Abstract Submitted
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Staged Z-pinch experiments on the Mega-Ampere current driver COBRA[1] JULIO VALENZUELA, University of California San Diego, JACOB BANASEK, THOMAS BYVANK, FABIO CONTI, JOHN GREENLY, DAVID HAMMER, WILLIAM POTTER, SOPHIA ROCCO, Cornell University, MICHAEL ROSS, University of California San Diego, FRANK WESSEL, Magneto Inertial Fusion, Inc, JEFF NARKIS, University of California San Diego, HAFIZ RAHMAN, EMIL RUSKOV, Magneto Inertial Fusion, Inc, FARHAT BEG, University of California San Diego — Experiments were conducted on the Cornell's 1 MA, 100 ns current driver COBRA with the goal of better understanding the Staged Z-pinch physics and validating MHD codes. We used a gas injector composed of an annular (1.2 cm radius) high atomic number (e.g., Ar or Kr) gas-puff and an on-axis plasma gun that delivers the ionized hydrogen target. Liner implosion velocity and stability were studied using laser shadowgraphy and interferometry as well as XUV imaging. From the data, the signature of the MRT instability and zippering effect can be seen, but time integrated X-ray imaging show a stable target plasma. A key component of the experiment was the use of optical Thomson scattering (TS) diagnostics to characterize the liner and target plasmas. By fitting the experimental scattered spectra with synthetic data, electron and ion temperature as well as density can be obtained. Preliminary analysis shows significant scattered line broadening from the plasma on-axis (˜0.5 mm diameter) which can be explained by either a low temperature H plasma with Te=Ti=75eV, or by a hot plasma with Ti=3keV, Te=350eV if an Ar-H mixture is present with an Ar fraction higher than 10%.

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