



**The PPPL Highlights for the week ending August 31, 2019 are as follows:**

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

**Recovery (J. Galayda):**

The DOE Office of Science review of the NSTX-U Recovery Project was held Aug. 27-29. The review committee, chaired by H. Lee (Deputy Head, DOE Bay Area Site Office), examined the technical design, cost and schedule for the project, including quality assurance and safety programs as applied to project activities. The committee recommended that the Office of Science approve CDE-2/3a, which will permit the acquisition of long-lead procurements and preparation for installation in the coming year. The review committee was impressed with the quality of the design and planned execution of the CD-3a scope. The committee also emphasized the importance of careful planning and control of the work scheduled for the coming year.

**Magnets** — PPPL successfully shipped G-11 filler pieces to Sigma Phi for use in coil fabrication. Other materials including fiberglass insulation and copper conductor will be shipped in the next few weeks. Sigma Phi has shared project quality plans, fixture drawings, and a manufacturing inspection and testing (MIT) plan for PPPL comment, in addition to procuring and assembling winding line components at their main factory prior to the move into the new building in September.

**Research (S. Kaye):** Nothing to report for this week

**U.S. ITER FABRICATION (H. NEILSON)**

New results from microwave testing have provided experimental confirmation of the design strategy for minimizing stray reflections on the Low Field Side Reflectometer (LFSR). The design features an antenna array consisting of six open-ended waveguides that extend from a recessed conducting plane into a cavity in the first wall. The waveguides' ends are flush with the first wall. A full-scale mockup of the antenna array and the back and side walls that form the cavity was installed on the microwave test stand at General Atomics, the Laboratory's partner in the LFSR project. The test results showed that unwanted reflected radiation across multiple frequency bands was attenuated to the point that its effect was similar, in phase spectra, to that of tests with perfect absorbers covering everything but the transmitting horn.



## **ITER & TOKAMAKS (R. NAZIKIAN)**

### **DIII-D (B. Grierson):**

#### *Research:*

A. Bortolon presented the seminar, “Fusion Energy Research and the Creation of Miniature Stars for Electricity” at the San Diego World Affairs Council, a San-Diego-based community organization supporting the community’s civic, social, professional, business, cultural, and educational organizations in their internationally oriented efforts. The talk introduced the concept of fusion and discussed the role of international collaboration in the present quest for fusion energy. <https://sdwac.org/event-3507278>

## **ADVANCED PROJECTS (D. GATES)**

### **Stellarators (D. Gates)**

On Aug. 26, N. Pablant submitted a paper to *Nuclear Fusion* titled, “Investigation of the neoclassical ambipolar electric field in ion-root plasmas on W7-X,” comparing the measured ion heat flux to that predicted by neoclassical physics. The research involves experimental measurements taken with the PPPL-supplied X-ray imaging crystal spectrometer (XICS) on W7-X to verify the predictions of the neoclassical theory that was used to optimize W7-X’s ion confinement. The XICS measures the poloidal rotation and ion temperature profiles by measuring the Doppler shift and spreading of X-rays emitted by argon impurities in the W7-X plasma. The measurements are used to infer the radial electric field and the ion heat flux, both of which are required to verify the theoretical predictions. Submission of this paper satisfies the FY19 Notable Outcome for the Advanced Projects Department.

F. Nespoli visited General Atomics Aug. 19-26 and took part in experiments involving the impurity powder dropper (IPD) on DIII-D. The experiments were coordinated by A. Bortolon as a training for future operation of a similar PPPL-built IPD on LHD, foreseen for the upcoming LHD experimental campaign. He also took part in the Plasma Edge Theory conference in UCSD in which he presented the talk, “Filament dynamics in presence of X-point in turbulence simulations,” reporting on the disconnection of plasma filaments at the X-point in TOKAM3X simulations of WEST diverted plasmas.

## **INFORMATION TECHNOLOGY (M. COHEN)**

P. Bisbal attended the Linux Cluster Institute (LCI) workshop hosted at Rutgers University where he gave lectures on HPC cluster software stacks and managing user software. He also provided assistance to students during the labs.



## **COMMUNICATIONS & PUBLIC OUTREACH (A. ZWICKER)**

### **Communications (L. Bernard):**

The Office of Communications posted one press release to the PPPL website. It focused on the Lab's second annual Graduate Summer School, during which physics graduate students from around the country gather at PPPL for a week to learn about plasma and fusion. The story was also posted to the *Newswise* press release distribution service.

### **DIRECTOR'S OFFICE (S. COWLEY)**

On Aug. 28, PPPL and DOE plasma physicists met with materials scientists from the Princeton Institute for the Science and Technology of Materials (PRISM) at Princeton University. DOE FES Associate Director James Van Dam, PPPL Deputy Director for Research Jon Menard, and PPPL physicist Yevgeny Raitses visited the PRISM Imaging and Analysis Center (IAC). IAC Director Nan Yao, PRISM Executive Director Anuj Seth, and the Director of the PRISM Micro-Nano Fabrication Laboratory (MNFL) Ian Harvey gave tours and explanations to the visitors, demonstrating PRISM's research facilities housed in the IAC and MNFL. PPPL scientists frequently use the IAC's advanced materials characterization and imaging equipment, including the transmission electron microscope (TEM) for ex-situ evaluation of materials engineered by PPPL for plasma generation.

The FLARE (Facility for Laboratory Reconnection Experiment) vacuum vessel was transported to PPPL on August 29. The transport of the 22,000-lb. vessel involved four trucks, three crane lifts, two hoisting and rigging crews, and one large and delicate piece of scientific equipment. The arrival of the vessel is a major step forward in the progress of the FLARE project and the device will soon be placed in its final location within the C41 test cell. FLARE experiments will study magnetic reconnection interactions that are present in fusion plasmas, Earth's magnetosphere, solar corona, and other astrophysical phenomena.

This report is also available on the following web site:

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