



The PPPL Highlights for the week ending September 21, 2012, are as follows:

U.S. ITER FABRICATION (D. JOHNSON):

C. Gentile and H. Neilson were on the Panel and S. Schoen, C. Neumeyer, and D. Johnson participated in the Lehman Review of the US ITER Project, held in Oak Ridge. This review focused on the plans for FY13 and FY14.

D. Johnson and R. Johnson participated in a meeting with IO Diagnostics and Procurement Divisions to discuss a number of issues with the diagnostics PA. Some high level issues remain, such as the specification of common manufacture of the port plug structures.

A meeting between MSE experts in the US and within the IO diagnostics team confirmed the present direction of activity in the US, which is to perform an initial assessment of the value of viewing the diagnostic neutral beam. The proposal involves use of precision measurement of the line shift associated with the motional Stark effect to constrain the calculation of the plasma equilibrium. The assessment will be reviewed in approximately 2 weeks, when a decision is made on the next phase of conceptual design.

The Procurement Arrangement for the US part of the ITER Steady State Electric Network was signed, satisfying a FY12 Notable Outcome for PPPL. Working with engineering services subcontractor URS, WBS Leader C. Neumeyer will now begin activities for 15 separate procurements of components in this area.

NSTX (M. ONO):

NSTX-U is in the Upgrade Project outage in FY 2012.

The NSTX-U Year End Report (pdf and Word) is available for download from:

http://nstx.pppl.gov/DragNDrop/Reports/Quarterly_Reports/2012/Q4/

The report has also been made available to FES/DOE.

The paper "Multi-energy Soft-x-ray Technique for Impurity Transport Measurements in the Fusion Plasma Edge" was published by D. J. Clayton (JHU) et al. in Plasma Phys. Control. Fusion 54, 105022 (2012) and can be found at <http://iopscience.iop.org/0741-3335/54/10/105022/>. The article describes a new technique for measuring impurity particle transport in the plasma edge. Perturbative transport measurements were performed with short neon gas puffs and the resulting emission was detected with a multi-energy SXR diagnostic.

These emissivity measurements were modeled using the STRAHL impurity transport code and ADAS atomic database, and the free parameters $D(r)$ and $v(r)$ were found using chi square minimization. Results show neon transport to be neoclassical through most of the plasma volume.

R. Kaita (PPPL) gave a seminar entitled "Scientific and Engineering Challenges for First Wall Materials in Magnetic Confinement Fusion" in the Department of Physics and Astronomy at Vanderbilt University in Nashville, Tennessee on September 19. Molecular and atomic studies at surfaces are among the active research subjects at Vanderbilt, including ultra-fast vibrational and electronic vibrational processes at surfaces and interfaces. With the growing emphasis on surface science at PPPL, these are areas of potential common interest.

NSTX Upgrade construction activities continued this week and are highlighted in the Engineering section below.

Preparations of non-upgrade equipment for plasma operations in the NSTX-U configuration continued with the ongoing assembly of new firing generators for the field coil power conversion system rectifiers. Painting and general maintenance of outdoor equipment also continued.

Access to the NSTX test cell will be available only through previous arrangement with the Upgrade Work Control Center.

ADVANCED PROJECTS (H. NEILSON):

Sam Lazerson and David Gates visited the National Institute for Fusion Science (NIFS) in Toki, Japan as part of the ongoing collaboration between NIFS and PPPL. David Gates presented a talk to the LHD research staff entitled "The origin of tokamak density limit scaling" which attempts to explain the difference between tokamak and stellarator density limits. Sam Lazerson presented a talk entitled "3D equilibrium reconstruction on LHD" in which he presented his recent progress on implementing the STELLOPT suite of codes for this purpose. Numerous productive individual discussions were held on several issues associated with reconstructions. Gates also met with NIFS management to discuss plans for future collaborations.

The first shipment of components for the upgrade of the U.S. x-ray imaging crystal spectrometer on LHD reached Japan this week. The upgrade will increase the spatial coverage of this diagnostic.

The Wendelstein 7-X (W7-X) Trim Coil project accomplished two milestones this week, a supplier preliminary design review (PDR) for the trim coil power supplies, and a peer review of the input-output (I/O) interface unit. Representing Applied Power Systems, Inc. (APS) of Hicksville, NY, Jim Murphy, Joe Pignatelli, and Tom Murphy visited PPPL this week to present their preliminary design for the power supplies. The review team chaired by Al von Halle found the APS design presentation and responses to be highly satisfactory. The successful completion of this review will allow APS to move forward to a final design review (FDR), scheduled for November 7 at APS's facility. At the peer review of the I/O interface unit, PPPL's Xin Zhao presented a design for the unit which will be used to relay the voltage and temperature signals from the Trim Coils to the W7-X central control system. The completion of this review will

allow the project to commence procurements needed to start fabrication of the units which are scheduled to be delivered early in calendar year 2013.

David Mikkelsen worked with the IPP Theory group in Greifswald this week on gyrokinetic stability benchmarks and analysis of a W7-AS experimental plasma. He installed at PPPL the recently generalized geometry generating package written at IPP, which has two very fast new methods of generating Boozer representations of stellarator configurations. He also learned to run the IPP gyrokinetic code GENE using stellarator geometry files, and began a benchmark of GENE, GS2, and GKV-X (the similar code from NIFS) that is based on the LHD configuration. Additional W7-AS discharges were selected for gyrokinetic stability analysis; these plasmas have substantial ion temperature gradients (unlike the first case which has been analyzed).

