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Optical properties of warm dense fluid helium at jovian planet interior conditions MARIUS MILLOT, Lawrence Livermore National Laboratory, STEPHANIE BRYGOO, PAUL LOUBEYRE, CEA, PETER CELLIERS, Lawrence Livermore National Laboratory, GILBERT COLLINS, University of Rochester, JON EGGERT, Lawrence Livermore National Laboratory, RYAN RYGG, University of Rochester, DAMIAN SWIFT, RAYMOND JEANLOZ, Lawrence Livermore National Laboratory — In contrast to hydrogen, helium does not participate in molecular bonds and therefore constitutes an excellent prototypical system to test quantum simulation and theories of metallization and ionization in the warm dense regime. To reveal the role of density and temperature on the ionization of helium going beyond the conditions explored in previous studies we conducted a series of laser-driven shock compression experiments at the Omega Laser facility, using precompressed targets with initial pressures up to 6 GPa. We will discuss how the new VISAR velocimetry and streaked optical pyrometry (SOP) data provide stringent benchmarks on the thermodynamics and electronic structure of helium at extreme conditions relevant for the understanding of the formation, evolution and structure of giant planets. Part of this work was performed at LLNL under Contract DE-AC52-07NA27344.

Marius Millot
Lawrence Livermore National Laboratory

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