The PPPL Highlights for the week ending April 12, 2013, are as follows:

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

A Request for Proposals was issued for the ITER 22kV switchgear.

The DOE Princeton Site Office gave approval to the RFP package for the "Physics and Engineering Design Support and Diagnostic Hall Instrumentation Development for ITER Low-Field-Side Reflectometry (LFSR) Diagnostic System".

A Preliminary Design Review for the Residual Gas Analyzer was completed in Cadarache. Twelve category 1 chits were created and actions were distributed to resolve them.

A "LFS-R Physics Risk Mitigation Review Closure Statement" was issued by the Responsible Officer at the ITER Organization, providing ITER acceptance of the US proposal to modify the LFS Reflectometer design to a monostatic configuration.

NSTX (M. ONO):

NSTX-U is in the Upgrade Project outage in FY 2013. NSTX Upgrade construction activities continued this week and are highlighted in the Engineering section below.

Researchers from NSTX-U attended the 2013 US-EU Joint Transport Task Force Workshop in Santa Rosa, California, April 9–12. R. Maingi (PPPL) presented a plenary talk "The Role of Upstream Edge Transport and Stability in the Divertor Power Flux Footprint". This work recapped progress on the heat flux width studies that followed the 2010 Joint Research Target on SOL thermal transport, and included data and modeling from NSTX and DIII-D. Oral presentations were: "Linear Edge Gyrokinetic Simulations of NSTX Plasmas Without and with Lithium Coated PFCs" by J. Canik (ORNL), "Toroidal Asymmetry of Divertor Heat Flux by ELMs and 3-D Effects in NSTX" by J-W. Ahn (ORNL), “Parameter Dependence of Fast-Ion Redistribution Events” by E. Fredrickson (PPPL), “Energetic Particle Effects on Non-Resonant Kink Mode in Spherical Tokamaks” by G. Fu (PPPL), and “Gyrokinetic Prediction of Momentum and Impurity Transport in NSTX” by W. Guttenfelder (PPPL). Poster presentations were: “Low-Wave Number Pedenstal Turbulence in NSTX: Measurements, Parametric Scalings, and Simulations” by D. Smith (U. Wisconsin), “Properties of Alfen Eigenmodes in the TAE range on NSTX-U” by M. Podesta (PPPL), “Effect of MHD Bursts During the Plasma Current Ramp Up on Neutral Beam Ions and Beam Driven Current in NSTX” by D. Darrow (PPPL), “Studies of Electron-scale Turbulence and Thermal Transport in NSTX L-mode Plasmas” by Y.

Ren (PPPL), and “The Nearly Continuous Improvement of Discharge Characteristics and Edge Stability with Increasing Pre-discharge Lithium Evaporation on Graphite PFCs in NSTX” by R. Maingi. R. Maingi also served on the TTF Executive Committee. R. Maingi and Tom Rognlien (LLNL) organized the edge breakout sessions at TTF, and Maingi chaired the session on "Inter-ELM Pedestal and L-mode Edge Transport".

M. Jaworski (PPPL) has completed a series of experiments on the Magnum-PSI fusion materials test facility in Rijnhuizen in the Netherlands. This work was performed in collaboration with the Dutch Institute for Fundamental Energy Research (DIFFER). A sample of TZM, a molybdenum alloy that is a candidate NSTX-U high-Z plasma-facing component (PFC) material, was exposed to a divertor-like plasma. Impurity emission increased as the temperature of the uncoated TZM exceeded 1000 degrees C. Whether or not it is related specifically to this alloy is under investigation. A sample was also coated with lithium using an evaporator from PPPL. The lithium coating persisted through multiple exposures to Magnum-PSI plasmas, consistent with a high lithium redeposition fraction. No significant reduction in heat flux to the sample surface was observed, however, as expected if heat flux reduction by the lithium is due to momentum loss alone. To see if the amount of deposited lithium has an effect, the measurements will be repeated with thicker lithium coatings.

R. Maingi (PPPL) presented a talk at the Edge Coordinating Committee (ECC) Meeting (April 8, in Santa Rosa, Calif.) titled "Physics Setting the Heat Flux Width in Tokamaks: Experimental Results and Potential Consequences for ITER." S. Gerhardt (PPPL) presented a talk at the ECC "Update on Recent EP H-Mode Research". John Canik (ORNL) presented a talk "Gyrokinetic Pedestal Stability of NSTX and CMOD in ELM-free Regimes”. D. Battaglia (PPPL) presented a talk "Interpretive Analysis with XGC0". Canik and Maingi also participated in the planning meeting for the ECC technical session at APS 2013.

