Abstract Submitted
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Effect of Driver Impedance on Dense Plasma Focus Z-Pinch Neutron Yield and Beam Acceleration[1] J. SEARS, A. LINK, J. ELLSWORTH, S. FALABELLA, B. RUSNAK, V. TANG, A. SCHMIDT, Lawrence Livermore National Laboratory, D. WELCH, Voss Scientific — We explore the effect of driver characteristics on dense plasma focus (DPF) neutron yield and beam acceleration using particle-in-cell (PIC) simulations of a kJ-scale DPF [1]. Our PIC simulations are fluid for the run-down phase and transition to fully kinetic for the pinch phase. The anode-cathode boundary is driven by a circuit model of the capacitive driver, including system inductance, the load of the railgap switches, the guard resistors, and the coaxial transmission line parameters. Simulations are benchmarked to measurements of a table top kJ DPF experiment with neutron yield measured with He3-based detectors. Simulated neutron yield scales approximately with the fourth power of peak current, I^4. We also probe the accelerating fields by measuring the acceleration of a 4 MeV deuteron beam and by measuring the DPF self-generated beam energy distribution [2], finding gradients higher than 50 MV/m.

[1] A. Schmidt et al., PRL, 109 (2012);
[2] J. Ellsworth et al., RSI, 85 (2014)

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