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Status of the Majorana Demonstrator

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The Majorana Demonstrator is searching for neutrinoless double beta decay ($0\nu\beta\beta$) in ^{76}Ge , a beyond the standard model second order nuclear process whose discovery would indicate that the neutrino is a Majorana fermion. The experiment consists of a modular array of 44 kg of p-type point contact (PPC) high-purity germanium detectors (HPGe), 30 kg of which are enriched to 88% in ^{76}Ge . The Demonstrator is constructed from low-background materials and housed at the Sanford Underground Research Facility (SURF). Due to the PPC detector geometry, pulse shape analysis (PSA) cuts can reject many background events. In addition, the experiment has achieved a leading energy resolution of 2.5 keV FWHM at 2039 keV. With 26 kg-yr of exposure, the Majorana Demonstrator has achieved a half-life limit of $> 2.7 \times 10^{25}$ yr at 90% CL. Recently, the experiment has undergone hardware upgrades, including the exchange of several PPC detectors for 4 Inverted Coaxial Point Contact (ICPC) detectors (6.7 kg) which will be used in future experiments. Many PSA routines have also been improved to improve efficiency, uniformity and stability. Many of the detectors, technology and analysis techniques developed by Majorana are being incorporated into LEGEND-200, the first phase of a next-generation search for $0\nu\beta\beta$ in ^{76}Ge . This talk will present the current status and recent results of the Majorana Demonstrator.

Collaboration name

Majorana

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