Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Core heat convection in NSTX-U via modification of electron orbits by high frequency Alfvén eigenmodes[1] N.A. CROCKER, UCLA, K. TRITZ, JHU, R.B. WHITE, E.D. FREDRICKSON, N.N. GORELENKOV, PPPL, NSTX-U TEAM — New simulation results demonstrate that high frequency compressional (CAE) and global (GAE) Alfvén eigenmodes cause radial convection of electrons, with implications for particle and energy confinement, as well as electric field formation in NSTX-U. Simulations of electron orbits in the presence of multiple experimentally determined CAEs and GAEs, using the gyro-center code ORBIT, have revealed substantial convective transport, in addition to the expected diffusion via orbit stochastization. These results advance understanding of anomalous core energy transport expected in high performance, beam-heated NSTX-U plasmas. The simulations make use of experimentally determined density perturbation (δn) amplitudes and mode structures obtained by inverting measurements from 16 a channel reflectometer array using a synthetic diagnostic. Combined with experimentally determined mode polarizations (i.e. CAE or GAE), the δn are used to estimate the ExB displacements for use in ORBIT. Preliminary comparison of the simulation results with transport modeling by TRANSP indicate that the convection is currently underestimated.

[1]Supported by US DOE Contracts DE-SC0011810, DE-FG02-99ER54527 & DE-AC02-09CH11466.

Neal Crocker
University of California, Los Angeles

Date submitted: 23 Jul 2015 Electronic form version 1.4