

## NSTX-U Weekly Report (July 25, 2014)

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

Several NSTX-U researchers performed two experiments on DIII-D as part of the National Campaign for FY2014. First, on July 21, M. Podestà (PPPL) co-lead an experiment with W. Heidbrink (UCI) to characterize the threshold for Alfvénic instabilities and their effects on neutral beam current drive (NB-CD) in plasmas with elevated  $q_{min} > 1.5$ . The experiment targeted low toroidal field scenarios (down to  $B_t = 1.2T$ ) to approach the parameter range expected on NSTX-U. Scans of NB power and NB mix (on- vs. off-axis NBI) were performed at  $B_t = 1.2, 1.5$  and  $1.7T$ . In particular, a good set of data was obtained at  $B_t = 1.2T$ . TRANSP analysis will be performed to investigate the effects of instabilities on NB-CD efficiency and NB-driven current redistribution. Second, Dennis Mueller, Jon Menard, and Francesca Poli of PPPL performed an experiment on July 22 entitled “Fully Non-Inductive Current Overdrive Prospects for ST” with Christopher Holcomb, Andrea Garofalo and Al Hyatt of General Atomics, Devon Battaglia, Wayne Solomon, and Stefan Gerhardt of PPPL, and Bill Heidbrink. The goal of the experiment was to gain understanding of the requirements for, and the limiting factors of, non-inductive current drive which is needed to ramp-up plasma current without a central solenoid. The experiment achieved plasma current ramps from 520 kA to 620 kA and from 300 kA to 470 kA after the ohmic solenoid current was clamped to remove the primary inductive drive. The determination of how much of the current increase is due to the various mechanisms (inductive, bootstrap, ECCD, and NB current drive) awaits further analysis with TRANSP and other modelling tools. (D. Mueller / J. Menard)

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

NSTX Upgrade activities continued with the post VPI (vacuum impregnation with epoxy) clean-up and sanding of the completed TF/OH coil assembly. The removal of the temporary mandrel material between the TF and OH coils (Aquapour) is in progress, as well as the silver-plating of the TF coil lead electrical contact surfaces. The upper ceramic break has been fit up on the NSTX-U vessel. Trial fit-ups of the center column PF coils continue on both the NSTX-U vessel and the centerstack casing. The lower ring and the upper Belleville assemblies have been installed on the centerstack.

Development of the new Digital Coil Protection System (DCPS) continued with the ongoing testing of system software and user interfaces, and the design/fabrication of hardware and I/O layouts.

Preparations for plasma operations in the NSTX-U configuration also continued with the ongoing refurbishment of the Motor Generator Rotor. All weld repairs have now been completed and have successfully completed magnetic particle weld inspections. All of the rotor jacking equipment and temporary wooden platforms have been removed from the MG Pit, and post-weld repair measurements for generator air gap, stator roundness, brake ring runout, and rim concentricity have been completed. The generation and exercise of pre-operational test procedures for the Neutral Beam (NBPC) and Field Coil (FCPC) power conversion systems also continues. Neutral Beam arc and filament power supply testing began this week, and supplies for the NB#2 ion source "A" and "C" positions have been completed.

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