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Recent Results from the Pegasus Toroidal Experiment[1] A.J. REDD, J.L. BARR, M.W. BONGARD, M.G. BURKE, R.J. FONCK, E.T. HINSON, D.J. SCHLOSSBERG, N.L. SCHOENBECK, K.E. THOME, Univ of Wisc - Madison — Pegasus is an ultra-low aspect ratio spherical tokamak (A=1.15), used to study the physics of low-A plasmas and develop non-solenoidal tokamak startup techniques. A combination of point-source magnetic helicity injection and poloidal field induction produces non-solenoidal tokamak plasmas with $I_p \leq 0.17$ MA using 4 kA injected current I_{inj}, consistent with the heilicity injection rate and a Taylor relaxation limit. A strong double layer sheath at the injectors describes the impedance of the injection circuit, implying the helicity injection rate for a given I_{inj} is a strong function of the local plasma density. Impurity ion spectroscopy indicates strong heating ($T_i \sim 0.5$ keV) during helicity drive. Passive gas-fueled electrodes can be used as helicity injectors, complementing active current sources and affording a means to optimize the Taylor and helicity injection limits. Ohmic plasmas in Pegasus are often unstable to peeling modes, an instability underlying edge localized modes (ELMs) in larger tokamaks. Time-resolved current profile measurements show that ELM-like, current-carrying filaments form at the plasma edge, which then detach and propagate outward.

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Aaron Redd
University of Wisconsin - Madison

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