

## NSTX-U Weekly Report (March 29, 2013)

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

Charles Skinner and Rob Goldston of PPPL travelled to Hefei, China for the DivSOL ITPA meeting March 19 - 22nd. The focus of the meeting was to assess the main issues and potential showstoppers for the implementation of a single tungsten divertor from the ITER startup phase through the Q=10 milestone. A report on the implications for divertor heat flux, fuel retention, material issues and operations is due by May 2013 and will be of interest for the proposed move of NSTX-U from C to metal PFCs. Charles Skinner gave presentations on behalf of Joon-Wook Ahn (ORNL) on 'ELM heat flux widths and toroidal asymmetry' that triggered interest and follow up action on the implications for ITER's ELM strategy. He also gave a presentation on behalf of Vlad Soukhanovskii (LLNL) on 'Divertor Detachment Studies in NSTX'. Rob Goldston has been working with Peter Stangeby and the JET and COMPASS groups on interpreting measurements relevant to the ITER Be start-up limiters, in light of the melting seen on the Be start-up limiters at JET. He gave a presentation on 'Theoretical explanations for narrow heat flux layers near a LCFS'. (C. Skinner)

Recent General Atomic studies for NSTX plasma control have been focused on developing a new TokSys model for the NSTX-U configuration, analyzing equilibria from the LRDFIT code, producing TokSys GSEQ equilibria for the new system, and analyzing the new configuration for relative vertical stability. The TokSys designeq and convergeq codes were used to produce a well-converged lower single null equilibrium with the NSTX-U coil-set for a 2 MA plasma current. In the next step the code gspert was applied to this NSTX-U equilibrium. It gave a vertical growth rate of about 4 rad s<sup>-1</sup> with the new TokSys conductor configuration. The predicted mode in this case is not purely vertical. Although it is common for axisymmetric instabilities to have significant non-vertical, nonrigid components, it is possible that a better solution can be found. Further studies will address the form of such modes in NSTX data, and produce calculations using appropriate constraints. (Dave Humphreys, Matt Lanctot and Anders Welander, General Atomics).

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

NSTX Upgrade construction activities continued with the successful vacuum leak checking of the fully assembled mold for the second TF inner quadrant, and the lift of that mold into the bake-out oven. A "warm" leak check will be performed before the vacuum impregnation with epoxy later next week. The new bay L nozzle for the MPTS diagnostic has been successfully leak checked on the NSTX vessel.

Preparations of non-upgrade equipment for plasma operations in the NSTX-U configuration also continued with the reinstallation of outer TF #4 in the bay G position, and the start of repairs of outer TF #12. The assembly and testing of the new firing generators for the field coil power conversion (FCPC) system rectifiers continues with 4 complete and tested, and three more chassis being assembled.

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

**New TF Coil Designations** - The nomenclature for the NSTX-U TF coils will be changing from a number system used for NSTX to a letter system as follows:

- There are a number of coils that have been shifted to a different position to accommodate repairs and assembly schedule. It is important not to lose any reference information such as manufacturing, repair or testing data.
- To accommodate the coil repositioning, the designations for the TF coils installed on NSTX-U will change from a number to letter system based on the installation location. The letter designation will correspond to the adjacent Bay letter ID. For example, TF-1 which was located north side will be now designated as TF-A, and it is located adjacent to Bay A.
- The existing number designation will become the coil serial number. In this way data history can be maintained for all TF coils.
- The new TF coils being fabricated for the NSTX Upgrade will have new S/N's of TF-13 and TF-14.
- The coil serial number and the new TF position ID will be clearly identified on the individual coils in the near future.

If you have any questions on this matter please contact Erik Perry or Jim Chrzanowski. (J. Chrzanowski)

