

## **NSTX-U Weekly Report (December 8, 2017)**

**FY 2018 status: NSTX-U is in a maintenance and repair outage.**

### **Recovery**

The magnet team prepared for a Preliminary Design Review (PDR) for the inner PF Coils scheduled for December 14, 2017.

### **Research**

On Tuesday December 5 Dan Boyer (PPPL) presented "Preliminary results of modeling neutral beam injection on NSTX-U using neural networks". Predictive real-time control applications, along with scenario development optimization studies and between shots analysis all require models of actuators and plasma response that can be evaluated quickly while maintaining relatively high fidelity. In this work, data produced by NUBEAM during interpretive TRANSP runs for the shots in the 2016 NSTX-U campaign is used to train a neural network model of the heating, current drive, torque, and other effects of beam injection. The resulting model reproduces the NUBEAM results well, with an execution time measured in microseconds as opposed to seconds or minutes. Initial modeling results, an application to fitting uncertain parameters in interpretive TRANSP runs, and future plans will be presented.

Steve Sabbagh gave the presentation "Automated Identification of MHD Mode Bifurcation and Locking in Tokamaks" at PPPL on 30-Nov-2017. The talk reviewed a new, portable code capability that automatically analyzes MHD magnetic spectrograms for further use in computer generated disruption event characterization and forecasting. Analysis of NSTX/-U plasmas with various MHD activity was shown. This talk was given as part of a collection of presentations by Columbia U. researchers reviewing a wide array of analyses comprising international collaboration research on KSTAR. The talks can be found at these links:

[http://nstx.pppl.gov/DragNDrop/NSTX\\_Meetings/Monday\\_Physics\\_Meetings/2017/2017\\_11\\_29](http://nstx.pppl.gov/DragNDrop/NSTX_Meetings/Monday_Physics_Meetings/2017/2017_11_29)  
[http://nstx.pppl.gov/DragNDrop/NSTX\\_Meetings/Monday\\_Physics\\_Meetings/2017/2017\\_11\\_30](http://nstx.pppl.gov/DragNDrop/NSTX_Meetings/Monday_Physics_Meetings/2017/2017_11_30)

A group from NSTX-U visited the Brookhaven National Laboratory on December 4-5 to learn how their user facilities are operated with the goal of improving NSTX-U operation as a DOE Office of Science user facility. The group consisted of B. Stratton, J. Menard, S. Gerhardt, M. Jaworski, G. Tchilinguirian, and M. Ono. They visited the STAR detector at the Relativistic Heavy Ion Collider, the Accelerator Test Facility, the National Synchrotron Light Source II, and the Center for Functional Nanomaterials. In addition to touring these facilities, discussions were held with representatives of the facilities to address specific questions on a number of topics including the experimental proposal process, the structure and functions of the user group, user training, and best practices. Similar visits to user facilities at Argonne National Laboratory and Oak Ridge National Laboratory are planned for January.