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Design and Fabrication of PDE enhanced SiPM with Micro-lens

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An SiPM is a good candidate for PET-MRI systems to overcome problems of conventional PMTs. In this paper, a virtual guard ring and wafer trench in SiPM active areas were adopted to prevent the premature breakdown in the curvature junction. N+/p-/p/π/p+ doping structure was simulated and designed to improve avalanche trigger probability. In order to improve the fill factor in small sized micro-cells in an SiPM pixel, layout was designed with high sheet resistance poly-silicon quenching resistor, and a micro-lens, to maximize light collection efficiency, was accurately modeled. SiPM fabrication is now in progress. PDE, the dark count, the timing resolution, and the gamma-ray energy resolution with a scintillation crystal will be measured. Other experiments in order to compare the performance of different structured SiPMs will be done.

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