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Measuring the Spatial Evolution of Ejecta Transport Using Particle Image Velocimetry[1] JOHN CHARONKO, JOHNNY GOETT, Los Alamos National Laboratory, MICHAEL GROVER, BRANDON LA LONE, JASON MANCE, MSTS Special Technologies Laboratory, RUBEN MANZANARES, JOHN MARTINEZ, DEREK SCHMIDT, Los Alamos National Laboratory, GERALD STEVENS, WILLIAM TURLEY, MSTS Special Technologies Laboratory, WILLIAM BUTTLER, Los Alamos National Laboratory — Historically, many diagnostics have been used to examine the production and transport of metal particles from a shocked surface, including x-ray and proton radiography, optical shadowgraphy and imaging, LN-pins, Asay foils, Mie scattering, and PDV. Each measures different quantities such as particle position, size, mass, or velocity. However, direct measurement of the spatial distribution of velocities within ejecta clouds has never before been demonstrated; to do so we report for the first time application of the principles of particle image velocimetry to this problem. Pulsed lasers were used with ultra-high-speed cameras to image light scattered from ejecta, and the images were analyzed to obtain quantitative measurements of the temporally evolving particle velocity fields. We will present results from three dynamic ejecta experiments of Sn transporting in D_2 at $P_{initial}$ = 3040 torr. For each experiment, the ejecta velocity field within the cloud was sampled at four different times over the first 10 μs after shock breakout. The PIV measurements revealed the distribution and variation of speeds between the free surface and observable leading edge of the ejecta cloud. Implications of the work for ejecta dynamics will be discussed.

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John Charonko
Los Alamos National Laboratory

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