

## NSTX-U Weekly Report (Nov. 2, 2012)

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

Members of the NSTX-U Team participated in the 54th Annual Meeting of the Division of Plasma Physics of the American Physical Society in Providence, RI, October 29 – November 2, 2012, and presented 4 invited/tutorial talks, 11 contributed talks and 48 contributed posters. The invited/tutorial talks were: “Modifications of impurity transport and divertor sources with lithium wall conditioning in NSTX” by F. Scotti (PPPL), “Interplay between coexisting MHD instabilities mediated by energetic ions in NSTX H-mode plasmas” by A. Bortolon (UCI), “Physics of tokamak plasma start-up” by D. Mueller (PPPL), and “Assessing low wavenumber pedestal turbulence in NSTX with measurements and simulations” by D. Smith (U of Wisconsin). (M. Ono)

A new paper "Spherical torus equilibria reconstructed by a two-fluid, low-collisionality model" by A. Ishida (Niigata University, Japan) and L. C. Steinhauer (Bothell, Washington) has been published in *Physics of Plasmas* 19, 102512 (2012). The paper describes reconstruction of the high-performance National Spherical Torus eXperiment (NSTX) [Bell et al., *Phys. Plasmas* 17, 082507 (2010)] using the two-fluid, low-collisionality equilibrium model [Ishida et al., *Phys. Plasmas* 17, 122507 (2010)]. Profiles of the electron and ion temperatures, the toroidal flow, the density, and the magnetic field pitch angle of the reconstructed equilibrium fit well the measured profiles of NSTX shot 132484 at 0.7 s. The reconstructed equilibrium shows that (1) the global two-fluid effect is fairly large; (2) the perpendicular flow of both species differs significantly from the ExB drift; (3) local gradient scale lengths can be smaller than the ion inertial length especially on the outboard side; (4) the electrostatic potential varies along a given magnetic flux by as much as several percent of the electron temperature in the core region. (A. Ishida)

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

Following the preparation for and the recovery from Hurricane Sandy, NSTX Upgrade construction activities resumed this week with the ongoing fit-up and welding of new umbrella legs. Preparations and scaffolding have been completed at Bays J-K for the vessel cuts needed to install the new NSTX vessel to NB2 interface flange, and the pre-job brief for making those cuts has been held. The cuts themselves are scheduled to start early next week. NB2 is now within a 1/4" vertically and horizontally of its final position. Another round of alignments will be performed following the Bay J-K vessel cuts.

Preparations of non-upgrade equipment for plasma operations in the NSTX-U configuration also continued with the ongoing testing of the prototype fault detector in conjunction with the new firing generator in a field coil power conversion rectifier. Efforts this week centered around the testing of the power conversion control link.

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