

# THE KAMLAND-ZEN 800 EXPERIMENT: THE FIRST SEARCH FOR A MAJORANA NEUTRINO IN THE INVERTED MASS ORDERING REGION

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The discovery of neutrinoless double beta decay ( $0\nu\beta\beta$ ) would confirm the Majorana nature of the neutrino, shedding light on the persistent puzzles surrounding the neutrino mass and help explain the matter-dominated universe. The KamLAND-Zen experiment has provided some of the most stringent constraints on the  $0\nu\beta\beta$  decay half-life in  $^{136}\text{Xe}$  using a monolithic xenon-loaded liquid scintillator. Here, we present an updated search for this rare process using an upgraded detector, ultra-low radioactive container, and nearly 800 kg of enriched xenon - amounting to an exposure of 979 kg yr of  $^{136}\text{Xe}$ . No significant observation of a non-zero  $0\nu\beta\beta$  rate was observed, and we set a lower limit on the half-life for this process of  $T_{1/2} > 2.29 \times 10^{26}$  years at the 90% C.L. corresponding to an upper limits on the effective Majorana neutrino mass of 36-156 meV. This results represents the first  $0\nu\beta\beta$  search probing the inverted mass ordering region.

