Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

A Reactor Development Scenario for the FUZE Shear-flow Stabilized Z-pinch[1] H.S. MCLEAN, D.P. HIGGINSON, A. SCHMIDT, K.K. TUMMEL, Lawrence Livermore Natl Lab, U. SHUMLAK, B.A. NELSON, E.L. CLAVEAU, R.P. GOLINGO, T.R. WEBER, University of Washington — We present a conceptual design, scaling calculations, and a development path for a pulsed fusion reactor based on the shear-flow-stabilized Z-pinch device. Experiments performed on the ZaP device [U. Shumlak, et. al., Nucl. Fusion 49 (2009) 075039] have demonstrated stable operation for ∼40 us at ∼150kA total discharge current (with ∼100kA in the pinch) for pinches that are ∼1cm in diameter and 100 cm long. Scaling calculations show that achieving stabilization for a pulse of ∼100 usec, for discharge current ∼1.5 MA, in a shortened pinch ∼50 cm, results in a pinch diameter of ∼200 um and a reactor plant Q∼5 for reasonable assumptions of the various system efficiencies. We propose several key intermediate performance levels in order to justify further development. These include achieving operation at pinch currents of ∼300 kA, where Te and Ti are calculated to exceed 1 keV, ∼700 kA where fusion power exceeds pinch input power, and 1 MA where fusion energy per pulse exceeds input energy per pulse.

[1]This work funded by USDOE ARPAe ALPHA Program and performed under the auspices of Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. LLNL-ABS-697801

Harry McLean
Lawrence Livermore Natl Lab

Date submitted: 15 Jul 2016 Electronic form version 1.4