

Development of an sCMOS Position-Sensitive UCN Detector

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In trapping experiments such as the ultracold neutron lifetime experiment (UCN τ), Position-Sensitive Detection (PSD) of UCNs can be useful in characterizing the spatial distribution of detected particles. In particular, this detection method can aid in understanding systematic effects such as depolarization and phase space evolution. We have demonstrated that this can be accomplished using a cost-effective “scientific” complementary-symmetry metal-oxide-semiconductor (sCMOS) camera to image a Zinc Sulfide scintillator. The challenge of building a practical detector is the development of a lens system that allows sufficient signal to be collected from distances of over a meter. A test stand was constructed which allows the evaluation and calibration of detectors using various lens systems. The construction and performance of a periscopic lens system designed using this apparatus for imaging at a distance of 1.1m will be discussed.