

## **NSTX-U Weekly Report (May 3, 2013)**

### **NSTX-U is in the Upgrade Project outage in FY 2013**

S. Kaye (PPPL) and S. Sabbagh (Columbia University) from NSTX-U were members of the DIII-D Five Year Review, which was held at General Atomics on Mon-Wed, April 29-May 1, 2013. The DIII-D group presented their overall objectives and detailed plans and facility upgrades proposed for the years 2014 to 2018. (S. Kaye)

The article "The dependence of H-mode energy confinement and transport on collisionality in NSTX" by S. Kay (PPPL) et al. was published in Nuclear Fusion, Vol. 53, p. 063005 (June 2013). The article investigates the scaling of the energy confinement time in lithiated and unlithiated plasmas, showing how the different confinement scalings with engineering parameters for these two sets of discharges can be unified when the scaling is expressed in terms of dimensionless physics variables. Both show a strong, almost inversely linear, scaling with collisionality, the normalized confinement time increasing strongly with decreasing collisionality. The increased confinement is due primarily to the broadening of the electron temperature profile with reduced collisionality, with these plasmas being more stable to both microtearing and Electron Temperature Gradient modes. At the lower collisionality, however, a hybrid Trapped Electron Mode/Kinetic Ballooning Mode is predicted to become dominant, consistent with the increase in anomalous ion transport as collisionality is reduced. (S. Kaye)

"Non-linear modulation of short wavelength compressional Alfvén eigenmodes" by E. D. Fredrickson (PPPL) et al. has been published in Phys. Plasmas **20**, 042112 (2013). The paper presents analysis using a simple 2-D dispersion relation that predicts CAE frequencies within approximately 5% and some aspects of the mode's poloidal structure. It also experimentally demonstrates coupling of the 1-2 MHz CAE to a low frequency ( $\approx 5$  kHz) kink-like mode. A proposed coupling mechanism is through fast ion drive via a predator-prey relationship with a modulated drive or damping term for the CAE. (E. Fredrickson)

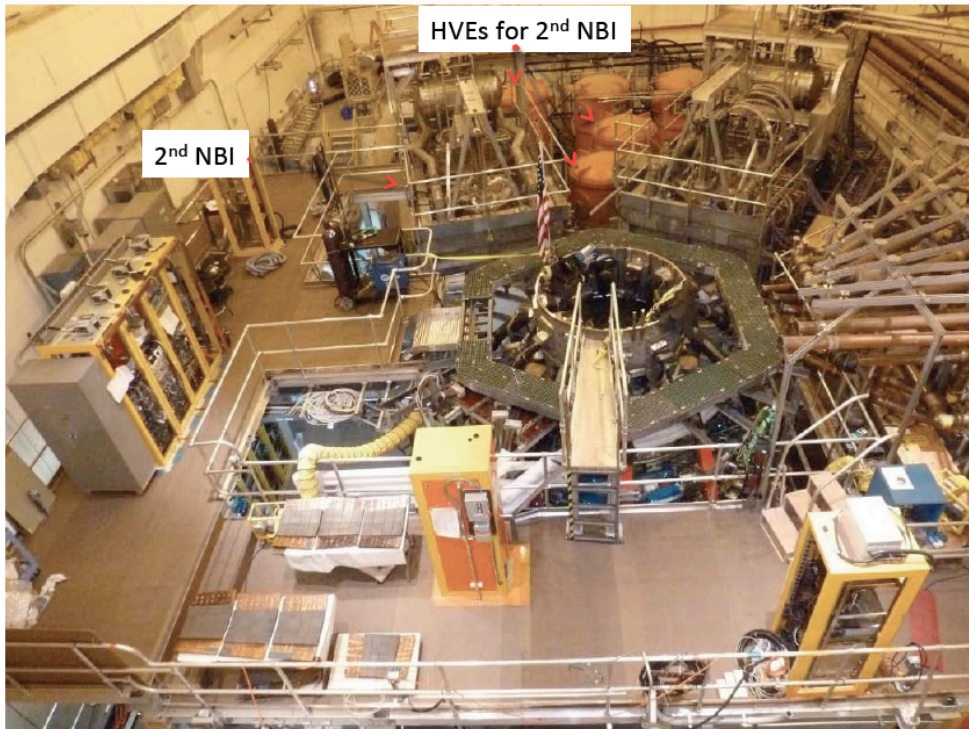
### **Engineering Operations (A. von Halle, C. Neumeyer)**

NSTX Upgrade construction activities continued with the epoxy fill and oven curing of the third TF inner quadrant. The last of the three high voltage enclosures (HVE) containing the power supplies for the NB2 ion sources has been assembled in place in the test cell.

Preparations for plasma operations in the NSTX-U configuration also continued with the successful review of the final design of the MPTS diagnostic exit flight tube and laser dump. Power testing of the new firing generators for the field coil power conversion (FCPC) system rectifiers continues. Eight of the planned thirty four firing generators have now been delivered to FCPC.

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

## HVEs in the NSTX-U Test Cell (May 2013)



High Voltage Enclosures for the 2<sup>nd</sup> NBI were successfully moved to the test cell ahead of schedule.