POTENTIAL ENERGY SURFACES OF PT-PU ISOTOPES IN THE 4D FOURIER PARAMETRISATION

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Poster abstract

The power of a recently developed extremely flexible Fourier shape parametrisation [1], implemented in a macroscopic-microscopic approach is discussed. The main quality of this model lies in the very rapid convergence of the nuclear shape function with respect to the number of considered multipoles and permits a systematic investigation of nuclear deformation energy landscapes. Scanning in particular the nuclear chart from Pt to Pu isotopes, this contribution is intended to illustrate the power of the approach, while presenting some of the physics aspects it can address. A selected sample of 4D landscapes is analysed, searching for absolute and local extrema, ridges and valleys. The significance of the analysis for predicting mass partitioning in fission at low excitation energy, and its evolution with proton and neutron number is illustrated along the Hg, Po, Ra and U chains. A certain number of yet unknown super and hyper-deformed shape isomers in even-even Pt, Hg, Pb and Th isotopes are predicted, and the existence of a third minimum in the Th region is discussed. Quadrupole moments in the relevant minima are evaluated, too. Comparison with the experiment is discussed wherever possible.

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REFERENCES

[1] K. Pomorski, B. Nerlo-Pomorska, J. Bartel, and C. Schmitt, Acta Phys. Pol. B Supl. 8 (2015) 667.