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Dynamics of dinuclear system in mass asymmetry coordinate

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Abstract

We developed a cluster model which allows us to take into account both shape deformation parameters and cluster degrees of freedom. In the proposed model the mass asymmetry variable which describes the partition of nucleons between the clusters is used as a collective coordinate. Due to this, the wave function of the nucleus is treated as a superposition of different cluster configurations including the mononucleus. To describe the reflection asymmetric collective modes characterized by the nonzero values of K, the degrees of freedom related to the internal excitation of clusters are taken into account [1].

The observed excitation spectra and angular-momentum dependencies of the parity splitting and electromagnetic transition probabilities are explained for different isotopes of Rn, Ra, Th, U, and Pu. Special emphasis is made on the investigation of recently measured 0_2^+ state in ^{240}Pu [2]. Our results suggest that this state can be understood as built on the excited state in mass asymmetry degree of freedom [3].

References

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