



The PPPL Highlights for the week ending August 4, 2017, are as follows:

NSTX-U RECOVERY PROJECT (R. HAWRYLUK)

A total of 40 presentations were prepared and uploaded to the web site for review by participants in the NSTX-U Conceptual Design Review, which was held August 1-3. The six most important systems for the Recovery effort were reviewed.

Several rounds of metrology of the in-vessel passive plate supports have been successfully completed and reviewed by Engineering. This concludes an activity in support of recommendations made during the Extent of Condition review.

NSTX-U RESEARCH (J. MENARD)

J. Menard (PPPL), D. Maurer (Auburn University and University Fusion Association), and M. Wade (General Atomics) co-chaired the US Magnetic Fusion Research Strategic Directions Workshop held at the University of Wisconsin-Madison during July 24-28, 2017. J. Menard presented "Overview of Goals and Organization of the Workshop," as well as a plenary presentation titled, "Increase Emphasis on Physics and Technology Innovations for Compact Tokamak Fusion." S. Sabbagh presented "Accelerated Fusion Development and Predictive Capability Utilizing Spherical Tokamaks + Initiative on Disruption Elimination." D. Gates presented "An Invigorated US domestic Quasi-symmetric Stellarator Program." A. Bhattacharjee presented "Strategic Role of Exascale Computing in US Magnetic Fusion Research." M. Jaworski presented "An Applied Energy Program to Achieve Economical Fusion Energy," and C. Kessel presented "The Fusion Nuclear Science Facility, the Break-In to the Fusion Nuclear and Ultra-Long Pulse Plasma Regime." The next community workshop is planned for the week of December 11 in Austin, TX.

G. Taylor visited the QUEST spherical tokamak at Kyushu University from July 18 to 28 to collaborate on the first current drive experiments with the newly installed 28-gigahertz gyrotron. On the final days of this collaboration, plasma currents of up to 86 kiloamps were obtained using 230 kilowatts of ECH/EBW injection for 1.25 seconds. Plasma current decreases were sometimes observed during the current ramp-up with rapid increases of the OII line intensity. These events prevented further increases in the plasma current and will be investigated in more detail during future run campaigns.



U.S. ITER FABRICATION (H. NEILSON)

Steady State Electrical Network (J. Dellas)

Uninterruptible power supply (UPS): The supplier has now successfully implemented cabinet cooling modifications to resolve an overheating problem that surfaced during internal testing. A revised shipping schedule has been negotiated and pickup at the supplier's facility is now scheduled for mid-September.

Diagnostics (R. Feder)

Motional Stark Effect (MSE): Cleanliness of the in-vacuum plasma facing metal mirrors clean is critical for MSE, a highly sensitive spectroscopic diagnostic that requires photon losses to be minimized. An *in situ* cleaning technique is necessary to remove material that migrates from plasma-facing surfaces during plasma operation and deposits on the MSE mirror surfaces. In a recent status meeting, Nova Photonics, which is developing mirror-cleaning technology for the ITER MSE system under subcontract to PPPL, reported having completed of fabrication of key equipment items for conducting the necessary tests. One unique and important feature of the Nova Photonics mirror cleaning chamber is the inclusion of electromagnetic coils surrounding the chamber that allow for partial simulation of the ITER magnetic field conditions.

ADVANCED PROJECTS (H. NEILSON)

Stellarators (D. Gates)

Recent upgrades to the TERPSICHORE code, an ideal-MHD stability code capable of calculating stellarator instability growth rates, have been benchmarked against various equilibria for both tokamaks and stellarators. The work was performed by N. Pomphrey, D. Mikkelsen and S. Lazerson, who compared older and newer versions of the TERPSICHORE code examining the response of an axisymmetric tokamak equilibrium to an external kink. They also analyzed the stability of both the baseline National Compact Stellarator Experiment (NCSX) equilibrium and a newly developed quasi-axisymmetric reactor equilibrium. After careful examination, the code was found to be in working order and was cleared for use in the optimization loop of the recently upgraded STELLOPT code. Efforts to explore stability of various stellarator configurations is now underway as part of the ongoing LDRD study entitled "Future Stellarator Configuration Investigation."

ENGINEERING & INFRASTRUCTURE (V. RICCARDO)



Gamma HQ, a company based in Virginia, has signed an exclusive license for the commercialization of the miniature integrated nuclear detection system (MINDS).

The final design review for the flowing liquid limiter for EAST occurred on August 4.

As part of research collaboration with NIFS Japan on High Temperature Superconducting cable sample test, PPPL worked on extracting the field and forces on the test sample for redesign of the mechanical support of these high current (>30 kA) HTS conductor samples in a 13 Tesla background field. Results indicate that present support design is not sufficient to take the mechanical loads.

SITE PROTECTION (F. WHITE)

Site Protection Division conducted an Emergency Management Review Committee forum to discuss the 2017 PPPL Emergency Exercise.

This report is also available on the following web site:

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