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Measurements of laser-driven magnetic fields in quasi-hohlraum geometries BRADLEY POLLOCK, D. TURNBULL, C. GOYON, S. ROSS, W. FARMER, A. HAZI, LLNL, E. TUBMAN, N. WOOLSEY, York, K. LAW, S. FUJIOKA, ILE, J. MOODY, LLNL — Magnetic fields of 10-100 T have been produced with a laser-driven scheme using a parallel-plate target geometry, where a laser is directed through a hole in the front plate and irradiates the plate behind it. Hot electrons generated from the rear plate collect on the front plate, creating a voltage difference ($\sim$ 10-100 keV) between them. When the plates are connected via a quasi-loop conductor, this voltage sources current in the range of $\sim$ 0.1-1 MA which produces a magnetic field along the axis of the loop. The field is generated on fast ($\sim$ ns) timescales, and can be scaled by changing the drive laser parameters. Recent experiments at the Jupiter Laser Facility have allowed temporally-resolved measurements of the voltage between the plates with $\sim$ 1 J laser drive. Separate experiments at the Omega EP laser system have allowed direct Faraday rotation (in fused SiO_2) measurements of the field strength inside the current loop by employing the 4w polarimetry capability of EP. We have also measured the extent and structure of the field with proton deflectometry at EP. The maximum field recorded along the axis of the quasi-loop is $\sim$ 5 T at moderate (100 J) laser drive, and measurements of fringing fields outside the loop at 1 kJ indicate that the field increases to $\sim$ 40 T. These results are compared with modeling to determine the current driven in the target, and infer information about the plasma conditions which sourced the current. This work was performed under the auspices of the United States Department of Energy by the Lawrence Livermore National Laboratory under Contract No. DE-AC52-07NA27344.

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