Abstract Submitted
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Progress on Scaling the Sheared-Flow Stabilized Z-Pinch: The Fusion Z-Pinch Experiment "FuZE"[1] B.A. NELSON, U. SHUMLAK, E.L. CLAVEAU, E.G. FORBES, R.P. GOLINGO, A.D. STEPANOV, T.R. WEBER, Y. ZHANG, University of Washington, H.S. MCLEAN, D.P. HIGGINSON, A.E. SCHMIDT, K.K. TUMMEL, LLNL — The sheared-flow-stabilized (SFS) Z-pinch ZaP experiment was constructed based on calculations [1] showing stabilization of the kink and sausage instabilities with sufficient flow shear. ZaP experimentally demonstrated production and sustainment of an SFS Z-pinch for a wide range of plasma parameters, with densities up to $n = 5 \times 10^{22}$ m^{-3} and a pinch radius of a=1 cm. [2-4] The follow-on ZaP-HD (high density) experiment demonstrated scaling of the SFS Z-pinch to 2-3x smaller radii and 10x higher densities than ZaP, with up to 1 keV temperatures. [5] Based on the successful results of ZaP and ZaP-HD, the Fusion Z-pinch Experiment (FuZE) project is experimentally and computationally studying scaling the plasma performance toward fusion conditions, with the target of a smaller radius, a=1 mm, and higher density, $n = 2 \times 10^{24}$ m^{-3}. Initial FuZE experimental results show several hundred eV ion temperatures, with pinch currents of 100–200 kA and a few mm radius. 2D kinetic calculations show stabilization of instabilities at moderate sheared flows, and 3D kinetic calculations are in progress. 1. Shumlak PRL 1995 2. Shumlak PRL 2001 3. Golingo PoP 2005 4. Shumlak NF 2009 5. Shumlak PoP 2017

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