

NSTX-U Weekly Report (February 24, 2017)

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

NSTX-U Recovery Project (R. Hawryluk)

The sixth Design Verification and Validation Review (DVVR), reviewing the NSTX-U Cooling Systems was held this week. The review was chaired by Valeria Riccardo, head of engineering. External reviewers included Geoffrey Gettelfinger, department manager of the Physics Department at Princeton University; as well as Seokho Kim, of the ITER project office at Oak Ridge; Jim Irby and Brian La Bombard, of MIT's Plasma Science and Fusion Center; Dennis Youchison, of Oak Ridge National Laboratory; and Tom Todd, chair of the Extent of Condition Committee. The next DVVR will review the NSTX-U power systems. The chits are now being organized into corrective actions for the upcoming external Extent of Condition review.

Silver-plating of the upper and lower umbrella outer TF Bus connecting surfaces has been completed in the Test Cell, and plating of the CHI bus connections is in progress. Installation of waveguides and the configuration of electrical systems for the FIRETIPS diagnostic continues, and the installation of Pulse Burst Laser System (PBLS) equipment in Diagnostic racks in the Gallery has been completed. Recommissioning of the coil winding facility also continued with the completion of the painting and insulation of the bake-out oven, and the successful leak checking and hydrostatic test of conductor copper for the PF1A coil. Alignments of the pivot beam and tape winder have been completed, and final adjustments of the tape machine are in progress.

Voith Hydro contract work on the MG#1 Thrust Bearing work is expected to resume on Monday. Fluidics representatives have successfully tested the first two MG heat exchangers to 75 PSIG and are assembling the third today. The PPPL Tech Shop is expected to complete a new baffle plate today as needed to assemble the fourth and last heat exchanger. Ion Source work continues in the Neutral Beam (NB) decon facility, and testing of the NB#1 calorimeter drive is in progress.

NSTX-U Research (J. Menard)

Tariq Rafiq visited PPPL on February 21 and discussed with Stan Kaye and Walter Guttenfelder the numerical results obtained with a reduced transport model for microtearing modes. The reduced microtearing mode model, developed at Lehigh University, employs a unified fluid/kinetic approach and allows the inclusion of nonlinear effects due to magnetic fluctuations in the derivation of the nonlinear dispersion relation. The objective is to efficiently describe, in integrated predictive model studies, the evolution of the plasma in devices in which microtearing modes have a significant role. The dependence of the microtearing mode real frequency and growth rate on plasma parameters, appropriate for high collisionality NSTX discharges, is obtained using the reduced transport model. The results obtained are compared and found to be consistent with the microtearing mode results obtained at PPPL using the gyrokinetic code GYRO. The electron temperature gradient along with the collision frequency and plasma beta are sufficient for microtearing modes to become unstable in NSTX high collisionality discharges. The effects of low current density, low density gradient, and large magnetic shear are found to be destabilizing resulting in increased transport.