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Xe134 2□□□/0□□□ Search in PandaX-4T Experiment

^{134}Xe is a candidate isotope for neutrinoless double beta decay˜($0\nu\beta\beta$) search. In addition, the two-neutrino case ($2\nu\beta\beta$) allowed by the standard model of particle physics has not yet been observed.With the 656-kg natural xenon in the fiducial volume of the PandaX-4T detector, which contains 10.4\% of ^{134}Xe, and its initial 94.9-day exposure, we have established the most stringent constraints on $2\nu\beta\beta$ and $0\nu\beta\beta$ of ^{134}Xe half-lives, with limits of 2.8×10^{22}˜yr and 3.0×10^{23}˜yr at 90\% confidence level, respectively. The $2\nu\beta\beta$ ($0\nu\beta\beta$) limit surpasses the previously reported best result by a factor of 32 (2.7), highlighting the potential of large monolithic natural xenon detectors for double beta decay searches.

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