Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Compression and Cavitation of Externally Applied Magnetic Field on a Hohlraum due to Non-Local Heat Flow Effects[1] ARCHIS JOGLEKAR, ALEC THOMAS, Univ of Michigan - Ann Arbor, CHRIS RIDGERS, University of York, ROB KINGHAM, Imperial College - London — In this study, we present full-scale 2D kinetic modeling of externally imposed magnetic fields on hohlraums with laser heating. We observe magnetic field cavitation and compression due to thermal energy transport. Self-consistent modeling of the electron momentum equation allows for a complete treatment of the heat flow equation and Ohm's Law. A complete Ohm's Law contains magnetic field advection through the Nernst mechanism that arises due to the heat flow. Magnetic field amplification by a factor of 3 occurs due to magnetic flux pile-up from Nernst convection. The magnetic field cavitates towards the hohlraum axis over a 0.5 ns time scale due to Nernst convection. This results in significantly different magnetic field profiles and slower cavitation than can be expected due to the plasma bulk flow. Non-local electrons contribute to the heat flow down the density gradient resulting in an augmented Nernst convection mechanism that is included self-consistently through kinetic modeling. In addition to showing the prevalence of non-local heat flows, we show effects such as anomalous heat flow up the density gradient induced by inverse bremsstrahlung heating.

[1]This research was supported by the DOE through Grant No. DE SC0010621 and in part through computational resources and services provided by Advanced Research Computing at the University of Michigan, Ann Arbor.

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Date submitted: 24 Jul 2015 Electronic form version 1.4