



The PPPL Highlights for the week ending September 5, 2014, are as follows:

NSTX (M. ONO):

The paper "Taming the plasma-material interface with the 'snowflake' divertor in NSTX" by V. A. Soukhanovskii (LLNL) et al. Nucl. Fusion (2011) 51 012001. doi:[10.1088/0029-5515/51/1/012001](https://doi.org/10.1088/0029-5515/51/1/012001) has been selected for the shortlist for the 2014 Nuclear Fusion Award. The winning paper will be determined by a secret ballot of the journal's Board of Editors, and will be announced at this year's IAEA Fusion Energy Conference. The 'short list' consists of eleven papers judged to be of the highest scientific standard, selected from the journal volume published two years previous to the award year. Nominations are based on citation record and recommendation by the Board of Editors. The snowflake divertor configuration was proposed by D. D. Ryutov in 2007 as a possible solution for the plasma-material interface problem in magnetically confined fusion plasma devices (tokamaks).

ITER & TOKAMAKS (R. HAWRYLUK):

DIII-D (R. Nazikian):

R. Nazikian was session leader for a DIII-D experiment aimed at developing steady state Hybrid plasmas with robust $n=3$ RMP ELM suppression at high q_{95} (≈ 6.0) in the ITER similar shape. This would address a key question whether Hybrid plasmas are compatible with ELM suppression. ELM suppressed hybrid plasmas were obtained with the Ohmic transformer turned off for two seconds with peak $\beta_n=2.9$, $H_{98y2}=1.3$. The plasma current (0.95 MA) and normalized internal inductance were very steady for 1.3 sec with a small surface loop voltage (4 mV) corresponding to 40 kA Ohmic current. Analysis is continuing to assess the stationarity of the current profile.

E. Kolemen and the DIII-D team used for the first time a newly developed multi-mode NTM suppression capability in a DIII-D experiment. The system first aligned the ECCD to the $q=3/2$ and preempt the $3/2$ mode from occurring. When the $2/1$ mode appeared, the ECCD was steered under feedback control to the $q=2/1$ surface and used to suppress the $2/1$ mode and study the plasma recovery. The results show that the six sets of gyrotrons can be aligned under feedback control to multiple modes within a shot, track them as the q -profile evolves during the shot and successfully preempt and suppress them.

A. Nagy visited PPPL last week to participate in training in the use of the Lithium Granule Injector. The assembly was completed in approximately four days and successfully tested on the fourth day. The LGI is being shipped to DIII-D for lithium injection experiments planned for the fall campaign (Nov - Dec. 2014.)

THEORY (A. BHATTACHARJEE):

W. Fox and A. Bhattacharjee were co-authors on an article recently accepted in PRL, "Magnetic reconnection between colliding magnetized, laser-produced plasma plumes", written in collaboration with colleagues at the University of Rochester Laboratory for Laser Energetics, and the University of New Hampshire. The paper reports the results of experiments conducted on the OMEGA EP laser facility through a project "Dynamics and Instabilities of Magnetic Reconnection Current Sheets in High-Energy-Density Plasmas" funded through the National Laser User Facility program. In the paper, plumes of magnetized plasma are created by laser ablation of targets in concert with externally applied magnetic field, and a pair of oppositely magnetized ribbons are collided, forming a current sheet, and driving magnetic reconnection. The propagation and reconnection of the magnetized structures are observed with proton radiography, and in good agreement with particle-in-cell simulations.

J. Johnson and E.-H. Kim attended the American Geophysical Union Chapman Conference on Low Frequency Waves in Space Plasmas in Jeju, South Korea September 1-5. They presented invited talks on EMIC waves in space plasmas and ultra-low frequency waves at Mercury. <http://chapman.agu.org/spaceplasmas/>

ENGINEERING AND INFRASTRUCTURE (M. WILLIAMS):

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

Construction: The installation of tiles on the centerstack casing continues - the center section has been completed. Modifications are being made to the category 3/4 ground bus. The installation of cooling water hoses for the PF coils has started. Bus fit-ups continue under the vessel. Preparations continue for removing the 109' platform from bays A and L on September 19 so the lower ceramic break and PF1C can be lowered to the floor and moved into place under the machine. The installation of the centerstack pedestal will follow the fit-up of the lower ceramic break.

CS Upgrade: Installation of the TF Crowns was completed. The OH Bus connection on the bottom of the coil is being refitted with new connection hardware to meet the as-built connection. The installation of the water connections at the top and bottom of the TF conductors was started. The second weld for lower PF1C can was completed. (Machining of the flange is the next operation.) Martinez is about 75% complete on the type 1457 TF Lead extensions and hopes to wrap up the last of the cooling ports on September 5. Inspection is caught up as far as possible so as to not delay any progress on shipment. Venting of the CS tile screws was completed in the Tech Shop. The parts are ready for shipment to the plater on September 8.

BUSINESS OPERATIONS (K. FISCHER):

The following three proposals were submitted to NASA in response to the Heliophysics Technology and Instrument Development for Science solicitation.

- M. Yamada submitted "Laboratory Experimental Research on Magnetic Reconnection Layer in Collaboration with the Magnetospheric Multiscale (MMS) Mission." The proposed budget was \$58,000.00 for the three-year period of performance.
- W. Fox submitted "Study of Equilibrium Force Balance and Eruptive Instabilities of Solar-relevant Flux Ropes." The proposed budget was \$509,000.00 for three-year period of performance.
- H. Ji submitted "Multi-fluid Studies of Chromosphere Reconnection in Partially Ionized Laboratory Plasmas." The proposed budget was \$588,000.00 for the three-year period of performance.

Congressman Don Payne, Jr. requested a speaker on September 13 in Newark, NJ from the Department of Energy. John Hale III, Director DOE OSDBU asked A. White to attend representing the Department. The topic involves small business development and growth. The audience will include small business owners.

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

The annual Graduate Student Safety Training Class was conducted for six first year graduate students on September 5.

DIRECTOR'S OFFICE (C. AUSTIN):

On September 3-4, A. Cohen participated in the Financial Systems Modernization Independent Review at Lawrence Berkeley National Laboratory in Berkeley, California.

This report is also available on the following web site:
<http://www.pppl.gov/publication-type/weekly-highlights>