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Examination of reliability of nuclear matrix elements of neutrinoless double-β decay by QRPA

One of few methods to determine the neutrino mass scale is to use the neutrinoless double-β decay under the assumption that the neutrino is a Majorana particle. The nuclear matrix element of this decay is one of the indispensable ingredients for this approach, and this quantity can only be obtained by theoretical calculations. Currently, the calculated nuclear matrix elements are distributed in the range of a factor of 2-3. The key point for solving this problem is to investigate the validity of the used approximations in detail. The result of the best checked approximation is most reliable. I have been examining the reliability of the application of the random-phase approximation (QRPA) for several decay instances, and it turns out that this application has the acceptable quality for 136Xe→136Ba in all of the seven check points that I examined.

Mini-abstract

The approximation for the nuclear matrix element of the neutrinoless double-β decay is examined.

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