Abstract Submitted
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Stability of hcp-Fe at TPa pressures from in-situ x-ray diffraction and laser-driven ramp compression[1] F. COPPARI, R. F. SMITH, Lawrence Livermore National Laboratory, G. W. COLLINS, University of Rochester, T. S. DUFFY, Princeton University, D. E. FRATANDUONO, A. LAZICKI, Lawrence Livermore National Laboratory, J. R. RYGG, University of Rochester, J. H. EGGERT, Lawrence Livermore National Laboratory — The use of lasers to induce extreme compression states has enabled the study of material properties and equations of state at unprecedented pressure and temperature conditions, existing in the interiors of planets and extra-solar planets. The combination of laser-driven compression and x-ray diffraction provides a unique picture of the transformations taking place in high-energy-density matter. X-ray diffraction is now routinely used at the Omega laser facility (University of Rochester, NY) [1,2,3] to investigate *in-situ* phase transitions occurring on nanosecond time scales. Iron is an important material for geophysics and planetary science and understanding its behavior at extreme pressures and temperatures is paramount to the development of reliable models describing the formation and evolution of planetary bodies. In this work we present x-ray diffraction data of ramp-compressed iron up to TPa pressures, showing that the hexagonal-close-packed (hcp) phase is stable at these conditions. [1] J. R. Rygg et al, RSI 83, 113904 (2012) [2] F. Coppari et al, Nat Geosci 6, 926 (2013) [3] A. Lazicki et al, PRL 115, 075502 (2015)

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