



The PPPL Highlights for the week ending August 17, 2019, are as follows:

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

Recovery (J. Galayda):

Independent Project Review — The recovery project is in intense preparation for the upcoming independent project review (IPR) Aug. 27-29. A successful outcome for this review is a crucial step in determining whether the project is ready to be baselined. Project personnel have contacted review subcommittees to preview the review plan and to ensure that the committee's expectations for content and format are met.

Passive Plates — The NSTX-U recovery project team finalized preparations for the passive plates final design review (FDR). This is the last major step on the path to baselining the project.

Training — M. Cropper held a mandatory D-Site orientation training session for recovery project team members on Aug. 16. Additional training sessions will be scheduled for project team members unable to make the first session. The training sessions are in addition to the GET training required for all PPPL employees. All recovery project team members must attend D-Site orientation training in order to gain access to D-Site buildings. An additional mandatory training session will be held for team members who need access to the NSTX-U test cell.

U.S. ITER FABRICATION (H. NEILSON)

The Low Field Side Reflectometer (LFSR) design team continues to investigate critical manufacturing issues for the in-vessel antenna assembly. Two such issues are the machining of long narrow-diameter water cooling passages (gun drilling) and the sealing of their ends with welded plugs. Although the equipment will be manufactured in industry, the PPPL team is performing tests in order to better understand how to optimize the design for manufacturability. A small contract has been placed with a local machine shop to perform some gun drilling trials on a mock-up of one of the LFSR antennas. The aim is to ascertain the feasibility of machining long channels sufficiently close to a nominal center line to maintain a safe distance from the surface or from neighboring channels. In preparation for a plug welding test, a 5/8-inch thick steel plate with 20 racetrack-shaped weld sockets of prototypical size and geometry, along with 25 plugs, have been fabricated by the PPPL machine shop. Weld trials using these components will be performed to support the development of weld procedure specifications for the LFSR equipment.

Weekly

HIGHLIGHTS



ITER & TOKAMAKS (R. NAZIKIAN)

DIII-D (B. Grierson):

Research:

An experiment led by a team collaboration between PPPL and ORNL researchers was executed on DIII-D to investigate the pedestal structure in pellet-fueled and electron-cyclotron-heated (ECH) plasmas. A. Nelson and F. Laggner from PPPL together with A. Sontag and D. Shiraki from ORNL led the planning and execution of the experiment that relied on the ORNL fueling pellet-launching system. The experimental goals are to compare the density profile of the H-mode pedestal when varying the particle source from dominantly edge-localized using deuterium gas puffing to a more central particle source using frozen deuterium pellets. The achieved dataset enables to quantify the importance of particle transport and particle source location in setting the pedestal profile structure.

The newly commissioned impurity dropper was successfully used to drop single granules of vitreous carbon delivered into the DIII-D SAS divertor during detachment experiments. This experiment completes a milestone deliverable for controllably injecting single impurity granules for trace impurity transport studies connecting the divertor to the plasma core. Fast visible and UV spectroscopy provided by ORNL and LLNL was used to detect the ablation of the impurity in the divertor, and charge-exchange spectroscopy was used to observe the propagation of the impurity to the pedestal and core. These edge and core diagnostics will be used to assess divertor impurity leakage.

S. Haskey traveled to PPPL to present a Graduate Summer School seminar entitled “Measuring the Ion Temperature, Rotation and Density: Impurity and Main-ion Charge-Exchange Recombination Spectroscopy.” In the presentation, Haskey reviewed the principles of the diagnostic technique, as well as recent advancements in measurement capability.

Operations:

Commissioning of the single granule injector capability of the impurity dropper system was completed on DIII-D for upcoming experiments, supporting a FY19 milestone. The dropper was installed on DIII-D and tested with a new National Instruments remote controller by dropping single granules of vitreous carbon into a granule catcher system. Individual granule drops were verified by a LED-based granule monitor that uses the reduction of transmission from a granule passing through the miniaturized optical system.



ADVANCED PROJECTS (D. GATES)

Stellarators (D. Gates)

A paper entitled, "Tuning of the rotational transform in Wendelstein 7-X," by S. Lazerson has been accepted for publication in *Nuclear Fusion*. This paper addresses the effect of electromagnetic loads on the superconducting planar coils in Wendelstein 7-X (W7-X), measurement of said effect on divertor loads, and compensation through changes to the magnetic configuration. Simulations and measurements suggest that the superconducting coil set appears stiffer than finite element analysis would predict. Measurements scanning correction also confirm an increase in divertor neutral compression as the strike lines are moved toward the pumping gap. Only small corrections to the magnetic configuration were found necessary. Such experiments highlight the need for auxiliary coils in stellarators and the need for accurate modeling of coil deformations due to electromagnetic effects.

COMMUNICATIONS & PUBLIC OUTREACH (A. ZWICKER)

Communications (L. Bernard):

The Office of Communications posted one press release to the PPPL website. It announced that T. Stoltzfus-Dueck was given a DOE Early Career Research Award for exceptional scientists in the early stages of their careers. Stoltzfus-Dueck will use the five-year, approximately \$500,000-per-year award to develop and test models essential to plasma confinement. The story was also posted to the *EurekAlert* and *Newswise* press release distribution services.

DIRECTOR'S OFFICE (S. COWLEY)

S. Cowley, M. Zarnstorff, and J. Menard participated in the ARPA-E Fusion meeting held Aug. 13-14 in San Francisco.

On Aug. 14, C. Ferguson traveled to DOE headquarters in Washington, D.C. to meet with J. Fontaine, Deputy Director for Field Operations for the Office of Science and give her an update on PPPL.

This report is also available on the following web site:

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