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Dynamic X-ray Diffraction to study the shock-induced $\alpha-\varepsilon$ Phase Transition in Iron. BRITTANY BRANCH, BRIAN JENSEN, Los Alamos National Lab — Iron undergoes a well-known polymorphic phase transformation from a ferromagnetic body-centered cubic (α-phase) ground state to a non-magnetic hexagonal-closed pack (ε-phase) crystal structure at pressures exceeding 13 GPa. With the coupling of dynamic loading platforms and advanced light sources we were able to study the α- ε phase transition of iron using dynamic X-ray diffraction (XRD) now available at the Advanced Photon Source (APS). Specifically, front-surface plate impact experiments were performed using single and two-stage gun systems coupled to the X-ray beam line at the new Dynamic Compression Sector (DCS) at the APS. X-ray diffraction data obtained from multiple 80 picosecond width x-ray bunches were obtained for impact stresses that spanned the a-e region of the phase diagram. The experimental methods, results, and preliminary analysis will be presented. LA-UR - 17-21401

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