



Contribution ID: 22

Type: Oral

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Monday, 24 February 2020 14:40 (20 minutes)

Theoretical description of half-lives and electron spectra for higher order forbidden non-unique β decays

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In this work we have calculated $\log ft$ and half-lives values of the higher order forbidden β -decays for selected nuclei [for e.g. $^{87}\text{Rb}(3/2^-) \rightarrow ^{87}\text{Sr}(9/2^+)$] in the framework of the nuclear shell model [1-3]. In the present study, we have included next-to-leading-order terms [4-6] in the shape functions to see their effect in the calculated half-lives and β (or electron) spectra. The role of effective value of axial-vector coupling constant (g_A) in half-lives and β spectra for higher-forbidden beta decay are very important. The β^- -spectrum of the fourth-forbidden non-unique decays of ^{113}Cd and ^{115}In strongly depends on the effective value of g_A [4,7]. In our study we will report the spectrum-shape method (SSM) for electron spectra with the effective value of g_A . With the SSM, it is possible to extract information of effective value of the weak coupling constant by comparing the theoretical and experimental β electron spectra of forbidden non-unique β -decays.

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Session Classification: Contributed Talks