R. Maingi (PPPL) attended the APS-DPP Executive Committee meeting on April 13 in Denver Colorado.

Preparations for plasma operations in the NSTX-U configuration also continued with the ongoing assembly and testing of the new firing generators for the field coil power conversion (FCPC) system rectifiers. Four of the production firing generators are complete and bench tested, and five more are ready to start bench testing. The outer TF #12 winding was reinstalled at bay K after repairs and successful electrical insulation tests.

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

ITER & TOKAMAKS (R. WILSON):

DIII-D (R. Nazikian):

N. Gorelenkov presented a contributed talk at the TTF meeting titled " Validating the Critical Gradient Model for Alfven Eigenmode Ion Relaxation in DIII-D".

Brian Grierson presented a poster at the TTF meeting titled "Modification of Mean Field Poloidal Rotation by Turbulent Fluctuations".

W. Solomon presented a poster at the TTF meeting titled "Transport Studies in High Performance, Low Rotation Advanced Inductive Plasmas in DIII-D".

ADVANCED PROJECTS (H. NEILSON):

N. Pablant reported progress made during a recent trip to Japan in transport analysis of LHD high electron-temperature, electron-cyclotron heated plasma. The U.S. x-ray imaging crystal spectrometer (XICS) diagnostic provides ion temperature data in this regime that is not available from diagnostics that depend on the presence an injected neutral beam. The aim of the study is to determine thermal diffusivity coefficients for comparison with theory and other experimental techniques, and to compare transport properties before and after the start of the high temperature phase. The work is being carried out in collaboration with National Institute for Fusion Science (NIFS) scientists using the NIFS TASK3D analysis code. Progress reported includes: integration of XICS profiles into TASK3D, partial integration of U.S. equilibrium reconstruction code into TASK3D, identification of an LHD shot for initial analysis, and completion of a test run demonstrating successful integration of the new elements. The report also highlighted open issues being addressed by Pablant and NIFS collaborators in their ongoing joint work.

In the Wendelstein 7-X (W7-X) trim coil project, the fifth and final coil arrived at the W7-X site in Greifswald, Germany and the five instrumentation interface modules arrived in Germany, en route to Greifswald.

FUSION SIMULATION PROGRAM (W. TANG):

B. Tang presented the opening keynote plenary talk on "Exascale Challenges at the Extreme Scale in Fuson Energy Sciences" at the international Exascale Applications & Software Conference (EASC 2013), April 9-11, in Edinburgh, Scotland. The associated conference web site can be found at: http://www.easc2013.org.uk/programme. He also presented an invited seminar on April 11 in the School of Physics at the University of Edinburgh on "Scientific and Computational Advances in Fusion Energy Research."

THEORY (A. BHATTACHARJEE):

PPPL scientists participated in an international workshop held last week at the Princeton Center for Theoretical Science (PCTS) on "Stability, Energetics, and Turbulent Transport in Astrophysical, Fusion, and Solar Plasmas: Unifying Theoretical and Computational Tools". This interdisciplinary workshop aimed to share research strategies and tools (primarily in theoretical and computational research). There were presentations by eight PPPL scientists (seven from the Theory Department), including A. Bhattacharjee, F. Ebrahimi, A. Hakim, G. Hammett, H. Ji, J. Johnson, J. Krommes, and J. Parker. Most of the workshop was held in the PCTS facilities in Jadwin Hall on the Princeton University main campus. The complete program and abstracts can

be found at the following link (slides for many of talks will be posted there soon):
http://www.pctp.princeton.edu/pcts/Stabilityinplasmas2013/Stabilityinplasmas2013.html

PLASMA SCIENCE AND TECHNOLOGY (P. EFTHIMION):

S. Zweben worked with Professor Michael Burin and his undergraduate students at California State University at San Marcos (CSUSM), as part of the Off-site University Research (OSUR) Support program. A. Nagy (on assignment from PPPL to GA) also worked together with the team. The project at CSUSM mission is to improve our physics understanding of the 'plasma ball', the spherical filamentary discharge often seen in science exhibits. Our visit this week focused on setting up and operating two different intensified cameras recently loaned from PPPL to CSUSM, and powering the plasma ball with a new programmable high voltage supply. Both cameras were successfully set up and took excellent images of the plasma ball at exposure times of 4-10 μsec/frame. The new HV supply also worked well to create plasma with either square waves or short pulses of both polarity. There was a clear difference between positive and negative polarity for a square wave on the center conductor: one sign showing sharp plasma filaments, the other only a diffuse glow. We tried several ways to produce plasma using only a single sub-millisecond burst of high voltage, but found no visible plasma formation. Apparently the plasma formation process requires many cycles to become established, with some long-term 'memory' of previous filament being an important factor, even though almost no light is visible between cycles. This memory process and the filament formation and propagation will be investigated further using varying controlled gas mixtures of neon, argon, nitrogen, and xenon by Professor Burin and his students.

