Abstract Submitted
for the SHOCK19 Meeting of
The American Physical Society

Investigating off-Hugoniot states using multi-layer ring-up targets DAVID MCGONEGLE, PATRICK HEIGHWAY, MARCIN SLIWA, JUSTIN WARK, University of Oxford, UK, CYNTHIA BOLME, LANL, ANDREW COMLEY, AWE, UK, LEORA COOPER, MIT, ANDREW HIGGINBOTHAM, ASHLEY POOLE, University of York, UK, EMMA MCBRIDE, BOB NAGLER, INHYUK NAM, MATT SEABERG, SLAC National Accelerator Laboratory, BRUCE REMINGTON, ROBERT RUDD, CHRISTOPHER WEHRENBERG, LLNL — While laser shocks have long been used as a method for reaching high pressure states, their highly entropic nature limits the range of pressures over which a sample can be kept solid. Laser pulse shaping has been used to ramp compress samples while keeping them close to the isentrope, but this requires long laser pulses that are unavailable to most facilities or expensive pusher materials such as diamond or sapphire. We demonstrate the use of a multilayer target with different impedance layers that result in the sample 'ringing-up' to the desired pressure via a series of smaller shocks, keeping it cooler. We present experimental data taken at LCLS, where laser-ablation pressure is used to drive a 'ring-up' target, allowing for the compression of Pb sample above 100 GPa while remaining solid, approximately two times as high in pressure than where it would shock melt on the Hugoniot. We examine the feasibility of applying this technique to other samples as well as other laser facilities.

David McGonegle
University of Oxford

Date submitted: 20 Feb 2019 Electronic form version 1.4