

NSTX-U Weekly Report (June 14, 2013)

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

The 25th Symposium on Fusion Engineering (SOFE) was held June 11-14, 2013 in San Francisco, USA. Several presentations were given by NSTX-U researchers describing research progress on NSTX and plans for NSTX-U. Jon Menard (PPPL) gave an invited presentation entitled “NSTX Accomplishments and NSTX Upgrade Research Plans in Support of Fusion Next-Steps”, Roger Raman (Univ. Washington) presented a poster on the “Design Description of the Coaxial Helicity Injection System on NSTX-U”, Lane Roquemore (PPPL) presented a poster on “Upward Facing Lithium Flash Evaporator for NSTX-U”, and Dan Andruczyk (Univ. Illinois) presented a poster on a “Method to Produce Lithium Pellets for Fueling and ELM Pacing in NSTX-U”. Several presentations were also given describing the latest results from the LDRD-funded ST-FNSF mission and configuration study. Jon Menard presented a poster on “ST-FNSF Mission and Performance Dependence on Device Size”, Tom Brown (PPPL) presented a poster on “Progress in Developing the ST-FNSF Configuration”, Laila El-Guebaly (Univ. Wisconsin) presented a poster on “TBR and Shielding Analyses in Support of ST-FNSF Study”, and John Canik (ORNL) presented a poster on “Power and Particle Exhaust in an ST-FNSF”. Robert Woolley (PPPL) gave an oral presentation on “Radial Cooling of a Spherical Torus (ST) TF Centerpost”. Numerous NSTX Upgrade Project engineering presentations were also given. (J. Menard)

On Wednesday June 12th, Stefan Gerhardt (PPPL) presented NSTX data on a conference call of participants in ITPA-MHD JA-1 on flow shear and NTMs (JA-Joint Activity). The talk focussed on data in his 2008 APS poster, and showed that the onset criterion for 2/1 NTMs in NSTX had some correlation with rotation-related variables, and that the correlation was best with normalized flow shear. He also presented analysis of soft X-ray signal from these modes, illustrating that they have a strong 1/1 component in addition to the 2/1 island. Other presentations were given with data from DIII-D, AUG, and TCV, with the ultimate goal of guiding theory and modeling research on the role of flow and flow shear in the stability of NTMs. (S. Gerhardt)

Gary Taylor (PPPL) visited MAST on June 3-7 to collaborate on 28 GHz electron Bernstein wave (EBW) plasma startup experiments. These experiments are being conducted in collaboration with the Culham Centre for Fusion energy and Oak Ridge National Laboratory. There also are additional collaborators from Japan and Russia. Previous EBW startup experiments on MAST had been limited by transmission line arcs and low, ~ 50%, transmission line efficiency. In these earlier experiments only 50 kW were coupled to the plasma generating up to 33 kA of non-inductive current, which was a world record at that time. Since the 2009 experiments the performance of the transmission line components have been significantly improved and transmission efficiencies ~ 80% are now routinely achieved. In the recent experiments 75-85 kW of gyrotron source power were used with pulse lengths up to 400ms being achieved on some shots. A new record non-inductive current of 75 kA was achieved with only 75 kW of gyrotron source power, more than doubling the previous record in 2009. (G. Taylor)

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

NSTX Upgrade construction activities continued with the completion of the epoxy impregnation of the fourth and final TF inner quadrant. The four quadrants will now be prepared for the full inner TF coil mold, and subsequent winding of the OH Coil. Contractors are on site installing new cooling system piping required for two neutral beam operation.

Preparations for plasma operations in the NSTX-U configuration with the completion of the schematic diagrams and printed circuit board layouts for the new diagnostic system Stand-Alone Digitizers. Fabrication and power testing of the new firing generators for the field coil power conversion (FCPC) system rectifiers continues. To date, 18 of the 34 planned new firing generators have been delivered to FCPC, and 13 of those have completed dummy load testing.

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