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THREE CLUSTER MODELS FOR NUCLEUS WITH A=8, 10 AND 11

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In last years the appreciable progress in understanding of nuclei structure was achieved in three-cluster α+2N and 2α +N models of nuclei with A = 6 and 9 [1]. The simple analytical form of model wave functions makes them convenient for account of various nuclear processes and allows to consider two freedom degrees both of its cluster and one-nucleon [2]. In particular, we have calculated spectroscopic factors for neutron separation from ^{8}Be ground state with formation of ground and excited states of ^{8}Be. The spectroscopic factors for proton separation represent significant interest for the theory. In this case, taking into account 2α +N- of model of ^{9}Be, the nucleus ^{8}Li should be formed with αtn- structure. Really, 97 % of ground state shell wave function form components with the Young scheme [431], compatible with atn- decay [3].

We have calculated an energy spectrum and wave functions of well- known low-lying levels of ^{8}Li within the framework of this multicluster model with the projecting in which forbidden states being in relative motion of fragment pairs [1] are consistently excluded. The configurations, which were taken into account in calculation of the ground state with J^{π}, $T=2^+$, 1 are shown in a table. Here, L and S are total orbit and spin moments of the state. Other designations are obvious. As the calculations show, that the model gives well relative energies of four low- lying states of ^{8}Li. Thus the ground state seemed to be overbinded for 0.5 MeV. The result is quite satisfactory, as we failed to make the adjusting procedure of parameter values: simple pair potentials of Gaussian form reproduced the low-energy scattering phases [1] have been used as a pair interaction. The statistical characteristics of ^{8}Li are also reproduced quite well: root mean square radius, magnetic and quadrupole moments. We carried out the similar calculations for mirror nucleus ^{8}Be in three-body (αtp-model) and for nuclei with A=10,11 in 2α+d, 2α +t(τ) models, correspondingly.

lat	l	L	S
1	1	1	1
1	1	2	0
1	1	2	1

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2. Zhusupov et al. // Izv. RAN, ser.phys. T.62, N5, P. 985.
3. Boyarkina A.N. Structure of nuclei of the Ip-shell. MSU, 1973.