

Abstract Submitted  
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**X-ray Diffraction and Multi-Frame Phase Contrast Imaging Diagnostics for IMPULSE at the Advanced Photon Source**<sup>1</sup> ADAM IVERSON, CARL CARLSON, National Security Technologies, LLC, BRIAN JENSEN, KYLE RAMOS, JOHN YEAGER, Los Alamos National Laboratory, KAMEL FEZZAA, APS, Argonne National Laboratory, DAVID ESQUIBEL, National Security Technologies, LLC — The diagnostic needs of any dynamic loading platform present unique technical challenges that must be addressed in order to accurately measure *in situ* material properties in an extreme environment. The IMPULSE platform (IMPact system for Ultrafast Synchrotron Experiments) at the Advanced Photon Source (APS) is no exception and, in fact, may be more challenging, as the imaging diagnostics must be synchronized to both the experiment and the 60 ps wide x-ray bunches produced at APS. The technical challenges of time-resolved x-ray diffraction imaging and high-resolution multi-frame phase contrast imaging (PCI) are described in this paper. Example data from recent IMPULSE experiments are shown to illustrate the advances and evolution of these diagnostics with a focus on comparing the performance of two intensified CCD cameras and their suitability for multi-frame PCI. The continued development of these diagnostics is fundamentally important to IMPULSE and many other loading platforms and will benefit future facilities such as the Dynamic Compression Sector at APS and MaRIE at Los Alamos National Laboratory.

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