ENGINEERING AND INFRASTRUCTURE (M. WILLIAMS):

NSTX Upgrade (R. Strykowsky, E. Perry, L. Dudek, T. Stevenson):

Construction: The machining repair of TF 12 has been completed and the coil has passed electrical, hydro and flow tests. It has been re-installed on NSTX. Cable trays have been installed along the north wall and the NW labyrinth. Welding of the umbrella arch reinforcements continues - 58% of the uppers and 92% of the lowers are done. Insulation is being installed between the pairs of PF4 and PF5 coils as the modifications for these coil pairs gets underway. In-vessel cleaning was completed and fresh herculite has been installed. Fabrication of half of the bay L in-vessel stiffeners has been completed and preparations for installing it are underway. NB duct and OH winding fixtures fabrication continue in the Tech Shop.

Center Stack Upgrade: The second TF Bundle quadrant was removed from the mold early this week. The VPI appearance was excellent and the meggar test values again passed with flying colors. Inspection of the overflow pots confirmed that the CTD Hybrid epoxy cured without any evidence of overheating. The mold is now being prepped for quadrant three and is on track to begin conductor installation next week with the target of turning the mold around in three weeks. The OH Winding station and spool station fabrication continued throughout the week in RESA. The passive plate straps are now being fit up to the as-built condition of the plates. Shims are being placed beneath the straps to improve the fit to the as-built condition of the plates. The OH Winding station and coil reel frame fabrication continued throughout the week in RESA. The

upper umbrella lids fabrication was awarded to Astro machining in PA. A price quote was received from the vendor for the fabrication of the CS Casing stud welding fixture. Everson has loaded the first OTF coil into the VPI mold and is preparing for the first VPI. The second round of E-beam weld tests are scheduled to begin on April 12 at Electron Beam Welding in CA.

NBI Upgrade: The access platform was moved onto the BL2 source platform. Water manifolds were also attached underneath the source platform. BL2 handrails and kickplates around the entire lid were installed and completed. Calorimeter alignments, limit switch alignments and tests, and superstructure welds were completed. Calorimeter limit switch wiring is in progress. Decon of the BL2 surround and tools continued in order to make way for HVEs. Fabrication and leakchecking of LHe cryo line continues in the NB shop. LHe cryogenics line installation, welding, and leakchecking on the TFTR Test Cell South and East wall continues. HVE relocation has started in the TCB. The first HVE has been broken down into its three segments and moved to the floor plug location for lifts to the TTC. The second HVE is in position for dismantling. Floor plug hoisting gear is on order. Fabrication continues on the NB/TVPS duct components in the Tech Shop. Work continued on the SOW and drawings for the power supply cable and tray subcontract requisition package. Tray supports are being analyzed.

Office of Project Management (T. Stevenson):

Several link problems were identified with Work Planning system WP 6.1 and were corrected. The COG/RLM online training package narration was completed. Release for training is expected to begin next week. The monthly Project Status Review Board meeting was delayed one week until next Tuesday due to conflicts.

Facilities and Site Services (Viola, Donohue, Bryan, Jeanes, Pinto, Cargill):

Engineering Services: Work proceeds on Chiller 701 Maintenance and rebuild. A meeting was held for the SLI MG and Lab Bldg. portion of the project. Validation of the cost elements continues and the Building Life Cycle Cost model work has started.

Telecom: The Telecommunications Office requested from DOE and received a Government Emergency Telecommunications Services (GETS) calling card, which is a national security and emergency preparedness service of the Federal Government. The GETS service provides priority communications to the nation's emergency response personnel under a variety of conditions. GETS uses telephone lines to route priority calls to Federal, State, first responders, and owners/operators of the nation's critical infrastructures. GETS could be a valuable tool to be used by PPPL authorized personnel when they are unable to complete emergency calls through normal or alternate telecommunications means because of natural disasters, power outages, cable cuts, software problems or phone calling congestion. GETS is used in an emergency or crisis situation when the public telephone network lines are overloaded and the ability to complete a call by normal means is significantly decreased. The Telecommunications Officer will manage the service and develop a plan on who and how the GETS cards could be distributed at PPPL. The Telecommunications Office will periodically test the service. At this time, there is no cost to PPPL for this service. The Telecommunications Office completed a cost analysis of all the data lines to the Lab's Canal Pump House on Mapleton Road. The Telecommunications Officer discussed the applications and service options with the end users, Verizon and Comcast Cable. After review of the applications, service options and costs, it was determined that the current

Verizon data service is the most suitable and cost effective service at this time for the user applications.

