

## NSTX-U Weekly Report (February 12, 2016)

### **FY 2016 NSTX plasma operations**

**Operation Targets: Total - TBD**

**Completed: 2.69 run week and 277 plasma shots**

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

Monday, 2/8/2016, was spent troubleshooting problems in FCPC and resolving grounding issues on the outer vacuum vessel.

On Tuesday 2/9/2016, 6 shots were taken towards XMP-137 (Increase  $I_p$  and  $\kappa$  in L- and H-modes). These discharges were used to develop an inner-wall-limited L-mode target discharge with flat-top  $I_p$  of 0.8 MA. Discharge development was pursued in tandem with XMP-138 on Tuesday and Thursday to realize L-mode discharges with elongation near 1.9 at internal inductance around 1.0 (203209). The improvements in vertical control allowed for repeatable operations close to the present vertical stability limit.

Wednesday 2/10/2016 was largely spent troubleshooting the gas delivery system. A single discharge was taken towards XMP-138 (Vertical Control Checkout).

On Thursday 2/11/2016, XMP-138 (Vertical Control Checkout) was largely completed. This XMP demonstrated filtering of the voltage and flux differences used in the vertical position observer. The filters successfully removed the pickup of power supply ripple and noise spikes that had triggered vertical instabilities in previous XMPs. A weighted combination of the filtered sensors was also tested, which improved the estimated vertical position. Only some minor steps left in XMP-138 are outstanding, and were deferred in order to move forward with other control development. Shots were then taken on XMP-115 (Isoflux Commissioning) for initial testing of ISOFLUX control of the mid-plane outer gap using PF-5.

Operation of Friday 2/12 was delayed in order to resolve a problem with the MG cyclo-converter. When this was cleared, further development on ISOFLUX control via XMP-115 was done. These shots resolved a software issue with transitioning into ISOFLUX control and allowed tuning of the PF-5 control of the mid-plane outer gap to be finished. Tuning of ISOFLUX control of PF-3U/L was started before the end of the day.

### **Engineering Operations (A. von Halle, P. Titus)**

NSTX-U plasma operations resumed this past week with experiments to evaluate machine conditions after the vacuum vessel boronization over the weekend, and to further test the plasma vertical controls. Earlier in the week, debris was discovered in-vessel on the vessel floor at the lower divertor near Bay L. Further investigation revealed that this material was part of the boron nitride cover on the BES diagnostic shutter. A team has been commissioned to develop the tools and procedures for the recovery of this debris. A procedure to assess the current state and operability of the shutters is also under development. All six NB ion sources were conditioned this week, but the NB2A had to be taken off-line for a telemetry repair. The NB2A system still needs to complete qualification/aiming shots into the in-vessel armor before it can be

used to support experiments.

The NSTX-U Test Cell will be in restricted access this coming week during plasma operations. Access will be available in the evenings for approved work.