place this abstract near those of my other colleagues from:
Magneto-Inertial Fusion, University of Nevada, Reno, and University of California, San Diego,
and in the special section for projects funded by the ARPA-E.

Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Instability control in a Staged Z-pinch, using an axial-magnetic field and target plasma[1] HAFIZ U. RAHMAN, Magneto-Inertial Fusion Technologies, Inc., F. BEG, Univ. CA, San Diego, F. CONTI, UCSD, A. COVINGTON, Univ. Nevada, Reno, T. DARLING, E. DUTRA, UNR, J. NARKIS, UCSD, P. NEY, MIFTI, M. ROSS, UCSD, E. RUSKOV, MIFTI, J. VALENZUELA, UCSD, F. WESSEL, MIFTI — Experiments on Zebra at UNR, and COBRA at Cornell, show evidence of a uniform pinch by the inclusion of low-Z target plasma (H, or D) inside a hollow gas shell of high-Z (Ar, or Kr) liner plasma. Adding an axial magnetic field of 1 - 2 kG improves the pinch stability. Numerical simulation is conducted using the 2-1/2 D radiation-MHD code MACH2. During implosion, magnetosonic-type shock waves propagate radially inward at different speeds in the liner and target plasmas, producing a shock front at the liner - target interface and a conduction channel ahead of the liner that preheats the target. This secondary conduction channel remains stable throughout the compression, even as the outer surface of the liner becomes Rayleigh-Taylor (RT) unstable. An axial magnetic field reduces the growth of the RT instability and enhances the secondary conduction channel. And in some cases reverses the effects of the RT instability, resulting in a uniform pinch. Simulations reveal that B_z field "piles-up" at the liner-target interface, instead of compressing uniformly over the entire volume. This scenario confines the target plasma in a magnetic well resulting in a high-β, stable plasma.

[1]Funded by the Advanced Research Projects Agency - Energy, under grant number DE-AR0000569

Frank Wessel
Magneto-Inertial Fusion Technologies, Inc.

Date submitted: 12 Jul 2017 Electronic form version 1.4