Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Magnetic field advection in two interpenetrating plasma jets D.D. RYUTOV, N.L. KUGLAND, M.C. LEVY, C. PLECHATY, J.S. ROSS, H.S. PARK, Lawrence Livermore National Laboratory — Two laser-generated colliding jets can serve as a test-bed for the study of various astrophysical phenomena [1] and the general physics of self-organization [2]. For jets of a sufficiently high energy, collisions of the ions of one jet with the ions of the other jet are negligible, and the jets can penetrate through each other [1, 3]. On the other hand, the intra-jet collisions for high-Mach-number jets can be very frequent, so that each jet can be described by hydrodynamic equations [4]. We present an analytical study of the effects of this flow on large-scale magnetic fields either imposed by external sources or generated near the laser targets. Specifically, we consider an issue of the line tying ("Which jet is the magnetic field frozen into?"), possible stretching of the field by a shear flow, and the potential effect of hydrodynamic instabilities on the magnetic field. Work performed for U.S. DoE by LLNL under Contract DE-AC52-07NA27344.

[1] H. S. Park et al, HEDP, 8, 38 (2011).
[2] N.L. Kugland et al, submitted to Nature-Physics (2012).
[3] J.S. Ross et al, Phys. Plas., 19, 056501 (2012).
[4] D.D. Ryutov et al, Phys. Plas., 19, 074501 (2012).

D. D. Ryutov
Lawrence Livermore National laboratory

Date submitted: 16 Jul 2012 Electronic form version 1.4