

NSTX-U Weekly Report (August 21, 2015)

NSTX-U is in the Upgrade Project outage in FY 2015

Byron Peterson, Professor from National Institute of Fusion Science (NIFS), Japan completed his sabbatical visits for the summer spanning June 11 – August 17, 2015. During these visits he worked closely with his host Luis Delgado-Aparicio (PPPL) and with Travis Gray and Matthew Reinke (both from ORNL) and G. G. ‘Stein’ van Eden (a graduate student from FOM, Netherlands). This work was done in close collaboration with Dr. Ryuichi Sano with further assistance from Dr. Kiyofumi Mukai, both of NIFS. The purpose of visits was to help the NSTX-U team develop an Infrared Imaging Video Bolometer (IRVB) for NSTX-U. When he arrived in June, he brought with him a calibrated platinum foil to be used for the NSTX-U IRVB. After consultation with the NSTX-U colleagues, it was decided that the first attempt at an IRVB on NSTX-U would be a prototype mounted on an existing gate valve at the Bay J upper port. This would demonstrate the operability of the IRVB in the NSTX-U environment and provide the NSTX-U team with experience with and confidence in the diagnostic before designing a more permanent and optimized IRVB with a tangential view of the NSTX-U plasma. In addition it would provide useful poloidally resolved brightness measurement of the radiation from the NSTX-U lower divertor region. Before his arrival B. Peterson obtained CAD data for the Bay J upper port and made preliminary drawings of the IRVB, detailing the aperture, foil and IR camera locations. Using this design, he made estimates of the signal to noise ratio (SNR) using equations for the noise equivalent power density previously derived at NIFS and an estimate of the signal assuming a uniformly radiating plasma volume. Also, using the CAD data provided by PPPL and the IRVB design data the NIFS CAD group produced an image of the IRVB field of view that was useful in understanding the spatial limitations of the upper Bay J port installation. These results were presented by B. Peterson in a seminar at PPPL on July 6th entitled ‘*Comparison of bolometric images of detached plasmas with synthetic images calculated from EMC3-EIRENE results in LHD*’. Further detailed design work of the IRVB was done by M. Reinke. Preliminary calibration of the IR camera viewing a black body source and viewing the platinum foil heated by a HeNe laser was made by van Eden. He also obtained SOLPS two-dimensional simulation data of the radiation from NSTX-U from J. Canik of ORNL. Using the design B. Peterson made previously, R. Sano calculated synthetic radiation brightness profile data from the SOLPS data. Also M. Reinke calculated the synthetic brightness profiles from SOLPS data for use in more accurate signal estimates for the SNR. These results were presented at a design review on August 13th to which B. Peterson contributed noise equivalent power estimates. After his return to NIFS further collaboration will be carried out to design, fabricate and install the IRVB for the FY 2016 run campaign on NSTX-U. This collaboration will be continued by possible future visits to NSTX by R. Sano in early 2016 and by B. Peterson in the summer of 2016. (B. Peterson)

Physics Analysis (S. Kaye)

In support of the recently implemented PPPL Data Management Plan, the digital data associated with the recently published paper by D. Stotler et al. [PHYS. PLASMAS **22** 082506 (August 2015)] was uploaded to the PPPL Community in the Princeton University DataSpace. The data and description files can be accessed at the following Archival Resource Key (ARK) <http://arks.princeton.edu/ark:/88435/dsp01zg64tp300>. The Princeton Univ. DataSpace site will be used to archive the digital data associated with all PPPL published articles, and can

be accessed using the following link: <http://arks.princeton.edu/ark:/88435/dsp01pz50gz45g>. J. Schmitt and S. Kaye are working with physicists and the Princeton Univ. DataSpace staff to streamline the procedure for uploading the data.

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

Work continues on the preparation of the lithium evaporators (LITERs) for lithium wall conditioning. The liquid lithium filler for LITER (LIFTER) has heaters for liquefying the lithium prior to LITER loading. New control software has been implemented, and the LIFTER heaters were successfully tested in the C-Site High Bay. The LITER filling station is now ready for moving to the NSTX-U South High Bay. (R. Kaita, PPPL)

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

After completing the CD-4 Plasma milestone, integrated system testing of additional NSTX-U coil circuits was performed this week with successful individual test shots of the PF-2U/L, PF-1aU/L, and PF-4 coils. Coil Protection Test Trips were performed for those circuits per the Integrated System Pest Procedure (ISTP-001). Also, additional magnetic diagnostic calibrations were performed as part of the ISTP. At the end of the week, the NSTX-U vessel was partially vented in nitrogen in preparation for next week's calibration of the Multi-Pulse Thompson Scattering (MPTS) diagnostic. Procedures for the upcoming vessel bake are being reviewed and approved.

Access to the NSTX-U Test Cell is expected to be available this coming week. Access must be arranged through Work Permits approved by the D-Site Shift Supervisors.