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A study of the elastic precursor in thin Zr and Ta foils DANIEL EAKINS, DAVID CHAPMAN, Imperial College London — The evolution of the elastic precursor with strain rate and distance contains rich information regarding the origins of yielding under intense dynamic loading. Such information is necessary for the development of new dislocation-based strength models. In this work we extend study of elastic precursor behavior in zirconium and tantalum foils down to 25 μm to address the role of reduced thickness and crystal symmetry on the kinetics of stress relaxation. Using a newly constructed mesoscale gas launcher, high purity Zr and Ta targets ranging in thickness from 6 mm down to 25 μm have been impacted at velocities of $\sim$500 m/s. A combination of line-imaging VISAR and frequency-shifted PDV were employed to measure the particle velocity at a windowed interface. Features of the elastic precursor in the breakout profiles, such as the peak elastic state and yield drop, were used to infer the kinetics of incipient relaxation processes. In future work, these results will be used to further validate the D3P code currently under development.

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