

The MAJORANA low noise low background front-end electronics

The Majorana Demonstrator will search for the neutrinoless double beta decay ($\beta\beta(0\nu)$) of the isotope ^{76}Ge with a mixed array of enriched and natural germanium detectors. One of its major goals is to demonstrate a path forward to achieving a background rate at or below 1 cnt/(ROI-t-y) in the 4 keV region of interest (ROI) around the 2039-keV Q-value of the ^{76}Ge $\beta\beta(0\nu)$ -decay. Such a requirement on the background level significantly constrains the design of the readout electronics located in the direct vicinity of the detectors. We present here the low background low noise front-end electronics developed for the low-capacitance P-type point-contact (PPC) germanium detectors of the Majorana Demonstrator. This resistive-feedback front-end is fabricated on a radioactivity-assayed fused silica substrate where the feedback resistor consists of a sputtered thin film of high purity amorphous germanium and the feedback capacitor is based on the stray capacitance between circuit Au traces.

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