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**The Liquid Krypton Hugoniot at Megabar Pressures** SETH ROOT, RUDY J. MAGYAR, ANN E. MATTSSON, DAVID L. HANSON, THOMAS R. MATTSSON, Sandia National Laboratories — Krypton is an ideal candidate to study multi-Mbar pressure effects on elements with filled-shell electron configurations. Few experimental data on Kr at high pressures exist, however, with prior Hugoniot data limited to below 1 Mbar. Similar to liquid xenon [1], the current Kr equation of state (EOS) models agree with the data and each other below 1 Mbar, but diverge with increasing pressure. We examine the liquid Kr Hugoniot up to 8 Mbar by using density functional theory (DFT) methods and by performing shock compression experiments on the Sandia Z – accelerator. Our initial DFT Kr Hugoniot calculations indicated the standard PAW potential is inadequate at the high pressures and temperatures occurring under strong shock compression. A new Kr PAW potential was constructed giving improved scattering properties of the atom at high energies. The Z Hugoniot measurements above 1 Mbar validated the DFT results and the pseudo-potential. The DFT and Z results suggest that the current EOS models require some modifications. [1] S. Root *et al.*, PRL, **105**, 085501 (2010). Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Company, for the U. S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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