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Ramp Compression of Diamond to Over 1000 GPa JON EGGERT, DAVID BRADLEY, PETER CELLIERS, GILBERT COLLINS, DAMIEN HICKS, DAVID BRAUN, SHON PRISBREY, RAY SMITH, Lawrence Livermore National Laboratory, THOMAS BOEHLY, University of Rochester — Isentropic compression of materials to multi-megabar pressures has long been a grand challenge for high-density and planetary science. Recently, ramp-wave experiments have demonstrated quasi-isentropic compression using lasers, pulsed-power, and impactors with peak pressures up to 240 GPa[1,2]. Using a tailored-radiation drive at the Omega laser we have ramp-compressed and measured the stress-strain relation in diamond to over 1000 GPa, more than 4 times the maximum previously attained. We find an elastic-plastic transition at 60-70 GPa in good agreement with the elastic limit from shock experiments. We will discuss the potential of this technique for exploring ultra-high pressure phase transitions including the predicted BC8 phase in carbon. [1] J-P Davis, J. App. Phys. 99, 103512 (2006). [2] R.F. Smith et al., Accepted for Publication, Phys. Rev. Lett. (2007). This work was performed under the auspices of the U. S. Department of Energy by University of California Lawrence Livermore Nationa Laboratory under Contract No.W-7405-Eng-48.

Jon Eggert
Lawrence Livermore National Laboratory

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