

Analog X-ray Pixel Detector (APAD) Developments

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Area semiconductor Pixel Array Detectors (PADs) utilize integrated circuit technology to make x-ray detectors in which each pixel has built in signal processing electronics. PAD efforts divide into two broad strategies: Digital PADs (DPADs), in which each stopped x-ray is digitally counted and analog integrating PADs (APADs), in which the signal is analog integrated for later digitization. APADs are necessary in situations where the instantaneous count-rate exceeds that which can be handled by processing each photon. Examples in which this occurs are time-resolved, high-flux radiography and many of the flash experiments anticipated with x-ray free electron lasers. Several generations of APADs have been constructed at Cornell University and applied to problems such as gas shock waves and instabilities in transient fluid jets. These devices and their applications are described.