NSTX-U Weekly Report (December 18, 2015)

FY 2016 NSTX plasma operations
Operation Targets: Total - TBD
Completed: 0.12 run week and 11 plasma shots

Matthew Lanctot from General Atomics (GA) visited PPPL during Dec 7-18 as part of a PPPL-GA collaboration on advanced operating scenarios and plasma control in NSTX-U. During the trip, the GA TokSys toolbox, a set of tokamak control software tools in Matlab/Simulink, was installed on PPPL clusters and the NSTX-U model was updated to include all new passive conductors, PF coils, PF power supplies, and magnetic diagnostics. The model was interfaced with the NSTX-U PCS allowing closed-loop simulations to test PCS algorithms. The accuracy of the new model is being assessed via comparison of simulations with vacuum field test shots. Meetings with NSTX-U staff and collaborators were also held to discuss a possible 3D magnetics upgrade that would complement the Non-axisymetric Control Coils (NCC) upgrade. Technical data, including detailed wall geometry, NSTX-U target equilibria, and 3D plasma response calculations, were obtained to allow an initial assessment of the existing 3D magnetic sensors, and new sensor configurations to be evaluated. (M. Lanctot)

Run Coordination (J. Menard, S. Gerhardt)

Plasma operations began on December 18 with XMP-101: Inductive Startup Scenarios for NSTX-U (Battaglia). A 120 kA discharge performed in August was successfully repeated, then progress was made in developing a startup scenario using lower loop voltage following plasma breakdown. A number of new tools were integrated into the startup scenario, including raising the on axis toroidal field to 0.65T, which exceeds the maximum field achieved on NSTX. (D. Battaglia, PPPL)

Experimental Research Operations (S. Gerhardt, R. Kaita)

Six transmitters for high harmonic fast wave (HHFW) system are now ready to support the antenna conditioning planned to start on Dec. 22. (J. Hosea, PPPL)

Engineering Operations (A. von Halle, P. Titus)

Repairs/Calibrations of the Motor Generator #1 cyclo-converter and liquid rheostat control systems have been completed, and that MG set is fully operational. Field Coil Integrated System Tests were expanded to include TF, OH, PF1aU/L, PF2U/L, PF3U/L, PF4, PF5 and the Switching Power Amplifier (SPA) driven Resistive Wall Mode (RWM) coils, and were successfully completed. Test results were reviewed, and plasma operations resumed on Friday, 12/18/2015. Plasma shots were taken per an experimental machine proposal (XMP) intended to optimize plasma performance and close plasma control system (PCS) feedback loops. Neutral beam conditioning of ion sources on both beam-lines continued this week. Voltage break-down problems internal to the NB2 transmission lines will be addressed on the off-shifts. All six RF sources have now been fully tested and are ready to support High Harmonic Fast Wave (HHFW) antenna conditioning. Also this week, the preliminary design of the new Massive Gas Injection System (MGI) was successfully reviewed.

The NSTX-U Test Cell will be in restricted access this coming week during plasma operations. Access will be available on the 2nd shifts for approved work.