

NSTX Weekly Report (September 3, 2010)

FY 2010 NSTX plasma operations

Planned: Total - 15 run weeks (Base - 14 run weeks, ARRA - 1 run week)

Total completed – 11.94 run weeks and 2268 plasma shots

Completed: Base – 10.93 run weeks and 2097 plasma shots

Completed: ARRA -1.01run week and 171 plasma shots

The NSTX FY2010 mid-run assessment was held Friday, August 27, 2010. Guidance for the assessment was provided, and research goals for the remainder of the run were outlined. Run-time usage by the topical science groups (TSG) was summarized and projections made for the remainder of the run. Each TSG then provided summaries of Experimental Proposal (XP) status and recommendations for prioritization of XP completion. The NSTX team then discussed the proposals and remaining issues. Run coordination is drafting a schedule taking this input into account. (J. Menard)

The manuscript, “A synthetic diagnostic for validation of electron gyroradius scale turbulence simulations against coherent scattering measurements” by F. Poli et al. has been accepted for publication in *Physics of Plasmas*. The paper details the systematic errors that can impact the comparison of gyrokinetic turbulence simulation results with measured turbulence spectra. These systematic errors include the locality of the scattering measurements, different wavenumber ranges, periodicity of modes along the toroidal direction and the time-stationarity of the simulated spectra. The paper shows results from a case study for National Spherical Torus Experiment plasmas using high-k tangential scattering system. (S. Kaye)

Charles Skinner attended the PMTS2010: International Workshop on Requirements for Next Generation PMI Test Stands in Fusion Research, Oak Ridge National Laboratory, Oak Ridge, TN, USA, August 31 – September 2, 2010 and gave a presentation entitled "*Considerations for liquid PFM test stands*". The meeting reviewed progress and plans for materials testing facilities worldwide to address materials issues in fusion. (C. Skinner)

Run Coordination (E. Fredrickson, S. Sabbagh - Columbia University)

Friday, August 27 we completed XP1021 by Adam McLean to study halo currents and divertor heat flux profiles during (ohmic) VDEs. Good two-color IR camera data and tile-current data was obtained. We started Alberto Loarte's XP1026 which investigates the effect of 3-D fields (primarily $n=3$) on the divertor heat and particle flux profiles during and between ELMs.

On Monday, August 30 we completed XP1026, Alberto Loarte's experiment begun on the previous Friday. We were then able to finish XP1029, Rajesh Maingi's study of the H-mode power threshold scaling with triangularity.

Tuesday, August 31, we started with XP1002, Vlad Soukhanovskii's experiment to look for impurity reduction by puffing gas into the divertor. In contrast to the results obtained in the initial part of this XP, divertor deuterium injection induced small ELMs so the effect of divertor gas puffing on core impurity accumulation was not readily discernable. This was followed by XP1056, Dennis Mansfield's experiment to drop lithium powder in the SOL to control impurities. The lithium dropper mechanism performed as designed and 'large' amounts of lithium were deposited in the plasma scrape-off layer, without deleterious effects on the plasma.

On Wednesday, On Sept 1 we continued with Ron Bell's DIII-D/NSTX similarity experiment on poloidal rotation XP1041. Poloidal rotation measurements were made and overall impurity levels (Z_{eff}) were low, but there remained a significant non-carbon impurity contribution. That was followed by Stewart Zeben's XP1051 to study the use of biased electrodes to control SOL. The outer strike point was successfully scanned across the biased electrodes and probes (BEAP) in the outer divertor.

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

NSTX plasma operations continued on extended shifts this past week with experiments utilizing lithium evaporation, plasma strike point control, various Liquid Lithium Divertor (LLD) conditions, neutral beam heating, and Resistive Wall Mode (RWM) feedback via the Switching Power Amplifier (SPA) driven error field coils. Vacuum conditioning of the HHFW antennas was performed in the off-shifts and also between plasma discharges during experimental operation, successfully achieving 20kV operations at half second pulse lengths. Also this week, the new disconnect switches for the addition of a second SPA system were installed.

Access to the NSTX test cell will be restricted during plasma operations this coming week. Access is expected to be available each evening.

Research Operations (M. Bell)

Boundary Physics Operations (H. Kugel)

- Liquid Lithium Divertor (LLD)
 - Components and materials for the 4-plate air heating system test were received.
- Lithium Evaporators (LITER)
 - LITER units K2 and F1 were used each day as required to support experiments
 - LITER units K1 and F2 were refilled.
- Lithium Powder R&D
 - Lithium powder injections were performed in support of XP1056.
- Molybdenum Inner Divertor Tiles
 - Diagnostic and CHI requirements for the four, Row-2 tile, 5 cm gas ports were reviewed for designing the molybdenum divertor tiles.. It was concluded that it would be desirable to retain one gas port for optical spectroscopy and one for investigating disruption quenching experiments.