

NSTX-U Weekly Report (September 6, 2013)

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

Prof. Tom Jarboe and Dr. Brian Victor of University of Washington visited PPPL to discuss the imposed dynamo current drive research at HIT-SI with the NSTX-U and PPPL researchers. Tom Jarboe gave an Experimental Seminar entitled “Progress with the HIT-SI experiment and Imposed Dynamo Current Drive”. In HIT-SI ($R_o = 0.34$ m, $a = 0.23$ m) two inductive helicity injectors, oscillating 90° out of phase, continually drive edge currents and impose perturbations. [Victor B. S. et al., Phys. Rev. Lett. 107, 165005 (2011).] Results including toroidal currents of over 90 kA, current gains ($I_{\text{tor}}/I_{\text{inj}}$) of 3.9, the highest ever achieved in a spheromak, and frequency scans from 14.5 kHz to 68.5 kHz are presented. Experimental data and two-fluid MHD simulations show the $n=1$ injectors initially building up an $n=1$ structure that reconnects to form the $n=0$ spheromak. The spheromak current then increases quiescently with the level of $n=1$ decreasing to only that imposed. By driving the edge current high and imposing high frequency fluctuations, a kink stable equilibrium can be very efficiently sustained with minimal interchange losses. Results from a reactor study are presented that show a spheromak reactor based on this current drive method would be economically competitive, even with natural gas. The presentation material is downloadable from the following URL:

http://nstx.pppl.gov/DragNDrop/NSTX_Meetings/Monday_Physics_Meetings/2013/2013_08_29/ (M. Ono, PPPL)

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

NSTX Upgrade construction activities continued with the fabrication of the final pieces for the inner TF bundle mold in preparation for the installation of the bundle for vacuum impregnation with epoxy (VPI). In parallel, crews are commissioning the equipment for the subsequent winding of the new OH coil on the completed TF inner bundle. For the second neutral beam, contractors have completed cooling piping runs from the Pump Room to the NSTX test cell, and will now begin making connections in the test cell.

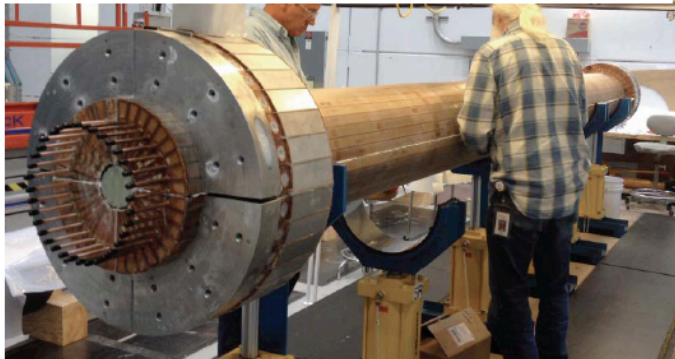
Preparations for plasma operations in the NSTX-U configuration also continued with the retrofitting of the new firing generators in their final positions in the field coil power conversion (FCPC) system rectifiers. The maintenance of the power supply and distribution equipment for the neutral beams continued.

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

Center Stack Is Coming Together

TF Bundle is nearing completion

Four TF quadrants were combined into a full TF bundle



Inner TF bundle with ground wrapping before VPI



Center-Stack Casing with tile studs

