

NSTX-U Weekly Report (November 20 2015)

NSTX-U is in the commissioning phase for the FY16 campaign.

NSTX-U physicists attended the 57th Annual APS-DPP meeting held in Savannah, Georgia on November 16 – 20, 2015. There were three NSTX/NSTX-U related invited talks: “The tokamak density limit: A thermo-resistive disruption mechanism” by D.A. Gates (PPPL), “Phase space effects on fast ion transport modeling in tokamaks” by M. Podesta (PPPL), “Torque-consistent 3D force balance and optimization of non-resonant fields in tokamaks” by J-K. Park. In addition, there were six NSTX/NSTX-U related oral contributed talks and 56 contributed posters. (M. Ono, PPPL)

Rob Goldston (PPPL) has won the “Nuclear Fusion Journal” award for 2015, for his 2012 paper on the “Heuristic drift-based model of the power scrape-off width in low-gas-puff H-mode tokamaks,” Nucl. Fusion **52** (2012) 013009. His model predicts that this width should be $2a/R^* \rho_p$. In 2011, when the paper was written, initial experimental results were roughly consistent with this model. Many more measurements and careful analysis by NSTX, C-MOD, DIII-D, ASDEX-U and JET teams have found results surprisingly close to this model. Even inner-wall limited plasmas seem to have a similar near-plasma high-heat flux feature. It is on the basis of this model that we project that NSTX-U will be a very effective device for studying PMI physics – because it will have a very high heat flux. (R. Goldston)

A tutorial “The snowflake divertor: by D. D. Ryutov (LLNL) and V. A. Soukhanovskii (LLNL) has been published in Phys. Plasmas **22**, 110901 (2015); <http://dx.doi.org/10.1063/1.4935115>. The paper provides a comprehensive review of the snowflake divertor magnetic configuration: its theory, main magnetic and plasma properties, and experimental results obtained with the snowflake divertor configuration on several tokamaks, including NSTX, to date. (V. A. Soukhanovskii)

An extensive review paper “Neoclassical plasma viscosity and transport processes in non-axisymmetric tori” by K.C. Shaing (National Cheng Kung University, Taiwan), K. Ida (NIFS, Japan), and S.A. Sabbagh (Columbia University) has been recently published in Nuclear Fusion **55** (2015) 125001 (<http://stacks.iop.org/0029-5515/55/125001>). The paper reviews substantial work on neoclassical transport processes, especially neoclassical toroidal viscosity (NTV) published in ~10 papers by Shaing through the period 2000 ~ 2010. Foundational NTV experimental work on stellarators and tokamaks is also contained in the review. (S.A. Sabbagh)

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

NSTX-U Operations activities were curtailed on Tuesday through Thursday this past week so staff could attend DOE Conduct of Operation Training. Diagnostic installation activities continued during this time, and vacuum leak checking and the sealing of vacuum leaks in the upper and lower umbrellas was successfully completed. Field Coil power testing per the Integrated System Test Procedure resumed at the end of the week.

The NSTX-U Test Cell will be in restricted access this coming week for field coil testing.