

NSTX-U Weekly Report (July 17, 2015)

NSTX-U is in the Upgrade Project outage in FY 2015

The 3rd Quarterly Report for Joint Research Target-15 (JRT-15) was submitted to FES. The Milestone for the 3rd Quarter has been met by beginning experiments on C-Mod, complemented by experiments run earlier in FY-15 on DIII-D. Experimental operations have been postponed on NSTX-U because of delays in the machine recommissioning. For NSTX-U, plans for the JRT-15 related activities for the remainder of FY-15 have been revised with more focus on analysis and modeling of data from NSTX and from collaborations with C-Mod and DIII-D. Progress was reported in optimization of non-inductive plasma ramp-up scenario for NSTX-U, profile characterization including impurities and inclusion of the effects of MHD instabilities in time-dependent simulations. Progress was also made in defining operating conditions for JRT-15 related experiments, in addition to those discussed in the 2nd Quarterly Report. (M. Podesta, PPPL)

Several NSTX-U researchers participated in the IEA Workshop on the Theory and Simulation of Disruptions hosted by PPPL July 13-15, 2015. Presentations included: “Tearing Mode Control for ITER” by E. Kolemen, “M3D-C1 Simulation of a NSTX Disruption Induced by Rapid Current Ramp-down” by S. Jardin, “Wall Current Calculations for an NSTX VDE” by J. Breslau, “Multi-Machine Analysis of Non-Axisymmetric and Rotating Halo Currents” by C. Myers, a discussion of the Joint Research Target (JRT) for 2016 on disruption avoidance and mitigation chaired by S. Gerhardt, “NSTX-U Plans” (for JRT-16) by R. Raman, “The Tokamak Density Limit – a Thermo-Resistive Disruption” by D. Gates, “Simulation of Radiation Driven Islands at the Density Limit” by D. Brennan, “Theory and Modeling Needs For Improved Kinetic Treatments of High-Beta Pressure Limits” by J. Menard, and “Global MHD Mode Stabilization for Disruption Avoidance in Tokamaks” by S. Sabbagh. (J. Menard, PPPL)

Francesca Poli (PPPL) visited the ITER Organization on July 06 - 10, 2015. This visit is part of a collaboration between PPPL and ITER to implement TRANSP (a time dependent tokamak plasma analysis and simulation code) in the ITER Modeling and Analysis Suite (IMAS) for scenario development. She worked with Sun Hee Kim of ITER on the implementation in IMAS of a translator between the ITER Data Structure (IDS) and TRANSP. The translator, which has been developed by the PPPL Computational Plasma Physics Group, reads data from the ITER data tree and writes UFILES to initialize a TRANSP simulation. Poli and Kim have adapted the translator to be an 'actor' in the IMAS Kepler workflow. The translator is the first step in the implementation of TRANSP as a full component of the Kepler (a framework that allows easy coupling and integration of code modules) workflow in IMAS. A user-friendly interface now performs a sequence of operation to initialize a TRANSP simulation, by simply pushing a 'play' button. This work will continue over the summer to demonstrate the first TRANSP simulation submitted to the FusionGrid using the ITER Kepler workflow. (S. Kaye, PPPL)

Run Coordination (J. Menard, S. Gerhardt)

The following NSTX-U eXperimental Proposals (XPs) were approved by run coordination:

- XP-1520 “Ip/Bt scaling” by S. Kaye
- XP-1523 “Characterization of 2nd NBI line” by M. Podesta

- XP-1524 “Test Critical Gradient Model of Alfvén Eigenmode Transport” by W. Heidbrink

The following XMPs (experimental Machine Proposals) were approved:

- XMP-107 (Darrow): Neutron Calibration Transfer Through Low Power NBI Plasmas
- XMP-108 (Skinner): TMB Sequencing in Support of XP-1505
- XMP-110 (Liu): FIDA/ssNPA/sFLIP Checkout
- XMP-127 (Boyer): Neutral Beam Checkout

Numerous other XMP designed to support initial NSTX-U plasma operations are in development.

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

Good progress was made on alignment of the MPTS diagnostic. For the first time, the Nd:YAG laser beams were sent through the vacuum vessel, down the exit flight tube, and onto the beam dump. Saturation of the cameras that observe the beams at various locations was resolved by adding neutral density filters and stopping down some of the cameras. Laser beam burns were taken at various locations in the system. Clipping of one of the beams on a baffle near the entrance to the beam dump enclosure was observed and will be corrected. (B. Stratton, PPPL)

As part of the preparations for lithium use in NSTX-U, the heater testing for the liquid lithium loading system was completed. Called the Lithium Filler for LiTER (LIFTER), this device is used to fill the lithium evaporator (LITER) for coating plasma-facing components. Preparations are also continuing for the implementation of the Laser Blowoff (LBO) trace impurity injector from the Lawrence Livermore National Laboratory. The beam path has been determined from the proposed laser enclosure in the NSTX-U South High Bay to the injection port Bay J, which will support the positioning mechanism for impurity targets. (R. Kaita, PPPL)

Fabrication of the support stand for the IR camera at Bay "H" top was completed. Fabrication of components for the divertor SPRED flight tube were completed. They will be sent out for welding the week of July 20-25. Fabrication of mounting brackets for the IR cameras below bay "G" continues in our shops. (R. Ellis, PPPL)

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

OH system rework and machine reassembly activities continued this past week. Installation of upper and lower TF flex bus along with the associated resistance testing is nearing completion, and the OH coil coax connection has been made up and potted. OH joint resistance measurements were taken before and after the OH Coax potting, and are now being compared to ANSI models. All upper and lower umbrella assemblies, including the new PF1B coil heating/cooling lines, are expected to be completed by the middle of this coming week, and machine area scrubs will then start in preparation for coil system pre-operational testing. Also, the vessel magnetic sensors have been successfully tested, indicating that all sensors have remained operational during activities in the upper and lower umbrellas.

Access to the NSTX-U Test Cell is expected to be available this coming week. Access must be arranged through Work Permits approved by the D-Site Shift Supervisors.