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High Repetition Rate Volumetric Measurements of Spontaneously Generated Magnetic Fields in Laser Produced Plasmas[1] JESSICA PILGRAM, CARMEN CONSTANTIN, PETER HEUER, ROBERT DORST, University of California, Los Angeles, DEREK SCHAEFFER, Princeton, University of California, Los Angeles, CHRISTOPH NIEMANN, University of California, Los Angeles — The Biermann Battery effect is the spontaneous generation of magnetic fields due to misaligned temperature and density gradients in a plasma. This effect is known to spontaneously generate magnetic fields in many astrophysical phenomena and is theorized to be an important source of the primordial magnetic fields of the universe. Biermann Battery generated fields can be replicated and studied using high energy density laboratory plasmas where this effect occurs in the corona of an expanding laser produced plasma (LPP). In this poster we present a high repetition rate (HRR) experiment examining the three-dimensional spatial structure of these Biermann generated fields and their dependence on laser energy. A 10 J HRR laser is incident on a high-density polyethylene (C_2H_4) target creating a collisional LPP. The spatial structure of the resulting Biermann Battery fields is measured with a magnetic flux probe. Volumetric datasets containing thousands of points are recorded by moving the probe to various spatial positions between laser shots. Preliminary measurements show azimuthally symmetric magnetic fields with peak magnitudes of up to 160 G in our closest transverse planes which are a distance of 7 mm from the target surface.

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