



**The PPPL Highlights for the week ending September 16, 2017, are as follows:**

## **NSTX-U RECOVERY AND RESEARCH (J. Menard)**

### **Recovery**

J. May (DOE-FES) visited NSTX-U this week to tour the NSTX-U facility, meet with NSTX-U Recovery effort leadership, and meet with other laboratory leaders and staff.

Loading on the new inner PF coil configurations and interactions with the toroidal field have been quantified and are being factored into the design of new coil supports. Physics and engineering group members met on September 13 to discuss the approach to qualifying field errors for the inner PF coils and for other areas of the machine. To minimize net loads and magnetic field errors, spiral-wound coils are being specified for NSTX-U replacement inner PF coils. In the Coil Winding Facility, the test copper bundle has been fit into the mold enclosure in preparation for an upcoming test VPI.

The removal of the CHI gas injector has been completed. The neutral beam group successfully completed test runs of the Helium Refrigerator compressor water system this week.

### **Research**

N. Bertelli, R. Ellis, J. Hosea, E. Kim, R. Perkins, and G. Taylor traveled to Santa Monica, California, to attend the 2017 US/EU/JPN Workshop on RF Heating Technology and 2017 US/JPN Workshop on RF Physics. N. Bertelli gave a presentation entitled "Self-consistent calculation of the effects of the RF wave-field on the evolution of beam ion population in toroidal plasmas for HHFW heating regimes." R. Ellis gave a presentation entitled "Conceptual design of a 2-channel steady-state ECH launcher for KSTAR." J. Hosea gave a presentation entitled "RF Rectified Current Flow for HHFW and Minority ICRF Heating." E. Kim gave a presentation entitled "2D full-wave simulation of HHFW in the scrape-off layer of NSTX". R. Perkins gave a presentation entitled "RF rectification in LAPD in support of fusion research: relationship between rectified currents and potentials." G. Taylor gave a presentation entitled "Predictive simulations of low- $I_p$  NSTX-U discharges heated by 30 MHz FW power that achieve a high non-inductive current." They also toured the LAPD facility.



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

### **Steady State Electrical Network (J. Dellas)**

DC Distribution: The final shipment for this procurement was picked up at the supplier's facility and arrived at the ITER site on September 11.

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

### **EAST (R. Maingi)**

A new collaboration on fast ion physics was discussed between PPPL and ASIPP staff. The plan is two-fold: to apply the SPIRAL code to observations of far scrape-off layer ablation of injected particles on EAST with counter-neutral beams, connecting to DIII-D observations with injected impurity granules, and to conduct a new set of dedicated experiments on EAST to characterize these effects. G. Kramer and A. Bortolon will be involved on the PPPL side, joining J. Huang and J. Chang from the ASIPP side. R. Maingi and X. Gong will provide management and advice.

## **THEORY (A. BHATTACHARJEE)**

A Theory Department Seminar titled "Gyrokinetic simulation of boundary plasma in contact with material wall" was presented by S. Ku, PPPL Theory Dept., on Sep. 11. The abstract and presentation are available on the Theory Department website, <http://theory.pppl.gov/news/seminars.php?scid=1&n=research-seminars>

V. Duarte, PPPL Theory Dept. gave a talk titled "A criterion for the onset of wave chirping" at the PPPL Monthly Research Meeting on Sep. 12. A talk at the same meeting titled "Intrinsic core rotation" was given by T. Stoltzfus-Dueck, PPPL Theory Dept.

## **ADVANCED PROJECTS (H. NEILSON)**

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

With the start of a new experimental campaign on Wendelstein 7-X, all the U.S. partners have updated their Task Agreements, documenting current and near-future plans for the U.S. W7-X collaboration program. There are 21 active tasks involving 7 U.S. institutions, addressing a range of topics including core and edge transport research, plasma control, and diagnostics. All the task agreements are on-line at <http://advprojects.pppl.gov/home/w7-x/tasks-in-progress>.



Opportunities for increased collaboration with Japan's National Institute for Fusion Science (NIFS) were discussed during a visit to PPPL by Prof. M. Yokoyama of that institute. Collaborations in the areas of core transport and pellet fueling are already under way. Ideas for research tools that could be a basis for expanded collaboration on the Large Helical Device (LHD) stellarator, including an impurity dropper and an X-ray spectrometer, are of mutual interest. Having successfully completed its first operating campaign with deuterium plasmas, LHD offers new opportunities to advance stellarator physics understanding.

### **System Studies (C. Kessel)**

The Laboratory submitted a report on work performed in the period August 2016-2017 contributing to the K-DEMO concept study by S. Korea's National Fusion Research Institute (NFRI). This report summarized work on device configuration development (T. Brown), helicon wave heating and current drive (D. Mikkelsen), and time-dependent free-boundary transport simulations (C. Kessel). Overall these activities continue to explore options for plasma configurations and operations, and engineering systems and interfacing. The work is funded by NFRI under a Strategic Partnership Project agreement. PPPL provides detailed assessments in areas requested by NFRI as well as guidance in technical decisions.

### **COMMUNICATIONS (L. BERNARD)**

The Office of Communications posted three news releases this week to the PPPL website. One focused on research by graduate student J. Ng, along with PPPL physicist A. Hakim and PPPL Theory Head A. Bhattacharjee, applying a fluid simulation to the space plasma process behind solar flares, the Northern Lights, and space storms. Another focused on the appointment of PPPL physicist and head of the NSTX-U Recovery Project R. Hawryluk as PPPL interim director. The third focused on physicist G. Kramer's research into Alfvén eigenmodes and the loss of high-energy particles in fusion plasmas. All three news releases are posted on the *Newswise* and *EurkeAlert!* distribution services.

### **DIRECTOR'S OFFICE (R. HAWRYLUK)**

#### **QA/QC (Graham)**

The Safeguards and Security audit (audit 1717) activities have been completed and the draft report is being finalized by the audit team.

**This report is also available on the following web site:**

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