Contribution ID: **16** Type: **Oral presentation**

Double-beta decay and test of fundamental symmetries

Monday 29 August 2022 14:00 (25 minutes)

International Centre for Advanced Training and Research in Physics,
P.O. Box MG12, 077125 Bucharest-Magurele, Romania

Abstract
Double beta decay (DBD) is a currently hot research topic as it can offer a wide range of physics investigations beyond the Standard Model (BSM). These refer to some fundamental neutrino properties, yet unknown (neutrino nature –is it a Dirac or a Majorana particle, the neutrino absolute mass and mass hierarchy, number of neutrino flavors, etc.), conservation of the lepton number and validity of Lorentz and CP symmetries, as well as to different BSM mechanisms that can contribute to the neutrinoless double-beta decay.
In my talk, I'll first summarize the current challenges facing the DBD study. Then, I'll focus on the DBD potential to test fundamental symmetries and, in particular, I'll present the current status of Lorentz invariance violation (LIV) searches. Such investigations are currently been conducted in several large experiments as EXO, GERDA, SuperNEMO, CUORE and CUPID-0, and are based, on one side, on precise measurements of the electron spectra and electron angular correlations and, on the other side, on reliable theoretical calculations of these spectra. I'll present the theoretical formalism and precise calculation of the single, summed energy and angular correlation electron spectra, along with their deviations due to LIV. Next, I'll show different LIV signatures that can be investigated in DBD experiments and the current constraints of the coefficient that governs the LIV strengths. Finally, I'll propose an alternative, new method to constrain this coefficient through the measurement of the angular correlation coefficient, and show that future DBD experiments can improve these limits significantly.

References
1. S. Stoica, Investigation of Lorentz symmetry violation in double-beta decay, MEDEX'19, Prague, May 28-June 2, 2019 (invited talk).
2. O. Nitescu, S. Ghinescu, and S. Stoica, J. Phys. G 47, 055112 (2020).
3. O. Nitescu, S. Ghinescu, and S. Stoica, Phys. Rev. D 103, L031701 (2021).
4. S. Stoica, Study of kinematic factors in double-beta decay, Conference on Neutrino and Nuclear Physics (CNNP2020), February 20-24, 2020, Cape Town, South Africa (invited talk).
5. S. Ghinescu, O. Nitescu and S. Stoica, Phys. Rev. D 105, 055032 (2022).

Scientific topic

Symmetries and Interactions

Author: Prof. STOICA, Sabin (CIFRA)

Presenter: Prof. STOICA, Sabin (CIFRA)

Session Classification: Fundamental interactions