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Cerium under High Pressure (and Temperature): X-ray Diffraction and Emission, Radiography and Ultrasound MAGNUS LIPP, ZSOLT JENEI, HYUNCHAE CYNN, WILLIAM EVANS, Lawrence Livermore National Laboratory, PAUL CHOW, YUMING XIAO, YOSHIO KONO, CURTIS KENNEY-BENSON, Carnegie Institute of Washington — Modern experimental techniques have increased our knowledge of cerium's unique behavior under the elements, an iso-structural (fcc) volume collapse transition of 15% at room temperature from the γ- to the α-phase ending in a critical point. Our recent findings favor a Kondo Volume Collapse model, a step-wise decrease of the moment across the transition but then continuation of most of it. Simple radiography appears to tell us that both solid phases continue on in some form into the liquid. The contribution of the lattice-phonons to this transition is re-evaluated using a unique combination of several techniques eliminating any indirect / iterative procedures. This methodology provides new data about the elastic properties bridging the gap from the atomic to the meso-scale dimension. Our preliminary analysis indicates a larger contribution by the lattice phonons as very recently thought. This work was performed under the auspices of the US DOE by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. The X-ray studies were performed at HPCAT (Sector 16), APS/ANL. HPCAT is supported by CIW, CDAC, UNLV and LLNL through funding from DOE-NNSA, DOE-BES and NSF. APS is supported by DOE-BES, under Contract No. DE-AC02-06CH11357.

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