DOES THE «ISLAND OF STABILITY» EXISTS?

Nurmukhamedov A.M.

Institute of Nuclear Physics of the Academy of Science of Uzbekistan, Ulugbek, Tashkent
E-mail: fattah52@mail.ru

In the work [1], basing on experimental data for nuclear mass in the region of mass number $5 \leq A \leq 257$, values of Francini-Radicati factor R were calculated. These calculations allowed to estimate the bounds of realization of Wigner's spin-isospin $SU(4)$-symmetry in atomic nuclei. On the basis of Wigner's mass formula for the factor R, developed the expression which depend on isospin and takes into account odd-even fluctuation of the mass and therefore describes distribution of nuclei into three groups of Wigner's kind. The analysis of calculated values of R factor using Student's t-criteria allowed to state that the violated Wigner's spin-isospin $SU(4)$-symmetry restored only for nuclei with odd A mass numbers, isospin $T_z \geq 53/2$ and the level of significance $\alpha < 0.01$. The obtained data justify that the Wigner's symmetry is not restored in real and artificial even-even nuclei and especially in odd-odd nuclei however general tendency of restoration also visible.

A number of experimental facts justify restoration of Wigner's spin-isospin $SU(4)$-symmetry in the region of super-heavy nuclei: 1) asymptotic convergence of Gamov-Teller Resonance and Analogue Resonance in the region of heavy nuclei [3, 4]; 2) decrease of experimental values of the energy of spin-orbit interaction for nuclei with number of neutrons $N > 146$ up to ~100 KeV [5]; 3) results of statistical analysis applying Student's t-criteria that evidencing about restoration of $SU(4)$-symmetry for the nuclei with odd A mass number and isospin $T_z \geq 53/2$ [1]; 4) visible tendency of restoration of Wigner's symmetry for nuclei with even A in line with the growth of isospin T_z [1]. Wigner's symmetry restored due to elimination of spin-orbit splitting. The hypothesis of the «stability island» is not justified because it assumed significant spin-orbit splitting in this region.

1. A.M.Nurmukhamedov // Phys. Atom. Nucl. 2012. V.75. P.27.
2. A.M.Nurmukhamedov // Phys. Atom. Nucl. 2009. V.72. P.1435.
3. Y.V.Gaponov // Phys.of Atom.Nucl. Materials of XVIII winter school. LINP. 1983. P.43.
4. Y.V.Gaponov *et al.* // Nucl. Phys. A. 1982. V.391. P.93.
5. A.M.Nurmukhamedov // Phys. Atom. Nucl. 2009. V.72. P.401.