

Search for resonant double-electron capture

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It is still unknown whether neutrinos are Dirac or Majorana particles. An answer to this question can be obtained from neutrinoless double-electron capture. An observation of this process would prove that the neutrino is a Majorana particle. A measurement of the half-life of this process would allow a determination of the effective Majorana neutrino mass.

In the search for the nuclide with the largest probability for neutrinoless double-electron capture, we have determined the Q -values of several potentially suitable nuclides with SHIPTRAP by Penning-trap mass-ratio measurements. The ECEC-transition in ^{152}Gd has been determined to have the smallest half-life of 10^{26} years for a 1 eV neutrino mass among all known $0\nu\text{ECEC}$ -transitions, which makes ^{152}Gd the most promising candidate for the search for neutrinoless double-electron capture. This contribution will summarize the recent experimental results.