Abstract Submitted
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Point-source DC helicity injection on the Pegasus toroidal experiment[1] D.J. BATTAGLIA, M.W. BONGARD, B.A. KUJAK-FORD, E.T. HINSON, B.T. LEWICKI, A.J. REDD, A.C. SONTAG, University of Wisconsin - Madison — Point-source plasma guns are used to form tokamak-like plasmas via DC helicity injection on the Pegasus Toroidal Experiment. This has been demonstrated using plasma guns mounted in the lower divertor and near the outboard midplane. The plasma guns generate high-current density ($\sim$ 0.6 kA/cm^2) plasma filaments with minimal impurity production. Under appropriate conditions, the discrete helical filaments can transition into a tokamak-like magnetic topology. Magnetic measurements suggest the tokamak-like plasma expands into the vacuum region during the current ramp, consistent with radial force equilibrium. A significant increase in the line-integrated density indicates improved particle confinement, and the line-averaged density can approach the Greenwald density limit ($>$ 1 x 10^{19} m^{-3}). After gun shutoff, the tokamak-like plasma persists for several milliseconds. The maximum plasma current that can be created by the plasma guns is described by radial force balance, helicity balance and the requirements for Taylor relaxation. Using these limits, a simple model for point-source DC helicity injection with arbitrary plasma gun geometry is presented.

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