

## NSTX Weekly Report (July 28, 2006)

**FY 2006 NSTX plasma operations completed on June 23, 2006.**

**Joule Milestone: 11 weeks**

**Achieved: 12.66 weeks**

- The NSTX Results/Theory Review was held on Wed-Fri, July 26-28. A total of 57 presentations on experimental/diagnostic, modeling and theoretical work from the six Experimental Task groups were made, both from on-site and remotely. The presentation material is available on the NSTX web. (S. Kaye)
- The paper “Model of filament structure in a turbulent plasma edge” by N. Nishino of Hiroshima University was recently published in Nuclear Fusion. The work was based on fast visible imaging of turbulence in NSTX plasmas. The paper “Radial electric field formation by the gyrocenter shifts of the charge exchange reactions at the boundary of fusion device by K.C. Lee (UC Davis) was published in the June 2006 issue of Physics of Plasmas. This work studies the effect of radial gradients of the neutral density in the presence of large orbit-sized ions, and the resulting gradient in charge-exchange losses. These gradients lead to the generation of radial electric fields, which has direct consequence on the turbulence suppression believed to be associated with the L-H transition.
- There will be no NSTX physics meeting on July 31. (S. Kaye)

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

Post-run NSTX diagnostic checks continued this past week with calibrations of CHERS, VIPS, OSXR, MPTS, High K Scattering, and edge optical diagnostics. The Faro Measuring Arm has been installed in the vessel to support these activities, and to perform inspections of the upper divertor. Troubleshooting of recent problems with connections to some of the internal magnetic sensors is in progress. The machine's umbrella lid has been removed to provide access for OH coil lead and TF joint inspections. Maintenance on the FCPC ground and line switches is in progress, as well as inspections of the MG set braking system.

The test cell will remain in free (card reader) access through the coming week.

### **Research Operations (M. Bell)**

#### Diagnostic Operations (R. Kaita)

- The post-run diagnostic calibrations are nearly complete. Calibrated diagnostics include the charge-exchange recombination spectroscopy (CHERS) system for ion temperature and plasma rotation measurements, filtered visible detector arrays in collaboration with the Lawrence Livermore National Laboratory, and the “optical” X-ray array from the Johns Hopkins University.

#### Boundary Physics Operations (H. Kugel)

An inspection of the upper NSTX vacuum vessel was performed. Four inner horizontal divertor tiles,

two from Bay-F and two from Bay-L were removed for analysis at SNL (W.R. Wampler, SNL). These tiles mirror similar tiles removed from the lower divertor, and will provide information on lithium transport to upper divertor region. (C.H. Skinner)

### **Physics Analysis (S. Kave)**

The general geometry GTC code has started to carry out gyrokinetic analysis of turbulence transport for actual NSTX discharges. It directly reads plasma profiles from the TRANSP experimental database, and numerical MHD equilibrium reconstructed by JSOLVER or ESC code using TRANSP radial profiles of the total pressure and the parallel current, along with the plasma boundary shape. First successful application has been demonstrated for the ITG driven turbulence of NSTX shot #115821. This global simulation radially covers from  $r/a=0.2$  to 1.0 with a linearly unstable region roughly located in  $0.45 < r/a < 0.8$ . Well-saturated fluctuations, with eddies of significant size compared to the minor radius, are observed. Our ongoing studies focus on the ETG driven turbulence and associated electron transport in NSTX plasmas under various experimental conditions, including reversed magnetic shear, H- and L-mode discharges.