

NSTX-U Weekly Report (March 11, 2016)

FY 2016 NSTX plasma operations

Operation Targets: Total - TBD

Completed: 4.81 run week and 482 plasma shots

Vlad Soukhanovskii (Lawrence Livermore National Laboratory Collaboration on NSTX-U) visited DIII-D at General Atomics last week. He served as a Session Leader of an experiment aimed at studying heat transport and radiation distribution in the snowflake-plus divertor configuration. A Princeton University postdoctoral researcher David Eldon (on assignment at DIII-D) and a Princeton University graduate student Patrick Vail (remotely) served as deputy session leaders and assisted with plasma control system aspects. Progress in plasma control enabled inter-null distance variations in the snowflake-plus configuration on a slow (transport) time scale. Deuterated methane divertor puffing was used to achieve a radiative snowflake divertor with up to 60% of the SOL power exhausted via carbon and deuterium divertor radiation. Good H-mode confinement with H98y2 factors in the range 1.0-1.2 was retained. Initial results suggest that radiation was broadly distributed in the snowflake-plus divertor. Analysis of scrape-off layer power widths in the snowflake-plus configurations vs inter-null distance is underway. While at DIII-D, Vlad Soukhanovskii also discussed installation and data analysis aspects of the divertor near-infrared and core extreme ultraviolet spectrometers operated by LLNL on DIII-D. Similar spectrometers are being installed by LLNL on NSTX-U. (V. Soukhanovskii)

John Rice of the MIT Plasma Science Fusion Center visited PPPL on March 9-10. The primary purpose of the visit was to work with PPPL x-ray physicists and engineering to develop a concept for implementation of an imaging x-ray crystal spectrometer for measurement of ion temperature and rotation velocity profiles in NSTX-U. An attractive concept was found: a system could be implemented at Bay J that would provide spatial coverage of nearly the entire plasma diameter with the high spectral resolution needed for these measurements. It appears that there is space for the required ex-vessel hardware. We plan to follow-up by doing detailed layouts of the proposed system to further develop the concept. (B. Stratton, PPPL)

Dr. Ryuichi Sano (NIFS, Japan) visited PPPL this week to work with the team developing the prototype infrared video bolometer for NSTX-U, participating in bench top calibration work and discussing methods and techniques used by the NIFS group led by Prof. Byron Peterson. Dr. Sano also presented research describing methods for 3D tomography of radiated power based on results from LHD. (M. Reinke, ORNL)

Dr. Ryo Yasuhara visited PPPL from March 8 through March 11 to discuss ongoing collaboration of the development of an edge polychromator for the Thomson scattering system of interest for LHD and NSTX-U. In addition, Yasuhara and Diallo (PPPL) discussed plans for Yasuhara's next visit at PPPL for the commissioning of the pulse burst laser system. During his next visit, a prototype of this polychromator will be implemented in a laboratory setup to provide a detailed characteristics of this system. (A. Diallo)

Tom Osborne and Xi Chen of General Atomics visited PPPL to update the Python analysis tools used for pedestal profile analysis on NSTX-U. (R. Maingi, PPPL)

Prof. Yoshi Hirooka of NIFS, Japan visited PPPL this week to discuss liquid lithium collaboration and possible neutron science experimental collaboration with NSTX-U (M. Ono, PPPL)

Alistair McGann (University of York, UK) began a 3-month visit to PPPL this week for his collaboratry, offered to PhD students participating in the UK Centre for Doctoral Training on Fusion Energy (<http://www.fusion-cdt.ac.uk/>). He will be working with the ORNL group in interpreting IR measurements in NSTX/NSTX-U, focusing on improving methods to account for the effect of surface layers, such as boron and lithium, when calculating heat flux. . (M. Reinke, ORNL)

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

NSTX-U has completed the first of a two week maintenance period, which includes a quick argon vent of the vessel to retrieve boron nitride debris from a diagnostic shutter. Installation activities during this maintenance period include the Lowus/Zeus/Mona Lisa diagnostic systems, the Argon Dump system controls needed for future lithium operations, the SAMI diagnostic, the Lithium Granule Injection system, the new Massive Gas Injector system, the fast Voltage measuring system needed for CHI operations, and new cameras/fiberoptics. Upgrades to the lower TF water fittings are in progress. The Residual Gas Analyzer (RGA) heads have been replaced, and remote system operation has been restored. Procedures/work packages for the installation of the LITER probes on the NSTX-U vessel are being developed. Repair of the Neutral Beam (NB) 2C transmission line have been completed, and NB2A transmission line repairs are in progress. The NB2B autotransformer will be replaced with a spare unit this coming week. Weld inspections of Motor Generator (MG) #1, and a test run-up of MG#2 are scheduled for this coming week.

The NSTX-U Test Cell will be in controlled access this coming week for approved work.

On March 11, 2016, the boron nitride BES shutter fragments were successfully removed from the NSTX-U inner divertor floor. The entire removal process, from venting the vacuum vessel with argon to reinstalling the Bay L rectangular port, went as planned, taking less than an hour. A positive argon pressure was applied during the removal to minimize the air contamination of the vacuum vessel plasma facing components. The insertion of the extraction tools and removal of the fragments took approximately 3-1/2 minutes, using the vacuum suction tool and a net. During the argon vent, the FIRETIP vacuum window was also replaced. (S. Raftopoulos, PPPL)