Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Shock Fast Ignition of Thermonuclear Fuel with High Areal Density C. ZHOU, R. BETTI, Fusion Science Center for Extreme States of Matter and Fast Ignition Physics, Laboratory for Laser Energetics, U. of Rochester — A novel method separating the assembly and ignition phases of thermonuclear fuel is presented. Massive cryogenic shells are first imploded with a low implosion velocity on a low adiabat using the relaxation laser pulse technique.[1] While the low implosion velocity yields a small, low-temperature hot spot, the low adiabat of the fuel leads to large peak values of the density and areal density. The assembled fuel is then ignited from the central hot spot heated by the collision of a spherically convergent shock and the return shock. The resulting thermonuclear gain can be significantly larger than in standard hot-spot ignition for equal driver energy. Shock fast ignition can be tested on the National Ignition Facility through relatively low energy implosions ranging from 130 kJ to 800 kJ, yielding gains from 60 to 110. This work has been supported by the US Department of Energy under Cooperative Agreement ER54789 and DE-FC03-92SF19460.

[1]R. Betti *et al.*, Phys. Plasmas **9**, 2277 (2002).

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Date submitted: 21 Jul 2005 Electronic form version 1.4