

Abstract Submitted  
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**Concurrent Radiography, Velocimetry and High Speed Imaging During Ballistic Impact** BRIAN SCHUSTER, PHILLIP JANNOTTI, DAVID ANDREWS, BRADY AYDELOTTE, US Army Research Laboratory, NICHOLAS LORENZO, Oak Ridge Institute for Science and Engineering — We present applications of the High voltage In-situ Diagnostic Radiography Apparatus (HIDRA) at the US Army Research Laboratory to terminal ballistic impact in ductile and brittle material systems. HIDRA consists of an array of fourteen 150 kV flash X-ray sources that are coincident on the impact site, a four channel Photon Doppler Velocimetry (PDV) system and two synchronized high speed cameras operating at up to 10 million frames per second. We will present examples of laboratory penetrators fired from smooth bore powder cannons at velocities up to 2.3 km/s. This system has been applied in single events to measure the striking velocity, deceleration during penetration and residual velocity. Measurements of the penetrator/target interface position yield have been used to track the dwell time in ceramics, rod consumption velocity and penetration velocity as a function of time. PDV has been combined with edge-on and stereo imaging to map back face deformation. Direct comparisons to computational models of impact and penetration will be shown.

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