The PPPL Highlights for the week ending August 29, 2014, are as follows:

FEATURED HIGHLIGHT:

The Physical Review Letters editor has highlighted the MRX experimental paper, "Laboratory Study of Magnetic Reconnection with a Density Asymmetry across the Current Sheet" by Jongsoo Yoo, Masaaki Yamada, Hantao Ji, Jonathan Jara-Almonte, Clayton E. Myers, and Li-Jen Chen (Phys. Rev. Lett. 113, 095002 – Published 28 August 2014).

U.S. ITER FABRICATION (D. JOHNSON):

Final comments on documents associated with Procurement Arrangements 55.P5.US.01 for the Core Imaging X-ray Diagnostic and 55.P6.US.01 for the Motional Stark Effect Diagnostic and Equatorial Port 3 were sent to the IO. If convergence is achieved, these documents will next be sent to DOE for concurrence.

NSTX (M. ONO):

NSTX-U is in the Upgrade Project outage in FY14. NSTX Upgrade construction activities continued this week and are highlighted in the Engineering section below.

Preparations for plasma operations in the NSTX-U configuration also continued with the ongoing re-commissioning of the FCPC and neutral beam power systems. Control and telemetry fiber optics are being terminated and tested between the NSTX Test Cell and the Neutral Beam Power Conversion Building, and between the NSTX Test Cell and the FCPC Building.

ITER & TOKAMAKS (R. HAWRYLUK):

Sun-Hee Kim, scientific officer at the ITER Organization, visited PPPL to work with R. Andre and F. Poli. The agenda included discussion of installation and use of TRANSP in the ITER IMAS (Integrated Modeling Analysis Suite), introduction to the use of TRANSP and benchmarking of CORSICA and TRANSP on the baseline scenario. The benchmarking aims at identifying similarities and differences between the models used, quantify assumptions and uncertainties and define guidelines for time-dependent simulations. The approach taken in the benchmarking is to step-wise increase the complexity in the simulation, starting from fix-boundary simulations to move to fully predictive free-boundary simulations. This exercise is the

start of a collaboration on integrated tokamak modeling between PPPL and the IO.

DIII-D (R. Nazikian):

B. Grierson led an experiment with the DIII-D team to explore QH-mode operation with a radiative divertor approaching detachment. High triangularity was used to maintain QH-mode with increased fueling from gas puffing, with high density. QH operation was achieved with a constant flow rate of 30 Torr-l/s of deuterium into the main chamber, with a corresponding reduction of the divertor heat flux by greater than 30%.

R. Nazikian was session leader for an experiment this week exploring ELM suppression dependence with upper/lower I-coil phasing for n=2 RMP. Successful documentation was obtained of the suppression dynamics with increased temporal resolution of the main ion and carbon CER for several different values of q95.

The DIII-D vessel/platform interface design is complete for the Lithium Granule Injector. The vacuum system components were received at General Atomics. A. Nagy visited PPPL for participating in the final assembly and testing. Lithium pellets were received at GA this week from ASIPP, China.

The procurement of the Pole Shields continues to be on schedule with expected delivery around late October or early November.

N. Atnafu (PPPL Mechanical Engineering) visited DIII-D to discuss several design approaches for the design error field correction of the 30 deg. TF bus.

C-Mod (A. Diallo):

A. Diallo travelled to Cambridge to perform experiment on C-Mod on August 20-28. The experiment's goal was to first reproduce the ELMy results of August 15, 2012, where the quasi-coherent modes were observed to limit the pedestal growth. Second, the plan was to measure the mode layer in the pedestal. Finally, LH was injected to investigate the impact of the LH in the edge and on the ELMs. Control room analysis using GPI showed that quasi-coherent mode is localized in a narrow layer spanning 4-6 mm in the pedestal region. Further analysis will be performed to also get the profiles recovery rate to compare with recent DIII-D experiments.

ADVANCED PROJECTS (D. GATES):

The Laboratory and Korea's National Fusion Research Institute (NFRI) have collaborated for the past two years on a conceptual study for a next-step fusion nuclear facility, K-DEMO. In a recent project videoconference meeting, NFRI participants announced that they have completed a draft of a Conceptual Studies Report, which will be issued to NFRI management in September after a final review at NFRI. It was reported that the draft draws extensively on PPPL work, incorporating large sections of PPPL's reports to NFRI under the research agreement. In addition, four papers on the study with joint NFR-PPPL authorship will be presented by NFRI team members at the IAEA Fusion Energy Conference. The K-DEMO program, including PPPL's collaboration, is expected to continue with the study phase through 2015 at least. At the

videoconference, PPPL reported on tasks in progress, namely heating and current drive analysis, disruption simulation, and machine configuration studies.

C. Kessel gave a presentation to the VLT (Virtual Laboratory for Technology) on the FNSF activity up to date. He covered the work being done on the facility missions, metrics, program description, blanket testing strategy, backup blanket strategy, and DEMO program. In addition he described the challenges facing the FNSF in topical areas pertinent to the VLT participants, and how the project will attempt to approach most of them.

THEORY (A. BHATTACHARJEE):

A paper "Controlling turbulence in present and future stellarators", by P. Xanthopoulos (IPP), H. Mynick (PPPL), P. Helander, Yu. Turkin, F. Jenko, T. Goerler, D. Told, G. Plunk, T. Bird, and J. Proll (all IPP) has been accepted for publication in Physical Review Letters.

ENGINEERING AND INFRASTRUCTURE (M. WILLIAMS):

NSTX Upgrade (R. Strykowsky, E. Perry, L. Dudek, T. Stevenson):

Construction: Over two-thirds of the tiles have been installed on the center section of the centerstack casing. Trial fit-ups of the TF flex bus inside the umbrellas have pointed out the need to custom machine some of them at assembly to account for the as-exists condition of some of the TF outer leg flags. Preparations are underway to leak check the PF1C coil cans once they have been completed. The completion of the PF1C coil is a prerequisite for installing the centerstack lower ceramic break and pedestal, both of which need to be in place before the centerstack can be installed in NSTX.

CS Upgrade: The OH coil successfully completed the impulse test and the coil inductance was successfully verified using the test data. Both TF crowns were drilled for the load pins. The upper crown was installed and is ready for epoxy injection to lock in place. The lower PF1C thermocouples and centering band were installed and the vacuum can was installed. Tack welding of the can in place on the coil commenced. A meeting was held to review the OH coil specimen test plan. Fit-up of the coil buss work continued in the Test Cell.

NBI Upgrade: TVPS installation and leakchecking is complete. VV leg strut installation is complete. Work continues to prepare for the NB2 turbopump and the vacuum foreline installations. BL Platform drawings are in progress. NB Controls fabrication and installation cabling work on rack connections, cable runs, and BL wiring continued in NTC and gallery. Telemetry fiber optics end-to-end testing and rework continues in NTC and NBPC. The NBI Cryogenics effort continues with pump down of cryogenic lines for upcoming operations.

Digital Coil Protection System: DCPS software efforts include Autotester fixes, code debugging, and PTP testing. Two hardware test procedures have been approved. Installation of hardware Iinterface subsystem in the Junction Area is complete.

DIRECTOR'S OFFICE (C. AUSTIN):

On August 26-29, A. Cohen participated in a meeting with DOE/SC at ORNL in Oak Ridge, Tennessee for an assessment of the U.S. Contributions to ITER Project.

This report is also available on the following web site:
http://www.pppl.gov/publication-type/weekly-highlights