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**PIC Simulations of Dense Plasma Focus Z-pinch** A. SCHMIDT, D. BLACKFIELD, V. TANG, LLNL, D. WELCH, D. ROSE, Voss Scientific — Dense Plasma Focus (DPF) Z-pinches are abundant sources of radiation, including neutrons, x-rays, and energetic electron and ion beams. Energetic protons and deuterons up to 10 MeV have been observed from cm-scale-length pinches, implying average acceleration gradients up to 1 GV/m. Gradients of this magnitude could potentially be exploited in the design of a compact accelerator. However, the physical mechanisms behind these immense electric fields are not well understood and thus DPF design cannot currently be optimized to maximize these gradients. At LLNL, we have assembled a DPF Z-pinch experiment and will be using a 4 MV ion probe beam to directly measure pinch-induced gradients. LSP, a fully relativistic electromagnetic Particle-In-Cell (PIC) code is used to perform time-dependent simulations of the pinch phase of the DPF and to gain insight into the origin and evolution of the large accelerating fields. LSP can be used in 2D or 3D geometries and can model the ions kinetically with fluid electrons (hybrid model) or model both species kinetically (fully kinetic model). We present results from both pressure and sheath width scans using LSP. 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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