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Single Event Effects in 0.18um Pinned Photodiode CMOS Image Sensors

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In this paper, Pinned Photodiode (PPD) CMOS Image Sensors (CISs) were exposed to heavy ions (Xe) with Linear Energy Transfer (LET) (50.34 MeV·cmˆ2/mg) and paper described how Single Event Effects (SEEs) disturbed the operation of Active Pixel Sensors (APS). The sensor has on-chip PLL and 12-bit analog to digital converters (ADC) for high speed readout. Results showed that no Single Event Function Interrupt (SEFI) was observed, however Single Event Latch-up (SEL), Single Event Upset (SEU) and Single Event Transient (SET) effects happened. Then physical failure mechanisms were investigated. SET was caused by the pixels, which contained the photosensitive area and could accumulate excess charges. SEL was due to addressing decoder and ADC circuits, then latch-up properties were investigated. SEU could be attributed to heavy ion hit occurring either in the register of read and reset pointer, or the multiple register.

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