

NSTX-U Weekly Report (April 12, 2013)

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

Researchers from NSTX-U attended the 2013 US-EU Joint Transport Task Force Workshop in Santa Rosa, CA, April 9 – 12, 2013. R. Maingi (PPPL) presented a plenary talk "The Role of Upstream Edge Transport and Stability in the Divertor Power Flux Footprint". This work recapped progress on the heat flux width studies that followed the 2010 Joint Research Target on SOL thermal transport, and included data and modeling from NSTX. Oral presentations were "Linear edge gyrokinetic simulations of NSTX plasmas without and with lithium coated PFCs" by J. Canik (ORNL), "Toroidal asymmetry of divertor heat flux by ELMs and 3-D effects in NSTX" by J-W. Ahn (ORNL), "Parameter dependence of fast-ion redistribution events" by E. Fredrickson (PPPL), "Energetic particle effects on non-resonant kink mode in Spherical Tokamaks" by G. Fu (PPPL), and "Gyrokinetic prediction of momentum and impurity transport in NSTX" by W. Guttenfelder (PPPL). Poster presentations were "Low-wavenumber pedestal turbulence in NSTX: measurements, parametric scalings, and simulations" by D. Smith (U. Wisconsin), "Properties of Alfvén Eigenmodes in the TAE range on NSTX-U" by M. Podesta (PPPL), "Effect of MHD bursts during the plasma current ramp up on neutral beam ions and beam driven current in NSTX" by D. Darrow (PPPL), "Studies of electron-scale turbulence and thermal transport in NSTX L-mode plasmas" by Y. Ren (PPPL), and "The nearly continuous improvement of discharge characteristics and edge stability with increasing pre-discharge lithium evaporation on graphite PFCs in NSTX" by R. Maingi. There was NSTX-U participation in all of the individual topical Working Groups. R. Maingi also served on the TTF Executive Committee. R. Maingi and Tom Rognlien (LLNL) organized the edge breakout sessions at TTF, and Maingi chaired the session on "Inter-ELM pedestal and L-mode edge transport". (R. Maingi, S. Kaye, PPPL)

M. Jaworski (PPPL) has completed a series of experiments with on the Magnum-PSI fusion materials test facility in Rijnhuizen in the Netherlands. This work was performed in collaboration with the Dutch Institute for Fundamental Energy Research (DIFFER). A sample of TZM, a molybdenum alloy that is a candidate NSTX-U high-Z plasma-facing component (PFC) material, was exposed to a divertor-like plasma. Impurity emission increased as the temperature of the uncoated TZM exceeded 1000 degrees C. Whether or not it is related specifically to this alloy is under investigation. A sample was also coated with lithium using an evaporator from PPPL. The lithium coating persisted through multiple exposures to Magnum-PSI plasmas, consistent with a high lithium redeposition fraction. No significant reduction in heat flux to the sample surface was observed, however, as expected if heat flux reduction by the lithium is due to momentum loss alone. To see if the amount of deposited lithium has an effect, the measurements will be repeated with thicker lithium coatings. (R. Kaita, PPPL)

R. Maingi (PPPL) presented a talk at the Edge Coordinating Committee (ECC) Meeting (April 8, 2013 in Santa Rosa, Calif.) titled "Physics setting the heat flux width in tokamaks: Experimental results and potential consequences for ITER." S. Gerhardt (PPPL) presented a talk at the ECC "Update on Recent EP H-Mode Research". John Canik (ORNL) presented a talk "Gyrokinetic pedestal stability of NSTX and CMOD in ELM-free regimes". Devon Battaglia (PPPL) presented a talk "Interpretive analysis with XGC0". Canik and Maingi also participated in the planning meeting for the ECC technical session at APS 2013. (R. Maingi)

R. Maingi (PPPL) attended the APS-DPP Executive Committee meeting on April 13, 2013 in Denver Colorado. (R. Maingi)

There is a featured story on the successful completion of the first quadrant for NSTX-U in the ITER Newline: <http://www.iter.org/newsline/263/1551>. The NSTX-U magnet vacuum pressure impregnation (VPI) uses the newly formulated epoxy material CTD-425 (Cyanide-Ester Blend Hybrid) which is a candidate epoxy material for ITER magnet VPI.

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

NSTX Upgrade construction activities continued with the successful electrical insulation tests of the completed second inner TF quadrant (see the attached photo). The quadrant mold is now being prepared for the loading of TF conductors and subsequent epoxy impregnation to complete the third inner quadrant.

Preparations for plasma operations in the NSTX-U configuration also continued with the ongoing assembly and testing of the new firing generators for the field coil power conversion (FCPC) system rectifiers. Four of the production firing generators are complete and bench tested, and five more are ready to start bench testing. The outer TF #12 winding was reinstalled at bay K after repairs and successful electrical insulation tests.

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

2nd TF Quadrant after vacuum pressure impregnation (VPI)



The 2nd TF quadrant after VPI (right) being readied for electrical test.