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Ground state properties and shape evolution in Pt isotopes within the covariant density functional theory

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Abstract

In this work [1], the ground-state properties of the platinum isotopic chain, $^{160-238}$Pt are studied within the covariant density functional theory. The calculations are carried out for a large number of even-even Pt isotopes by using the density-dependent point-coupling and the density dependent meson-exchange effective interactions. All ground-state properties such as the binding energy, separation energy, two-neutron shell gap, rms-radii for neutrons and protons and quadrupole deformation are discussed and compared with available experimental data, and with the predictions of some nuclear models such as the Relativistic Mean Field (RMF) model with NL3 functional and the Hartree Fock Bogoliubov (HFB) method with SLy4 Skyrme force. The shape phase transition for Pt isotopic chain is also studied. Its corresponding total energy curves as well as the potential energy surfaces confirm the transition from prolate to oblate shapes at ^{188}Pt contrary to some studies predictions and in agreement with others. Overall, a good agreement is found between the calculated and experimental results wherever available.

References

[1] Y. El Bassem and M. Oulne, IJMPE **28**, 1950078 (2019).