Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Production of high-beta magnetised plasmas by colliding supersonic flows from inverse wire arrays JACK HARE, LEE SUTTLE, SERGEY LEBEDEV, MATTHEW BENNETT, GUY BURDIAK, THOMAS CLAYSON, FRANCISCO SUZUKI-VIDAL, GEORGE SWADLING, SIDDHARTH PATANKAR, TIMOTHY ROBINSON, NICHOLAS STUART, ROLAND SMITH, Department of Physics, Imperial College London, QINGGUO YANG, Institute of Fluid Physics, Chinese Academy of Engineering Physics, JIAN WU, State Key Laboratory of Electrical Insulation and Power Equipment, Xi'an Jiaotong University, WOJCIECH ROZMUS, Department of Physics, University of Alberta — HEDP often exhibit a high plasma β and an electron Hall parameter greater than one. This results in a complex interplay between the transport of heat and magnetic fields, relevant to the Magnetised Liner Inertial Fusion (MagLIF) concept. We can produce such plasmas by colliding two supersonic quasi-planar flows from two adjacent inverse wire arrays made from carbon. The standing shock formed by the collision heats and compresses the plasma. The plasma flows advect magnetic fields which are perpendicular to the flow direction. Depending on the experimental set up, this can result in either flux compression or reconnection in the interaction region. The experiments are conducted on MAGPIE (1.4 MA, 250 ns current pulse). The formed shock is stable over long timescales ($\sim$100 ns), and the electron temperature (100 eV) is close to the ion temperature (500 eV), measured by spatially resolved Thomson scattering. Magnetic fields above 5 T is observed using a Faraday rotation diagnostic, and an electron density of around $5\text{x}10^{17}$ cm^{-3} is measured by interferometry.

Jack Hare
Department of Physics, Imperial College London

Date submitted: 02 Jul 2015 Electronic form version 1.4