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The nature of isotopic anomalies in charge radii and atomic isomer shifts at N=126 region.

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The nature of isotopic anomalies in charge radii and atomic isomer shifts at N=126 region.

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The nuclear charge rms-radii and atomic isomer shift for the 211-219Bi isotopes are calculated within the self-consistent finite Fermi systems theory using the Fayans functional FaNDF0. A special attention is paid to the anomalous part of the functional. In contrast to our previous calculations [1], the full Hartree-Fock-Bogolubov (HFB) formalism is employed with the non-diagonal pairing. The main impact on the kink in the isotopic dependence of radii at N=126, as well as on the isomer shifts comes from the occupancy factors of the neutron discrete and continuum quasiparticle states with principal quantum number $n = 1$, as well as the neutron pairing contribution to the proton central mean field potential. In contrast, in the RMF framework [2] the kink is determined exclusively by the contribution of the $\nu 1i11/2$ orbital assuming it is inverted with respect to the $\nu 2g9/2$ orbital which is not supported by the experiment. Importantly, our calculations successfully describe the unexpected negative isomer shift in ^{215}Bi observed recently at ISOLDE (CERN) [3].

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2. U. C. Perera, A. V. Afanasjev, and P. Ring. Phys.Rev. C 104, 064313 (2021).
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