

NSTX-U Weekly Report (September 27, 2013)

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

The paper "Overview of physics results from the conclusive operation of the National Spherical Torus Experiment" by S.A. Sabbagh (Columbia University), and the NSTX Team is now published in Nuclear Fusion (Nucl. Fusion 53 (2013) 104007, <http://stacks.iop.org/0029-5515/53/104007>). This paper summarizes NSTX results obtained before the upgrade outage with broad scope (including transport and stability physics at reduced collisionality, H-mode pedestal physics, effects of lithium wall conditioning, macroscopic stability and control at high beta_N (incl. kinetic RWM stability and control), disruption prediction and characteristics, energetic particles, modes and 3D field effects, heat flux mitigation (incl. snowflake divertor), L-H power threshold, non-inductive current results and operational scenarios for NSTX-U) and with suitable references to the more detailed material. (S.A. Sabbagh)

On Sept. 23 and 24, S. Kaye (PPPL) participated in a review of the ITER Research Plan at the ITER IO in Cadarache, France. Also participating in the review were three other representatives from the U.S. as well as representatives from the EU, India, S. Korea, Japan and Russia. The objective of the review was to elicit comments and suggestions from the review panel on requirements and steps necessary to achieve the Q=10 goal of ITER. These comments would be incorporated into a presentation for the STAC meeting, which will be held in several weeks. The first day of the meeting was devoted to presentations by the ITER IO on the how it is envisioned that the present ITER Research Plan will be impacted by a number of diagnostic and facility capability delays and deferrals, as well as presentations on some of the critical ITER capabilities that need to be in place to achieve the Q=10 goal. These critical capabilities included the heating/current drive and diagnostic capabilities, the plasma control system, Disruption and ELM mitigation systems, effects of the tungsten divertor, and the tritium processing plant. The second day of the workshop involved the review committee to split into four working groups to address specific elements of the program (requirements and necessary steps to achieve the goals). For this exercise, the ITER IO asked us to assume that all delayed and deferred items would be available before the non-nuclear phase. S. Kaye led the working group on the " Experimental program in nuclear phase towards Q=10 demonstration." (S. Kaye)

J. Menard (PPPL) visited the Culham Centre for Fusion Energy, UK on September 23-25 to collaborate on kinetic MHD modeling for NSTX and hold collaboration discussions with MAST researchers. J. Menard also toured several of the facilities of Tokamak Solutions, Inc. (J. Menard)

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

NSTX Upgrade construction activities continued with the vacuum impregnation with epoxy (VPI) of the full TF inner bundle. The epoxy curing cycle has been completed in the bake-out oven, and the oven is now open. Initial inspections indicate that we had uniform distribution of epoxy throughout the TF mold, but a full detailed inspection cannot be made until the bundle is removed from the mold. The ground wrap station is ready in the coil shop, and the OH winder is being commissioned in preparation for the winding of the new OH coil on the TF bundle. For the second neutral beam, the subcontract installation of power cabling and tray-work between the neutral beam power conversion building and the NSTX-U test cell has started. The NSTX-U

Activity Certification Committee (ACC) walked down newly installed systems in the test cell to begin assessments on the readiness of those systems for commissioning.

Preparations for plasma operations in the NSTX-U configuration also continued with the retrofitting of the field coil power system rectifiers for operation with the new firing generators and the PLC based fault status system. All rectifiers are expected to be ready to start pre-operational testing by early November.

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

TF Inner Bundle VPI is Complete!

