Abstract Submitted for the 56th Annual Meeting
Division of Plasma Physics
October 27–31, 2014
New Orleans, Louisiana

Category Number and Subject:

[ ] Theory [X] Experiment

Separation of Particle and Energy Transport in the H- and QH-mode Pedestal,[*] D.J. Battaglia, C.S. Chang, A. Diallo, B.A. Grierson, *PPPL*; K.H. Burrell, R.J. Groebner, *GA* – Net particle transport through the H-mode pedestal is dictated by anomalous transport mechanisms; however, a significant fraction of the energy transport is governed by enhanced transport of high-energy ions on collisionless orbits. The pedestal radial electric field (E_r) is constrained to the value that balances this ion flux with a pinch of colder main ions and impurities as demonstrated using XGC0, a self-consistent full-f multi-species neoclassical calculation that includes neutral recycling and transport. These calculations resolve how edge modes can increase the anomalous particle transport with only a small effect on energy transport, the observed scaling of the height of the density pedestal with I_p, and the structure of E_r in the pedestal. Quantitative agreement between XGC0 and the unique features of QH-mode, such as T_i anisotropy, large scrape-off layer T_i and intrinsic co-I_p edge rotation provide confidence that the simulation captures the kinetic effects in the pedestal that drive the neoclassical energy transport.

*Work supported in part by the US DOE under DE-AC02-09CH11466 & DE-FC02-04ER54698.