

## NSTX-U Weekly Report (Nov. 9, 2012)

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

A special issue of the 2nd International Symposium of Lithium Application for Fusion Devices was published on Fusion Engineering and Design Volume 87, Issue 10, Pages 1709-1800, October 2012. The NSTX related articles in the special issue are “Modification of the electron energy distribution function during lithium experiments on the National Spherical Torus Experiment,” by M.A. Jaworski (PPPL), “NSTX plasma operation with a Liquid Lithium Divertor,” by H. W. Kugel (PPPL), “Dynamics of deuterium retention and sputtering of Li-C-O surfaces,” by P.S. Kristic (ORNL), “Modeling of plasma/lithium-surface interactions in NSTX: Status and key issues” by J.N. Brooks (Purdue U.), “Recent progress of NSTX lithium program and opportunities for magnetic fusion research” by M. Ono (PPPL), and “Characterization of transient particle loads during lithium experiments on the National Spherical Torus Experiment” by V. Surla (U. of Illinois). (M. Ono)

A paper entitled “Two-dimensional Characterization of ELM Precursors in NSTX” by Y. Sechrest (University of Colorado), et al., was published in Nucl. Fusion **52** 123009 (2012), <http://iopscience.iop.org/0029-5515/52/12/123009/>. The article details the observation of coherent intensity fluctuations preceding ELM events in the NSTX edge. The Gas Puff Imaging (GPI) system captured the evolution of these precursors in two-dimensions through the ELM filamentation and crash. ELM precursors are characterized by short-lived, coherent intensity fluctuations visible in the outer few centimeters of the plasma, and the intensity oscillations are observed to grow in strength preceding the ELM crash. Intensity fluctuations measured by the GPI system were also strongly correlated with magnetic fluctuations, and magnetic pick-up coils estimate intermediate toroidal mode numbers. A detailed characterization of the precursor mode and discussion of the nature of the precursors can be found in the full article. (Y. Sechrest)

S. Kaye (PPPL) participated remotely in a portion of the RLPAT International Advisory Committee Meeting and Workshop on the Scientific Basis and Roadmap Towards a Neutron-Source Based on the Spherical Tokamak Concept that was held in St.Petersburg, Russia on Oct. 31 - Nov. 3, 2012. RLPAT stands for Research Laboratory for the Physics of Advanced Tokamak Physics, whose purview is to interconnect the fusion research efforts of the Ioffe Institute and the St. Petersburg Polytechnic University. The RLPAT is headed by Prof. F. Wagner. S. Kaye and C. Neumeyer of PPPL gave remote presentations at the Workshop entitled "From NSTX to ST-FNSF" and "Technical Challenges of Spherical Tokamaks" respectively. The first talk focused on how NSTX and NSTX-U will address physics issues critical to the development of an ST-based FNSF design, and the second focused on the engineering issues in constructing both NSTX-U and an ST-FNSF. S. Kaye is also a member of the RLPAT International Advisory Committee, and will be working with the other committee members to develop a set of recommendations for the RLPAT. (S. Kaye)

Jon Menard (PPPL) participated in the Research Councils UK (RCUK) Fusion Advisory Board November 5-6 and presented a summary of the 6th MAST PAC held May 2012. (J. Menard)

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

NSTX Upgrade construction activities continued this week with the ongoing fit-up and welding

of new umbrella legs. The preliminary vacuum vessel cut at bays J and K needed to install the new NSTX vessel to NB2 interface flange was made, and the machining of that new flange was completed in the shop. The installation template can now be fabricated, and metrology and weld prep will be completed before making the remainder of the bay J -K vessel cuts. Welding of the last two NB2 neutralizer water feed-throughs was completed, and work continued on the commissioning of the calorimeter for that beam-line.

Preparations of non-upgrade equipment for plasma operations in the NSTX-U configuration also continued with the ongoing testing of the prototype fault detector in conjunction with the new firing generator in a field coil power conversion rectifier. The primary power breaker has been racked-in for that rectifier, and faults/trips are being simulated and tested. A final design review of the proposed reconfiguration of the PF1 power systems is scheduled for next week.

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