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Hybrid amorphous selenium / CMOS devices for MeV electron tracking

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We present the development of hybrid devices made from a thick ionization target layer of amorphous selenium (aSe) coupled to a silicon complementary metal-oxide-semiconductor (CMOS) active pixel array for charge readout. The CMOS pixels are instrumented to measure both the amplitude and time-of-arrival (TOA) of the charge signal for 3D tracking. The high spatial resolution in a solid-state target provides unparalleled rejection of backgrounds from natural radioactivity in the search for neutrinoless $\beta\beta$ decay and for solar neutrino spectroscopy with ^{82}Se . We summarize the current status of R&D, including results from the first CMOS sensors optimized for charge collection in aSe, and our plans to incorporate TOA and digital capabilities in the pixel.

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