Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

**Shockwave dynamics: a comparison between stochastic and periodic porous architectures**[1] BRITTANY BRANCH, AXINTE IONITE, BRADFORD CLEMENTS, DAVID MONTGOMERY, ANDREW SCHMALZER, BRIAN PATTERSON, ALEXANDER MUELLER, BRIAN JENSEN, DANA DATTELBAUM, Los Alamos National Lab — Polymeric foams are used extensively as structural supports and load mitigating materials in which they are subjected to compressive loading at a range of strain rates, up to the high strain rates encountered in blast and shockwave loading. To date, there have been few insights into compaction phenomena in porous structures at the mesoscale, and the influence of structure on shockwave localization. Of particular interest is when the properties of the inherent mesoscopic, periodic structure begin to emerge, versus the discrete behavior of the individual cell. Here, we illustrate, for the first time, modulation of shockwave dynamics controlled at micron-length scales in additively manufactured periodic porous structures measured using *in situ*, time-resolved x-ray phase contrast imaging at the Advanced Photon Source. Further, we demonstrate how the shockwave dynamics in periodic structures differ from stochastic foams of similar density and we conclude that microstructural control in elastomer foams has a dramatic effect on shockwave dynamics and can be tailored towards a variety of applications.

[1]Laboratory Directed Research and Development (LDRD) program at Los Alamos National Laboratory (project 20160103DR) and DOE/NNSA Campaign 2

Brittany Branch
Los Alamos National Lab

Date submitted: 03 Nov 2016 Electronic form version 1.4