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Magnetic Field Generation by a Laser-Driven Capacitor-Coil Target JESSICA CHENG, Brown University, LAN GAO, Princeton Plasma Physics Laboratory, Princeton University, Princeton, NJ, 08543, USA — Magnetic fields generated by currents flowing through a capacitor-coil target were characterized using ultrafast proton radiography at the OMEGA EP Laser System [1]. Two ˜1.25 kJ, 1-ns laser pulses propagated through the laser entrance holes in one foil of the capacitor, and were focused to the other with an intensity of ˜3 10^{16} W/cm^2. The intense laser-solid interaction induced a high voltage between the foils and generated a large current in the connecting coil. The proton data show tens of kA current producing tens of Tesla magnetic fields at the center of the coil. Theoretical lumped circuit models based on the experimental parameters were developed to simulate the target behavior and calculate the time evolution of the current in the coil. The models take into account important elements such as plasmas conditions for building up the voltage, the capacitance between the gap, the resistive heating and skin effect to gain insights on the field generation mechanism. Applications to other coil geometries and magnetic field configurations will also be described. [1] L. Gao et al, Phys. Plasma 23, 043106 (2016)

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