Title: Dynamic, high-resolution, phase contrast imaging of impact events using synchrotron X-rays


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Dynamic, high-resolution, phase contrast imaging of impact events using synchrotron X-rays


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Understanding the dynamic properties of heterogeneous materials and/or processes require experiments capable of examining their time, rate, and spatial dependencies during loading. An impact system developed for use at synchrotron sources was used to obtain phase contrast imaging (PCI) data with 3 micron spatial resolution using a single 60-ps width X-ray pulse from the Advanced Photon Source (Sector 32 ID-B). Experiments were performed using the PCI method to examine dynamic loading of materials ranging from foams/powder to study compaction, high strain-rate cylindrical impact to examine material failure, and jet formation in cerium metal to study material strength. Preliminary experiments using dynamic Laue diffraction to examine crystal structure were promising. A description of the impact system along with experimental details from a representative series of experiments will be presented to illustrate the versatility of this new capability.