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Towards an Amorphous Selenium CMOS Imager for a $0\nu\beta\beta$ Search

Tuesday, 26 May 2020 11:54 (18 minutes)

^{82}Se is an interesting candidate for a $0\nu\beta\beta$ search due to its high $Q_{\beta\beta}$ (2998 keV) value, which is above many natural radioactive backgrounds, and relatively long $T^{2\nu}_{0.5}$ (10^{20} yrs). We have proposed a tower of low noise pixelated CMOS detectors with a 200 μm layer of amorphous selenium (a-Se) as a $0\nu\beta\beta$ experiment. The high spatial resolution of a pixelated detector improves background rejection from Compton scattering and single β decays and highlights the desired topology of two βs from a single vertex. We will present results on our initial investigation into the resolution of a-Se using a single pixel detector with $\sim$ 100 keV γ-rays and the impact of this study on the energy resolution in the $Q_{\beta\beta}$ range of selenium. Additionally, we will discuss our work on depositing a-Se on the existing TopMetal-II$^-$ chip (72x72 pixels) and moving towards a full pixelated CMOS detector.

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