



The PPPL Highlights for the week ending November 23, 2019, are as follows:

NSTX-U RECOVERY (J. GALAYDA) AND RESEARCH (S. KAYE)

Recovery (J. Galayda):

Center Stack Casing — Forging components for the center stack casing (CSC) have been ultrasonically tested (UT), and partial shipment of several pieces is underway to the Holtec fabrication facility in Turtle Creek, Pennsylvania, where the assembly will be welded and machined. The final machining of the inner diameter of the first wall of the CSC continued in Italy, and it is expected to ship to the U.S. in the next two weeks. The PPPL contract UT oversight engineer was very impressed with the quality of the forgings.

PF Coils — Winding line #1 at Sigmaphi in France was completed this week, with the exception of the PF1A mandrel which is being repaired in France. Preliminary testing of the line was successfully conducted using the mandrel previously utilized in the prototype effort. Upon receipt of the repaired mandrel, the winding line will be tested again in anticipation of starting winding of the PF-1A coil in December.

FPDP Clock Transmitter and Receiver FDR — A final design review (FDR) was held this week to review the revised design of the front panel data port (FPDP) clock transmitter. Data for the NSTX-U control and protection systems are gathered using FPDP as protocol. The existing clock transmitter and receiver modules are based on handmade circuits based on outdated stripboards with many obsolete components, and there are no spare modules available. The design was updated to remedy these factors.

Research (S. Kaye):

V. Soukhanovskii (Lawrence Livermore National Laboratory) spent the week of Nov. 11 at the Culham Centre for Fusion Energy (CCFE), Culham, United Kingdom. He worked with CCFE staff on the development and installation of two LLNL divertor spectrometers on the MAST-U tokamak as part of the LLNL-CCFE collaboration in spherical tokamak divertor physics. He also discussed the on-going LLNL modeling of snowflake divertor experiments and divertor opacity measurements planned for the first experimental campaign in 2020.

A number of NSTX-U researchers attended the APS-DPP-sponsored community planning workshop in Knoxville, Tennessee, Nov. 18-22. The attendees participated in breakout groups to discuss the draft strategic plan and provide input for the preliminary prioritization of its sub-components. Attending from NSTX-U were J. Menard, S. Kaye, D. Battaglia, R. Goldston, D. Smith (U. Wisconsin), and T. Gray (ORNL). N. Ferraro, W.



Guttenfelder, and M. Reinke (ORNL) were among the leadership of the planning process.

F. Poli traveled to ITER headquarters in France to participate in the 11th meeting of the ITER modeling expert group (IMEG). Poli attended as a U.S. representative. Other representatives from South Korea, China, Europe, and Russia also attended. The IMEG group advises ITER on strategies for integrated modeling and data analysis, and provides a connection with the community to promote the adaptation of IMAS among the domestic agencies. As part of the meeting, Poli discussed plans for adaptation of TRANSP to the ITER Modeling Analysis and Suite (IMAS), which is the platform that ITER is developing.

S. Sabbagh, J.-H. Ahn, and J. Riquezes visited South Korea's National Fusion Research Institute (NFRI), joining Y.-S. Park of Columbia University to run the initial plasmas for the experiment, "Generation of Co-Ip-Directed Plasma Rotation and Strong Shear by Generalized NTV Offset Rotation in High-Performance Plasmas with Near-100% Non-Inductive Current." The run successfully produced a positive effect, driving plasma velocity in the co-Ip direction with strong rotation shear. The effect was successfully applied for the first time in KSTAR H-mode plasmas as a precursor to the continuation of the experiment at higher neutral beam power. Several meetings were also conducted regarding the design and implementation of several new real-time data acquisition systems for key plasma diagnostics, supporting real-time disruption event characterization and forecasting (DECAF) on KSTAR. This research is part of a multi-institutional collaboration between Columbia University, PPPL, and Nova Photonics.

U.S. ITER FABRICATION (H. NEILSON)

During the U.S. ITER diagnostics team visit to the ITER site the week of Nov. 12, a number of lingering interface issues affecting the Low Field Side Interferometer (LFSR) design were resolved in meetings with the port integration team. This week, updated CAD models for both in-vessel and ex-vessel equipment were uploaded to ITER servers. Detailed checking of the models for clashes between the LFSR and Equatorial Port 11 structures and other diagnostic tenants is proceeding based on these models.



