

NSTX-U Weekly Report (April 6, 2012)

NSTX-U is in the Upgrade Project outage in FY 2012

A paper entitled "High non-inductive fraction H-mode discharges generated by high-harmonic fast wave heating and current drive in the National Spherical Torus Experiment" by G. Taylor (PPPL) et al., has been published in Physics of Plasmas **19**, 042501 (2012). The paper reports the generation of a deuterium H-mode discharge in NSTX that has a plasma current of 300 kA, an axial toroidal magnetic field of 0.55 T, and a calculated non-inductive plasma current fraction of 0.7–1. 1.4MW of 30MHz high-harmonic fast wave (HHFW) heating and current drive was used in the experiment. Seventy-five percent of the non-inductive current was generated inside an internal transport barrier that formed at a normalized minor radius 0.4. Three quarters of the non-inductive current was bootstrap current, and the remaining non-inductive current was generated directly by HHFW power inside a normalized minor radius 0.2." (G. Taylor)

R. Maingi (ORNL) attended the ITPA pedestal group meeting in Hefei, China from Apr. 2-4, and presented a talk on behalf of A. Diallo (PPPL), "Evolution of the plasma profiles between ELMs in NSTX." (R. Maingi)

Stanley Kaye (PPPL) gave an Invited talk entitled "Why Magnetically Confined Plasmas Rotate, and Why it is Important" at the American Physical Society meeting in Atlanta, GA on April 2, 2012. The talk was in a session on Momentum Transport in Laboratories and Space. The talk focused on how rotation could influence both micro- and macro-turbulence (and thus plasma performance) as well as the mechanisms involved in external and intrinsic torque generation, and momentum transport. The talk stressed the close connection between ion-gyroradius scale turbulence and intrinsic drive and momentum transport. Approximately 60 people attended the talk. (S. Kaye)

Ben LeBlanc (PPPL) travelled to the Republic of Korea, February 20-29, 2012. This trip occurred within the framework of the USA-Korea Bilateral Agreement and is part of the NSTX-KSTAR Collaboration. He participated in the KSTAR Research Results Meeting in Muju. Ben, who is responsible for the NSTX Thomson scattering (TS) system, then visited the KSTAR TS installation and discussed with the TS group. Recommendations have been made including means of improving the laser delivery optics stability. Plans have been discussed of revisiting the TS group later this year, at the time of pre-run calibration work. (B. LeBlanc)

Engineering Operations (A. von Halle, C. Neumever)

NSTX Upgrade construction activities continued this week with the on-going welding of additional support on the upper vacuum vessel ribs, and the grinding away of the old TF coil clamps and clevis pads. New neutral beam armor supports have been tack-welded in place in the vessel, and engineering evaluations are in progress. New flux loops are being installed in the lower vessel while the passive plates are out for modification. Upper flux loops will be replaced once those passive plates are removed from the vessel. Fume hoods and power systems have been set up in the machine shop for soldering cooling lines in new TF center conductors. Initial tests have been performed on 20 foot long TF test pieces, and engineering continues on the further development of solder formulations and uniformity. Fabrication of new cryogenic lines for the second neutral beam continues, and platforms are being assembled in

the NSTX test cell for cryo-line installation. The refurbishment of the calorimeter for that beam-line, including the implementation of the new double bellows design, also continued. Technical staff continued on the preparation of the fabrication area for the new center stack.

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