Contribution ID: **47** Type: **Oral**

Uncovering Multiple Mechanisms of bb0nu Decay

Wednesday, September 11, 2013 5:20 PM (30 minutes)

We investigate the possibility to discriminate between different pairs of CP non-conserving mechanisms inducing the neutrinoless double beta
$betabeta$-decay by using data on
$betabeta$-decay half-lives of nuclei with largely different nuclear matrix elements (NMEs). The mechanisms studied are: light Majorana neutrino exchange, heavy left-handed (LH) and heavy right-handed (RH) Majorana neutrino exchanges, lepton charge non-conserving couplings in SUSY theories with R-parity breaking giving rise to the "dominant gluino exchange" and the "squark-neutrino" mechanisms. The nuclei considered are ^{76}Ge, ^{82}Se, ^{100}Mo, ^{130}Te and ^{136}Xe. Four sets of nuclear matrix elements (NMEs) of the decays of these five nuclei, derived within the Self-consistent Renormalized Quasiparticle Random Phase Approximation (SRQRPA), were employed in our analysis. While for each of the five single mechanisms discussed, the NMEs for ^{76}Ge, ^{82}Se, ^{100}Mo and ^{130}Te differ relatively little, the relative difference between the NMEs of any two nuclei not exceeding 10%, the NMEs for ^{136}Xe differ significantly from those of ^{76}Ge, ^{82}Se, ^{100}Mo and ^{130}Te, being by a factor $\sim (1.3 - 2.5)$ smaller. This allows, in principle, to draw conclusions about the pair of non-interfering (interfering) mechanisms possibly inducing the
$betabeta$-decay from data on the half-lives of ^{136}Xe and of at least one (two) more isotope(s) which can be, e.g., any of the four, ^{76}Ge, ^{82}Se, ^{100}Mo and ^{130}Te. Depending on the sets of mechanisms considered, the conclusion can be independent of, or can depend on, the NMEs used in the analysis. The implications of the EXO lower bound on the half-life of ^{136}Xe for the problem studied are also exploited.

Primary author: AURORA, Meroni (Trieste)

Presenter: AURORA, Meroni (Trieste)

Session Classification: Double Beta Decay/ Neutrino Mass IV

Track Classification: Double Beta Decay