

GAMOW-TELLER AND ANALOG RESONANCES IN NEUTRON-RICH Sn ISOTOPES

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Charge-exchange resonances: the giant Gamow-Teller (GTR [1]), analog (AR) resonances and the so-called "pigmy" resonance (PR), which are lying below GTR [2], have been studied in the microscopic theory of finite Fermi systems and in the semiclassical approach. Calculations are presented for tin isotopes with the mass numbers $A = 112 - 140$ and compared with experimental data [3, 4].

The calculations were performed with the refined constants of local spin-isospin (τ) and isospin-isospin (σ) interaction of quasiparticles – and accordingly. These interaction constants are phenomenological parameters and they were determined from comparison with experimental data [5]. The calculated energy difference $\Delta E_{G-A} = E_G - E_A$ tends to zero with increasing A number and $N - Z$ indicating the restoration of Wigner SU(4)-symmetry [6].

The energies and matrix elements of the excited resonant states that determine the structure of the charge-exchange strength function $S(E)$ were calculated. A comparison of the calculated and experimental strength functions $S(E)$ also shows their similarity both in energies and in matrix elements. The influence of charge-exchange resonances on the process of neutrino capture by nuclei was also investigated [7] and it is shown that taking these resonances into account is of fundamental importance.

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[1] Yu. V. Gaponov, and Yu. S. Lyutostanskii. JETP Lett. 15, 120 (1972).

[2] Yu. S. Lutostansky. JETP Lett. 106, 7 (2017).

[3] K. Pham, J. Janecke, D. A. Roberts, et al. Phys. Rev. C 51, 526 (1995).

[4] J. Yasuda, et al. Phys. Rev. Lett. 121, 132501 (2018).

[5] Yu. S. Lutostansky. Phys. Atomic Nuclei 83, 33 (2020).

[6] Yu. S. Lutostansky. Phys. Atomic Nuclei 83, 39 (2020).

[7] Yu. S. Lutostansky, V. N. Tikhonov. Phys. Atomic Nuclei 79, 540 (2018).

The speaker is a student or young scientist

No

Section

1. Nuclear structure: theory and experiment

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