ITER & TOKAMAKS (R. NAZIKIAN)

DIII-D (B. Grierson)

Research:

R. Nazikian, B. Grierson, and F. Laggner attended and participated in the 2019 [Division of Plasma Physics Community Planning Process](#) (DPP-CPP) workshop held Nov. 18-22 in Knoxville, TN. This was the second in a series of workshops for the DPP-CPP, which culminates in a joint community workshop in Houston, Texas, that will be held Jan. 13-17, 2020. Grierson is on the program committee. Grierson and W. Guttenfelder delivered the opening overview presentation of the draft community strategic plan. All attendees participated in breakout discussions.

International PMI and FES LM PFC Development Program (R. Maingi):

A. Diallo and R. Maingi presented invited orals at the 14th Asia-Pacific Physics Conference in Kuching, Malaysia, Nov. 16-19. Diallo presented, "Pedestal dynamics and onset mechanism of ELMs," and Maingi presented, "Impurity injection for improved fusion plasma performance in tokamaks." Maingi also chaired session Magnetic Fusion 2A.

ADVANCED PROJECTS (D. GATES)

Stellarators (D. Gates):

Several members of the Advanced Projects Department — R. Goldston, N. Pablant, K. Hammond, F. Nespoli, and C. Zhu — attended the 2nd Joint Community Planning Workshop for Magnetic Fusion Energy and Fusion Materials and Technology at Knoxville, TN, Nov. 18-22. They participated in the discussions about the strategies toward a fusion pilot plant. Several of the department members emphasized the strategy of advancing stellarator physics basis.

THEORY (S. HUDSON)

D. Schaeffer helped organize and lead the second APS Division of Plasma Physics Community Planning Process (DPP-CPP) workshop in the topical area of High-Energy-Density Physics (HEDP) on Nov. 12-14 in Menlo Park, California. The [DPP-CPP](#) is a strategic planning process with the goals of identifying scientific and technological opportunities in the fields of plasma physics and fusion energy science, and making consensus recommendations for a strategy to address these opportunities to the US DOE Office of Fusion Energy Science Advisory Committee (FESAC). The workshop



solicited feedback from the HEDP community, which will be incorporated into a long-term strategic vision for FES.

W. Wang attended the 3rd Asia-Pacific Conference on Plasma Physics (AAPPs-DPP 2019) held in Hefei, China, Nov. 4-8, and presented a plenary talk titled, “E x B Shear Flow Structure and Plasma Self-Driven Current Generation in Magnetic Island.”

COMMUNICATIONS & PUBLIC OUTREACH (A. ZWICKER)

Communications (L. Bernard):

The Office of Communications posted two press releases to the PPPL website. The first focused on research by F. Ebrahimi, who has used high-resolution computer simulations to investigate the practicality of the coaxial helicity injection (CHI) technique. The simulations show that CHI could produce electrical current continuously in larger, more powerful tokamaks than exist today to produce stable fusion plasmas.

The second story noted that PPPL has received six Federal Green Challenge regional awards from the U.S. Environmental Protection Agency (EPA) for its sustainable practices in reducing waste, energy and water, and transportation, and for green purchasing and electronics recycling. Both articles were also posted to the *Newswise* and *EurekAlert* press release distribution services.

PPPL hosted the semiannual meeting of the National Laboratories Chief Communications Officers (NLCCO) Nov. 18-20. The meeting, organized by L. Bernard and L. Hefty, featured representatives from all but two of the 17 national laboratories, and included two representatives from the U.S. Department of Energy headquarters Office of Public Affairs. A. Zwicker presented an update and overview of PPPL. The communicators discussed strategies, collaborations on upcoming projects, and ways the Labs and DOE public affairs staff can work together.

DIRECTOR’S OFFICE (S. COWLEY)

J. Menard, S. Cowley, and M. Zarnstorff attended the Division of Plasma Physics community meetings held in Knoxville, TN, Nov. 17-22.

On Nov. 18, J. Sims of the SLAC National Accelerator Laboratory and the Project Leadership Institute (PLI) presented to select members of the Laboratory. PLI is a program designed to cultivate a diverse network of successful DOE project delivery practitioners — those capable of delivering major high-risk projects. The PLI program participants contribute to building a culture of project management excellence across DOE.



On Nov. 19, C. Ferguson hosted J. Fontaine, Deputy Director for Field Operations (Acting), U.S. Department of Energy, for meetings and a tour of the Lab including NSTX-U, the TFTR test cell, the tritium area, FLARE, and SLI/GPP focus areas.

S. Cowley participated in the National Laboratory Directors Council (NLDC) Horizon Scanning Workshop, held in Denver, Colorado on Nov. 21.

This report is also available on the following web site:

<http://www.pppl.gov/publication-type/weekly-highlights>