

NSTX-U Weekly Report (January 29, 2016)

FY 2016 NSTX plasma operations

Operation Targets: Total - TBD

Completed: 2.33 run week and 241 plasma shots

The NSTX-U Program Advisory Committee (PAC) Meeting was held January 26-28, 2016 at PPPL. The PAC was charged with addressing four charges including assessments of: (1) the research planned to be carried out for the NSTX-U FY2016 experimental campaign, (2) the alignment between the NSTX-U research plans and goals and the FESAC / FES initiatives, research opportunities, and ITER urgent research needs, (3) progress and plans for the NSTX-U / PPPL theory partnership and how well this partnership and the broader NSTX-U research activities support integrated predictive capability, and (4) team prioritization of planned facility enhancements including: a lower divertor cryo-pump, non-axisymmetric control coils (NCC), a 28GHz ECH/EBW gyrotron, and conversion to all high-Z PFCs and liquid metals research. The NSTX-U team gave 11 presentations and two question-and-answer presentations to assist the PAC in addressing the charges. PAC members also gave seminars on JET and MAST-U status and plans prior to the meeting. PAC and seminar presentations are archived on the PAC-37 website: <http://nstx-u.pppl.gov/program/program-advisory-committee/pac-37> (J. Menard, PPPL)

A new paper "Blob structure and motion in the edge and SOL of NSTX" by S J Zweben (PPPL) J R Myra (Lodestar Research), et al. has just been published in Plasma Physics and Controlled Fusion, and is at: (<http://dx.doi.org/10.1088/0741-3335/58/4/044007>). In this paper, the structure and motion of discrete plasma blobs (a.k.a. filaments) in the edge and scrapeoff layer of NSTX is studied for representative Ohmic and H-mode discharges. Individual blobs were tracked in the 2D radial versus poloidal plane using data from the gas puff imaging diagnostic taken at 400 000 frames s⁻¹. A database of blob amplitude, size, ellipticity, tilt, and velocity was obtained for ~45 000 individual blobs. Empirical relationships between various properties are described, e.g. blob speed versus amplitude and blob tilt versus ellipticity. The blob velocities are also compared with analytic models. (S.J. Zweben)

Dr. Kunihiro Ogawa, of the LHD group at the National Institute for Fusion Science in Japan, visited the NSTX-U group for the week of January 25. During his visit, he contributed to a refinement of the absolute calibration of the NSTX-U neutron diagnostic system. Since LHD plans to start its first-ever deuterium in the fall, absolute calibration techniques for neutron diagnostics are of interest to both research groups. In addition, Dr. Ogawa worked on improvement of a zero-dimensional model of the neutron production rate from NSTX-U plasmas. Further topics of discussion included the status of the fusion proton detector for NSTX-U, and the use of thin film Faraday cup detectors for the measurement of fast ion loss in JET, NSTX-U, and LHD. (D. Darrow, PPPL)

Engineering Operations (A. von Halle, P. Titus)

A two week NSTX-U maintenance period started this past week. Cabling for the Lithium Evaporator (LITER) probes has been installed, and terminations have started. Good progress is being made on electrical installations for the Coaxial Helicity Injection (CHI) Monitoring system and for the Lowus/Zeus/MonaLisa diagnostics. Installation of piping for the new Argon Purge

system is in progress. The recent degradation of the PFIC upper coil insulation (not currently being used for NSTX-U experiments) has been traced to trapped water in the coil casing. A capillary tube was installed and the water pumped out for a corresponding improvement in electrical insulation. Dry leak checking has not yet revealed an active leak indicating the possibility that the water entered the coil casing during an unrelated water leak. Investigations will continue this coming week. The repairs to Neutral Beam (NB) 2A and 2B Trunk Lines have been completed and systems are being prepared to resume operations at the end of the maintenance period. All six NB ion sources are expected to be available to support upcoming experiments.

The NSTX-U Test Cell will be in controlled access this coming week for approved work.