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Characterization of T_e and n_e Profiles of Discharges Driven Purely by Helicity Injection in the Pegasus Toroidal Experiment[1] G.M. BODNER, M.W. BONGARD, R.J. FONCK, M.D. NORNBERG, J.A. REUSCH, N.J. RICHNER, C. RODRIGUEZ SANCHEZ, C.E. SCHAEFER, University of Wisconsin-Madison — Understanding the electron confinement and transport in plasmas driven purely by local helicity injection (LHI) is critical to the demonstration of high-performance discharges. Given the proper operating conditions, purely LHI-driven discharges can feature peaked T_e profiles with $T_{e,0} \sim 150$ eV. Ohmic discharges in Pegasus at the same field level, $B_T \sim 0.15$ T exhibit similar T_e profiles albeit with higher n_e. At lower levels of B_T, LHI discharges feature hollow T_e profiles that increase in $<T_e>$ as the effective loop voltage, V_{LHI}, is increased. The increase in $<T_e>$ scales with V_{LHI} rather than the injector electrode voltage, V_{inj}, contrary to predictions from open field line theory. The hollowing of the T_e profile is hypothesized to be a combination of low ηj^2 heating power due to the hollow current profile and low-Z impurity radiation losses. Approximations of Z_{eff} in LHI discharges from voltage balance assuming purely Spitzer and neoclassical resistivity are ~ 3 and ~ 1, respectively. Thomson scattering and magnetic probe measurements indicate a pressure-free region between the kinetic and magnetic boundaries, possibly indicative of separate Ohmic and stochastic confinement regions. Overall scaling of I_p with V_{LHI} appears to be consistent with linear Ohmic confinement scaling assuming auxiliary ion and electron heating from magnetic reconnection.

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