The influence of isovector-isoscalar proton-neutron pairing on the Wigner energy

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In spite of many studies, the microscopic origin of Wigner energy, i.e., the extra-binding energy of N=Z nuclei compared to the neighboring nuclei, is still a subject of debate (e.g., see Ref. [1]). Recently, it was shown that the isovector proton-neutron pairing acting upon Nilsson single-particle levels and combined with a T^2 interaction can give a reasonable description of the mass dependence of Wigner energy [2, 3]. Later on, using the framework of Quartet Condensation Model (QCM) for treating the isovector pairing [4, 5], it was shown that a better description of the Wigner energy can be obtained in self-consistent Skyrme calculations [6]. The issue we analyze in the present work is how much is affected the Wigner energy by the isoscalar proton-neutron pairing correlations. Both the isoscalar and the isovector pairing interactions are treated in the framework of the extended QCM approach [7, 8] and the mean field is described by Skyrme functionals. It will be shown that the isoscalar proton-neutron pairing has a significant effect on Wigner energy.

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