



The PPPL Highlights for the week ending April 27, 2019, are as follows:

NSTX-U RECOVERY (R. HAWRYLUK) AND RESEARCH (S. KAYE)

Recovery (R. Hawryluk):

TF Bundle — For the TF bundle investigation, fabrication started on samples for the material testing that will be performed at PPPL. In addition, PPPL completed the machining and shipping of parts to external vendor CTD for making test samples that will be subject to tensile testing at CTD. On the analysis front, efforts are focused on benchmarking the model that simulates delamination, and the alignment of that model with another high-fidelity model that evaluates stresses with greater resolution. The aim is to have the models all working and in alignment using estimated property data in such time that they can be quickly updated when the material test data becomes available.

Magnets — The RFP for the fabrication of coils PF-1A, B, and C was re-sent to the qualified bidders on April 19, and bids were received on April 26.

Personnel Safety System (PSS) — Proposals were received yesterday in response to the two RFPs for the Personnel Safety Systems SIS and PLC design support. Evaluation of the proposals will commence next week, with awards of subcontracts expected shortly thereafter.

Research (S. Kaye):

Seminars — F. Poli gave a seminar to Princeton University graduate students in the plasma physics program entitled, “The Challenges and Glories of Integrated Tokamak Modeling,” on April 22. The seminar gave an introduction to integrated modeling, the concept of a whole device model and its components, and the missing pieces to have a self-consistent model. Examples of applications were given from research done at PPPL using TRANSP. This cycle of seminars is meant to be an introduction for first-year graduate students on the research conducted at PPPL in order to open a dialogue on opportunities for graduate thesis work.

Conferences — On April 17, S. Kaye gave a presentation summarizing the findings and recommendations of the National Academy of Sciences Panel on Burning Plasmas, of which he was a member, in the town hall session of the Sherwood Theory Conference.

M. Ono participated in the DIII-D Program Advisory Committee Meeting April 24-27 at General Atomics in San Diego. He served as a sub-group leader on the high-performance, fully-non-inductive advanced tokamak scenarios.



U.S. ITER FABRICATION (H. NEILSON)

The Low Field Side Reflectometer (LFSR) design team continues to develop the detailed design of the in-vessel antenna assembly, in preparation for a final design review in early 2020. A current focus is the details of fit and precision between LFSR equipment and interfacing port plug components being developed by the Russian Federation's ITER team. Important goals are establishing necessary content for the LFSR-to-Port Plug interface sheet, coordination with a remote handling assembly mockup activity, and freezing of certain interfaces to support the upcoming final design review of Equatorial Port 11.

Another focus of LFSR design work is manufacturability. Measurement performance requires the antennas to be precisely aimed along a line normal to the plasma surface. With no possibility of fine adjustment after installation, the design solution is a press fit of the circular waveguide antenna into a hole bored in a massive support block. A bearing sleeve and an installation tool have been designed as a solution that will allow the antenna to be tightly captured inside the bore with the freedom to expand or contract axially relative to the block without risk of galling.

Progress continues to be made toward final closeout of preliminary design following the Nov. 2018 review. This week an interface sheet between the LFSR and the central safety system was approved, paving the way for closeout of the second of three Category 1 chits. Recently the system requirements specification for LFSR instrumentation and controls was submitted to ITER following U.S. ITER approval. Revisions to the project's project flow and cabling diagrams are in final checking prior to submission.

ITER & TOKAMAKS (R. NAZIKIAN)

DIII-D (B. Grierson).

Research:

The article, "Main-ion Intrinsic Toroidal Rotation Across the ITG/TEM Boundary in DIII-D Discharges During Ohmic and Electron Cyclotron Heating," by B. Grierson et. al. has been published in *Physics of Plasmas* as an editor's pick:

<https://doi.org/10.1063/1.5090505>. This paper, based on the invited talk delivered at the 2018 APS-DPP meeting in Portland, OR, shows that in both the linear ohmic confinement (LOC) regime and with ECH, the main-ion toroidal rotation frequency is flat across the profile from the sawtooth region to the plasma separatrix, whereas the impurity carbon rotation possesses a gradient, which may mislead comparisons with theory.



ITER-JET (F. Poli):

Plans for PPPL contributions to the next JET experimental campaigns were discussed in a videoconference with F. Poli, M. Podesta, P. Bonfiglio, and JET colleagues. The discussion identified possible PPPL contributions to scenario development and EP physics within ongoing JET activities in preparation for the DT campaign in 2020.

THEORY (S. HUDSON)

Many members of the Theory department attended the International Sherwood Fusion Theory Conference April 15-17 at the Westin Hotel in Princeton. There were three invited talks presented by Theory department members: I. Dodin presented, "Mode-converting wave beams can be simulated without full-wave codes;" N. Ferraro presented, "Simulations of fast thermal quench using two-temperature model;" and A. Reiman presented, "Suppression of tearing modes by RF current condensation." Most of the other department members had poster presentations throughout the 2.5-day conference. This year's conference was hosted by PPPL; the conference chair was Theory department member F. Ebrahimi; and the local organizing committee consisted of Ebrahimi, T. Stoltzfus-Dueck, J. Jones, A. Mayfield, T. Perez, and L. Hefty.

In addition to the Sherwood meeting, there was the Center for Tokamak Transient Simulations (CTTS) SciDAC meeting held on April 14, which was attended by several Theory staff. N. Ferraro hosted the DPP-CPP town hall at Sherwood on the afternoon of April 17, and presented "Overview of APS-DPP Community Planning Process (DPP-CPP)," at the joint NAS/DPP-CPP town hall on April 18.

TRANSP (F. Poli):

TRANSP v19.2 was released this week. The new version features minor updates to the MMM7.2 module and additional options for TGLF, including the ability of using a larger number of modes for smoother fluxes. This version has been released by G. Staebler in March 2019. With version v19.2, the CURRAY and SPRUCE (obsolete) modules are no longer available in the production system. Also, the transition from Python2 to Python3 is completed and will be available with the next release in July.

SITE PROTECTION (D. CHRISTIE)

On April 25, members of the Emergency Services Unit (ESU) ran a live fire demonstration utilizing the fire extinguisher training prop and provided an information session on the PPPL fire apparatus during the 2019 Take Your Daughters and Sons to Work Day. Our PPPL youth community enjoyed looking at and sitting in Engine 66, the PPPL fire truck.



The Site Protection Division (SPD) is planning for upcoming participation in a Department of Energy Emergency Exercise Drill. SPD collaborates with IT, Cyber Security and other PPPL System SMEs for continued improvement in emergency response operations.

COMMUNICATIONS & PUBLIC OUTREACH (A. ZWICKER)

Communications (L. Bernard)

The Office of Communications hosted many groups from a wide range of institutions for tours of the Lab in April, including the following: Monmouth County Technical Schools, Raritan Valley Community College, the Hellenic Students Association of Princeton University, the Sherwood Fusion Theory Conference, North Brunswick High School, Princeton Windrows Retirement Community, the Girl Scouts of Central and Southern New Jersey, the Borough of Manhattan Community College, and the College of New Jersey. Communications also conducted a training for eight new tour guides on April 24.

On April 12 the Office of Communications organized a tour guide appreciation event. PPPL director S. Cowley gave certificates to the “top tour guides” of 2018, based on who gave the most tours. Awardees were: physicist D. Battaglia; engineers A. Brereton and R. Camp; physicist A. Dominguez, senior program leader in Science Education; engineer J. Guttenfelder; and graduate student J. Schwartz.

This report is also available on the following web site:

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