Fire Protection: An interview team met with another candidate for the Fire Protection engineer position. A new high temperature alarm was included in the BAS and ACAMS system for L137/138 (PPLCC UPS rooms). Facilities is implementing two additional fire protection inspections to help assure that certain fire protection features function as intended. The first is a visual sprinkler examination. This inspection will check all of the sprinkler pipes and heads for problems--leaks, corrosion or any other obvious damage. The inspection will also include looking for any non-sprinkler items attached to sprinkler pipes since this is specifically prohibited in the code. This inspection is done from the floor and will include checking all areas once each year. The second new inspection is a fire barrier inspection. A fire barrier is any floor or wall that is designed to slow the spread of fire. Typical locations of fire barriers are the floors between stories of multistory buildings, walls of stairwells and walls between buildings or fire areas. Again, this inspection will be an annual visual inspection and will look primarily for openings that have been made and not properly fire sealed.

Energy: Effort has started on the FIMS Building assessments, which have been combined with energy audit tasks on the buildings that are due this cycle. This work by our energy manger will reduce duplicate efforts.

Material Services Highlights: "Other Accountable Inventory" is currently in process until August 2013 (previously known as “Sensitive Equipment Inventory”).

BUSINESS OPERATIONS (E. WINKLER):

Ms. Mary Faith Westervelt conducted a compliance review on samples of PPPL procurement transactions placed in the first two quarters of FY 2013. Ms. Westervelt is a practicing attorney and magistrate in the State of New York, and the former Head of Procurement and Property Management at Brookhaven National Laboratory.

J. Peterson, PPPL's Subcontract Audits and Compliance analyst, met with R. Templon and Ms. Westervelt to discuss plans for revising the PPPL Procurement Policies and Procedures Manual, and for updating Procurement's flowdown clause sets.

The Procurement Division entered PPPL's mid-year small business subcontracting performance statistics into the SBA's eSRS system.

The Procurement Division reported PPPL's mid-year Davis Bacon and Related Acts/Contract Work Hours and Safety Standards Act (DBRA/CHWSSA) construction contracting statistics to DOE Headquarters.

L. Lauria and T. Bleach met with representatives from the Baker Tilly, LLC (the Laboratory's external accounting firm) to review the conference management process; this was a part of their audit of travel expenditures for FY's 2011 and 2012.

PPPL submitted its draft FY2015 Field Work Proposals to the DOE Office of Fusion Energy Sciences to support the FY2015 budget planning process. In addition, PPPL submitted FY2015 budget information for its Safeguards and Security program to the DOE Office of Safety, Security and Infrastructure, and the DOE Princeton Site Office.

PPPL's report on its FY2012 Laboratory Directed Research and Development (LDRD) program was submitted to the DOE. The report includes an overview of the program and individual technical reports for each of the LDRD projects funded in FY2012.

A new Laboratory Directed R&D (LDRD) project for FY2013 titled "Development of a Plasma Data Management Program", was approved by the DOE Princeton Site Office.

Amendment 1 to the Work for Others Agreement with Lockheed Martin Corporation Space Systems Company was executed. The amendment increases the work scope and increases the funding to be provided by Lockheed Martin in the amount of $40,000. The Principal Investigator for this effort is Y. Raitses.

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

ESU Ambulance A166 responded to Plainsboro for three mutual aid assignments. ESU Engine 66 responded to Princeton for one mutual aid assignment.

ESU Driver/Operator S. Galie provided classroom and practical Fire Extinguisher Training on, April 9 for 9 students (seven employees, one graduate student and one subcontractor).

Platoons A and C completed the annual Physical Agility Test. This test is completed by all ESU Operations personnel while wearing full turn-out gear and self-contained breathing apparatus (SCBA). This nine-station test contains various Fire, EMS and Security components.

J. Dunnigan (Alkhateeb) received his certificate for Fire Service Instructor Level I from the Mercer County Fire Academy, NJ Division of Fire Safety.

SPD submitted articles for the next issue of the ESH&S Newsletter, including information on our two new Emergency Services Officers and Pedestrian and Bicycle Safety at PPPL.

The April ESH&S Newsletter and the March STOP Program Update were issued to all staff.

A management safety walkthrough of the LSB Penthouses took place on April 10. Safety conditions in these areas were found to be good to very good.

INFORMATION TECHNOLOGY (S. BAUMGARTNER):

A meeting with Mounir Awad of AC Power was held to develop software that can alleviate the manually-intensive effort to tabulate and reconcile our electrical energy vendors' monthly bill.

