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Simulations of a dense plasma focus on a high impedance generator[1] ANDREY BERESNYAK, JOHN GIULIANI, STUART JACKSON, STEVE RICHARDSON, STEVE SWANEKAMP, JOE SCHUMER, ROBERT COMMISSO, Naval Research Laboratory, DAVE MOSHER, Syntek Technologies, BRUCE WEBER, ALEXANDER VELIKOVICH, Naval Research Laboratory — We study the connection between plasma instabilities and fast ion acceleration for neutron production on a Dense Plasma Focus (DPF). The experiments will be performed on the HAWK generator (665 kA), which has fast rise time, 1.2 μs, and a high inductance, 607 nH. It is hypothesized that high impedance may enhance the neutron yield because the current will not be reduced during the collapse resulting in higher magnetization. To prevent upstream breakdown, we will inject plasma far from the insulator stack. We simulated rundown and collapse dynamics with Athena – Eulerian 3D, unsplit finite volume MHD code that includes shock capturing with Riemann solvers, resistive diffusion and the Hall term. The simulations are coupled to an equivalent circuit model for HAWK. We will report the dynamics and implosion time as a function of the initial injected plasma distribution and the implications of non-ideal effects. We also traced test particles in MHD fields and confirmed the presence of stochastic acceleration, which was limited by the size of the system and the strength of the magnetic field.

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