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Description of low-lying states of 96Zr based on the collective Bohr Hamiltonian including the triaxial degree of freedom

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Experimental data on ^{96}Zr indicate in this nucleus the coexistence of spherical and deformed structures with small mixing amplitudes. Several low-lying collective quadrupole states and the probabilities E2 and M1 of transitions between them are known in this nucleus. In our work, the observed properties of low-lying collective states of ^{96}Zr are investigated on the basis of a geometric collective model. The consideration is based on the collective Bohr quadrupole Hamiltonian, taking into account the triaxial degree of freedom, which provide the axial symmetry of the states localized in the deformed minimum. The shape of the potential near both minima was determined in such a way as to describe the observed properties of several low-lying collective quadrupole states of ^{96}Zr. Good agreement with experimental data on the reduced probabilities of E2 transitions was obtained in this work. It is shown that the low-energy structure of ^{96}Zr can be satisfactorily described in the framework of a geometrical collective model with a potential assuming the coexistence of spherical and deformed nuclei. However, the excitation energy of the 2^+_2 state can be reproduced only if the rotational inertia coefficient in the region of the deformed minimum is four times less than the vibrational one. It is also shown that shell effects are important for describing the probability of M1 transitions.

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