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Investigation of Lorentz violation in double-beta decay

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Observable effects of the Lorentz violation symmetry at low energy scale can also be investigated by comparing the theoretical calculations with precise analysis of the measured summed energy spectra of electrons emitted in two-neutrino double beta decay (DBD) mode. In this study we make a detailed comparison of the phase space factors (PSF) and their differentials computed with analytical (approximate) electron functions and with "exact"electron functions obtained by solving the Dirac equation in a realistic Coulomb-type potential with the inclusion of the finite nuclear size and screening effects. We found relevant differences between the electron spectra calculated by the two methods, which lead to revised constraints of the coefficient that governs the time-like component of Lorentz-violating operator a3of which appears in the Standard-Model Extension (SME) theory.

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