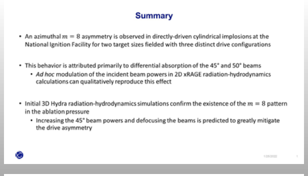
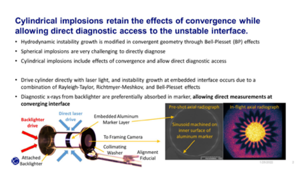
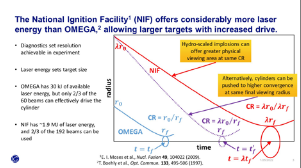
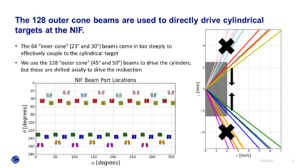
Understanding Drive Asymmetry in Cylindrical Implosion Experiments Using the FLASH Code

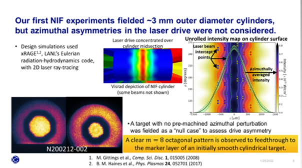
J. P. Sauppe[1], Y. Lu[1,2], P. Tzeferacos[2], S. Palaniyappan[1], R. Roycroft[1], W. P. Gammel[1,3]
[1]Los Alamos National Laboratory (LANL), [2]University of Rochester, [3]University of Arizona





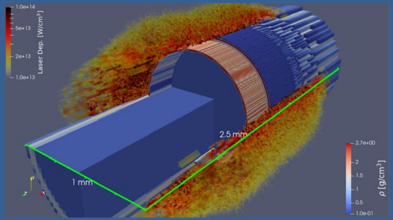




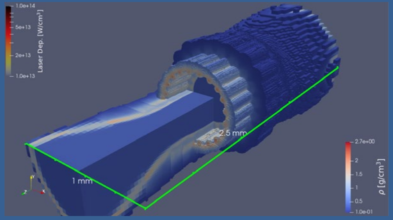


The FLASH [B. Fryxell et al. (2000) *ApJS* **131** 273; P. Tzeferacos et al. (2015) *HEDP* **17**, 24-31] Eulerian radiation-hydrodynamics code with adaptive mesh refinement is used to simulate laser-driven cylindrical implosion experiments in 3D.

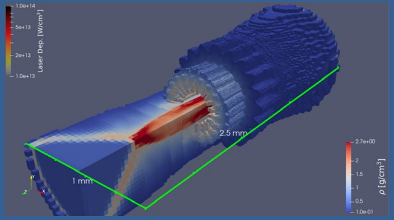
$t = 0.5$ ns



$t = 4.0$ ns



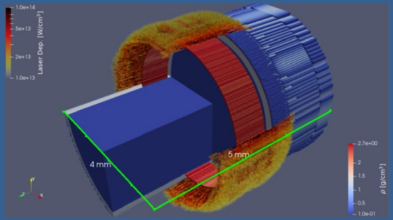
$t = 8.0$ ns



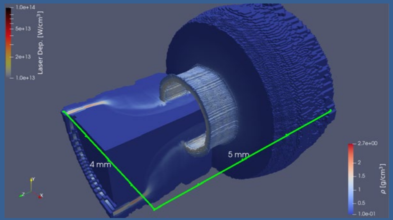
Above: Simulations of an OMEGA-scale cylindrical implosion show Rayleigh-Taylor growth of a pre-seeded sinusoidal perturbation on an embedded aluminum marker layer.

Below: FLASH simulations of larger NIF-scale cylinders are underway to provide further insight into the $m = 8$ drive asymmetry and identify schemes to mitigate this in future experiments.

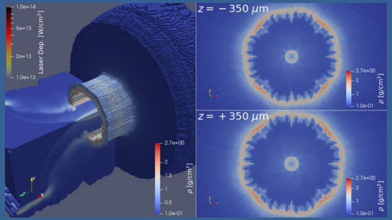
$t = 1.5$ ns



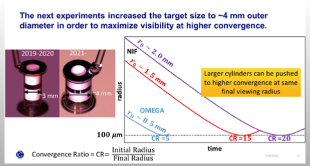
$t = 20.0$ ns

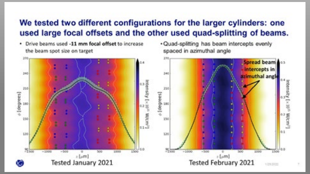


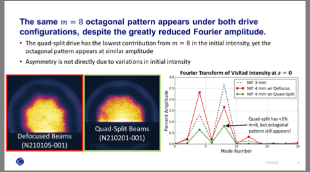
$t = 25.0$ ns

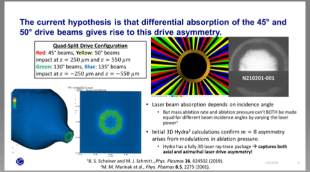


The 3D laser ray-trace capability in FLASH is expected to provide greater insight in the design of these experiments and help identify the conditions where 3D effects are most pronounced.









LA-UR-22-20673

National Ignition Facility • Lawrence Livermore National Laboratory • Operated by the US Department of Energy
This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

The Flash Center acknowledges support by the US DOE NNSA under subcontracts 536203 and 630138 with LANL.