

## NSTX-U Weekly Report (March 8, 2013)

### **NSTX-U is in the Upgrade Project outage in FY 2013**

NSTX-U researchers collaborating with the Korean National Fusion Research Institute (NFRI) attended and made presentations at the annual KSTAR Conference, held in Buyeo, South Korea last week. Each also visited NFRI to advance continuing joint research. Steve Sabbagh (Columbia University) presented a talk summarizing the achievement of KSTAR surpassing the  $n = 1$  ideal no-wall stability limit in a specific 2012 experiment, a milestone that signifies KSTAR producing advanced tokamak plasmas for the first time. Open-loop control of the charge exchange spectroscopy (CES) measured rotation profile by applied  $n = 2$  fields inducing non-resonant neoclassical toroidal viscosity (NTV) was also demonstrated, along with ELM mitigation by  $n = 2$  fields generated by a midplane coil configuration. Specifications of a high bandwidth power supply to support KSTAR long-pulse advanced tokamak research based on 3D mode stability and control calculations were discussed with NFRI management, physicists, and engineers. Interfaces supporting KSTAR TRANSP runs with new data from 2012 were discussed with L. Terzolo. Initial implementation plans for a model-based RWM state-space controller were discussed with S.H. Hahn and M. Woo. Dennis Mueller (PPPL) presented a talk on vertical control performance and improvements, and discussed these improvements with S.H. Hahn, formulating a plan to request additional flux loops to be installed closer to the plasma for use in vertical control. Moving away from reliance on feed-forward terms in the control system, and ways to preserve the plasma shape in spite of imperfect power supply response to the ohmic flux request were discussed. J.K. Park (PPPL) submitted a poster presentation on NTV physics and related experimental work on KSTAR. (S.Sabbagh)

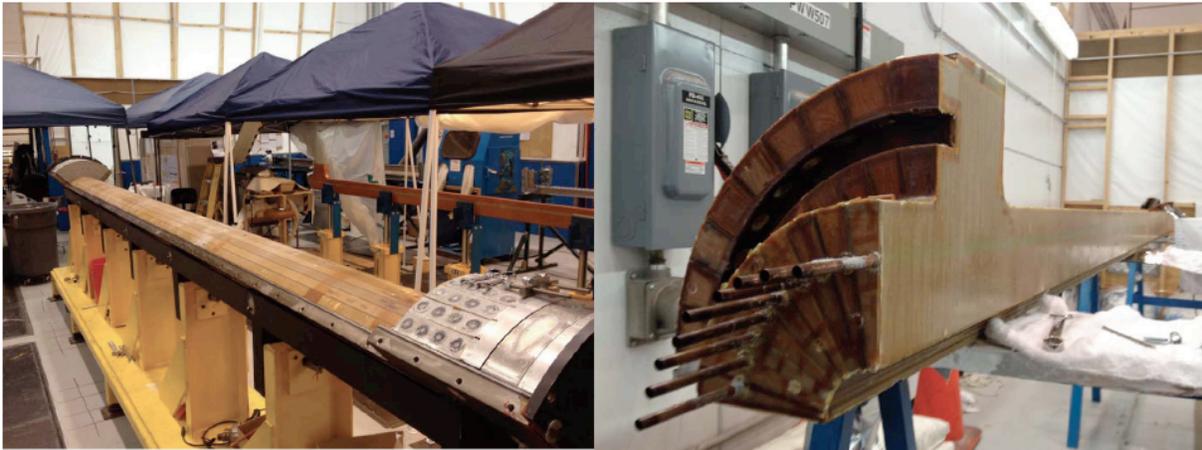
### **Engineering Operations (A. von Halle, C. Neumeyer)**

NSTX Upgrade construction activities continued this week with the removal of the first TF inner quadrant from its mold after the successful epoxy vacuum impregnation (VPI) (See the attached picture). Inspections have been positive, and dimensional/electric testing is starting. Welding of the NSTX vacuum vessel bay L external stiffeners has been completed, and preparations are now underway for the upcoming leak checking of the new neutral beam port at bays J-K.

Preparations of non-upgrade equipment for plasma operations in the NSTX-U configuration also continued with the ongoing assembly and testing of the new firing generators for the field coil power conversion (FCPC) system rectifiers. The second firing generator successfully completed bench tests in the Electronics Shop, and will now be installed in an FCPC rectifier for pre-operational testing.

Access to the NSTX test cell will be available only through previous arrangement with the Upgrade Work Control Center.

## TF Quadrant after successful vacuum pressure impregnation (VPI)



The new CTD-425 (Cyanide-Ester Blend Hybrid) was used for its strength at elevated temperature. CTD-425 is a candidate material for the ITER magnet VPI.