Dynamic Initiator Imaging at the Advanced Photon Source: Understanding the early stages of initiator function and subsequent explosive interactions. NATE SANCHEZ, Los Alamos National Laboratory, WILL NEAL, Atomic Weapons Establishment, BRIAN JENSEN, JOHN GIBSON, MIKE MARTINEZ, DENNIS JARAMILLO, Los Alamos National Laboratory, ADAM IVERSON, CARL CARLSON, National Security Technologies — Recent advances in diagnostics coupled with synchrotron sources have allowed the in-situ investigation of exploding foil initiators (EFI) during flight. We present the first images of EFIs during flight utilizing x-ray phase contrast imaging at the Advanced Photon Source (APS) located in Argonne National Laboratory. These images have provided the DOE/DoD community with unprecedented images resolving details on the micron scale of the flyer formation, plasma instabilities and in flight characteristics along with the subsequent interaction with high explosives on the nanosecond time scale. Phase contrast imaging has allowed the ability to make dynamic measurements on the length and time scale necessary to resolve initiator function and provide insight to key design parameters. These efforts have also probed the fundamental physics at “burst” to better understand what burst means in a physical sense, rather than the traditional understanding of burst as a peak in voltage and increase in resistance. This fundamental understanding has led to increased knowledge on the mechanisms of burst and has allowed us to improve our predictive capability through magnetohydrodynamic modeling. Results will be presented from several EFI designs along with a look to the future for upcoming work.

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Date submitted: 23 Feb 2017