-Mode" was attempted but problems with the plasma control system developed which limited progress. Helium operation the previous day helped control the density rise in deuterium, allowing good rf power penetration through the edge plasma. Central electron temperatures of 1.8 keV for $k_{||} = -8\text{m}^{-1}$ and 2.5 keV for $k_{||} = -13\text{m}^{-1}$ were achieved with 1.2 MW of HHFW power, the latter case leading to quite steep T_e gradients at $R = 1.2\text{m}$.

On both Friday 4/4 and Monday 4/7, the experiment XP-819 "Fast ion transport induced by Alfvén avalanches" was scheduled. However, the problems with plasma control from the previous day persisted and both days were spent diagnosing the problem which was repaired on the Monday afternoon.

On Tuesday 4/8, XP-815 "Characterization of divertor heat flux and mid-plane SOL widths" was run in low power Type-V ELM H-mode plasmas involving the fast reciprocating probe and IR camera as primary diagnostics. A scan in plasma current covered 1MA, 700kA, and 800kA plasmas at constant edge q . A density scan was obtained by plunging the probe at different time slices, although the density variation was rather limited ($\sim 20\%$). A power scan of 1MW and

2MW of NBI power was also obtained for 1MA plasmas.

A successful day for experiment XP817 "Flux savings from inductive drive of a Transient CHI started plasma" was achieved on Wednesday 4/9. Discharges developed in the previous run on 3/31 were improved to increase the peak in the CHI produced toroidal plasma current to 150kA. The plasma current was then successfully ramped up using the central solenoid to over 600kA. The CHI started discharges transitioned into a H-mode, reaching electron temperatures of 500eV, and had had low plasma inductance. In some discharges both NBI and HHFW Heating were applied during the ramp-up.

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

NSTX plasma operations continued this past week with experiments utilizing both neutral beam and high harmonic fast wave heating, and the neutral beam systems successfully supported shot-to-shot power scans ranging from 65keV to 95keV. An experiment in plasma edge characterization completed current and field scans using the fast reciprocating probe and the IR camera systems. The machine was once again configured to support one day of Coaxial Helicity injection (CHI) operations this week to continue investigations on transitions from CHI to inductively driven plasma current ramp-up. Also this week, work continued on preparations to install the second lithium evaporator (LITER) probe at bay F, and the in-situ latency measuring system was successfully used to diagnose signal propagation times through the various stages of the new plasma control system.

Access to the NSTX Test Cell will be available during scheduled maintenance this coming week.

Research Operations (M. Bell)

Boundary Physics Operations (H. Kugel)

- Lithium Evaporator (LITER) FY08
 - The umbrella structure support welding for LITER-F was completed and passed QA inspection. LITER-F is now in the High Bay awaiting a crane lift and installation during the maintenance.
 - The zoomable webcam camera mounted at the lower window of Bay-K was found to be very useful for observing the LITER-K insertion.
 - The alignment of LITER-K was much improved, and it was able to reach to within 0.26" of the estimated operating point. Additional alignment work will determine if the residual 0.26" is attributable to the bellows compression or internal interferences.
- Liquid Lithium Divertor (LLD)
 - A teleconference was held between the respective SNL and NSTX teams to review thermal calculations and controls design work in progress at SNL.

- A meeting was held to review the drafting and design work in progress at PPPL and to discuss remaining preparations for the FDR.

- The LLD Final Design Review has been scheduled for Tuesday, April 22, 2008, 9:30 am, B-318.