

NSTX-U Weekly Report (August 12, 2016)

FY 2016 NSTX plasma operations completed Completed: 10.06 run weeks and 1066 plasma shots

Steve Sabbagh (Columbia University) attended and co-chaired one of four working groups for the ITER Research Plan Workshop held at ITER Headquarters in St. Paul-lez-Durance, France, on July 26 – 28, 2016. The workshop conducted work to update the ITER Research Plan to conform to the new Staged Approach schedule for ITER. (S.A. Sabbagh)

Yoshiyuki Tajiri (a graduate student from the University of Tokyo) visited the NSTX-U RF group for four weeks under the Princeton University – University of Tokyo student exchange program. During his stay, Yoshi learned the fundamentals of the NSTX HHFW system and matching algorithm. He also helped analyze the transient response of the outer gap due to step-changes in auxiliary heating and also transitions from L- to H-mode in NSTX-U. This analysis will be important in preparing for HHFW experiment on NSTX-U, as the impedance match is quite sensitive to the outer gap size. (R. Perkins, PPPL)

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

NSTX-U post-run calibrations were completed this past week with an experiment utilizing stray fields from PF5 to document impacts on the Diagnostic Neutral Beam neutralization cell, the documentation of low-frequency impedance measurements of the PF coils, and a Raman scattering calibration of the new Pulse Burst Laser Scattering system. The neutral beam (NB) helium refrigerator cold box is at room temperature, and all NB power, vacuum and cryogenic systems have been secured for maintenance. The Lithium Evaporator (LITER) systems are being secured for the outage, and the LITER probes themselves will remain in place on NSTX-U for spatial calibrations until after the vessel vent. Preparations are now underway to perform in-situ TF joint resistance measurements to be done next week, and procedures for the disconnection of water lines and removal of bolts at the upper machine umbrella have been started. The schedule to remove the NB duct to provide in-vessel access has been accelerated to start by Sept.15th, and will help to get the in-vessel diagnostic calibrations done by mid October.

There will be some access restrictions to the NSTX-U Test cell this coming week during TF joint resistance measurements.

Experimental Research Operations (S. Gerhardt, R. Kaita)

Rayleigh and Raman calibrations of the multi-pulse Thomson scattering system were successfully completed on August 4th. The data collected will be used to ascertain the viewing window condition at the end of the run; density correction might ensue. In view of the commissioning the data acquisition for the pulse burst laser system, we performed a Raman calibration for a subset of the edge channels in order to test the acquisition system and compare with the current acquisition system data. (A. Dialo, B. LeBlanc, PPPL)

The MSE-LIF system has accomplished a number of tasks over the past several weeks. Installation and testing of detectors for 10 sightlines was completed. Data acquisition hardware and software has been tested, and Beam-into-gas calibrations were done to tune APD circuit

gains. Improvements to the remote control and telemetry for the MSE-LIF laser system were implemented and tested. Monday, August 1st, checkout of the full operation of the MSE-LIF diagnostic was performed. All systems were tested successfully at operational levels. XMP-158 for MSE-LIF stray fields assessments and LIF measurements was completed. Full operation of MSE-LIF diagnostic, including concurrent operation of the laser and modulation of the beam acceleration voltage, into a gas filled torus was performed, and LIF data was recorded on 10 sightlines. Testing of the diagnostic neutral beam with vertical field from PF-5 was also completed, and signal levels were observed to decrease by 66% with vertical field. The need for additional magnetic shielding, to be installed during this outage, is being investigated. (Y. Sechrest, Nova Photonics)

Samples of plasma-facing component materials were exposed during boronization using the Materials Analysis and Particle Probe (MAPP). They are made of ATJ graphite, which matches the composition of the outboard divertor tiles. The samples have been removed for study using a variety of surface analysis techniques at the University of Illinois at Urbana-Champaign (UIUC). The results will have a key role in interpreting data from MAPP samples exposed to plasmas during NSTX-U operations in a UIUC-PPPL collaboration. (R. Kaita, PPPL)