Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Development of Non-Solenoidal Tokamak Startup on the Urania Experiment[1] A.T. RHODES, M.W. BONGARD, University of Wisconsin-Madison, S.J. DIEM, ORNL, R.J. FONCK, J.A. GOETZ, B.A. KUJAK-FORD, B.T. LEWICKI, M.D. NORNBERG, A.C. PALMER, J.A. REUSCH, J.D. WEBERSKI, G.R. WINZ, University of Wisconsin-Madison — Initiation of plasma current without a central solenoid is a critical scientific goal for the spherical tokamak (ST). Following several campaigns on the Pegasus Toroidal Experiment using local helicity injection (LHI), which achieved $I_p > 0.2$ MA without use of an Ohmic solenoid, the facility is being shut down to upgrade into the Unified Reduced A Non-Inductive Assessment (Urania) experiment. This enhancement to the Pegasus facility will remove the central solenoid entirely, increase the toroidal field a factor of 4, up to 0.6 T, and investigate a variety of non-inductive startup techniques, including LHI, transient and sustained coaxial helicity injection (T- and S-CHI), poloidal field induction, and EBW radiofrequency heating and possibly current drive. A next-generation LHI system is being designed and built for Urania. Unlike the previous circular plasma-cathode electron sources used for LHI, this injector has a curved-slot arc channel of 1 cm width and 16 cm in length that is mounted off of a re-entrant port. This geometry allows for large A_{inj} for helicity input, while keeping w_{inj} low for a high Taylor limit, and matches the plasma edge curvature. A prototype of this design is currently in fabrication for initial testing with I_{inj} from 8–16 kA, and V_{inj} up to 1 kV.

[1]Work supported by US DOE grants DE-FG02-96ER54375 and DE-SC0019008.

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Date submitted: 28 Jun 2019 Electronic form version 1.4