Contribution ID: **25** Type: **Oral presentation**

Two-neutrino 0+ ⟶ 0+ double beta decay of 48Ca in the DFT-NCCI framework

Thursday, June 26, 2025 10:45 AM (30 minutes)

Two-neutrino double beta decay ($2\nu\beta\beta$) is a second-order weak-interaction process. Consequently,it is among the rarest radioactive processes observed in nature.

The $2\nu\beta\beta$ decay has recently attracted significant attention due to substantial investments in the search for the yet unobserved neutrinoless double beta decay ($0\nu\beta\beta$), a process considered a potential gateway to new physics beyond the Standard Model. Current efforts focus on high-precision half-life measurements and, on the theoretical side, on high-precision calculations of the nuclear matrix elements using various theoretical models.

In this talk, we present the results of our seminal calculation of the nuclear matrix element for the $2\nu\beta\beta$ decay 48Ca ⟶ 48Ti, performed using a post-Hartree-Fock (HF) Density Functional Theory-based No-Core Configuration-Interaction (DFT-NCCI) framework developed by our group. The preliminary value we have obtained for the nuclear matrix element describing this process, $|M2\nu\beta\beta| = 0.063(6)$ MeV−1, is in excellent agreement with the results of the shell-model study by Horoi et al., which yielded 0.054 (0.064) MeV−1 for the GXPF1A (GXPF1) interactions, respectively.

The consistency of our prediction with the shell-model results strengthens our confidence in the nuclear modeling of this extremely rare process, which is of paramount importance for the further modeling of the $0\nu\beta\beta$ decay.

Primary author: MIŚKIEWICZ, Jan (Physics Faculty, University of Warsaw)

Co-authors: Dr KONIECZKA, Maciej (Physics Faculty, University of Warsaw); Prof. SATUŁA, Wojciech (Physics Faculty, University of Warsaw)

Presenter: MIŚKIEWICZ, Jan (Physics Faculty, University of Warsaw)

Session Classification: Theory

Track Classification: Theory