Abstract Submitted
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An Extended X-Ray Absorption Fine Structure Spectroscopy Study of Iron and Iron Oxide[1] DAVID CHIN, University of Rochester, PHIL NILSON, JJ RUBY, DANAE POLSIN, XUCHEN GONG, MARY KATE GINNANE, J. RYAN RYGG, GILBERT COLLINS, DUSTIN TRAIL, U. of Rochester, YUAN PING, FEDERICA COPPARI, Lawrence Livermore National Laboratory, ALEXIS AMOURETTI, MARION HARMAND, Sorbonne — To increase our understanding of the formation and evolution of the Earth and iron-rich exoplanets, extended x-ray absorption fine structure (EXAFS) spectroscopy was used to characterize iron and iron oxides dynamically compressed to core Earth and super-Earth conditions. At the Omega Laser Facility, iron and iron oxides were ramp compressed to above 500 GPa and probed with a broadband x-ray source. The spatial and spectral behavior of the x-ray source was characterized using time integrating and time-resolved diagnostics. A new x-ray spectrometer was developed to improve the spectral resolution of the EXAFS measurement. By using a silicon mirror and new target geometry, EXAFS and VISAR (velocity interferometer system for any reflector) measurements were successfully carried out on the same shot, allowing for a complete and simultaneous equation-of-state measurement of pressure, density, and temperature. The temperature in the sample was determined from the EXAFS data by characterizing the ion positions in the crystal lattice.

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