Contribution ID: **9** Type: **not specified**

THE ENERGIES OF THE LOWEST LEVELS OF YRAST BANDS IN EVEN-EVEN TRANSFERMIUM NUCLEI

The report discusses some approaches currently being developed to describe the level energies of heavy and superheavy nuclei. Studies of the decay characteristics of transfermium and superheavy nuclei [1], due to the small statistics, make it especially desirable to obtain estimates of the energies of the lowest states of these nuclei. Previously, a correlation was found between the energy of 2_1^+ levels and the deformation energy E_{def}, as well as the systematics of the energy ratios within the rotational bands depending on $E(2_1^+)$ energy. This allowed us to obtain estimates for the energies of the first few excitations, namely, $2_1^+, 4_1^+, 6_1^+$ in even-even heavy and superheavy nuclei with Z from 96 to 118 [2]. Similar correlations and corresponding estimates of the level energies also were obtained for the nuclei in the rare earth region.
Experiments have shown the importance of high-spin orbitals for the formation and description of decays of high-spin isomers in the transfermium region. The fact that some excitation modes not clearly manifested in heavy nuclei up to high spins [3-5] makes heavy and superheavy nuclei the most suitable for testing of the nuclear models. The two-parameter Harris formula describes the rotational energy spectra of these nuclei up to spins $J^\pi < 12^+$ [6,7]. However, the use of the Harris formula does not allow us to describe the high-spin yrast states of the nuclei in the rare earth region.
In the rotation bands of heavy and superheavy nuclei, there is a special feature - the absence of a reverse bend (backbanding) in the dependence of the moment of inertia from the square of the rotation frequency. The nature of this special feature was considered in the framework of the extended model of interacting bosons in its microscopic version [5]. The expansion of the configuration space due to excitation modes with spins $J^\pi > 10^+$ made it possible to significantly expand the scope of the model both for describing the effects of band crossing and for its absence in this mass region at fairly high spins (up to $J^\pi \leq 34^+$) [5].
Estimates of the $2_1^+, 4_1^+, 6_1^+$ level energies based on systematics [2,6,7] and on yrast-bands level structure calculations both [3-5] within the framework of the phenomenology of the IBM1 and the microscopic version of the IBM1 for superheavy nuclei are presented.

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Primary author: IZOSIMOV, Igor (Joint Institute for Nuclear Research (JINR))

Co-authors: Prof. EFIMOV, Alexander (Admiral Makarov State University of Maritime and Inland Shipping); Prof. USMANOV, Pazlitdin (Namangan Institute of Engineering and Technology)

Presenter: IZOSIMOV, Igor (Joint Institute for Nuclear Research (JINR))

Track Classification: The V International Scientific Forum "Nuclear Science and Technologies": Nuclear physics (Section 1)