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High dynamic range CdTe mixed-mode pixel array detector (MM-PAD) for kilohertz imaging

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An x-ray imaging mixed-mode pixel array detector (MM-PAD) coupled to a $750\ \mu\text{m}$ thick CdTe sensor is described. The detector comprises a 2×3 tiled array of individual 128×128 pixel ASICs coupled at the pixel level to CdTe sensor. The CdTe sensor significantly improves the detection efficiency for high-energy x-rays when compared to silicon sensors. The detector is capable of continuous framing at 1 kHz and in-pixel mixed-mode circuitry allows for single image well-depths of greater than 4×10^6 80 keV x-rays. The charge integrating front-end allows for quantitative measurement of high flux x-ray images beyond the capabilities of photon counting detectors. Detector performance will be summarized and measurements from the Advanced Photon Source (Argonne National Lab, Lemont, Illinois, USA) will be presented.

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