

## **NSTX-U Weekly Report (October 17, 2014)**

### **NSTX-U is in the Upgrade Project outage in FY 2014**

Kimin Kim and Jong-Kyu Park of PPPL visited KSTAR to lead magnetic braking experiments using  $n=2$  non-resonant magnetic perturbation. Highly non-resonant  $n=2$  magnetic perturbation of even parity (0 phasing), which has been rarely used for 3D experiment in KSTAR, was utilized to investigate toroidal rotation damping in the various  $q$  profiles. The magnetic braking profile was scanned with  $q_{95}$  modulated by toroidal magnetic field and plasma current, and strong toroidal rotation damping in the whole tokamak volume was achieved at  $q_{95} \sim 5$ , which is consistent to 3D equilibrium calculation by IPEC and NTV torque prediction by POCA. Compared to an observation of edge magnetic braking by  $n=2$  odd parity (90 phasing) at high  $q_{95}$  in 2013 campaign, this experiment indicates that the  $n=2$  field in KSTAR can provide a tool to control toroidal rotation and rotation shear globally or locally depending on the phasing of 3D field coils. Contingency experiment proposal to produce reference discharges for NTV analysis and to further test magnetic braking at lower  $q_{95}$  using the same  $n=2$  field has been accepted. Additional experiments are scheduled in November. (K. Kim)

Bilel Rais from Consorzio RFX, Italy has concluded a 4-week visit to NSTX in which he collaborated with Charles Skinner (PPPL) and Professor Bruce E. Koel of Princeton University on the surface analysis of boronized and lithiated samples exposed to RFX-mod plasma discharges. Bilel Rais made a presentation at PPPL on Oct 14th entitled 'Surface analyses of graphite samples exposed to wall conditioning in RFX-mod'. The results are relevant to the upcoming NSTX-U plasma startup with boron and lithium conditioning. (C. Skinner)

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

NSTX Upgrade activities continued with the start of the installation of the centerstack casing over the top of the TF/OH centerstack and PF1A coil. Pinch points were identified between the centerstack casing and the centerstack at the micro-therm insulation and at the Rogowski coil, and the casing has been lifted off. Minor grinding of the upper and lower inner diameter lips is required and in progress, and modifications to the PF1A coil shields have been implemented. The re-installation of the centerstack casing over the centerstack is scheduled for this coming week. The upper ceramic break is being assembled, and the PF1C upper can is ready to be attached to the ceramic break.

The Digital Coil Protection System (DCPS) and the Power Supply Real Time Control (PSRTC) development efforts are working towards a mid November start of Field Coil Power Conversion System dummy load testing. Procedures and plans for PSRTC pre-operational testing are being developed.

Preparations for plasma operations in the NSTX-U configuration also continued. The internal inspection of D-MG-1 stator heat exchanger #1 was performed after chemical flushing and found to be satisfactory. The chemical flushing of the remaining five D-MG-1 stator heat exchangers is now in progress. The final design of the Stand Alone Digitizers (SAD2) was successfully reviewed yesterday, and installations may now proceed. A pre-job briefing for the installation of the Multi-pulse Thompson Scattering diagnostic (MPTS) Collection Optics Box has been held, and that work is starting. An NSTX-U Activity Certification Committee (ACC) review of the NB

operations prep was held this past week.

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