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Time-Resolved Full-Field X-ray Scatter Imaging of Small-Scale High Explosive Detonations[1] JOSHUA HAMMONS, MICHAEL BAGGE-HANSEN, MICHAEL NIELSEN, LISA LAUDERBACH, RALPH HODGIN, Lawrence Livermore Natl Lab, NICHOLAS SINCLAIR, Washington State University, WILLIAM SHAW, TONY VAN BUUREN, LARRY FRIED, MATT COWAN, TREVOR WILLEY, Lawrence Livermore Natl Lab, WASHINGTON STATE UNIVERSITY COLLABORATION, LAWRENCE LIVERMORE NATL LAB COLLABORATION — Radiographic imaging using a series of singles pulses from synchrotron storage rings or x-ray free-electron lasers gives new insight into dynamic phenomena. One limitation of these sources is that the native and natural beam size at most end-station hutches is, at best, of mm-scale dimensions. Here, we describe a method for collecting full-field, radiographic images of cm-scale phenomena using focused pink-beam and scattering the x-rays, effectively creating point-source images. Although currently photon starved and highly dependent on parameters chosen (such as source-to-object and source-to-detector distances, scattering material, etc.) we are continuously improving the technique. At the Dynamic Compression Sector at the Advanced Photon Source, we use this capability to image detonation phenomena, particularly direct imaging of detonator performance, imaging initiation and run-up to detonation, imaging differences in ideal vs. non-ideal explosives, and have a goal to determining density during detonation at 10's of microns in resolution. In this presentation, we summarize our progress developing and using this technique.

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