

Shape isomers, clusterization, and reactions

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Abstract

The U(3) symmetry plays an essential role in connecting the fundamental structure models of atomic nuclei not only for the single-shell problem, but also for multi-shell excitations [1]. In this contribution I show how this connecting symmetry can be applied for the determination of the stable shapes of nuclei.

The method is based on the investigation of the stability and self-consistency of the SU(3) symmetry [2], having quantum numbers which uniquely determine the quadrupole shape. The calculation is carried out in terms of the Nilsson-model and the quasi-dynamical symmetry.

This approach is an alternative of the well-known energy-minimum calculation for finding the shape isomers. Due to the presence of the U(3) symmetry a selection rule for the cluster configurations (and consequently for the reaction channels) can be used.

Applications to light [2], as well as to heavy nuclei [3,4], will be presented. (Heavy nuclei also have quasi-dynamical U(3) symmetry.)

Some of our theoretical predictions on shape isomers have already been approved by experimental observations [5,6].

References

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