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P1.065 Delayed charge recovery discrimination of passivated surface alpha events in P-type point-contact detectors

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The Majorana Demonstrator and GERDA experiments search for neutrinoless double-beta decay of ^{76}Ge using arrays of high-purity germanium detectors. If observed, this process would demonstrate that lepton number is not a conserved quantity in nature, with implications for grand-unification and for explaining the predominance of matter over antimatter in the universe. A problematic background in such large granular detector arrays is posed by alpha particles, particularly those that originate from Rn progeny that plate out on the detector surfaces during manufacturing and assembly. The p-type point contact (PPC) detector technologies implemented in these experiments have a thick outer dead layer covering most of the detector surface that is insensitive to alpha interactions originating external to or on the surface of the detector, and the point contact, despite being sensitive to these alphas, is very small in size. These features make PPC detector arrays inherently less sensitive to alphas than, for example, bolometric arrays. However, between the point contact and the outer dead layer is a passivated surface whose response to alphas is less easy to characterize. The charge collection properties near this surface can differ for different detector models. In the Majorana Demonstrator, events have been observed that are consistent with energy-degraded alphas originating on this surface, leading to a potential background contribution in the region-of-interest for neutrinoless double-beta decay. However, it is also observed that either electrons or holes created very close to the passivated surface are collected onto that surface, and then drift with a greatly reduced mobility. This leads to both a reduced prompt signal and a measurable change in slope of the tail of a recorded pulse. In this contribution we discuss the characteristics of these events and the development of a filter that can identify the occurrence of this delayed charge recovery, allowing for the efficient rejection of passivated surface alpha events in analysis.