Reason is that this merely an add-on applied to conventional indirect drive ICF targets to enhance their ignition probability and fusion yields

Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Enhancing Ignition Probability and Fusion Yield in NIF Indirect Drive Targets with Applied Magnetic Fields[1] L. JOHN PERKINS, B. GRANT LOGAN, DARWIN HO, GEORGE ZIMMERMAN, MARK RHODES, DONALD BLACKFIELD, STEVEN HAWKINS, Lawrence Livermore National Laboratory — Imposed magnetic fields of tens of Tesla that increase to greater than 10 kT (100 MGauss) under capsule compression may relax conditions for ignition and propagating burn in indirect-drive ICF targets. This may allow attainment of ignition, or at least significant fusion energy yields, in presently-performing ICF targets on the National Ignition Facility that today are sub-marginal for thermonuclear burn through adverse hydrodynamic conditions at stagnation. Results of detailed 2D radiation-hydrodynamic-burn simulations applied to NIF capsule implosions with low-mode shape perturbations and residual kinetic energy loss indicate that such compressed fields may increase the probability for ignition through range reduction of fusion alpha particles, suppression of electron heat conduction and stabilization of higher-mode RT instabilities. Optimum initial applied fields are around 50 T. Off-line testing has been performed of a hohlraum coil and pulsed power supply that could be integrated on NIF; axial fields of 58T were obtained. Given the full plasma structure at capsule stagnation may be governed by 3-D resistive MHD, the formation of closed magnetic field lines might further augment ignition prospects. Experiments are now required to assess the potential of applied magnetic fields to NIF ICF ignition and burn.

[1]Work performed under auspices of U.S. DOE by LLNL under Contract DE-AC52-07NA27344

John Perkins
Lawrence Livermore National Laboratory

Date submitted: 12 Jul 2017 Electronic form version 1.4