Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

ZaP-HD: High Energy Density Z-Pinch Plasmas using Sheared Flow Stabilization[1] R.P. GOLINGO, U. SHUMLAK, B.A. NELSON, E.L. CLAVEAU, S.A. DOTY, E.G. FORBES, M.C. HUGHES, B. KIM, M.P. ROSS, J.R. WEED, Aerospace & Energetics Research Program, University of Washington — The ZaP-HD flow Z-pinch project investigates scaling the flow Z-pinch to High Energy Density Plasma, HEDP, conditions by using sheared flow stabilization. ZaP used a single power supply to produce 100 cm long Z-pinches that were quiescent for many radial Alfven times and axial flow-through times. The flow Z-pinch concept provides an approach to achieve HED plasmas, which are dimensionally large and persist for extended durations. The ZaP-HD device replaces the single power supply from ZaP with two separate power supplies to independently control the plasma flow and current in the Z-pinch. Equilibrium is determined by diagnostic measurements of the density with interferometry and digital holography, the plasma flow and temperature with passive spectroscopy, the magnetic field with surface magnetic probes, and plasma emission with optical imaging. The diagnostics fully characterize the plasma from its initiation in the coaxial accelerator, through the pinch, and exhaust from the assembly region. The plasma evolution is modeled with high resolution codes: Mach2, WARPX, and NIMROD. Experimental results and scaling analyses are presented.

[1]This work is supported by grants from the U.S. Department of Energy and the U.S. National Nuclear Security Administration.

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Date submitted: 24 Jul 2015 Electronic form version 1.4