

NSTX Weekly Report (Sept. 9, 2005)

FY2005 Planned Operations: 17 weeks

Completed: 17.76 weeks producing 2190 plasmas

NSTX Department, Project, Program (M. Ono, M. Peng, E. Synakowski)

- There will be an NSTX Physics Meeting on Monday, 9/12 at 1:30 pm in LSB318. In addition to reports on recent XPs, we will start a series of short presentations by APS Invited Speakers on their progress to date and their analysis needs for their talk and paper. The agenda for the meeting will be: 2 VUgraph XP Updates: XP537 HHFWCD w/ MSE (Wilson), XP538 HHFW High Te (LeBlanc), XP514 EBW O-Mode (Taylor), XP531 Transient CHI (Raman). APS Invited Talk Status (not the correct titles): Zweben – Edge turbulence, Fredrickson – Fast ion instabilities, Kessel – Long pulse scenarios. (S. Kaye)

Run Coordination (J. Menard)

The seventeenth week of operation was completed successfully with two experimental proposals and two experimental machine proposals.

XP-508 Double-null long pulse discharges

A plasma current scan was performed at 5kG in an attempt to achieve high stored energy at high plasma current. Several discharges with 1.4MA flat-top durations of 200ms were achieved, and the best discharge sustained a stored energy of 400kJ for an energy confinement time before running out of transformer flux. 1.5MA discharges typically had much shorter flat-top durations due to limited OH flux.

XMP-43 Moveable glow probe

This XMP was started, and the glow probe was used during XP-508 to provide glow-discharge cleaning between shots. Additional testing will be performed this week.

XMP-33: Gas filled torus for MSE

A full MSE calibration was performed at a toroidal field of 5.0kG and partial calibration at 5.5 kG taking advantage of the completion of the high-TF ISTP. The previous calibration performed at 4.5 kG was also checked by operating at this field for several shots. The PF4 coil was also used for the first time to provide vertical field opposite in sign to that produced by PF5 coil.

XP-531: Transient CHI Startup

Good progress was made on improving CHI current persistence, and the CHI produced plasmas (in the absence of induction from the CS) very clearly persisted for at least 10ms past the time of zero injector current. The previous current persistence duration from the Aug 25 CHI run was 2ms. At the time of

zero injector current at least 40kA was left in the persisting closed flux plasma, doubling the previous record of 20kA obtained on Aug 25. Fast camera images showed clear evidence for the generation of a closed flux plasma ring, that shrank in minor radius with increasing time. A 20 ms pulse of 40keV neutral beams was injected into the discharge. This caused the persisting current to increase in magnitude suggesting that low energy beams could be used to improve the performance of CHI generated discharges.

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

NSTX operations resumed this past week with the integrated system testing to increase the machine toroidal field to 5 kilo-Gauss, and then, later in the week, to 5.5 kilo-Gauss. The effects of higher TF on the plasma current flattop and the ability to produce higher plasma pressure were investigated at 5 kG in XP-508 "Long-pulse DN plasmas", and an MSE calibration, XMP-33, was performed at 4.5, 5, and 5.5 kG. The machine's OH solenoid had to be taken out of service after a leak was discovered on one of the coil's lower fittings, and the focus of this week's run was shifted to the CHI experiment XP-531 "Transient CHI". The commissioning of the new Moveable Glow Discharge Cleaning Probe, XMP-43, continued this week, and the probe was used to support glow discharge cleaning between machine pulses.

The FY05 NSTX run will draw to a close this coming week with the majority of the week used to complete magnetic and diagnostic calibrations. The vent of the NSTX vacuum vessel is scheduled for the week of September 12th, with initial entry into the vessel expected sometime during the week of September 19th. (A. von Halle)

Research Operations (M. Bell)

Diagnostic Operations (R. Kaita)

- A calibration of the motional Stark effect (MSE) current profile diagnostic was performed this past week. Shots were taken with toroidal fields up to 5.5 kilogauss.
- The Photron fast camera from Hiroshima University was set up to view NSTX plasmas through the fiber bundle and Bay B midplane window usually used by the standard plasma TV camera. The faster framing rate for the Photron camera was used to obtain wide-angle images of discharges during coaxial helicity injection.
- The problem with the detector for the SPRED vacuum ultraviolet survey spectrometer was traced by the manufacturer to a bad capacitor in the preamplifier electronics. It is being repaired.

Boundary Physics Operations (H. Kugel)

- Electronic units were received from UCSD to support Fast Probe operations (J.Boedo, UCSD)
- Increased forced air cooling allowed the MGP to operate under normal conditions with acceptable anode temperatures. This completed the Integrated Systems Test Procedure, and the MGP was used thereafter to provide between-discharge GDC during operations.