

## NSTX-U Weekly Report (October 23, 2015)

### **NSTX-U is in the Upgrade Project outage in FY 2015**

J. Menard (PPPL) travelled to the Culham Centre for Fusion Energy (CCFE) in Culham, UK (October 20-23) to attend a status and review meeting for the MAST Upgrade project and to serve on the CCFE Program Advisory Committee. He then travelled to Morgantown, WV (October 24-25) to attend the annual meeting of the APS Mid-Atlantic Section to present an invited talk entitled “Progress and plans for NSTX Upgrade and prospects for next-step spherical tori”. (J. Menard)

Steve Sabbagh (Columbia University) attended the 26<sup>th</sup> Meeting of the ITPA Topical Group on MHD, Disruptions and Control held October 19-22 in Naples, Italy, and gave a presentation stating progress on ITPA joint experiment MDC-21 “Global MHD Mode Stabilization and Control” on behalf of the international researchers in the group. The results included analysis of the NSTX database partially addressing a critical ITER need regarding the maximum allowable global mode perturbation amplitude tolerable by tokamak plasmas before a disruption occurs. The analysis was processed in part by a new Disruption Event Characterization And Forecasting code (DECAF) being developed on NSTX and used here for the first time to analyze a tokamak database. Initial results from this code that automatically characterized disruption event chains were sent to joint experiment MDC-22 on Disruption Prediction, and the results were reported at the meeting by the leader of that group, Gabriella Pautasso. (S. Sabbagh)

R. Raman (U. Washington) visited the University of Washington (October 1 -16) to assemble and test the proto-type of a compact power supply to be used for powering the new MGI valves on NSTX-U. Duplicates of the capacitor bank components to be used on NSTX-U were assembled inside two 19-inch rack mount boxes, and the assembled hardware used to operate an MGI valve mounted on a test stand with a 1.3m<sup>3</sup> vessel volume. All power components were successfully tested. The design of the power supply system was also discussed during a Conceptual Design Review held at PPPL on October 16, 2015. Some of the changes recommended during the review were then incorporated into the power system hardware, and the system tested again to demonstrate successful operation. In previous tests the MGI valve has been operated in the presence of 1 T magnetic fields, also on the University of Washington test stand, but using a different (non-compact) power supply (R. Raman)

S. Kaye (PPPL) participated in the Transport and Confinement ITPA meeting held in Garching, Germany on Oct. 23 and 24, 2015. Prior to the ITPA meeting, he coordinated a small group discussion on updating and reanalyzing the International H-mode database. The motivation for doing this is to close gaps that existed in the present database, which contains very few discharges that approach the conditions of the ITER-baseline H-mode plasma. The reanalysis will also take a critical look at intra-machine vs inter-machine parametric trends to understand the source of differences. One such trend is the density scaling. S. Kaye reported on the discussions that took place, and the action items that were identified, at the ITPA meeting. (S. Kaye)

### **Experimental Research Operations (S. Gerhardt, R. Kaita)**

A series of 17 talks for new Physics Operators on NSTX-U that was begun in July was

completed last week. The each talk was attended by 20 to 30 scientists and engineers, only a few with the intent of becoming operators. Most attended to learn more about NSTX-U and/or how they can use that knowledge to perform better experiments on NSTX-U. The course schedule and the presentations are available at

[http://nstx.pppl.gov/DragNDrop/Operations/Physics\\_Operations\\_Course/](http://nstx.pppl.gov/DragNDrop/Operations/Physics_Operations_Course/)

These presentations provide a rich set of reference materials about machine capability, configuration details and operational techniques and limitations that can be hard to find elsewhere. Videos of the presentations can be viewed from the internal PPPL Employees Services Home page under PPPL Videos (top left about 7 lines down) then under Training.

<http://cctest.pppl.gov/KalturaAPI.aspx?x=PPPL%3ECourses%3Ephysics%20Operators%20Training%20Course>. (D. Muller, PPPL)

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

The NSTX-U vessel bake was completed this past week, and systems are being configured for operations. Technicians are vacuum leak checking for a small air leak that developed during the machine during cool-down, and have isolated internal helium lines into sections that are being pumped to search for a very small internal leak. There will now be a two week period of diagnostic system installations and calibrations before “scrubbing” the test cell areas and resuming coil system testing and operations. The test cell will be locked up for approximately 4 hours a day this coming week to allow for neutral beam conditioning.

Access to the NSTX-U Test Cell will be available for diagnostic system installations this coming week.