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Achieving banded spectral selectivity through coded apertures without energy resolving detectors

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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.

Previous work has demonstrated that a secondary property of coded aperture theory can relax the requirement for high substrate opacity, using a coded aperture with scatter and partial attenuation[1]. Here, we discuss a property of non-redundant coded apertures that can be incorporated into an aperture based imaging system to enable spectral band filtering without the need for an energy resolving detector. This is demonstrated through Geant4 modelling, allowing potential implementations and limitations to be discussed.

References

[1] M. P. Selwood, *et al.*, Plasma Physics and Controlled Fusion, vol. 62, p. 074002, 2020.