Candidates are being interviewed to replace a software engineer in support of NSTX-U.

A design review for the NSTX-U Digital Coil Protection System's "auto-tester" component has been scheduled for next week.

The Work Planning 6.1 Release had significant enhancements: Added a checkbox for laser; Changed the text to PPPL Layout Drawings/ NSTXU general arrangement drawing; In Interfaces/Impacts - remove text C site MG sets and replace with computing and control; In Special Processes - remove text computing and control and replace with chemical & MSDS review; In Required Reviews (ENG-033) section - add a new text box and text underneath the existing review of materials for magnetic impact line: "Review of materials for lithium impact and safety (notify Lithium Review Committee - mandatory)"

Members from Business Ops and IT attended a conference call briefing with Oracle to review the results/conclusions of the Oracle Insight program. The results of the evaluation will be used to help determine the Business Systems upgrade path.

A subject line prefix of [PPPL], PPPL surrounded by brackets, has been added to all emails which are sent to PPPL Group lists such as ALLEMP. Although not foolproof it is an indication that the email was probably generated by an authorized PPPL employee rather than a phishing attempt from outside PPPL. The IT Department is working on including the [PPPL] prefix on all emails generated by the various in-house systems such as requisitions, PCARD, monthly timesheets, account registration, and password changes.

OFFICE OF COMMUNICATIONS: (K. MACPHERSON):

C. Cane participated in the DOE Web Council meeting on April 11. Tom O'Neill of DOE will serve as the new chair, with the retirement of Suzanne Nawrot. The DOE Web Council has created its own wiki, which contains information about the DOE Web Council and also has an archive of previous DOE Web Council presentations:
https://powerpedia.energy.gov/wiki/DOE_Web_Council
Rob Roberts at DOE talked about Search Engine Optimization (SEO) findings, and using Google keywords, and how to take advantage of META tags. He also mentioned just by including the word, "zombie" in an article (http://energy.gov/articles/zombie-replicants-outperform-living) that the DOE received over 100,000 hits! The formation of a DOE Virtual University, a clearinghouse for learning and development (based on Drupal), was discussed.

G. Czechowicz completed the design and production of the ESH&S Newsletter.

J. Jackson DeVoe and G. Czechowicz edited, designed and produced the PPPL Weekly, including stories on the Young Women's Conference and a speech by A. Zwicker. The Women in Science story by J. DeVoe also ran in the April 11 edition of the Princeton Weekly Bulletin.

J. DeVoe helped arrange a tour of the Laboratory given by A. von Halle for John Rhoads and seven other people, including Adrian von Stechow from the Max Planck Institute and Akhira Kuwahata, of the University of Tokyo, which was hosted by B. Sarfaty.

J. Greenwald completed and delivered to the Princeton Digital Print Center all revisions for Quest, the PPPL magazine that will appear as an insert in the Princeton Alumni Weekly in July.

ITER Newsline published J. Greenwald's article on completion of the first quadrant for the center stack of the NSTX Upgrade.

K. MacPherson assisted several journalists, including a reporter from the Philadelphia Inquirer, and two student journalists from Princeton University on the federal budget and on NCSX.

E. Starkman provided images and enhanced images for the Weekly and slideshow. She also fulfilled outside requests for photographic services providing images and support as well as photographing Green Machine Award recipients and the Theory Conference on main campus. She also shot and edited five short films for a proposed National Lab collaboration.

BEST PRACTICES & EXTERNAL AFFAIRS (J. DELOOPER):

The following PPPL Report was posted to the web:
Comparison of Gas Puff Imaging Data in NSTX with the DEGAS 2 Simulation PPPL-4865
Authors: B. Cao, D.P. Stotler, S.J. Zweben, M. Bell, A.Diallo, B. LeBlanc
Submitted to: Fusion Science and Technology (November 2012)

OFFICE OF ACADEMIC AFFAIRS (N. FISCH):

On April 10, Nat Fisch visited Ben Gurion University, where he gave the Astrophysics and Cosmology Seminar, titled "Some Examples of Rotating Magnetized Plasma."

DIRECTOR'S OFFICE (B. SOBEL):

S. Prager attended the Workshop on Astrophysical and Fusion Plasmas held at the Princeton Center for Theoretical Science on main campus April 8-12.

On April 10, S. Prager, M. Zarnstorff, M. Ono, J. Menard, and R. Strykowsky attended the Budget Planning Meeting in Gaithersburg, Maryland.

This report is also available on the following web site:
http://www-local.pppl.gov/director/highlights/2013/2013-highlights.htm