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Setting Limits on Double β Decay of ^{136}Xe to the Excited State of ^{136}Ba using EXO-200 JEREMY GAISON, Drexel University, EXO-200 COLLABORATION — When a single β decay is energetically forbidden, it is possible for certain even-even nuclei to undergo the very rare process of two neutrino double β decay ($2\nu\beta\beta$). Further, the $2\nu\beta\beta$ decay to the excited state of a daughter nucleus has been directly observed for ^{150}Nd and ^{100}Mo with half lives on the order of 10^{20} years, several orders of magnitude longer than the age of the universe. A better understanding of this type of decay could put constraints on current models for nuclear matrix elements. Using data from EXO-200, a 110-kg liquid xenon time projection chamber designed to search for the neutrinoless double β decay ($0\nu\beta\beta$) of ^{136}Xe, we search for the $2\nu\beta\beta$ decay of ^{136}Xe to the first 0^+ excited state of ^{136}Ba, a process expected to have a half life on the order of 10^{25} years.

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