NSTX-U Weekly Report (September 1, 2018)

FY 2017 status: NSTX-U is in a maintenance and repair outage.

Recovery

The original PF1AL coil has been mounted on the new test stand in the Field Coil Power Conversion Building for upcoming power testing. For the PF1A test VPI log, individual bars have been wrapped. The layout for the new PF1A, B, and C is underway and variations of spiral windings are being explored. Coil instrumentation, split-core testing, and coil current scenarios are also being analyzed. In the PPPL coil shop the mold for the test VPI log has passed a high-vacuum leak check. External coil fabrication vendor evaluations are complete and recommendations have been submitted.

In-vessel metrology of the upper and lower out-board diverters has been completed, and the metrology of the center-stack casing and angle tiles is now in progress. The new bellows assemblies on the Neutral Beam #2 calorimeter have successfully passed vacuum leak checking, and the assembly of drive equipment and manifolds has started.

A group of New Jersey legislative staff toured NSTX-U this week.

The NSTX-U Recovery Cost and Schedule review will take place September 6-8.

Research

Francesca Poli has been nominated by the ITER Director General to become an ITER Scientist Fellow within the Integrated Tokamak Modeling program. She will be working with the Science and Operation Department (SCOD) on modeling ITER plasmas for the ITER Research Plan and on the exploitation of TRANSP within IMAS (the ITER Modeling and Analysis Suite) for scenario development at ITER. Part of the collaboration involves coupling the TRANSP core transport with a reduced model for the edge plasma transport, which is being developed at the ITER Organization.

A paper entitled “Liquid lithium loop system to solve challenging technology issues for fusion power plant” by M. Ono et al. was published in Nucl. Fusion 57 (2017) 116056 [https://doi.org/10.1088/1741-4326/aa7f41]. Calculations suggest that radiation-based liquid lithium divertor concepts with a modest lithium-loop of ~1 liter/s could provide a possible solution for high divertor heat flux and long term dust accumulation issues, while potentially improving reactor plasma performance. Two key technology issues were examined: (1) dust or solid particle removal and (2) real time recovery of tritium from liquid lithium while keeping the tritium inventory level to an acceptable level.

Devon Battaglia has completed a ten-week visit to the Culham Centre for Fusion Energy (CCFE) in the UK to assist in the development of startup and ramp-up scenarios for initial operations on MAST-U. For this work, Devon configured the LRDFIT code to operate on the CCFE computer system. He worked with the MAST-U team to build the device description for MAST and MAST-U including a 2D description of the conducting structures and the position of the coils and magnetic diagnostics. The code was used to examine the vacuum field structure in a subset of discharges that used direct induction on MAST and perform predictive calculations for MAST-U. Devon provided a User's Guide and hands-on training to the MAST-U team on using and developing LRDFIT. The calculations for MAST and MAST-U provide a direct comparison to similar calculations for NSTX and NSTX-U, allowing for the shared development and optimization of the ramp-up scenario on the two ST devices.