Neutrino Mass and Forbidden Beta Decays

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The most sensitive direct neutrino mass search is provided by a very precise measurement of the electron energy spectrum in single β decays close to the endpoint. Recent experiment KATRIN uses the super-allowed β decay of tritium [1]. A possibility to use the first, second, third unique forbidden β decays and the first non-unique forbidden β decay for the determination of the absolute mass of neutrinos is addressed. For selected nuclei we present the theoretical electron energy spectra for these forbidden β transitions. Our calculations are based on the exact Dirac wave functions of the electron with effects of finite nuclear size and the electron screening taken into account [2]. Our goal is to define the Kurie functions for these forbidden β decays in such a way that they are linear near the endpoint in the limit of massless neutrinos like the Kurie function of the super-allowed β decay of tritium [3,4].

References

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