Int. Workshop “Shapes and Dynamics of Atomic Nuclei: Contemporary Aspects”
ed. Nikolay Minkov, Heron Press, Sofia 2021

Description of evolution of mirror-asymmetric deformation in actinides within the cluster approach.

T.M. Shneidman[1], **E.V. Mardyban**[1], **G.G. Adamian**[1], **N.V. Antonenko**[1], **S.-G. Zhou**[2]

[1]Bogoliubov Laboratory of Theoretical Physics, Joint Institute for Nuclear Research, 141980, Dubna, Russia.
[2]State Key Laboratory of Theoretical Physics, Institute of Theoretical Physics, Chinese Academy of Sciences, 100190, Beijing, China

Abstract

We developed a model which allows taking into account both shape deformation parameters and cluster degrees of freedom. The important ingredient of the model is the dinuclear system (DNS) concept in which the wave function of the nucleus is treated as a superposition of mononucleus and two-cluster configurations [1]. 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 [2]. The evolution of mirror-asymmetric deformation inisotopic chains of Ra, Th, U, and Pu nuclei is analyzed [3]. The experimental data on energies of lowest negative-parity states and electric dipole and octupole transition probabilities are explained by treating the interplay between collective excitations of the DNS fragments and the motion in mass asymmetry.

References

[1] T.M.Shneidman, G.G.Adamian, N.V.Antonenko, R.V.Jolos and W.Scheid, Phys.Rev. C **67**, 014313 (2003).

[2] T.M.Shneidman, G.G.Adamian, N.V.Antonenko, R.V.Jolos and S.-G.Zhou, Phys.Rev. C **92**, 034302 (2015)

[3] T.M.Shneidman, G.G.Adamian, N.V.Antonenko, R.V.Jolos, H. Lenske and W. Scheid, Phys.Atomic Nuclei **79** (2016) 963-977.