

## **NSTX-U Weekly Report (September 11, 2015)**

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

An article "Numerical optimization of three dimensional coils for NSTX-U" by S. Lazerson (PPPL) et al., has recently been published (<http://iopscience.iop.org/article/10.1088/0741-3335/57/10/104001>) in Plasma Physics and Controlled Fusion **57** (2015) 104001. In this article the newly developed IPECOPT code is used to explore the effect of 3D fields in NSTX-U for torque control. The IPECOPT code is an optimizer built around the IPEC linear ideal MHD perturbed equilibrium code and coupled PENT neoclassical toroidal viscosity calculation. The work highlighted a capability of the proposed Non-axisymmetric Control Coils (NCC) to drive core torque with  $n=1$  and edge torque with  $n=3$ . This work was presented at the 2014 Workshop on MHD Stability and Control, and has been selected to provide a cover image for the October issue of Plasma Physics and Controlled Fusion (see attached). (S. Lazerson)

Joon-Wook Ahn (ORNL) gave an invited talk, "Effect of 3-D fields on heat and particle transport in tokamak divertors", in the 7<sup>th</sup> Workshop on Stochasticity in Fusion Plasmas, Bad Honnef, Germany, on September 10, 2015. The travel was supported by the Wilhelm and Else Heraeus Foundation. The talk highlighted recent progress on the understanding of 3-D divertor physics, for both steady state and transient conditions, with experimental data from NSTX and DIII-D. (J-W. Ahn)

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

The cable trays have been installed between the MAPP electronics rack and the analysis chamber and probe drive on the Bay K lower dome port. Most of the cables are in place, except for a few that need to be lengthened. These will be added after bakeout, when the chiller and vacuum pumps are to be moved to the test cell to complete the mechanical installation. A pump cart was also connected to the analysis chamber and probe drive to keep them under vacuum during bakeout. (R. Kaita, PPPL)

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

The bake of the NSTX-U vessel is in progress, and will continue to the end of September. New IR cameras installed at Bays G & H are operational and will be calibrated while the vessel tiles are at bake-out temperatures. Local testing of the Switching Power Amplifier (SPA) system used to power the NSTX-U Resistive Wall Mode (RWM) is in progress, and will continue during the bake. Pre-operational testing of MG#2 continued this week (MG#1 is already fully operational). Time will be scheduled during the bake for beam conditioning of the NB2 ion sources, RF conditioning of the High Harmonic Fast Wave (HHFW) sources, and power testing of the PF1cU rectifier.

The NSTX-U Test Cell is expected to be in restricted access this week during the vessel bake.

Plasma response calculated by IPECOPT code due to NSTX-U Non-Axisymmetric Control Coils (NCC) with  $n=3$  toroidal mode number

