

Abstract Submitted
for the SHOCK15 Meeting of
The American Physical Society

Dynamic Initiator Experiments using IMPULSE (Impact system for Ultrafast Synchrotron Experiments) at the Advanced Photon Source
NATHANIEL SANCHEZ, BRIAN JENSEN, KYLE RAMOS, Los Alamos Natl Lab, ADAM IVERSON, National Security Technologies, MICHAEL MARTINEZ, GARY LIECHTY, Los Alamos Natl Lab, KAMEL FEZZAA, Argonne National Laboratory, STEVEN CLARKE, Los Alamos Natl Lab — We have successfully imaged, for the first time, the operation of copper slapper initiators that are used to initiate high explosive detonators. These data will aid in model development and calibration in order to provide a robust predictive capability and as a design tool in future applications. The initiation system consists of a copper bridge fixed to a parylene flyer. The copper bridge functions when a capacitor is discharged causing current to flow through the narrow bridge. As this happens, a plasma forms due to the high current densities and ohmic heating, which launches the parylene flyer that impacts a high explosive pellet producing detonation. Unlike traditional measurements, x-ray phase contrast imaging can see “inside” the process providing unique information with nanosecond time resolution and micrometer spatial resolution. The team performed experiments on the IMPULSE system at the Advanced Photon Source to obtain high resolution, in situ images of this process in real-time. From these images, researchers can examine the formation of the plasma instabilities and their interaction with the flyer, determine the flyer velocity, and obtain crucial information on the spatial distribution of mass and density gradients in the plasma and flyer.

Nathaniel Sanchez
Los Alamos Natl Lab

Date submitted: 29 Jan 2015

Electronic form version 1.4