<u>**NSTX-U Weekly Report (July 3, 2015)**</u>

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

NSTX-U researchers attended the 42nd European Physical Society Conference on Plasma Physics, Lisbon, Portugal, 22nd - 26th June 2015. R. Perkins (PPPL) presented a poster titled "Searching for Enhanced RF Field Amplitudes in the SOL Using a Simplified Cold-Plasma Model." The high harmonic fast wave (HHFW) heating system on NSTX has been known to suffer from parasitic absorption of fast-wave power in the SOL, and both experimental data and full-wave simulations from the AORSA code suggest that this fast-wave propagation phenomenon. A cold-plasma model in cylindrical geometry has been developed to see whether similar effects can be found in this simplified geometry. Particular modes are found which propagate a significant fraction of wave power ($> 50\%$) in the edge of the plasma. While these results are promising, more work is needed to related these modes to experimental and full-wave simulation results. Ahmed Diallo (PPPL) presented a poster entitled "Inter-ELM Pedestal Evolution and the Role of Edge Fluctuations in the C-Mod and DIII-D Tokamaks." The paper highlighted similarities between the inter-ELM quasi-coherent fluctuations (QCF). Measurements on C-Mod showed correlations between the edge temperature and the onset of the QCFs. Furthermore, the QCFs are found to be field-aligned. Similarly, on DIII-D, the amplitude of the QCFs were shown track well the pedestal temperature gradient. QCFs are edge localized and electromagnetic of nature on both DIII-D and C-Mod tokamaks. (R. Perkins, A. Diallo)

Ahmed Diallo (PPPL) travelled to Culham Laboratory, UK on June 18 – 19, 2015 to continue collaboration with MAST on the characterization of the pedestal. During his visit, Diallo met with Rory Scannell to discuss the characterization of edge polychrometer developed for MAST divertor. In addition, Diallo met with Pamela to discuss ongoing NSTX ELM simulations using JOREK. NSTX-U is currently discussing the development of an edge polychrometer capable to resolve electron temperature between 5 eV and 100 eV. (A. Diallo)

Yong-su Na (Professor, Seoul National University, Korea) arrived last week to spend his sabbatical year at PPPL. He plans to work on advanced scenario development with the NSTX-U research team. (M. Ono, PPPL)

<u>Experimental Research Operations (S. Gerhardt, R. Kaita)</u>

The NSTX-U Divertor Upgrade (Phase) 1 (DU1) project held a Conceptual Design Review and review of the System Requirements Document. Presentations were given by M.A. Jaworski and K. Tresemer and the review was chaired by Bill Blanchard. The NSTX-U DU1 project encompasses the upgrade of a continuous row of plasma-facing component tiles in the outboard divertor of NSTX-U. The review was deemed a success pending the resolution of outstanding chits. (M.A. Jaworski, PPPL)

The control programs (LabVIEW Virtual Instruments or VI's) for the diagnostics on the Materials Analysis and Particle Probe (MAPP) have been successfully installed on a computer with a new operating system (Windows 7). The next task is to locate the computer in the NSTX-U data acquisition room (DARM), and establish remote communication (F. Bedoya, University of Illinois at Urbana-Champaign).

Alignments of the Multi-Pulse Thompson Scattering (MPTS) diagnostic flight paths continued, and Nd:YAG Laser burns have been taken to verify that the two beams are being captured by the beam dump. The beams were centered, and the alignment of the secondary focal spot optics has been adjusted. (B. Stratton, PPPL)

Physics Analysis (S. Kaye)

J.-M. Park of ORNL (on site at General Atomics) visited PPPL on June 25-26 and gave a presentation on FASTRAN, a fast transport solver. FASTEN uses numerical techniques that allow rapid convergence of stiff transport models such as TGLF, and has been shown to be a quite useful tool for time-slice temperature predictions of DIII-D steady-state plasmas, and subsequent comparisons to experimental data. There were discussions about how FASTRAN takes into account time-dependent terms for a non-stationary portion of the discharge, and how the required computational time for a converged time-slice FASTRAN calculation compares to the same for PT_SOLVER. A benchmarking of both "steady-state" and time-dependent time slices from DIII-D and NSTX will be performed to make this comparison between FASTRAN and PT_SOLVER. A consideration is to make FASTRAN a component of TRANSP that can be used in place of PT-SOLVER.

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

OH system rework and machine reassembly activities continued this past week. Installation of TF flex bus is in progress, and in-situ joint resistance measurements are being recorded. Daily inner and outer vacuum vessel electrical insulation checks (Hi-Pots) are being performed, and the OH, PF1A, PF1B, PF1C and PF2 coils were successfully Hi-Potted this week. Both neutral beam's cryo-pumps have been cooled to liquid helium temperatures to support ion source conditioning, and the cryo-operators are successfully balancing the Liquid He refrigerator to support two beam-line operations.

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.