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Experimental considerations of using coded apertures for high-energy high-resolution imaging[1] M P SELWOOD, W D PASH, University of York, C SPINDLOE, Scitech Precision, C D MURPHY, University of York — Laser-plasma x-ray sources have garnered interest from various communities due to their ability to generate high photon-energies from a small source size. The passive imaging of high-energy x-rays and neutrons is also a useful diagnostic in laser-driven fusion as well as laboratory astrophysics experiments which aim to study small samples of transient electron-positron plasmas. Conventional high attenuation aperture imaging techniques struggle with high-energy high-resolution imaging, due to their aspect ratios: substrate thickness needs to be substantial for high attenuation, whereas aperture elements need to be small for high resolution. Coded apertures with scatter and partial attenuation (CASPAs) are a technique used to relax this attenuation requirement, allowing thinner substrates to be used without significant detriment to the signal to noise ratio of the overall imaging system. There are manufacturing challenges associated with producing CASPAs with elements on the order of 10 m, which require changes to the original design to make the aperture self-supporting. Here, we discuss the impact of manufacturing and experimental considerations on the implementation of CASPA-based imaging systems for high-energy high-resolution imaging.

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