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Calculation of the nuclear matrix elements and phase space factors for the double-beta decay of 104Ru

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The nature of the neutrinoless double-beta decay remains one of the most talked topics in nuclear and particle physics. Observing this kind of decay would shed light on the nature of the neutrino, including its mass. Our goal is to calculate the phase space factors and nuclear matrix elements concerning the decay of ^{104}Ru. The phase space factors are evaluated using exact Dirac electron wave functions with finite nuclear size and electron screening [1] whereas the nuclear matrix elements are calculated using the microscopic interacting boson model (IBM-2) following the procedure introduced in [2]. From these results, we can calculate the estimates for both two neutrino and neutrinoless double-beta decay half-life. This study is done in collaboration with the experimental group (IGISOL) from the University of Jyväskylä. They measured a very precise Q-value for the double-beta decay of the nucleus in the investigation using the JYFLTRAP Penning trap. Before this, there has been no direct Q-value measurement for the double-beta decay transition between the nuclear ground states ^{104}Ru $\rightarrow$ ^{104}Pd. This kind of study was made previously for the ^{98}Mo [3].

References:
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