

## **NSTX-U Weekly Report (May 15, 2015)**

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

Luis Delgado-Aparicio (PPPL) won the 2015 DOE Early Career Awards. The five-year grant will fund Delgado-Aparicio's research aimed at developing active impurity control tools for NSTX-U. The implementation of an active feedback control system to minimize high-Z impurity content is pivotal to extending our experimental capabilities from our current experience with low-Z carbon walls, lithium coatings and short-lived boron films. A unique soft x-ray detector with appropriate time, space and energy resolution will be assembled and deployed on the NSTX-U experiment to track impurity content. The output of the detector will be used to control various actuators to flush impurities from the hot plasma. He also plans to conduct experiments on the Alcator C-Mod tokamak at MIT; the DIII-D tokamak at General Atomics in San Diego, and the Tokamak à Configuration Variable (TCV) in Lausanne, Switzerland. Comprehensive impurity transport measurements and validated physical models describing plasma transport and instabilities in the core of fusion experiments will strengthen the physics basis of operation for ITER and beyond. (L. Delgado)

Nicola Bertelli, Joel Hosea, Rory Perkins and Gary Taylor of PPPL attended the 21st Topical Conference on RF Power in Plasmas that was held at Lake Arrowhead, California on April 27-29, 2015. Nicola Bertelli presented an invited talk entitled "Effect of the Scrape-Off Layer in AORSA Full Wave Simulations of Fast Wave Minority, Mid/High Harmonic, and Helicon Heating Regimes". Rory Perkins presented a poster paper entitled "High Voltage Test-Stand Research Done on ICRF Antenna Elements of the High-Harmonic Fast-Wave System of NSTX", and Gary Taylor presented a poster paper entitled "Development of Fully Non-Inductive Plasmas Heated by Medium and High-Harmonic Fast Waves in NSTX-U". Bertelli, Hosea, Perkins and Taylor also participated in the US-Japan RF Physics Workshop that immediately followed the RF Conference. The focus of the workshop was to encourage future collaborations between the US and Japan RF research programs. The agenda for the session included short presentations by Japanese and US researchers on future plans, highlighting areas of possible collaboration. Rory Perkins presented the status and plans for PPPL RF research and Joel Hosea coordinated the workshop agenda for the US delegation. The meeting concluded with a discussion of the collaboration proposals. (G. Taylor)

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

The installation of the cameras on the exit side crosses at three locations is complete and testing is ongoing. The camera cabling for the laser optics enclosure is done; the cameras at that location will be installed when the laser optics is in place. The installation of the heating tape of the laser exit-flight tube is complete for bake-out. (B. LeBlanc, PPPL)

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

The NB2 neutral beam successfully fired 45kV beams at 100 msec pulse lengths for multiple shots, successfully completing the NSTX Upgrade Project CD-4 KPP for Neutral Beam injection into the in-vessel armor at > 40keV beam for > 50 milliseconds. The first cryopanel regeneration of NB2 (and for NSTX-U) was successfully completed this week. Recovery from an external arc fault at the Ohmic Heating (OH) coil terminals continued this past week.

Inspections, tests, and analysis of the upper umbrella structures have been completed, and prototypes of redesigned components are being fit-up. The removal of the lower TF flex buses has been completed, and the lower OH lead extensions are being removed to provide access for inspections and rework. Electrostatic analysis of a new OH cooling tube bracket design has been completed and a prototype has been built. Electrical insulation tests (Hi-Pots) of this new design are now being performed on that prototype. Also this week, power testing of Field Coil Power Conversion (FCPC) rectifiers into a “dummy” load continued on additional TF parallels, and a run-up on the motor generator was successfully performed after the replacement of the cycloconverter transformer. Work continues on the commissioning of the Multi-Pulse Thompson Scattering (MPTS) diagnostic with the installation of cameras at the Exit Flight Tube Crosses, and heater tape to provide baking capability for both the Input and Output Flight Tubes. Installation of components for the Purdue Material Analysis Particle Probe (MAPP) diagnostic is in progress.

Access to the NSTX-U Test Cell is expected to be available this coming week. Access must be arranged through Work Permits approved by the D-Site Shift Supervisors.