

Search for supernova relic neutrinos at KamLAND

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We report a search for electron antineutrinos at KamLAND with an energy range of 8.3–30.8 MeV via the inverse beta decay.

In 4528 days of KamLAND data, we found 18 event candidates and no significant excess over estimated backgrounds.

From data interpretation, with the assumption of some supernova relic neutrino spectrum predictions, we give upper flux limits of $60\text{--}110\text{ cm}^{-2}\text{s}^{-1}$ (90% CL) in the analysis range and present a model-independent flux.

These upper limits are the most stringent for 8.3–12 MeV region to date.

We also improve on the upper probability limit of ^8B solar neutrinos converting into antineutrinos via the Resonant Spin Flavor Precession with the neutrino magnetic moment.

Besides, we could set limits on the annihilation cross section for light dark matter pairs to neutrino pairs.

Reference to paper (DOI or arXiv)

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