

PROPERTIES OF NUCLEI IN THE NEIGHBORHOOD OF NEUTRON AND PROTON DRIP LINES

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We investigated the ground state properties of even-even nuclei in wide range of mass number A including nuclei with neutron and proton excess in the neighborhood of neutron and proton drip lines. Special attention was focused on nuclei beyond the theoretically known neutron drip line which form the peninsulas of nuclei which are stable against one and sometimes two neutrons emission for $N = 32, 58, 82, 126, 184, 258$. These calculations are based on the Hartree–Fock (HF) method with Skyrme forces (SkM*, SkI2, SLy4, Ska, SkP) and are the continuation of our investigations of nuclei with extreme neutron excess [1, 2]. Our calculations take into account axial deformation and the BCS pairing approximation. For neutron rich nuclei ^{248}Gd , ^{250}Dy and ^{266}Pb with magic neutron number $N = 184$ we have analyzed the potential energy curve as the function of the mass quadrupole parameter deformation $E(\beta_m)$ using the constrained HF. The analysis of the robustness of numerical solutions of HF equations for nuclei belonging to peninsulas of stability has been also made. We have also investigated the deformations, separation energies of one and two neutrons for the long isotope chains for $56 \leq Z \leq 72$ up to the neutron drip line. It is shown that for some superheavy nuclei with $Z \geq 120$ the oblate superdeformed shapes of neutron and proton density distributions can correspond to ground state.

1. V.N.Tarasov *et al.* // Physics of Atomic Nuclei. 2012. V.75. P.19.

2. V.N.Tarasov *et al.* // Int. Jour. Mod. Phys. E. 2013. V.22. 1350009.