The Institute for Shock Physics SEMINAR SERIES

Presents

Vaporization of Ejecta in Dynamic Compression Experiments

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Ejecta is generated during impact events, an example of which is the collision of an astronomical object with the lunar surface which results in an impact crater. Ejecta generated during these hypervelocity impacts are at elevated temperatures due to shock wave interactions with the impacted surface. At high temperatures, some of the ejecta is vaporized. We show how the liquid to vapor transition is kinetically driven and present a time-dependent evaporation model for ejecta particles in vacuum. Under the right conditions, the production of vapor rapidly cools the ejecta particles and is a more significant source of cooling than radiative cooling. The rapid cooling of ejecta is responsible for the impact "flash", or transient pulse of light often observed on the moon's surface during an impact event. We have begun to study ejecta vaporization in the laboratory using plate impact experiments. Using a suite of optical diagnostics, we estimate velocity, ejecta particle size, and time resolved temperatures to better understand the vaporization phenomena. The laboratory scale experiments can ultimately be used to improve our understanding of hypervelocity impacts in nature.

This work was done by Mission Support and Test Services, LLC, under Contract No. DE-NA0003624 with the U.S. Department of Energy and the National Nuclear Security Administration's Office of Defense Programs, and supported by the Site-Directed Research and Development Program. DOE/NV/03624--2132.

Wednesday, April 9 || 1:30 PM (Pacific)

Shock Physics Building || Seminar Room 201

Zoom Meeting ID: 921 1311 2063 || Passcode: WSUISP

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