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First Results from the Majorana Demonstrator

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The Majorana Demonstrator is performing a sensitive search for the neutrinoless double-beta decay of 76Ge using an ultra-low background array of enriched HPGe detectors deployed at the Sanford Underground Research Facility in Lead, SD. This rare process is generically predicted to occur by large classes of beyond-the-Standard-Model theories, and its observation would indicate that lepton number is not a conserved quantity in nature, with implications for the matter-dominance of the universe. The techniques used for the Majorana Demonstrator include selection and production of materials extremely low in natural radioactivity, choice of detector technology enabling active rejection of background, and graded active and passive shielding, which together provide strong background reduction over previous-generation efforts in 76Ge. First data from the Demonstrator is in-hand, and I will present our initial results on 76Ge double-beta decay, background levels, and other physics targets. I will also discuss the current detector status and plans for future upgrades, as well as our ultimate goal to field a much larger array with even lower background that will be sensitive to Majorana neutrinos with an inverted mass ordering.

Primary author: Dr DETWILER, Jason (University of Washington)

Presenter: Dr DETWILER, Jason (University of Washington)

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