STRUCTURE OF β-DECAY STRENGTH FUNCTION $S_\beta(E)$ IN HALO NUCLEI

Izosimov I.N.
Joint Institute for Nuclear Research, Dubna, Russia
E-mail: izosimov@jinr.ru

The strength function $S_\beta(E)$ governs [1, 2] the nuclear energy distribution of elementary charge-exchange excitations and their combinations like proton particle (πp)–neutron hole (νh) coupled into a momentum I^π: $[\pi p \otimes \nu h]_I^\pi$ and neutron particle (νp)–proton hole (πh) coupled into a momentum I^π: $[\nu p \otimes \pi h)]_I^\pi$. The strength function of Fermi-type β-transitions takes into account excitations $[\pi p \otimes \nu h]_0^+$ or $[\nu p \otimes \pi h]_0^+$. Since isospin is a quite good quantum number, the strength of the Fermi-type transitions is concentrated in the region of the isobar-analogue resonance (IAR). The strength function for β-transitions of the Gamow-Teller (GT) type describes excitations $[\pi p \otimes \nu h]_1^+$ or $[\nu p \otimes \pi h]_1^+$.When the nuclear parent state has the two-neutron Borromean halo structure, than IAR and configuration states (CSs) can simultaneously have nn, np Borromean halo components in their wave functions[3–5].

In this work, the structure of resonances in the GT β-decay strength function $S_\beta(E)$ for halo nuclei is analysed. It is shown that when the parent nucleus has *nn* Borromean halo structure, than resonances in the GT β-decay strength function $S_\beta(E)$ of halo nuclei, may have np tango halo [3–5] structure and mixed np tango + nn Borromean halo structure. Since the operators of GT β-decay and $M1$ γ-decay have no spatial components, GT β-transitions and $M1$ γ-transitions between states with similar spatial shapes are favored. Data of ^{6}He (Borromean nn halo) ground state (g.s., $I^\pi=0^+$) GT β-decay and $M1$ gamma decay of its IAR (Borromean np halo, resonans in ^{6}Li, E=3.56 MeV, $I^\pi=0^+$) are discussed. A rather large value of the transition strengths: $B(M1,\sigma)$ = 8.2 W.u. for $M1$ γ-decay from IAR and $B(\mathrm{GT}) \approx 5g_A^2/4\pi$ (Σ(sum rule) = $6g_A^2/4\pi$) for GT β^- decay to the ^{6}Li g.s. ($I^\pi=1^+$), complies the presence of an np tango halo in ^{6}Li g.s.

1. Yu.V.Naumov, A.A.Bykov, I.N.Izosimov // Sov. J. Part. Nucl. 1983. V.14. P.167.
2. I.N.Izosimov, V.G.Kalinnikov, A.A.Solnyshkin // Phys. of Part. and Nucl. 2011. V.42. P.1804.
3. I.N.Izosimov // AIP Conference Proceedings. 2015. V.1681. 030006.
4. I.N.Izosimov // EPJ Web of Conf. 2016. V.107. 09003.
5. I.N.Izosimov // Phys. of At. Nucl. 2017. V.80. P.867.