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Development of a hybrid amorphous selenium/CMOS charge sensor for the Selena neutrino experiment

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The Selena neutrino experiment couples an amorphous selenium (aSe) ionization target to a complimentary metal-oxide semiconductor (CMOS) active pixel array as an imaging detector for next generation neutrino physics. The high $Q_{\beta\beta}$ of ^{82}Se and the excellent event classification allows for a search for neutrinoless $\beta\beta$ decay free from environmental backgrounds. Furthermore, we can take advantage of the spatiotemporal resolution to perform high efficiency electron neutrino spectroscopy for solar neutrino studies and sterile neutrino searches. The Selena experiment will operate with a 10-ton target for a 100-ton year exposure. We are currently characterizing our first prototypes of the Selena detectors, which consist of 500um of aSe deposited on the Topmetal-II$^-$ CMOS pixel charge sensor. We present R\&D results from our studies and show the induced tracks within our detector, as well as a noise performance of 22.7 ± 0.4 electrons. We also present status on the development of the next version of the Selena detectors.

In-person or Virtual?

In-person

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