Abstract Submitted
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Non-solenoidal startup and low-β operations in PEGASUS[1] D.J. SCHLOSSBERG, D.J. BATTAGLIA, M.W. BONGARD, R.J. FONCK, A.J. REDD, University of Wisconsin, Madison, WI, USA — Non-solenoidal startup using point-source DC helicity injectors (plasma guns) has been achieved in the PEGASUS Toroidal Experiment for plasmas with I_p in excess of 100 kA using $I_{inj} < 4\,kA$. The maximum achieved I_p tentatively scales as $\sqrt{I_{TF} I_{inj}/w}$, where w is the radial thickness of the gun-driven edge. The I_p limits appear to conform to a simple stationary model involving helicity conservation and Taylor relaxation. However, observed MHD activity reveals the additional dynamics of the relaxation process, evidenced by intermittent bursts of n=1 activity correlated with rapid redistribution of the current channel. Recent upgrades to the gun system provide higher helicity injection rates, smaller w, a more constrained gun current path, and more precise diagnostics. Experimental goals include extending parametric scaling studies, determining the conditions where parallel conduction losses dominate the helicity dissipation, and building the physics understanding of helicity injection to confidently design gun systems for larger, future tokamaks.

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