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Charge-Exchange Resonances of Tin Isotopes

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Charge-exchange resonances: the giant Gamow–Teller (GTR [1]) and analog (AR) resonances, and the so-called "pigmy" resonances (PR), which are lying below GTR [2], have been studied in the self-consistent theory of finite Fermi systems (TFFS). Microscopic numerical calculations and semi-classical calculations are presented for nine tin isotopes with the mass numbers 112, 114, 116, 117, 118, 119, 120, 122, and 124, for which experimental data exist [3]. These data is from Sn(3He,t)Sb charge-exchange reaction at the energy (3He) = 200 MeV. The giant Gamow-Teller and analog resonances with the energies − EG and EA, respectively, dominate in the strength function of the charge-exchange excitations of atomic nuclei. The calculated energy difference ΔEG−A = EG − EA tends to zero with A in heavy nuclei indicating the restoration of Wigner SU(4)-symmetry. The calculated ΔEG−A values are in good agreement with the experimental data. The average standard rms deviation for GTR and AR energies is $\delta E \leq 0.30$ MeV for the 9 considered Sn nuclei that is close to the experimental EGTR errors. The comparison of calculations with experimental data on the energies of charge-exchange pigmy resonances gives the standard deviation $\delta E < 0.40$ MeV for microscopic numerical calculations and $\delta E < 0.55$ MeV for calculations by semi-classical formulas, which are comparable with experimental errors. These calculations are original. The strength function of the beta decay for the 118Sn isotope has been calculated. It has been shown that the calculated resonance energies are close to the experimental values. The calculated and experimental relations between heights of pygmy resonance peaks are also close to each other. The same methods were used to calculate the resonance structure of other nuclei and the results of calculations showed good agreement with the experimental data. Of particular interest are the short-lived neutron-rich nuclei. The appearance of a pigmy resonance in the energy window of the beta-decay leads to a sharp decrease of the nucleus half-live. And when the pigmy resonance appears in the window of the beta-delayed neutron emission or beta-delayed fission, the corresponding probabilities increase strongly. This was recently observed in an experiment of studying the emission of delayed neutrons in highly neutron-rich gallium isotopes [5]. The work is supported by the Russian RFBR grant 16-02-00228 and RSF project 16-12-10161.

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. D. Verney, D. Testov, F. Ibrahim, Yu. Penionzhkevich, et al. Phys. Rev. C 95, 054320 (2017).

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