NSTX-U Weekly Report (April 20, 2012)

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

The NSTX Upgrade Program Advisory Committee meeting was held April 17-19, 2012 at PPPL. The PAC commented on charge questions related to research plans during the NSTX Upgrade outage, collaboration activities, and 5 year plan goals and plans. Please see the PAC website for more detail: http://nstx-u.pppl.gov/program/program-advisory-committee/pac-31. (J. Menard, PPPL)

There were also 3 seminars presented by international members of the PAC. Hendrik Meyer (CCFE) presented a brief overview of the MAST program and plans, and progress towards MAST Upgrade, and also described recent work on "Dynamics of the L-H transitions at different density in MAST". Clemente Angioni (IPP Garching) described research on the "Role of and evidence for off-diagonal particle and toroidal momentum transport: experiments, theory and modelling". Finally, Houyang Guo (EAST/ASIPP) described progress and plans on the EAST experiment. (http://nstx.pppl.gov/DragNDrop/Program_PAC/PAC/PAC-31/seminars). (J. Menard, PPPL)

Luc Peterson successfully completed the requirements for his doctorate from Princeton University. His research advisors were G. Hammett and D. Mikkelsen. Luc defended his dissertation entitled "Relating Gyrokinetic Electron Turbulence to Plasma Confinement in the National Spherical Torus Experiment" on October 21, 2011. His dissertation compares experimental observations of high-k ETG turbulence in NSTX to numerical simulations of gyrokinetic turbulence (using the code GYRO), examining in particular the relationships between high-k density fluctuations, ETG turbulence, electron internal transport barriers and reversed magnetic shear. The dissertation also develops and compares new algorithms for simulating steady-state plasma transport, implementing them into the transport code TGYRO and applying them to some NSTX plasmas. A copy of the dissertation can be found online: http://search.proquest.com/docview/907106595. (L. Peterson, LLNL)

Tom Osborne of General Atomics visited NSTX twice, Jan 23-27 and March 12-16. Working with Rajesh Maingi (ORNL) on a paper comparing the NSTX lithium results with the DIII-D RMP results. For the pedestal tools added the ability to align the profiles to the separatrix based on two-point divertor model. Basically the profiles are shifted in and out relative to the separatrix until the two-point model gives a total power to the divertor consistent with the power entering the SOL. Added the ability to use a modified form of the Sauter bootstrap current based on XGC0 results in the kinetic EFIT tool. The XGC0 form was provided to us by C.S. Chang (PPPL). For DIII-D there is a very small decrease in the bootstrap current compared to Sauter predicted by the XGC0 formula. However for NSTX there is a significant (40%) increase. Submitted some NSTX cases base on the XGC0 form to Phil Snyder of GA for ELITE stability calculations. NSTX has generally had currents below the peeling limit based on Sauter and it is hoped that the XGC0 form will bring things into better agreement. (R. La Haye, General Atomics)

R. Maingi (ORNL) was one of 5 US representatives on the 2012 IAEA Fusion Energy Conference paper selection committee in Vienna, Apr. 16-20, 2012. (R. Maingi)

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

NSTX Upgrade construction activities continued this week with the completion of all vacuum-vessel rib welding needed to provide the additional support required for the upgrade. Modifications to the upper-passive-plates continues, and new upper flux loops are being installed. This work is expected to be completed by May 4th. A soldering station set up in the PPPL machine shop to solder cooling tubes into the new TF conductors has successfully completed a test piece, and heat runs have been performed on the first production conductor. Good progress also continues to be made on the fabrication and installation of new cryogenic lines for the addition of the 2nd NSTX neutral beam, and on the refurbishment of the calorimeter for that beam-line.

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