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Kinetic Modeling of Ion Beams in Dense Plasma Focus Z-Pinches[1]

A. LINK, Lawrence Livermore National Laboratory, N. BENNETT, National Security Technologies, S. FALABELLA, D.P. HIGGINSON, Lawrence Livermore National Laboratory, R. OLSEN, Los Alamos National Laboratory, Y.A. PODPALY, A. POVILUS, B. SHAW, Lawrence Livermore National Laboratory, N. SIPES, National Security Technologies, D.R. WELCH, Voss Scientific, A. SCHMIDT, Lawrence Livermore National Laboratory — Dense plasma focus (DPF) Z-pinches are compact devices capable of producing MeV ion beams, x-rays, and (for D or DT gas fill) neutrons. We report on predictions of ion beam generation using the particle-in-cell code LSP. These simulations include full-scale electrodes, an external pulse power circuit and model through the run-down phase as a fluid, transitioning to a fully kinetic simulation during the run-in phase and through the pinch. Simulations of a deuterium filled DPF predict a substantial number of ions accelerated to energies greater than 50 keV escape the dense plasma in the pinch region and could be used to enhance total neutron yield by employing a solid target. Results of the simulations will be presented and compared to experimental observations. LLNL-ABS-697617

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