



The PPPL Highlights for the week ending April 6, 2019, are as follows:

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

Recovery (R. Hawryluk):

Magnets - The team inspected and received all the conductors shipped to PPPL, and the conductors arrived in good shape. Six conductors are still at ICAS Tratos in Italy where they will be shipped directly to production coil vendors. There are a total of 15 crates of conductors.

TF Bundle - Preparations continued for the TF Bundle Stage 1 review scheduled for April 9. The purpose of this review is to receive feedback from subject matter experts on preliminary TF Bundle analysis models and material testing plans. Successful completion of the Stage 1 review will allow the Recovery Project to complete material tests on the TF Bundle, gather final analysis results from those tests, and draw final conclusions during Stage 2.

Research (S. Kaye):

J. Menard is now PPPL Deputy Director for Research and S. Kaye is Interim Head of NSTX-U Research.

U.S. ITER FABRICATION (H. NEILSON)

A Low Field Side Reflectometer (LFSR) design review deliverable, "Stray Radiation Protection Design Report," was approved by the ITER Organization Central Team. The report addresses the design solutions planned to make the LFSR robust such that it can withstand the ITER environment. The LFSR transceivers are vulnerable to incoming electromagnetic radiation generated by the plasma, by other diagnostics, and by the electron cyclotron heating system. The protection system, consisting of both passive and active components, is discussed in detail. The report was authored by J. Anderson of LFSR partner General Atomics.

A structural model for a commercial off the shelf solution LFSR waveguide supports has been completed, and initial simulations have been performed. Results to date show that it is a promising alternative to a more costly custom solution, the current baseline. Continued finite element analysis will confirm modal behavior, thermal and fire results, and response to seismic events.

Weekly

HIGHLIGHTS



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.A. Grierson et. al. has been accepted for publication in *Physics of Plasmas* and chosen to be promoted as an Editor’s Pick. This paper, based on the invited talk delivered at the 2018 APS-DPP meeting in Portland, Oregon, 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. In the saturated ohmic confinement regime (SOC), both the main-ion and impurity rotation profiles develop a deeply hollow feature near mid-radius while maintaining the offset in the edge rotation, both implying a positive core residual stress.

International Long Pulse (F. Poli):

B. Harvey and Y. Petrov, from CompX, visited PPPL to discuss upgrades to the interface between GENRAY/CQL3D and TRANSP to enable simulations of EAST plasmas with two lower hybrid antennae. Contrary to non-superconducting tokamaks, where the duration of the heated phase is only a few seconds, superconducting plasmas have a duration of several hundred seconds. Consequently, simulations take much longer. The TRANSP group has discussed with CompX improvements to the interface that would reduce the computational time for a typical EAST discharge from over three weeks down to a couple of days.

ADVANCED PROJECTS (D. GATES)

Stellarators (D. Gates)

S. Lazerson has recently been informed of an opportunity to install fast ion loss detectors in Wendelstein 7-X before the next operational campaign. Two material probes will be removed from outboard steel panels, providing two locations on which Faraday Cup Fast Ion Loss Detectors (F.C. FILD) can be mounted. Flanges are available for wire routing and preliminary timetables have been arranged. Development and installation of these detectors is a part of Lazerson's Early Career Award and a high priority for IPP.

Weekly

HIGHLIGHTS



THEORY (S. HUDSON)

B. Sturdevant gave a talk titled, “A fully implicit kinetic electromagnetic model for magnetically confined fusion plasma simulations,” at the 19th Copper Mountain Conference on Multigrid Methods on March 28.

S. Jardin attended the 33rd meeting of the ITPA MHD Topical Group in Daejeon, South Korea, and made a presentation titled, “VDE simulations with M3D-C1,” by S. Jardin, C. Clauser, N. Ferraro, and I. Krebs.

TRANSP (F. Poli):

B. Harvey and Y. Petrov, from CompX, visited PPPL to discuss upgrades to the interface between GENRAY/CQL3D and TRANSP toward the modernization of the architecture of TRANSP. The proposed approach would not only accelerate the computational time by at least a factor of ten, but would enable more robust calculations and move TRANSP towards a more modern architecture.

COMMUNICATIONS & PUBLIC OUTREACH (A. ZWICKER)

Communications (L. Bernard)

The Office of Communications posted one press release to the PPPL website. It focused on J. Menard being named Deputy Director for Research, replacing M. Zarnstorff, who becomes Laboratory Chief Scientist. S. Kaye becomes Interim Head of NSTX-U Research. The story was also posted on the *Newswise* and *EurekaAlert* news release distribution services.

DIRECTOR’S OFFICE (S. COWLEY)

A meeting of the bi-annual PPPL Advisory Board was held on April 2 and 3. The purpose of the Advisory Board is to provide an outside independent review of PPPL science and operations; the advisory board then provides Princeton University with feedback and recommendations.

This report is also available on the following web site:

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

Weekly

HIGHLIGHTS

