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New Hugoniot measurements on LiF and diamond from laser-driven compression[1] FEDERICA COPPARI, AMY LAZICKI, DAYNE FRATANDUONO, PETER CELLIERS, RICHARD LONDON, DAVID ERSKINE, DAMIAN SWIFT, JON EGGERT, GILBERT COLLINS, HEATHER WHITLEY, JOHN CASTOR, JOE NILSEN, Lawrence Livermore National Laboratory — The measurement of materials' equations of state (EOS) is relevant to a variety of applications, ranging from material science to geophysics and planetary science. EOS measurements along a shocked state (Hugoniot) are particularly useful for developing and benchmarking models because they yield data from well-defined thermodynamic states. Impedance-matching (IM) techniques, which are most often used to determine the shock state at multi-megabar pressure, rely on the accuracy of the impedance matching standard. We present new Hugoniot measurements of LiF from 15-30 Mbar, using the recently refined quartz standard, extrapolated to the pressures we achieved in our experiments. We also present the concept and initial experimental results for establishing diamond as an absolute (reference-free) impedance-matching standard up to tens of megabars, using symmetric impact of laser-accelerated diamond flyer plates on diamond windows, and our plans for extending the technique to perform higher-accuracy EOS measurement on opaque materials.

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