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Rayleigh-Taylor instability experiments in cryogenic deuterium J.F. HANSEN, A.R. MILES, H.F. ROBEY, Lawrence Livermore Natl Lab, V.A. SMALYUK, T.C. SANGSTER, T.R. BOEHLY, M.J. BONINO, D.D. MEYER-HOFER, Lab of Laser Energetics, U. Rochester — We report on experiments under way at the Omega laser, using cryogenic deuterium to study Rayleigh-Taylor instabilities in laser targets. These instabilities are important in astrophysical situations (e.g., mixing of the different shells during a supernova explosion) and in inertial fusion (during the compression stage of a fusion target). They can be studied in small  $(\sim 1 \text{ mm})$  shock tubes filled with one heavy and one light material, with an interface between the two materials that is machined to seed the instability. A high-energy laser ( $\sim 5 \text{ kJ}$ ) drives a shock from the heavy to the light material. The evolution of the interface is studied using gated x-ray cameras, where x-ray illumination is obtained from additional laser beams focused on metal backlighter foils. Traditionally the heavy material is CH  $(1 \text{ g/cm}^3)$  doped with I or Br for improved contrast, while the light material is a low-density ( $\sim 0.1 \text{ g/cm}^3$ ) C foam. The goal of the current experiments is to determine if contrast can be improved even further by replacing the foam with cryogenic deuterium, which has a density similar to the foam, but a lower x-ray opacity allowing clearer images, including images taken at late times in the evolution. Work performed under the auspices of the Department of Energy by the Lawrence Livermore National Laboratory under contract number W-7405-ENG-48.

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