Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Ultrafast Shocked Single Crystal PETN and Beta-HMX: Shock Hugoniot Measurements to Guide the Development of Continuum Models[1] JOSEPH ZAUG, MICHAEL ARMSTRONG, JONATHAN CROWHURST, LOUIS FERRANTI, RYAN AUSTIN, LAURENCE FRIED, Lawrence Livermore National Labatory — We report results from ultrafast shock-wave experiments conducted on single crystal high explosives. Ultrafast shock studies can enable high throughput characterizations of unreacted equations of state to higher pressures than previously reported and also quantify the magnitude of anisotropic mechanical response to shock waves. Our previous results derived from a 372 ps drive duration yielded anisotropic elastic wave response in single crystal beta-HMX ((110) and (010) impact planes). Here we provide results using a >2x drive duration to extend measurements into the plastic or bulk wave regime. We compare our ultrafast time domain interferometry (TDI) results with previous gun platform results. These 10 ps time scale resolution TDI measurements guide the development of a continuum model to study pore collapse and energy localization in shock-compressed crystals of beta-HMX.

[1]This work was performed under the auspices of the U.S. Department of Energy jointly by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344

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Date submitted: 07 Nov 2014 Electronic form version 1.4