#### Abstract ID : 30

# Description of Double Beta Decay within EMPM and STDA

## Content

Double beta decay (DBD) is a phenomenon which provides us unique window to physics beyond Standard Model and which lies at the intersection of particle, nuclear and atomic physics. It is of crucial importance to distinguish whether DBD occurs solely in two-neutrino or also neutrinoless variant. Possible discovery of neutrino-less or other exotic mode of DBD would have big consequences in next development of particle physics as well as cosmology. One of challenges in theoretical description of DBD is to provide precise nuclear matrix elements (NME) which enter to calculations of DBD's half-life. In our contribution we discuss Equation of Motion Phonon Method (EMPM), and additionally also Second Tamm Dancoff Approximation (STDA). Comparison of both methods, EMPM and STDA, was recently studied in more detail [1]. While in the paper [1] we described electromagnetic nuclear excitations, in this conference contribution we show that the generalization of STDA and EMPM, in which we apply the particle-hole configurations which change type of nucleon, is suitable for calculations of DBD in Calcium-48. We also discuss the problem of the center-of-mass (CM) spuriousity, which affects the low-energy states of nuclei participating in the DBD.

### References

[1] F. Knapp, P. Papakonstantinou, P. Veselý, G. De Gregorio, J. Herko, and N. Lo Iudice, Phys. Rev. C 107 (2023) 014305.

**Primary author:** VESELY, Petr (Nuclear Physics Institute, Czech Academy of Sciencies, 25068 Rez, Czech Republic)

**Co-authors:** DE GREGORIO, Giovanni (Dipartimento di Matematica e Fisica, Universita degli Studi della Campania "Luigi Vanvitelli", I-81100 Caserta, Italy); KNAPP, Frantisek (Institute of Particle and Nuclear Physics MFF Charles University, CZ-18000 Prague 8, V Holesovickach 2, Czech Republic); LO IUDICE, Nicola (Dipartimento di Fisica, Univerita di Napoli Federico II, 80126 Napoli, Italy); SIMKOVIC, Fedor

**Presenter:** VESELY, Petr (Nuclear Physics Institute, Czech Academy of Sciencies, 25068 Rez, Czech Republic)

## Status: SUBMITTED

Submitted by DE GREGORIO, Giovanni on Wednesday, 12 March 2025