Hutch Neilson attended the Office of Science review of the U.S. ITER project as a reviewer. The review, which was held September 18-20 at Oak Ridge National Laboratory, focused on the U.S. ITER project plans for FY13 and FY14.

COMPUTATIONAL PLASMA PHYSICS GROUP (S. JARDIN):

S. Jardin and S. Kaye led a delegation to DOE on Friday to give a briefing on the development plan for the TRANSP/PTRANSP code. The others presenting were P. Bonolli (MIT) and A. Kritz (Lehigh). They met with John Mandrekas, Steve Eckstrand, Jim VanDam, and Ed Synakowski. The two hours of presentations covered planned physics development in the areas of free-boundary equilibrium, non-linear solver development, anomalous diffusion of fast ions, and RF/fast-ion interactions. Productive discussions were held regarding funding this activity in the future.

BUSINESS OPERATIONS (E. WINKLER):

Business Operations Department staff started the process of closing the books on FY2012.

Ed Winkler and Marie Iseicz met with Ray Kimble and members of his staff to discuss the Laboratory's financial results through August 2012 FYTD.

ENVIRONMENT, SAFETY, HEALTH & SECURITY (J. LEVINE):

Captain Darren Thompson attended training Hosted by the Department of Homeland Security (DHS) at the DHS Training Complex in Hamilton NJ on Enhancing Public and Private Partnerships in Public Safety.

The Princeton Site Office has approved the 2012 PPPL Hazard Survey.

ESU Ambulance A166 responded to Plainsboro for two mutual aid assignments.

A new card reader has been added to the Engineering second floor Print Room. A revised and update Access Request Form has been posted on the Homepage.

ESU personnel completed an assessment of exterior property signage as part of the suggestions for improvement provided during the recent DOE Safeguards and Security biennial audit.

A management safety walkthrough of the C-Site MG Building, ESAT Building and new Carpenter Shop was conducted on September 19. Safety conditions in these areas ranged from good to excellent.

OFFICE OF COMMUNICATIONS: (K. MACPHERSON):

Jeanne Jackson Devoe organized the following tours: PPPL hosted 135 high school students and teachers from Busan Science High School in Korea last week who came here as part of a tour of the U.S. with Medtrina Tours. The students came in three tours of 45 students on September 20-21. They watched a movie about fusion in the auditorium and were treated to a slide show in Korean put together by Kimin Kim and given by Kimin Kim and Young Seok Park. The students also were given a plasma science demonstration. Volunteer tour guides led the students on a tour of PPPL, which included the NSTX control room and NCSX. The tour guides were: H. Carnevale, S. Gerhardt, K. Kim, J. Ahn, J. Yoo, B. Blanchard, A. von Halle and Y. Park.

Kitta MacPherson submitted historic PPPL photos and wrote captions for DOE press headquarters. These will be included as part of a slide show highlighting accomplishments in the history of the DOE as part of a national electronic presentation October 4 by DOE to mark its 35 year anniversary celebration. The DOE will be live streaming a video presentation on "<http://energy.gov/live>"

BEST PRACTICES & EXTERNAL AFFAIRS (J. DELOOPER):

Arturo Dominguez is a new post-doc in Science Education after finishing his thesis at MIT. He will replace Stephanie Wissel who is leaving Princeton for the polar opposite climates of Hawaii and Antarctica in her new position at UCLA.

Andrew Zwicker attended a planning meeting for the third year of funding of the Energy Efficient Building HUB at The Philadelphia Navy.

The following PPPL Reports were posted to the web:

Lithium As Plasma Facing Component for Magnetic Fusion Research PPPL-4808

Authors: Masayuki Ono

Submitted to: Nova Scientific Publications, Inc. (August 2012)

Design and Analysis of the ITER Vertical Stability Coils PPPL-4809

Authors: Peter H. Titus, et. al.

Submitted to: Nuclear Technology Magazine (August 2012) TOFE 2012 Conference, Nashville, TN (August 27-31, 2012)

Implementation of B_N Control in the National Spherical Torus Experiment PPPL-4810

Authors: S. Gerhardt, D. Mastrovito, M.G. Bell, M. Cropper, D.A. Gates, E. Kolemen, J. Lawson, B. Marsala, J.E. Menard, D. Mueller and T. Stevenson
Submitted to: Fusion Science and Technology, (October 2010)

Application of Spatially Resolved High Resolution Crystal Spectrometry to ICF Plasmas PPPL-4811

Authors: Kenneth W. Hill, et. al.

Submitted to: Review of Scientific Instruments (May 2012) Presented at: High Temperature Plasma Diagnostics Conference, Monterey, CA

Overview of Innovative PMI Research on NSTX-U and Associated PMI Facilities at PPPL PPPL-4812

Authors: M. Ono, M. Jaworski, R. Kaita, C. N. Skinner, J.P. Allain, R. Maingi, F. Scotti, V.A. Soukhanovskii, and the NSTX-U Team

Submitted to: Journal of Nuclear Materials, (September 2012)

DIRECTOR'S OFFICE (B. SOBEL):

On September 19, Professor Alan M. Title, Stanford University, presented a colloquium entitled "Coordinated Solar Energetic Events".

This report is also available on the following web site:

<http://www-local.pppl.gov/director/highlights/2012-highlights.htm>