DATA EVALUATION AND STRUCTURE OF NUCLEI WITH $A = 146$

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The data evaluation on the structure and decays of nuclei with mass number of $A = 146$ in the standard ENSDF [1] is completed. We present results of this work [2], which takes into account data up to the beginning of 2014. Based on them an overview of the properties and the characteristics of the structure of the nuclei in the isobaric chain is provided.

Systematics of the binding energies of one S_p and two S_{2p} protons, of the energies of the first excited 0^+, 2^+ and 3^- ($E(3^-) < E(2^+)$) levels point out to a closed proton shell with $Z = 64$ at $N = 82$ and to the magic properties of the nucleus ^{146}Gd as a whole. Results of single-particle transfer reactions and probabilities of electromagnetic transitions are indicative a large single-particle component of the ground and low-lying excited states of the neighboring odd-A nuclei.

The shell-correction method with the standard mean-field potential gives the single-particle orbitals in the vicinity of $Z = 64$, $N = 82$ qualitatively consistent with the experimental data, which enables one interpret the configuration of the ground and low-lying excited states of odd-odd nuclei, in particular ^{146}La and ^{146}Pr.

The peculiarities of the level scheme and characteristics of the low-lying levels and transitions in ^{146}Pm were given earlier [3].

Unlike classical doubly magic nuclei region, "magicity" in $A = 146$ region is sufficiently narrow as to the number of nucleons and excitation energy. Two-quasiparticle excitations and residual neutron-proton interaction give rise to the states with static deformation, which shows itself in the existence of rotational bands in neutron-rich nuclei, including the ^{146}Gd (superdeformed bands excited in heavy-ion reactions). All the rotational bands are described by two models: polynomial parameterization of Bohr-Mottelson and the variable moment-of-inertia model.

1. J.K.Tuli. Evaluated Nuclear Structure Data File. BNL-NCS-51655-01/02-Rev, 2001. http://www.nndc.bnl.gov/ensdf/
2. Yu.L.Khazov, A.A.Rodionov // LXII International Conference "NUCLEUS – 2012". Saint-Petersburg, 2012. P.82.
3. Yu.L.Khazov // LXI International Conference "NUCLEUS – 2011" on Nuclear Spectroscopy and Nuclear Structure. Sarov, 2011. P.56.