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The MAJORANA DEMONSTRATOR's Search for Double-Beta Decay of 76 Ge to Excited States of 76 Se

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The MAJORANA DEMONSTRATOR concluded its search for neutrinoless double-beta decay in 2021. The experiment operated an array of up to 40.4 kg of germanium detectors, 29.7 kg of which were isotopically enriched in 76 Ge. Thanks to its ultra-low backgrounds, excellent energy resolution, and background rejection capabilites, the DEMONSTRATOR was able to execute a broad program of searches for other rare physical processes. One such process is the double-beta decay of 76 Ge into excited states of 76 Se, which has not been observed before. Six possible decay modes exist, each of which produce events spanning multiple detectors that can be separated from backgrounds. The DEMONSTRATOR previously set world-leading limits in the range of $(0.75-4.0)\times 10^{24}$ yrs (90\% C.I.) on the various decay modes of 76 Ge. Since then, we have more than doubled the isotopic exposure and implemented improved analysis techniques that enable improved sensitivity. This talk will present an updated search for double-beta decay of 76 Ge to excited states of 76 Se, and will highlight searches for physics beyond the Standard Model that were conducted by the MAJORANA DEMONSTRATOR.

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Submitted on behalf of a Collaboration?

Yes

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