Abstract Submitted
for the SHOCK17 Meeting of
The American Physical Society

The Multi-Frame X-ray Diffraction and Imaging Detector at the Dynamic Compression Sector[1] NICHOLAS SINCLAIR, YUXIN WANG, STEFAN TURNEAURE, KURT ZIMMERMAN, YOSHI TOYODA, YOGENDRA GUPTA, Washington State University — The Dynamic Compression Sector (DCS) at the Advanced Photon Source (APS), located at Argonne National Laboratory, enables x-ray diffraction and imaging measurements on samples during single event, dynamic compression experiments. Since bright x-ray pulses arrive from the synchrotron at a high frequency, 'movies' may be captured with these x-ray measurements. However, the ideal detector system capable of these measurements is not yet commercially available and, instead, a composite optical system has been developed to achieve the required time resolution and sensitivity. In this presentation, the current x-ray diffraction and imaging detector system at DCS will be discussed. This system is capable of capturing four frames from x-ray pulses separated by 153ns – the pulse separation in the most common APS storage ring mode – and sensitive enough to capture x-ray powder diffraction patterns from a single ∼80ps duration pulse. Several data post-processing issues will be discussed, including the correction of phosphor after-images, determination of sample exposure times with respect to other diagnostics, and spatial distortion correction.

[1]Work supported by DOE/NNSA.

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Date submitted: 24 Feb 2017 Electronic form version 1.4