

## **NSTX Weekly Report (March 5, 2004)**

FY 2004 weeks of operation planned: - 18 weeks, Completed: - 5.5 weeks

Dear NSTX Team Members,

Due to a new development regarding the 51 channel CHERS diagnostic stray light issue, we are extending the next week's maintenance week to install a light dump for the system. So our present maintenance period is starting this coming week lasting through the week of March 29. As you know, our NSTX 51 channel CHERS system has unprecedented spatial resolution of order of ion gyro-radius in the critical edge gradient region, which is important for this years' research program. We have observed that in the edge region we have spurious signals due to reflections within the vessel. During the last outage, a carbon based paint was applied on the wall to reduce the light reflection from the wall. However, after obtaining preliminary data during the last few weeks and performing detailed analyses, it became clear that the amount of reflected light from the wall particularly during H-mode discharges is still too high to assure precise CHERS measurements in the pedestal area. To support the experimental run, the quality of our data needs to be improved. So it was decided to correct the problem early in the campaign by installing a viewing dump so that we will have the benefit of good CHERS data for the rest of the campaign. This maintenance period offered a logical and timely opportunity to correct this problem.

As for the impact on the run schedule, we believe that we can still meet the 18 run weeks as planned. Only change in our plan is that the scheduled campaign completion date is delayed by two weeks to the week of July 23 from the week of July 9. We still have August and September as contingency months to complete the 18 run weeks if necessary since we were able to start the campaign about one month ahead of schedule this year. During this extended maintenance period, we will address other maintenance issues and have much improved capabilities for the remainder of the run. If you have some tasks which we can do to take advantage of this extended maintenance period, please let the responsible persons know. While the priority is on the CHERS work, we will try our best to accommodate your needs.

We apologize for the inconvenience particularly those who were planning to visit NSTX this month. A new run schedule will be made available to you as soon as we have a revised plan. We thank for your understanding and support.

Sincerely,

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### **Department, Project, Program (M. Ono, M. Peng, M. Williams, E. Synakowski)**

- R. Maingi presented a talk titled: "Profile Comparisons from the NSTX/MAST Power Threshold Experiment" at the ITPA Pedestal group meeting at Culham, UK. Stability analysis of NSTX, MAST, and DIII-D "common" shapes was discussed to help plan the trilateral pedestal and ELM expt. Also, a preliminary discussion for possible NSTX/JT-60U aspect ratio scaling experiments was also held. (R. Maingi, ORNL)

- The NSTX Physics meeting will be held on March 8, 2004, in B318 at 1:30 P.M. There will be three brief presentations on progress with the experimental run: Ben LeBlanc will summarize the results from HHFW conditioning and XP 425 (HHFW-only H-mode), Rajesh Maingi will summarize the results obtained thus far for XP 418 (L-H threshold / shape) and David Swain will summarize the results obtained thus far for XP 403 (HHFW CD)

### **Run Coordination (S. Kaye, J. Menard)**

- A Helium density scan experiment was performed to validate the visible bremsstrahlung diagnostic. Plasmas with densities 25% greater than the Greenwald limit were produced, with Zeff decreasing with increasing density to a value of approximately 2.3 at the highest density, consistent with a Helium plasma with some Carbon at the edge. The HHFW conditioned up to 3.6 MW at 14 m<sup>-1</sup>, with electron heating up to >2 keV observed. At 3 m<sup>-1</sup>, pickup noise was observed and interfered with plasma

control, limiting the power at this phasing to approximately 1.8 MW. An experiment to measure HHFW current drive was performed, with the phasing starting out at 7 m-1 to heat the electrons and then switching to 3 m-1 to drive current. Electron temperatures up to 1.4 keV were obtained at the higher k||, but then dropped to 600 eV when the phasing was switched. A power scan was performed for co-current drive phasing up to 2.3 MW. Edge ion heating at all phasings was observed on the ERD diagnostic. An XMP to study HHFW breakdown was performed; HHFW at varying powers (up to 400 kW) and at varying prefill pressures was used successfully to initiate the discharge. PF was introduced to study the effect of stray fields on breakdown, with little effect seen for PF3 currents up to 10 kA. Finite loop voltage was introduced through PF ramps in an attempt to ramp the plasma current up further. On a light note, the NSTX Control Room display wall was renamed to "Plasmax". (S. Kaye)

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

- NSTX operations continued this week, with experiments on HHFW conditioning, current Drive, and initial plasma breakdown. The RF antennas were conditioned to 20kV, the highest antenna voltages to date, and several scans were completed for the HHFW current drive and initial breakdown experiments. New RF filters were installed for the 96 real-time magnetic signals, and were effective in reducing the RF induced noise in the real-time control system.

The scope of the NSTX maintenance period, which started at the conclusion of operations on Friday, has been expanded to include a vessel entry for the installation of a viewing dump to eliminate wall reflections for the CHERS diagnostic. Plasma operations are expected to resume on April 5th. (A. von Halle)

- A contract was placed with IE Power, Inc., of Toronto, Canada, for the RWM Switching Power Amplifier (SPA). The SPA will consist of three sub-units each capable of pulses rated +/-1kV, +/-3.33kA, 0-100Hz, 6 second duration, once every 300 seconds. Switching frequency is 7.5kHz. Delivery is anticipated by August 1, 2004. (C. Neumeyer)

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

#### Boundary Physics Operations (H. Kugel)

- The procurement for the bellows motion drive system for the NSTX Supersonic Gas Injector & Edge Magnetic Sensor (SGI/EMS) Probe was awarded. A meeting of the Joint CDX-U/NSTX SGI team reviewed progress on the off-line testing, the CDX-U application, and the assembly of the NSTX unit.