

Abstract Submitted
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Measurements of Ion Beam Production and Neutron Yields in the LLNL High Gradient Z-Pinch Experiment J.L. ELLSWORTH, S. FALABELLA, B. RUSNAK, A. SCHMIDT, V. TANG, Lawrence Livermore National Laboratory — Dense plasma focus (DPF) z-pinch plasmas are known to produce abundant neutrons and particle beams, but the mechanisms behind the high gradient fields in DPFs are not well understood. We have a 4 MeV deuteron beam that can be used to probe the electric field gradients produced by the DPF experiment at LLNL. This information can be used in conjunction with fully kinetic simulations of DPF plasmas to further our understanding of the mechanisms that produce these beams. This knowledge allows us to optimize the gradients in the DPF for next generation compact accelerators. The beam and neutron output from the LLNL DPF have been characterized. We present measurements of beam and neutron production for a variety of pinch currents. Acceleration gradients greater than 0.5 MV/cm have been achieved, a record for sub-kJ DPFs. Our upgraded gun design allows a probe beam to pass through the plasma, allowing for the first-ever measurements of DPF gradients. This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344 and supported by the Laboratory Directed Research and Development Program (11-ERD-063) at LLNL.

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