Abstract Submitted
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**Scaling of the Sheared-flow Stabilized Z-Pinch toward Reactor Conditions**[1] B.A. NELSON, B. CONWAY, U. SHUMLAK, Zap Energy Inc., T.R. WEBER, E.L. CLAVEAU, Z.T. DRAPER, E.G. FORBES, A.D. STEPANOV, Y. ZHANG, University of Washington, H.S. MCLEAN, D.P. HIGGINSON, J.M. MITRANI, K.K. TUMMEL, Lawrence Livermore National Laboratory — Zap Energy Inc. (ZEI) is scaling the sheared-flow stabilized (SFS) Z-pinch toward fusion reactor conditions. The UW and LLNL collaborated on the Fusion Z-Pinch Experiment (FuZE), sited at the UW. FuZE has demonstrated long-duration D-D fusion production periods of 8 $\mu$s [Zhang *et al.*, PRL 2019], thousands of times longer than the 1 ns MHD m=0 (sausage) and m=1 (kink) instability growth times. FuZE has reached 300 kA pinch currents, 1-2 keV ion temperatures, $1 - 2 \times 10^{23}$ m$^{-3}$ densities, and neutron yields of $> 10^5$ neutrons / pulse (for 20% $D_2$ / 80% $H_2$ admixtures). The UW and LLNL are presently upgrading the FuZE capacitor bank power supplies to push to 400 kA pinch currents. ZEI and the UW are teaming to measure electron temperatures on these 400 kA pinches. A new device will be built at ZEI with the goal of reaching equivalent scientific breakeven (scaling D-D operating conditions to equivalent Q if it were operated instead with D-T) at approximately 600 kA pinch currents. Status, plans, and reactor embodiment designs will be presented.

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