

## **NSTX Weekly Report (February 24, 2012)**

### **NSTX is in the Upgrade Project outage in FY 2012**

The following paper "Scaling of linear microtearing stability for a high collisionality National Spherical Torus Experiment discharge" by W. Guttenfelder (PPPL) et al. was published in Physics of Plasmas **19**, 022506 (2012). This paper investigates the scaling of the linear microtearing instability using gyrokinetic simulations based on an NSTX NBI-heated H-mode discharge. The mode is unstable over a significant region of the plasma ( $r/a=0.5-0.8$ ), and is destabilized with sufficient electron temperature gradient, collisionality, and beta. Growth rates peak at a finite ratio of electron collision frequency over mode frequency ( $\nu/\omega \sim 1-6$ ). Below this peak, the growth rate decreases with reduced collisionality, qualitatively consistent with global confinement observations. In some cases, increasing  $Z_{eff}$  is found to enhance the microtearing growth rate. Increasing magnetic shear ( $s$ ) and decreasing safety factor ( $q$ ) are both destabilizing for ratios around the experimental values ( $s/q=0.6-1.3$ ). Both the  $Z_{eff}$  and  $s/q$  scaling are opposite to those expected for the ETG instability offering an opportunity to experimentally distinguish the two modes. Kinetic ballooning modes are also found to compete with the microtearing mode at outer locations ( $r/a \geq 0.8$ ). (W. Guttenfelder)

The following paper "Conference Report on the 2nd International Symposium on Lithium Applications for Fusion Devices" by M. Ono (PPPL) et al., was published in Nuclear Fusion **51**, 037001 (2012). It is available on line at <http://stacks.iop.org/0029-5515/52/037001>. The paper summarizes the presentations at the 2nd International Symposium on Lithium Applications for Fusion Devices (ISLA-2011) which was held on 27–29 April 2011 at the Princeton Plasma Physics Laboratory (PPPL) with broad participation from the community working on aspects of lithium research for fusion energy development. (M. Ono)

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

NSTX Upgrade construction activities continued this week with the ongoing welding of additional support for the upper and lower vacuum vessel support ribs. Photogrammetry of the coils and vessel has been completed, and cross checked against Laser tracking measurements. In-vessel, the removal of the Liquid Lithium Divertor (LLD) plates has been completed, and preparations are underway to install the original graphite tiles. The footprint for the placement of the 2nd neutral beam-line (NBL2) has been laid out in the test cell, and the welding of required modifications to the water manifold on NBL1 has been completed. Good progress continues to be made on the fabrication of the neutral beam cryogenic lines, and internal beam-line assemblies. Also this week, open circuit testing of a prototype firing generator for the field coil power conversion system rectifiers was successfully completed. Power testing of this new firing generator will be performed before starting the manufacture of the production units for all the rectifiers.

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