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Cylindrical Liner Z-pinch Experiments on the MAGPIE Generator

GUY BURDIAK, SERGEY V. LEBEDEV, Imperial College London, ADAM J. 
HARVEY-THOMPSON, Sandia National Laboratories, GEORGE F. SWADLING, 
FRANCISCO SUZUKI-VIDAL, JONATHAN SKIDMORE, LEE SUTTLE, ESSA 
KHOORY, LOUISA PICKWORTH, PHILIP DE GROUCHY, GARETH N. HALL, 
SIMON N. BLAND, MARCUS WEINWURM, JEREMY P. CHITTENDEN, Im-
perial College London — Experimental data from gas-filled cylindrical liner z-pinch 
experiments is presented. The MAGPIE current (1.4 MA, 240 ns) is applied to a 
thin walled (80um) Al tube with a static gas-fill inside. The system is diagnosed ax-
ially using interferometry, optical streak photography and optical spectroscopy. We 
observe a series of cylindrically converging shock waves driven into the gas-fill from 
the inside liner surface. No bulk motion of the liner occurs. The timing of the shocks 
and their trajectories provide information on the shock launching mechanisms. This 
in turn allows a study of the response of the liner to the current pulse. Shock wave 
timing is compared to measurements of the liner resistance and optical images of 
the liner’s outside surface. The system provides a useful, essentially 1D problem for 
testing MagLIF relevant MHD codes, particularly with regards to EOS, strength 
and resistivity models. This work may also be relevant to the study of shocks in 
araphysical plasmas. The shocks launched into the gas radiatiate strongly; spa-
tially resolved optical spectroscopy data and radial electron density profiles from 
interferometry images provide evidence for a radiative precursor ahead of the first 
shock. Instabilities are seen to develop in the downstream regions.

Guy Burdiak
Imperial College London

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