**NSTX-U Weekly Report (February 17, 2017)**

**FY 2017 status: NSTX-U is in a maintenance and repair outage.**

**NSTX-U Research (J. Menard)**

Devon Battaglia travelled to the Culham Centre for Fusion Energy (CCFE) in the U.K. to initiate collaboration activities between NSTX-U and MAST-U emphasizing plasma control, scenario development, and MAST-U first-plasma preparation. Devon gave a presentation to the MAST-U team on the status of NSTX-U activities and proposed areas of collaboration, including possible development of common tools for scenario modeling and plasma control development.

Steve Sabbagh and Stan Kaye attended the first of two ITER Research Plan Workshops as US representatives on the review committee. The aim of the workshop was to develop an analysis of the ITER experimental program within the staged approach, leading from first plasma through full DT operation and towards long pulse/steady-state fusion power production. Steve participated in the Working Group on the commissioning of the plasma control system through all operational phases and including MHD control and disruption mitigation. Stan participated in the Working Group developing the research plan for the Long-pulse, steady-state program, which will be carried out after the Q=10 demonstration.

Jong-Kyu Park presented “Plasma response analysis on resonant field coupling by HFS coils in COMPASS" to the ITER Organization (IO) and the COMPASS Research Team. The analyses are currently being used to guide high field side (HFS) coil configurations and currents for COMPASS experiments to test HFS field effects on locking and L-H transition. This collaboration was motivated by the increasing concerns of HFS error fields in ITER and from NSTX-U results from the FY2016 research campaign where potential HFS error fields from toroidal field coil misalignment have been identified.

The paper “Fusion nuclear science facilities and pilot plants based on the spherical tokamak” by J.E. Menard, T. Brown, L. El-Guebaly, and 29 additional co-authors was selected to be included in the Nuclear Fusion journal annual Highlights collection for 2016. Publications in the Highlights collection are selected when they have generated particular interest in the community and with the referees during 2016. This and other selected articles are archived on the dedicated Highlights webpage: http://iopscience.iop.org/journal/0029-5515/page/Highlights-of-2016

**NSTX-U Recovery Project (R. Hawryluk)**

The fifth Design Verification and Validation Review (DVVR), reviewing the NSTX-U Vacuum Vessel and Internal Hardware, was held this week. Comments and suggestions on the design, analysis and as-built documentation/operating history of the vacuum vessel structures, center stack casing including ceramic breaks and load paths, plasma facing components including neutral beam armor and passive plates, and instrumentation and protection systems were recorded during this three day review and will be incorporated into the Corrective Action Plan. The review committee at PPPL included external reviewers Rui Viera, of MIT’s Plasma Science and Fusion Center; Roel Verhoeven, of the Culham Centre for Fusion Energy, and Dennis Youchison, of Oak Ridge National Laboratory; along with several external reviewers participating by video conference: Kevin Freudenberg and Brad Nelson, of Oak Ridge National

Laboratory; and Jeff Doody, Jim Irby, and Brian LaBombard, of MIT's Plasma Science and Fusion Center, and Tom Todd, head of the Extent of Condition Committee, Michel Huguet formerly head of the ITER EDA site in Naka in Japan and Rem Haange formerly ITER Deputy Director-General and Head of the ITER Project Department. Also attending remotely was Josh King, program manager for Spherical Tokamak in the DOE Fusion Energy Sciences program.

Regarding NSTX-U test cell work, preparations are underway to begin silver-plating of the TF Bus connecting surfaces. Installation of the OH Coil Pre-Heater system and diagnostic equipment such as FIReTIPS waveguides and components for the new Pulse Burst Laser System (PBLS) continued. Re-commissioning of the coil winding facility also continued with the completion of the assembly and alignments of the tensioning skid. Spools of coil conductor copper are being leak checked and hydrostatically tested, and the coil bake-out oven extension has been installed and is ready for painting and insulation. The commissioning of a PF inner coil test stand in the Field Coil Power Conversion Building continues. PPPL Motor Generator Technicians have completed D-MG#1 bearing surface inspection/measurements. This data has been reviewed by Andritz Engineering (formerly GE Canada), and found to be acceptable.