

## **NSTX-U Weekly Report (March 17, 2017)**

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

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

Stan Kaye attended the Exascale Crosscutting Review held in Tyson's Corner, VA on March 9-10. The purpose of this review was to identify and prioritize High Performance Computing (HPC) issues that cut across Office of Science programs to allow for deeper collaborations and more efficient software/hardware development among HPC/SciDAC efforts across the Office of Science.

Francesca Poli visited the University of York on March 13 and 14. She gave a seminar entitled "The role of integrated modeling in discharge analysis, prediction, and for development of more robust control algorithms". The seminar covered the work funded under the ITER Task Agreement on electron cyclotron analysis and also provided a short summary of the work performed for lower-hybrid current drive analysis on C-Mod and for the non-inductive startup on NSTX-U. Francesca also held discussions with Erasmus Du Toit and Roddy Vann related to using a 0D code developed by Du Toit for the simulation of electron Bernstein wave (EBW) startup on NSTX-U. The code, which has Fokker Planck calculations that are 0D in space, but 2D in velocity space, can reproduce EBW startup experiments on MAST, and includes the current build-up and the evolution of the magnetic flux surfaces from open to closed.

Steve Sabbagh and Stan Kaye attended the second of two ITER Research Plan Workshops on March 14-17 as US representatives on the review committee. The aim of the workshop was to begin the writing process of the new ITER Research Plan document 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, with preparatory research beginning in the non-nuclear campaigns.

On March 16, Jon Menard gave a seminar presentation at the Los Alamos National Laboratory (LANL) entitled "Motivations for advanced divertor system and materials research in next-step fusion facilities and NSTX Upgrade". J. Menard also toured several LANL research facilities including the Plasma Liner Experiment and the Ion Beam Materials Laboratory and discussed possible NSTX-U-related collaboration opportunities with LANL researchers.

NSTX-U collaborators from the University of Wisconsin-Madison have initiated collaboration with the MAST-U facility on particle transport, fueling and exhaust. This initiative in the group of Prof. O. Schmitz establishes a direct comparative research environment to study Resonant Magnetic Perturbation (RMP) effects on advanced divertors between NSTX-U and MAST-U. Two PhD students from UW Madison visited the MAST-U research team several times in the last 6 months, which enabled them to make an experimental proposal for the upcoming MAST-U campaign.

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

The eighth of the twelve planned Design Verification and Validation Reviews (DVVR's), this one reviewing the NSTX-U test cell construction and safety systems, was held this week. Nick Balshaw, of the Culham Centre for Fusion Energy, took part in the review at PPPL, and Jim Irby, of MIT's Plasma Science and Fusion Center, took part remotely. Valeria Riccardo, the head of engineering, chaired the review.

Regarding test cell work, engineering has completed initial inspections of the Poloidal-CHERS diagnostic in-vessel passive plate mounting structures, and passive plates/structures have been removed from the vessel for upgrades. Installation and alignment of waveguides for the FIRETIPS diagnostic continues.

Vacuum leak checking of in-vessel neutral beam armor has been completed, and the armor plates will now be removed from the vessel for repairs.

Recommissioning of the coil winding facility also continued with the successful flow testing of the spools of copper conductor to be used for coil winding. The replacement of O-rings and leak checking of a PF1A mandrel continues.

Installation of power components for the PF1 coil test stand in the Field Coil Power Conversion Building also continues.