Double beta decay phase space factor calculation using Coulomb potential calculated by mean field calculation

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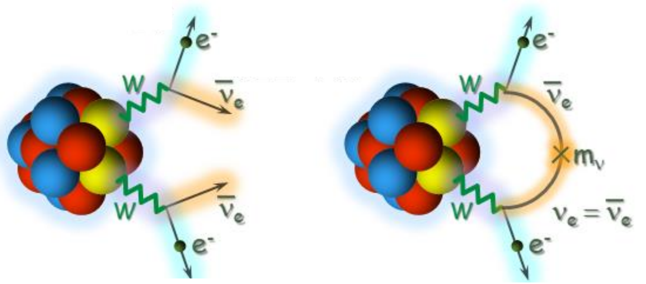
Double beta decay

$$(Z, A) \longrightarrow (Z+2, A) + 2e^- + 2\bar{\nu}_e$$
$$(Z, A) \longrightarrow (Z-2, A) + 2e^+ + 2\nu_e$$

If neutrinos are Majorana particle, they vanish



Double beta decay with neutrinos

Double beta decay without neutrinos

https://www.rcnp.osaka-u.ac.jp/candles/index.html?Lang=JP&InputContents=Study

The half-life of neutrinoless double beta decay

$$(T^{0\nu}_{1/2})^{-1} = G_{0\nu}(Q_{\beta\beta}, Z) g_A^4 |M_{0\nu}|^2 \left(\frac{\langle m_\nu \rangle}{m_e}\right)^2$$

Measured by exp. → Half-life

Phase space factor

Axial vector coupling constant

Nuclear matrix element

Effective neutrino mass

Electron mass

To determine neutrino mass, we must calculate nuclear matrix element and phase space factor