Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Magnetized jets and shocks in radial foil Z-pinches: experiments and numerical simulations S.V. LEBEDEV, F. SUZUKI-VIDAL, L.A. PICKWORTH, G.F. SWADLING, G. BURDIAK, J. SKIDMORE, G.N. HALL, M. BENNETT, S.N. BLAND, J.P. CHITTENDEN, P. DE GROUCHY, J. DERRICK, J. HARE, T. PARKER, F. SCIORTINO, L. SUTTLE, Imperial College London, A. CIARDI, Observatoire de Paris, R. RODRIGUEZ, J.M. GIL, G. ESPINOSA, Universidad de las Palmas de Gran Canaria, E. HANSEN, A. FRANK, University of Rochester, J. MUSIC, Imperial College London — Different variations of the radial foil Z-pinch configuration have been investigated in the recent years on the MAGPIE generator (1.4 MA, 250 ns), particularly using over-massed aluminum foils with thicknesses of $\sim 15\mu$m. This setup is characterized by a highly collimated, supersonic jet on the axis of the foil surrounded by low-density ablated plasma, both moving with the same axial velocity of ~ 60 km/s. Latest results show that the formation and collimation of the jet is directly related to toroidal magnetic field advected with the flow. We present new experimental results that include Thomson scattering measurements of plasma flow velocity and temperature, and a first study on the effect of foil material on jet formation. The effect of advected toroidal magnetic field in the plasma flow is clearly evidenced using a new experimental configuration that produces counter-streaming jets. The results are characterized by the formation of shocks in which the effect of magnetic field and radiative cooling are significant. The setup also allows controlling the polarity of the advected fields at the interaction point between the counter-streaming flows, and results from experiments and numerical simulations will be presented and discussed.

F. Suzuki-Vidal
Imperial College London

Date submitted: 11 Jul 2014 Electronic form version 1.4