Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Seeding the m = 0 instability in dense plasma focus (DPF) Z-pinches with a hollow anode[1] JASON LIU, JASON SEARS, MATT MCMAHON, DREW HIGGINSON, ANTHONY LINK, ANDREA SCHMIDT, Lawrence Livermore National Lab — The dense plasma focus (DPF) is a classic Z-pinch plasma device that has been long studied as a copious source of various types of radiation. The formation of the m = 0 plasma instability during the compression phase is linked to the generation of high-energy charged particle beams, which, when operated in deuterium, lead to beam-target fusion reactions and the generation of neutron yield. Here we present a novel technique of seeding the m = 0 instability by varying the anode's hollow inner diameter. As the plasma sheath moves along this hollow anode structure, a low density perturbation is formed and this seeds the instability. Dynamics of the low density perturbation and seeding of the m = 0 instability are studied in detail with fully kinetic plasma simulations performed in the LSP particle-in-cell code on a 60 kA device. It is discovered in the simulations that the neutron yield of the DPF may be significantly improved and made more consistent by employing an anode geometry with an appropriate inner hollow diameter.

[1]Prepared by LLNL under Contract DE-AC52-07NA27344 and supported by the Laboratory Directed Research and Development Program (15-ERD-034) at LLNL.

Jason Liu
Lawrence Livermore National Lab

Date submitted: 15 Jul 2016 Electronic form version 1.4