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The Fayans energy-density functional. New constraints from the equations of state.

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The Fayans energy-density functional.
New constraints from the equations of state.
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The equations of state for infinite, symmetric nuclear matter and pure neutron matter are analyzed in terms of the Fayans energy density functional parameters: a+,-1,2, h+,-1,2. Fitting procedure of the DF3-a functional [1] is redone involving the previously unused parameter h-2. Additional constraint is implemented from the upper bound of the giant dipole resonance energy in 208Pb. A quality of the previous global fit of the Fayans EDF has been kept for the nuclear densities, masses of nuclei, single-particle levels and charge radii. Recently the constraints on symmetry energy and its derivative has been obtained in [6] using the data on nuclear masses, results of ab initio calculations with N3LO, ΔRnp values from PREXP-II, CREX experiments, as well as the latest data from the radii of neutron stars and registration of gravitational waves. The symmetry energy slope at saturation L(ρ0) calculated for different h-2 with the relativistic corrections taken into account (Fig.1) is compared with the error margines derived from the set of restrictions [6]. As it can be seen, for DF3-a, the EOS is softer than the ones obtained from the FANDF0 functional [2], as well as from APR [3], AFDMC [4], N2LO(D2,E1) and N2LO(D2,Eτ) [5] (Fig.2).
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Fig.1. The L(ρ) for symmetric nuclear matter. Calculation with the DF3-a functional for various value of parameter h−2 .
Fig. 2. Energy per nucleon for a symmetrical nuclear mater (SNM) as a function of density. our calculation with the FaNDF0[1], DF3-a[2] as well as for APR [3], AFDMC [4], N2LO[5] functionals.

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The speaker is a student or young scientist

No

Section

1. Nuclear structure: theory and experiment

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