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The Equation of State and Optical Conductivity of Warm Dense He and H2 STEPHANIE BRYGOO, JON H. EGGERT, LLNL, PAUL LOUBEYRE, CEA, RYAN S. MCWILLIAMS, UC Berkeley, DAMIEN G. HICKS, PETER M. CELLIERS, LLNL, TOM R. BOEHLY, LLE, RAYMOND JEANLOZ, UC Berkeley, GILBERT W. COLLINS, LLNL — The determination of the equations of state of helium and hydrogen at very high density is an important problem at the frontier between condensed matter physics and plasma physics with important implications for planetary physics. Due to the limitations of the conventional techniques for reaching extreme densities(static or single shock compression), there are almost no data for the deep interior states of Jupiter. We present here shock compression measurements of helium and hydrogen, precompressed in diamond anvil cells up to $3\rho_{liquid}$. We report the shock pressure, density and reflectivity up to 2 Mbar for helium and up to 1 Mbar for hydrogen. The data are compared to equations of state models used for astrophysical applications and to recent first principles calculations. This work was performed under the auspices of the U.S. Department of Energy (DOE) by the University of California, Lawrence Livermore National Laboratory under Contract No. W-7405-Eng-48.

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