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New Evaluation of the γW-box Correction to $0^+ - 0^+$ Nuclear β-Decay and V_{ud} Extraction

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Current most precise knowledge of the value of V_{ud} is obtained from the analysis of a number of superallowed nuclear β-decays. At present, the main limitation in precision of this determination is due to radiative corrections, more specifically the "inner" γW-box correction that is independent of the electron spectrum but depends on hadronic structure. A novel dispersion formulation of the γW-box is developed. It allows to test the validity and improve the previous evaluation of Marciano and Sirlin, which was based on several semi-empiric assumptions. Further effects, such as possible effects of the nuclear excitations both on inner and outer corrections are discussed.

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