

NSTX-U Weekly Report (May 24, 2013)

NSTX-U is in the Upgrade Project outage in FY 2013

The NSTX Upgrade Five-Year Plan Review was held May 21-23, 2013 at PPPL. The five year plan proposal was assessed by a 9 person review panel for a range of criteria including: scientific and technical merit, appropriateness of the proposed research plan, competency of personnel and adequacy of resources, reasonableness of proposed costs, and performance during previous five-year period. The panel also provided specific comments related to each topical area presented in the five year plan. Particular attention was paid to the three main proposed upgrades of the plan (lower divertor cryopump, 1 MW ECH/EBW system, and the partial non-axisymmetric control coil set), and these upgrades were evaluated (preliminary) to be important to meeting the five-year plan goals of achieving reduced collisionality, developing non-inductive start-up and ramp-up, and sustaining high beta operation. Panel members will submit written peer review reports to DOE within the next month, and FES will evaluate these individual reports and prepare a summary report that will be provided to the NSTX-U team. The review presentations are archived at: <http://nstx-u.pppl.gov/five-year-plan/five-year-plan-2014-18/review> (J. Menard, PPPL)

Charles Skinner (PPPL) and Tyler Abrams (Princeton University) attended the 14th conference on Plasma Facing Materials and Components 13-17 May 2013 in Juelich, Germany. Charles Skinner presented (i) plans for PFC research on NSTX-U (with M. Jaworski) and (ii) results on laser cleaning of candidate diagnostic mirrors for ITER. Tyler Abrams presented results of experiments on Magnum-PSI, a linear plasma device in the Netherlands, that measured the erosion and re-deposition rates of lithium films on graphite and TZM molybdenum. (C. Skinner)

PPPL graduate student Tyler Abrams (Princeton University) has returned from a four-week experimental collaboration with FOM-DIFFER laboratory in the Netherlands. During his stay, Tyler completed nine days of experiments on Magnum-PSI, a linear plasma device capable of plasma conditions similar to those in the NSTX-U divertor. Tyler measured the gross erosion rate and re-deposition fraction of lithium and aluminum coatings on TZM molybdenum and graphite substrates. These results are important for NSTX-U because lithium-coated graphite and TZM molybdenum are planned plasma-facing components (PFCs) for the NSTX-U divertor and these results will help predict how long these lithium coatings will last and where they will start to disappear first. (T. Abrams)

Brian LaBombard (MIT) presented two physics seminars at PPPL on Friday, May 24 entitled “Observations of boundary plasma turbulence and the Quasi-Coherent Mode in Alcator C-Mod using a Mirror Langmuir Probe” and “Alcator C-Mod Shoelace Antenna System for active probing of boundary plasma turbulence”. Presentation materials are downloadable from: http://nstx.pppl.gov/DragNDrop/NSTX_Meetings/Monday_Physics_Meetings/2013/2013_05_24/ (J. Menard, PPPL)

The TGLF transport model is being exercised within TRANSP for prediction of both Te and Ti profiles in NSTX discharges. NSTX operates at low aspect ratio, and thus provides a high leverage test of TGLF for configurations with high toroidicity. At this stage, the testing is focused on understanding the effect of various model input parameters on the prediction, not so much on the actual agreement with data. It is a necessary first step to identify the highest

leverage model parameters for this configuration. A following step is to calibrate these parameters against full GYRO simulations of these discharges. Over the next several months this will be done for both L- and H-mode plasmas both with and without lithium conditioning. (S. Kaye, PPPL)

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

NSTX Upgrade construction activities continued with loading of conductors into the mold for TF inner quadrant #4. All conductors are expected to be assembled in the mold by next week to be ready for epoxy impregnation in early June. Work continues on the commissioning of the second neutral beam (NB2) on NSTX with the installation of the magnetic shield on the ion source side of that beam-line. Fit-ups of NSTX in-vessel armor at NB2 beam impinged surfaces is in progress.

Preparations for plasma operations in the NSTX-U configuration also continued with the power testing of the new firing generators for the field coil power conversion (FCPC) system rectifiers, and the recommissioning of the three autotransformer and transformer rectifier sets that will provide the primary power for the NB2 ion sources.

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