NSTX-U Weekly Report (Nov. 30, 2012)

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

Steve Sabbagh and Young-Seok Park of Columbia University visited NFRI to run experiment MP2012-04-23-021 on KSTAR. ELMs were mitigated using n = 2 applied fields using midplane coils alone, without particular alignment to the pitch of the confining field. Plasma stability parameters have reached and exceeded the n = 1 ideal no-wall limit, computed and published for H-mode profiles - a significant milestone for advanced tokamak operation. Initial analysis shows the ratio of normalized beta to li to exceed 4, which marks a 100% increase in this parameter compared to the 2011 run campaign. Plasma rotation was significantly altered in a controlled fashion using n = 2 applied fields, allowing study of the underlying physics, and providing a tool to access reduced plasma rotation. (S. Sabbagh)

Masayuki Ono (PPPL) attended the 29th annual meeting of Japanese Society of Plasma Physics in Kasuga Conference Center, Fukuoka, Japan, Nov. 27-30, 2012. He gave an invited talk entitled "Plasma-Wall Boundary Control With Lithium Divertor and Associated Plasma Confinement Improvements in NSTX". He also participated in a conference symposium organized on the plasma-wall interaction physics, and gave a symposium plenary talk which was a modified version of his invited talk. He also visited the nearby QUEST Facility during the conference and discussed the NSTX-U – QUEST collaboration activities with Prof. Hanada. (M. Ono)

Yang Ren (PPPL) attended the 22nd TOKI conference on "Cross-Validation of Experiment and Modeling for Fusion and Astrophysical Plasmas" held at TOKI city, Japan and presented a poster entitled "Experimental Observation of ExB Shear Induced Reduction in Electron-scale Turbulence and Thermal Transport in NSTX". In the poster, we presented the experimental observation of reduction in electron-scale turbulence and thermal transport in NSTX NBI-heated L-mode plasmas, and the observation is compared with linear and nonlinear gyrokinetic simulations. Toroidal flow induced ExB shear is found to be correlated with reductions in electron-scale turbulence and thermal transport not only temporally but also spatially. Linear and nonlinear gyrokinetic simulations have shown that ExB shear induced stabilization of ITG turbulence can be responsible for the observed reductions. Future work of further cross validation with numerical codes is also pointed out. The poster presentation was well attended and fruitful discussions with foreign colleagues were carried out. (Y. Ren)

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

NSTX Upgrade construction activities continued with the ongoing fit-up and welding of new umbrella legs, and the last of the upper umbrella legs was welded in place this week. The last pieces of the old bay K nozzle are being ground off in preparation for the bay J-K vessel cut scheduled for next week. Regarding the neutral beam work, a spool piece has been installed on the exit side of the NB2 box, and the torus interface valve is being installed. Water fittings have been installed and leak-checked on the 90" flange for the ion source side of the NB2 box, and refurbishment of that flange is expected to be completed in the shop by next week.

Preparations of non-upgrade equipment for plasma operations in the NSTX-U configuration also continued with the analysis of data from the recent successful power testing of a field power

conversion system equipped with a prototype fault detector and the new firing generator. Electrical insulation testing of hot and ground sticks used for safe access to NSTX power equipment was also performed this week.

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