

NSTX-U Weekly Report (October 21, 2016)

FY 2017, NSTX-U is in the maintenance and repair outage.

The 26th IAEA Fusion Energy Conference was held October 16-22, 2016 at the Kyoto International Conference Center in Kyoto, Japan. A total of 29 talks and posters were presented by NSTX-U associated researchers including: OV/5-2 - J. Menard (PPPL), “Overview of First Results from NSTX-U and Analysis Highlights from NSTX”, TH/P1-2 - F. Ebrahimi (Princeton University), “Physics of Flux Closure during Plasmoid-Mediated Reconnection in Coaxial Helicity Injection”, TH/P1-6 - J.-K. Park (PPPL), “Self-Consistent Optimization of Neoclassical Toroidal Torque with Anisotropic Perturbed Equilibrium in Tokamaks”, TH/P1-7 - S. C. Jardin (PPPL), “Nonlinear 3D M3D-C1 Simulations of Tokamak Plasmas Crossing a MHD Linear Stability Boundary”, TH/P1-10 - A. Fil (Princeton University), “Modelling and Simulation of Pedestal Control Techniques for NSTX-U”, TH/P1-21 - Z. R. Wang (PPPL), “Nyquist Analysis of Kinetic Effects on the Plasma Response in NSTX and DIII-D Experiments”, FIP/2-5 - M. Ono (PPPL), “Liquid Lithium Loop System to Solve Challenging Technology Issues for Fusion Power Plant”, EX/P3-30 - V. Soukhanovskii (LLNL), “Snowflake Divertor Configuration Effects on Pedestal Stability and Edge Localized Modes in NSTX and DIII-D”, TH/P3-14 - W. Guttenfelder (PPPL), “Analysis and Prediction of Momentum Transport in Spherical Tokamaks”, EX/P4-30 - J.-W. Ahn (ORNL), “Shielding and Amplification of Nonaxisymmetric Divertor Heat Flux by Plasma Response to Applied 3D Fields in NSTX and KSTAR”, EX/P4-33 - S. A. Sabbagh (Columbia University), “Isolation of Neoclassical Toroidal Viscosity Profile under Varied Plasma and 3D Field Conditions in Low and Medium Aspect Ratio Tokamaks”, EX/P4-34 - J.W. Berkery (Columbia University), “Characterization and Forecasting of Unstable Resistive Wall Modes in NSTX and NSTX-U”, EX/P4-35 - Y. Ren, (PPPL), “Exploring the Regime of Validity of Global Gyrokinetic Simulations with Spherical Tokamak Plasmas”, EX/P4-36 - F. Scotti (LLNL), “Kinetic Profiles and Impurity Transport Response to 3D-Field Triggered ELMs in NSTX”, EX/P4-38 - R. Maingi (PPPL), “Comparison of Helium Glow and Lithium Evaporation Wall Conditioning Techniques in Achieving High Performance H-Mode Discharges in NSTX”, EX/P4-40 - D. Smith (University of Wisconsin), “Identification of Characteristic ELM Evolution Patterns with Alfvén-Scale Measurements and Unsupervised Machine Learning Analysis”, EX/P4-41 - E. Fredrickson (PPPL), “Parametric Dependence of EPMs in NSTX”, EX/P4-42 - R. Perkins (PPPL), “Large RF Field Amplitudes in the SOL and Far-Field RF Sheaths: A Proposed Mechanism for the Anomalous Loss of RF Power to the SOL of NSTX”, EX/P4-43 - M. D. Boyer (PPPL), “Feedback Control Design for Noninductively Sustained Scenarios in NSTX-U Using TRANSP”, TH/P4-16 - G. Fu (PPPL), “Hybrid Simulations of Beam-Driven Fishbone and TAEs in NSTX”, TH/P4-17 - E. Belova (PPPL), “Coupling of Neutral-Beam-Driven Compressional Alfvén Eigenmodes to Kinetic Alfvén Waves in NSTX and Energy Channelling”, EX/5-3 - A. Diallo (PPPL), “Energy Exchange Dynamics across L-H Transitions in NSTX”, MPT/P5-30 - M. A. Jaworski (PPPL), “High-Temperature, Liquid Metal Plasma-Facing Component Research and Development for the NSTX-U”, EX/P6-46 - C. Myers (PPPL), “A Multimachine Analysis of Non-axisymmetric and Rotating Halo Currents”, TH/P6-12 - J. Lore (ORNL), “Pedestal-to-Wall 3D Fluid Transport Simulations on DIII-D and NSTX”, FIP/P7-1 - T. Brown (PPPL), “Development of a 3 m HTS FNSF Device and the Qualifying Design and Engineering R&D Needed to Meet the Low AR Design Point”, FIP/P7-36 - R. Lunsford (PPPL), “ELM Pacing with High Frequency Multispecies Impurity Granule Injection in NSTX-U H-Mode Discharges”, FIP/P7-42 - R. Raman (University of Washington), “NSTX-U Contributions to Disruption Mitigation Studies in Support of ITER”,

and a post deadline paper - N. Gorelenkov, “Suppression of Alfvén modes through additional beam heating” (J. Menard)

At the 2016 IAEA Fusion Energy Conference in Kyoto Japan, Rob Goldston (PPPL) received the 2015 Nuclear Fusion Journal award for his 2011 paper on the Heuristic Drift model for the power scrape-off width in H-mode tokamaks. IAEA Direction General Yukiya Amano made the award. The Editorial Board of Nuclear Fusion cited the paper as, “Potentially one of the most important results obtained in recent years in fusion” research. The model “provides a simple yet elegant model for the scrape-off layer power width,” the editors said, “and ultimately could have significant impact on the future direction of the field.” At a separate ceremony, Goldston thanked the many members of the Edge Physics research community who welcomed him and contributed to his understanding of this area of fusion physics, when he decided to focus his research on this area after stepping down from the PPPL directorship in 2009. (R. Goldston)

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

Preparations for the removal of the NSTX-U Center-stack continued this past week. The center-stack stand has been readied and bolted in place in the high bay area adjacent to the test cell, and the procedure for the center-stack removal has been reviewed and approved. In-vessel clean-up and wipe-downs are in progress as the sequence to remove the center-stack proceeds. Also, in-vessel metrology for the upper diverter is in progress. The dissection and forensics of the damaged PF1aU coil continued with the completion of the vertical cuts, and coil sections are now being removed from the mandrel for borescope inspections. Work continued on the recommissioning of the coil winding facility this week with testing of the oven and the coil conductor tensioning fixture. The PF1a VPI mold has been moved into the coil winding facility and checked. A test stand is being prepared in the Field Coil Power Conversion building with the required power, cooling water, and instrumentation systems needed for individual coil power testing.

Access to the NSTX-U Test Cell is expected to be available for approved work this coming week.

The dissection and forensics of the damaged PF1aU coil continued with the completion of the vertical cuts, and coil sections are now being removed from the mandrel for borescope inspections, electrical tests and vacuum tests. (I. Zatz, PPPL)