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Latest result of neutrinoless double-beta decay search by KamLAND-Zen (remote)

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Detection of neutrinoless double-beta decay ($0\nu\beta\beta$) would be an evidence of Majorana nature of neutrino, which clue on the extremely light neutrino mass and the matter dominant universe.
The KamLAND-Zen experiment started a search for $0\nu\beta\beta$ of ^{136}Xe nuclei in 2011 (KamLAND-Zen400). The experiment was upgraded in 2019 by double amount of xenon nuclei and a tenfold reduction in uranium and thorium contamination (KamLAND-Zen 800). In addition, lots of new analytical technics including particle identification with neural network have been developed.
A combined analysis of the KamLAND-Zen 400 and 800 dataset yields a lower limit of the half life of $0\nu\beta\beta$: $T_{1/2}^{0\nu\beta\beta} = 2.3 \times 10^{26}$ years at 90% confidence level, which corresponds to the most strong upper limit on the effective Majorana neutrino mass of 36–156 meV with different nuclear matrix elements. This experiment achieved the first search of $0\nu\beta\beta$ in the inverted neutrino mass hierarchy region.
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