

Abstract Submitted
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Mapping kA Return Currents in Laser-generated Z-pinch Plasmas M.J.-E. MANUEL, N. SINENIAN, F.H. SÉGUIN, C.K. LI, J.A. FRENJE, H.G. RINDERKNECHT, D.T. CASEY, A.B. ZYLSTRA, R.D. PETRASSO, MIT, M. FATENEJAD, UC, F.N. BEG, UCSD — During capsule irradiation “hot” electrons leave the capsule and a residual positive charge is left on the target. The positive potential, of order 10^6 V, drives a return current through the supporting stalk structure. The first measurements of the spatial extent and magnitude of these return currents were conducted using monoenergetic proton deflectometry. From the measured proton fluence radiographs an absolute current was inferred and shown to increase from ~ 2 kA to ~ 7 kA during a picketed laser pulse. These images also demonstrate that current begins near the stalk surface and move outward in a similar manner to a single exploding wire Z-pinch. The work described here was done as part of the first author’s PhD thesis and supported in part by NLUF (DE-NA0000877), FSC/UR (415023-G), DoE (DE-FG52-09NA29553), LLE (414090-G), and LLNL (B580243).

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