

New Results from the Majorana Demonstrator

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The MAJORANA DEMONSTRATOR neutrinoless double-beta decay ($0\nu\beta\beta$) search experiment comprises a 44 kg (29.7 kg enriched to 88% in ^{76}Ge) array of p-type, point-contact germanium detectors. During its main data taking period from 2015 to 2021, MAJORANA reached an exposure of ~ 65 kg-y before the removal of the enriched detectors. The MAJORANA DEMONSTRATOR continues to operate with 14.3 kg of natural germanium detectors in a single module for background studies and other rare-event searches, after the enriched detectors were removed for deployment in the 200 kg phase of the Large Enriched Germanium Experiment for Neutrinoless $\beta\beta$ Decay (LEGEND-200). In this talk, we present new results from the MAJORANA DEMONSTRATOR on its $0\nu\beta\beta$ decay search in addition to various physics topics including solar axions, bosonic dark matter, test of wavefunction collapse, and more physics beyond the Standard Model. We also discuss excellent performance of the MAJORANA detectors enabling these searches, including low energy threshold, unparalleled energy resolution approaching 0.1% FWHM at the $0\nu\beta\beta$ Q-value, and its ultralow background achieved by the use of ultraclean materials in a deep underground laboratory with pulse-shape discrimination capabilities. In addition, we discuss ongoing progresses of background modelling, which is informing the next-generation LEGEND experiment.

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