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Separation of Particle and Energy Transport in the H- and QH-mode Pedestal[1] D.J. BATTAGLIA, C.S. CHANG, A. DIALLO, B.A. GRIERSON, Princeton Plasma Physics Laboratory, K.H. BURRELL, R.J. GROEBNER, General Atomics — 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.

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