

Fourth Article

Axial shape and pairing evolution of $^{82-106}\text{Zr}$, $^{86-112}\text{Mo}$, $^{90-116}\text{Ru}$ and $^{94-122}\text{Pd}$ isotopic chains in the framework of the deformed BCS approach

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Abstract

The Deformed Bardeen–Cooper–Schrieffer (DBCS) approach is used to study the axial shape evolution of even–even $^{82-106}\text{Zr}$, $^{86-112}\text{Mo}$, $^{90-116}\text{Ru}$ and $^{94-122}\text{Pd}$ isotopic chains. Regarding the residual interaction, both like-particle pairing and unlike-particle pairing are considered in this study. It is found that, in general, the proton–neutron pairing does not affect the ground state shapes of nuclei except for few nuclei, where the inclusion of proton–neutron pairing predicts spherical shape in the ground state rather than a deformed one in case of considering only like-particle pairing. Pairing gaps, energies and strengths of both like- and unlike-pairing modes are discussed. One can conclude that the contribution of proton–neutron pairing to the total pairing energy is not negligible, even if the neutron excess number is high.