Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Volumetric Measurements of Spontaneously Generated Magnetic Fields at High Repetition Rate JESSICA PILGRAM, PETER HEUER, ROBERT DORST, SCOTT FEISTER, DEREK SCHAEFFER, CARMEN CONSTANTIN, CHRISTOPH NIEMANN, University of California, Los Angeles — The Biermann battery effect describes the spontaneous generation of magnetic fields by non-parallel temperature and density gradients, and is an important source of magnetic fields in astrophysical and high density laboratory plasmas. In particular, Biermann fields are generated in the corona of an expanding laser-produced plasma (LPP). A new high repetition rate (HRR) experimental platform has been commissioned at the University of California Los Angeles to study the three-dimensional spatial structure and parameter dependence of these fields. A HRR laser is incident on a plastic target, which may be placed in an ambient gas or magnetic field. The ablated laser-produced plasma (LPP) is collisional and characterized by the dimensionless ratio $L/d_e \approx 10$, where d_e is the electron inertial length and L is the LPP length scale. Density and temperature gradients in the LPP spontaneously generate magnetic fields via the Biermann battery effect, which are measured by a magnetic flux probe. We present volumetric measurements collected by moving the probe between shots to collect datasets comprised of several thousands of points. Results are compared to resistive MHD (FLASH) simulations.

Jessica Pilgram
University of California, Los Angeles

Date submitted: 01 Jul 2019 Electronic form version 1.4