Abstract Submitted
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Absolute equation of state measurements up to a gigbar using a converging shock[1] NATALIE KOSTINSKI, DAMIAN SWIFT, ANDREA KRITCHER, AMY LAZICKI[2], JAMES HAWRELIAK, TILO DOEPPNER, Lawrence Livermore National Laboratory, ALISON SAUNDERS, University of California, Berkeley, BENJAMIN BACHMANN, GILBERT COLLINS[3], Lawrence Livermore National Laboratory, ROGER FALCONE, University of California, Berkeley, JOSEPH NILSEN, Lawrence Livermore National Laboratory — We are developing laser-driven loading platforms that allow the equation of state (EOS) of matter to be measured to pressures above 10 TPa on the Omega laser and 80 TPa at the National Ignition Facility respectively. These pressures are reached using a spherically-converging shock, with x-ray radiography as the primary diagnostic, enabling absolute EOS measurements to be made. At pressures above 10 TPa, the x-ray opacity drops significantly because of k-shell ionization. Superficially, this would prevent the compression from being measured, but radiographic marker layers can be used to constrain the reconstructed object and enable the opacity and compression to be determined simultaneously. Using these techniques, we have measured the Hugoniot EOS of polystyrene, diamond, and boron to over 50 TPa respectively, enabling their use as reference materials for relative measurements of materials more opaque to x-rays.

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