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Shock-Ignited High Gain/Yield Targets for the National Ignition Facility L.J. PERKINS, K.N. LAFORTUNE, P. BEDROSIIAN, M. TABAK, A. MILES, S. DIXIT, Lawrence Livermore National Laboratory, R. BETTI, K. ANDERSON, C. ZHOU, LLE/University of Rochester — Shock-ignition, a new concept for ICF ignition [C.Zhou, R.Betti Bull APS, v50, 2005], is being studied as a future option for efficiently achieving high gains in large laser facilities such as NIF. Accordingly, this offers the potential for testing: (1)High yield (up to 200MJ), reactor-relevant targets for inertial fusion energy (2)High fusion yield targets for DOE NNSA stockpile application (3)Targets with appreciable gain at low laser drive energies (gains of 10's at 150kJ) (4)Ignition of simple, non-cryo (room temperature) single shell gas targets at (unity gain). By contrast to conventional hotspot ignition, we separate the assembly and ignition phases by initially imploding a massive cryogenic shell on a low adiabat (alpha 0.7) at low velocity (less than 2e7cm/s) using a direct drive pulse of modest total energy. The assembled fuel is then separately ignited by a strong, spherically convergent shock driven by a high intensity spike at the end of the pulse and timed to reach the center as the main fuel is stagnating and starting to rebound. Like fast ignition, shock ignition can achieve high gains with low drive energy, but has the advantages of requiring only a single laser with less demanding timing and spatial focusing requirements.

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