

SOME FEATURES OF BETA-DECAY STRENGTH FUNCTION IN HALO NUCLEI

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The probability of the β -transition is proportional to the product of the lepton part described by the Fermi function $f(Q_\beta - E)$ and the nucleon part described by the β -decay strength function $S_\beta(E)$. Until recently, experimental investigations of the $S_\beta(E)$ structure were carried out using total absorption gamma-ray spectrometers (*TAGS*) and total absorption spectroscopy methods, which had low energy resolution. With *TAGS* spectroscopy, it became possible to demonstrate experimentally the resonance structure of $S_\beta(E)$ for Gamow–Teller (*GT*) β -transitions [1]. However, *TAGS* methods have some disadvantages arising from low energy resolution of *TAGS* spectrometers. Modern experimental instruments allow using nuclear spectroscopy methods with high energy resolution to study the fine structure [2] $S_\beta(E)$.

In this report the fine structure of $S_\beta(E)$ in halo nuclei is analysed. When the parent nuclei has *nm* Borromean halo structure, than the Gamow-Teller resonance and pygmy resonances in *GT* β -decay strength function $S_\beta(E)$ in daughter nuclei may have structure corresponding to *np* tango [3,4] halo. When neutron excess is high enough, resonances in $S_\beta(E)$ may simultaneously have both *nm* Borromean halo component and *np* tango halo component and form so-called mixed halo [3,4]. Analysis of the $S_\beta(E)$ structure in halo nuclei allow to determine the most suitable region for the Wigner $SU(4)$ spin-isospin symmetry. Value $Z/N \approx 0.5 - 0.6$ may correspond to the $SU(4)$ spin-isospin symmetry region.

1. Yu.V. Naumov, A.A. Bykov, I.N. Izosimov, Sov.J.Part.Nucl., **14**, 175(1983). <https://www.researchgate.net/publication/233832321>
2. I.N. Izosimov, V.G. Kalinnikov, A.A. Solnyshkin, Phys. Part. Nucl., **42**, 1804(2011). DOI: 10.1134/S1063779611060049
3. I. N. Izosimov, Physics of Particles and Nuclei Letters **16**, 754 (2019). DOI: 10.1134/S1547477119060207
4. I. N. Izosimov, EPJ Web of Conferences **239**, 02003 (2020). DOI: 10.1051/epjconf/202023902003

Section

Nuclear structure: theory and experiment

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