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Towards hard X-ray imaging at GHz frame rate

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Gigahertz (GHz) imaging using hard X-rays ($\gtrsim$ 10 keV) can be useful to high-temperature plasma experiments, as well as research using coherent photons from synchrotron radiation and X-ray free electron lasers. GHz framing rate can be achieved by using multiple cameras through multiplexing. The advantages and trade-offs of single-photon detection mode, when no more than one X-ray photon is detected per pixel, are given. Two possible paths towards X-ray imaging at GHz frame rates using a single camera are a.) Avalanche photodiode arrays of high-Z materials and b.) Microchannel plate photomultipliers in conjunction with materials with large indices of refraction.

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