

Modified Fayans functional. Description of nuclear ground state properties and spin-isospin response.

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The isovector volume term of Fayans energy density functional DF3-f [1] is extended. The corresponding parameter h_2 is determined in [2] making use of experimental and theoretical constraints derived recently for the parameters of nuclear matter equation of state: the symmetry energy J and its derivative L at equilibrium density [3]. We also discuss the relativistic correction to the EDF. The obtained equations of state for SNM and PNM are compared with the relativistic approaches [4].

An impact of the h_2 parameter on the Gamow-Teller strength function of reference doubly-magic nuclei ^{208}Pb is studied. Also, the charge-exchange spin-dipole resonances in ^{208}Pb are treated and the calculated sum rule is compared with the one derived from the (p, n) and (n, p) reactions [5]. This gives restriction on the value of the “neutron skin”, which, in turn, correlates with the parameters of the equation of state J and L . Within the same framework, the β -decay half-lives are calculated for spherical nuclei with $Z = 81 - 83$ and $T_{1/2} < 240\text{c}$. The available data are described up to a factor of 5, which is higher than the accuracy of the relativistic RHB+RQRPA approach [6].

The magnetic moments are calculated for the chains of Pt and Au isotopes. A joint analysis of the charge radii and such an isovector characteristic, as the magnetic moment, makes it possible to limit the possible values of the spins of the ground states of very neutron-rich nuclei that are not known experimentally.

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