

NSTX-U Weekly Report (July 11, 2014)

NSTX-U is in the Upgrade Project outage in FY 2014

Several NSTX-U research team members gave presentations at the public sessions of the 2014 FESAC Strategic Planning Panel (SPP) meeting held July 8-10 in Gaithersburg, MD. NSTX-U/ experiment-related presentations included the following: J. Menard (PPPL) “NSTX-U: ST research to accelerate fusion development”, R. Majeski (PPPL) “LTX: Exploring the advantages of liquid lithium walls”, R. Fonck (University of Wisconsin – Madison) “Initiatives in non-solenoidal startup and edge stability dynamics at near-unity aspect ratio in the PEGASUS experiment”, R. Raman (University of Washington) “Simplifying the ST and AT concepts”, N. Crocker (UCLA) “Validating electromagnetic turbulence and transport effects for burning plasmas”, S. Sabbagh (Columbia University) “Critical need for disruption prediction, avoidance, and mitigation in tokamaks”, M. Podestà (PPPL) “Development of tools for understanding, predicting and controlling fast-ion-driven instabilities in burning plasmas”, R. Maingi (PPPL) “A liquid-metal plasma-facing-component initiative”, M. Jaworski (PPPL), “Liquid metal plasma material interaction science and component development toward integrated demonstration”, and J.P. Allain (University of Illinois) “Establishing the surface science and engineering of liquid-metal plasma-facing components”. (J. Menard)

The paper "Effect of a deuterium gas puff on the edge plasma in NSTX" by S. J. Zweben (PPPL), et al. was published in *Plasma Physics and Controlled Fusion* *Plasma Phys. Control. Fusion* **56**, 095010 (2014), <http://stacks.iop.org/0741-3335/56/095010>. This paper describes a detailed examination of the effects of a relatively small pulsed deuterium gas puff on the edge plasma and edge turbulence in NSTX. This gas puff caused little or no change in the line-averaged plasma density or total stored energy, or in the edge density and electron temperature up to the time of the peak of the gas puff. The radial profile of the D α light emission and the edge turbulence within this gas puff did not vary significantly over its rise and fall, implying that these gas puffs did not significantly perturb the local edge plasma or edge turbulence. These measurements are compared with modeling by DEGAS 2, UEDGE, and with simplified estimates for the expected effects of this gas puff. (S. Zweben)

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

NSTX Upgrade activities continued with the post VPI (vacuum impregnation with epoxy) clean-up and sanding of the completed TF/OH coil assembly. Metrology is set-up to verify CS diameters. Water paths of the TF/OH have successfully passed hydrostatic and flow tests. Work on the new centerstack casing continues in the South High Bay with the machining of PF coil pockets. In the NSTX-U Test Cell, electrical insulation tests (High Pots) of the installed Resistive Wall Mode (RWM) coils were successfully performed, and in-vessel work on the the upper RF Langmuir probes and sFLIP diagnostic cabling completed. The installation of the Torus Vacuum Pumping System continues with the 1st turbo-pump and ion gauges in place.

Development of the new Digital Coil Protection System (DCPS) continued with the ongoing testing of system software and user interfaces, and the design/fabrication of hardware and I/O layouts. The new DCPS Auto-tester interface panel has been installed and is being used in the software testing before the system is moved to its final location in the Field Coil Power Conversion (FCPC) Building junction area. An extensive DCPS code review was performed this

past week.

Preparations of non-upgrade equipment for plasma operations in the NSTX-U configuration also continued with the ongoing weld repairs of the Motor Generator Rotor. About 80% of the planned weld areas have now been addressed. The FCPC deionized water system has been initiated, and leak checking of the FCPC rectifiers has started. The chassis for the new magnetic diagnostic integrator rack is being assembled in the Cal lab, and the new analog links for the I_p calculator are being tested. A new Reactive Metal Chemist has joined the PPPL Team and is supporting planning for NSTX-U Lithium Operations.

Access to the NSTX test cell will be available only through previous arrangement with the Upgrade Work Control Center.