Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Collision of two magnetized jets created by hollow ring lasers[1]
EDISON LIANG, Rice University, YINGCHAO LU, rice university and LANL, LAN GAO, PPPL Princeton, RUSS FOLLETT, LLE rochester, PETROS TZEFERACOS, university of chicago, DUSTIN FROULA, LLE rochester, CHIKANG LI, DONALD LAMB, university of chicago, RICHARD PETRASSO, MIT, HANTAO JI, princeton university, HUI LI, LANL — In recent OMEGA laser experiments we have created narrowly collimated MG plasma jets by using 20 OMEGA beams from one hemisphere to form a hollow ring pattern on a flat CH target, and characterized the properties of these jets as a function ring radius d and target composition (pure CH vs. 2 percent Fe-doped CH). The strong MG poloidal magnetic field of these jets is created via the Biermann Battery (grad P_e **x** grad n_e) mechanism by the collisions of individual laser blow offs and further compressed by the on-axis flow. The magnetic field gets stronger, more ordered and persists to greater distances from the target as d is increased from 0 to 1200 microns. Here we discuss the formation and evolution of magnetized high-beta shocks created by the collision of two such MG plasma jets, and the effects of changing the ring radius, target separation and composition. Results from 2D and 3D FLASH code simulations, and designs for future OMEGA experiments, will be presented. We will highlight the effects of electron thermal conduction on the shock structure and evolution. Potential applications of high-beta magnetized shocks to young stellar object outflows will also be discussed.

[1]work supported by DOE NNSA NLUF

Edison Liang
Rice University

Date submitted: 03 Jul 2019 Electronic form version 1.4