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Particle-number conservation in charge-radii of odd-mass proton-rich nuclei in the isovector neutron-proton pairing case

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In medium-mass nuclei close to the $N=Z$ line, the neutron-proton (np) pairing correlations play an important role. They are generally studied within the BCS approach, but the main shortcoming of the latter is the particle-number fluctuation. A projection is thus necessary. Furthermore, the charge-radius is one of the fundamental properties of atomic nuclei. Its study may provide useful information about their size and shape. The isovector np pairing effects as well as those of the particle-number projection on the charge-radii of even-even nuclei proton-rich nuclei have been recently studied [1]. The aim of the present contribution is to study these effects on the charge-radii of odd-mass nuclei in the same region. As a first step, an expression of the projected quadratic charge radius is established using the Sharp-BCS (SBCS) method [2]. It is shown that it generalizes the one obtained when only the pairing between like-particles is considered. As a second step, the charge-radii of some odd-mass nuclei are calculated using the single-particle energies of a Woods-Saxon mean-field. The obtained results are compared to those obtained when only the pairing between like-particles is considered.

[1] M. Douici, N.H. Allal, M. Fellah, N. Benhamouda and M.R. Oudih, Int. J. Mod. Phys. E21, 1250046 (2012).

[2] N.H. Allal, M. Fellah, M.R.Oudih and N. Benhamouda, Eur. Phys. J A 27, 301 (2006).

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