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Two-neutrino double-beta decay of ^{150}Nd to excited final states[1]
MARY KIDD, Tennessee Technological University, JAMES ESTERLINE, SEAN FINCH, WERNER TORNOW, Duke University/TUNL — This study yields the first detection of the coincidence gamma rays from the 0_1^+ excited state of ^{150}Sm. These gamma rays have energies of 333.97 keV and 406.52 keV, and are emitted in coincidence through a $0_1^+ \rightarrow 2_1^+ \rightarrow 0_{gs}^+$ transition. The enriched Nd_2O_3 sample obtained from Oak Ridge National Laboratory consists of 40.13 g ^{150}Nd. This sample was observed for 642.8 days at the Kimballton Underground Research Facility, producing 21.6 net events in the region of interest. This count rate gives a half life of $T_{1/2} = 1.07^{+0.45}_{-0.25}(stat) \pm 0.07(syst.))$ years, which agrees within uncertainties with another recent measurement in which no coincidence was employed. Lower limits were also obtained for decays to higher excited final states. Finally, the nuclear matrix element was extracted from this half life with a value of $0.0232^{+0.0032}_{-0.0037}$.

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