Hydrodynamics experiments for astrophysics using intense lasers

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In a broad-based collaboration with universities, we are developing astrophysically relevant hydrodynamics experiments on the Nova and PetaWatt lasers at Lawrence Livermore National Laboratory (LLNL), and in the future on the Omega laser at the University of Rochester, and the National Ignition Facility, currently under construction at LLNL. Issues that we are or planning to investigate are deep nonlinear, compressible hydrodynamic mixing in 2D and 3D, relevant to supernovae [1]; strong-shock hydrodynamics relevant to supernova remnant formation [2]; radiative shocks and blast waves, of potential interest to gamma-ray burst models [3]; cratering experiments, of possible interest to hypervelocity meteoroid impacts [4], and equation-of-state measurements of hydrogen at multi-Mbar pressures, relevant to the interiors of giant planets and brown dwarfs [5]. An overview of this work will be given, and the issue of scaling will be addressed [6].

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