SUPER SYMMETRICAL PROPERTIES OF NUCLEAR STATES AND PARTICLE PAIRS IN THE CRANKED HARTREE – FOCK – BOGOLUBOV APPROXIMATION

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Interacting boson model has achieved a significant success in the phenomenological description of collective motion in medium and heavy nuclei at low excitation energy [1]. However, there still remains some question why such a simple picture with S and D bosons works well, even in the deformed region, without the other higher bosons. On the other hand cranked Hartree – Fock – Bogolubov (HFB) approximation gives a splendid explanation of low– and high - spin states in the rare earth region from the microscopic point of view [2]. The merits of the cranked HFB approximation are its ability to treat collective– and single – particle aspects of nuclear structure on the same footing, and to take into account in a consistent way shape and pairing changes as well as rotational alignment. The main aim of this paper is to explore the microscopic foundation of the IBM in the framework of the cranked HFB model, and to see the mechanism of backbending in terms of the boson picture.

The numerical calculations are carried out for the structure of energy spectra and backbending phenomena of the isotope string of Er. Backbending of the moment of inertia of the yrast and β states can be reproduced reasonably. The gapeless superconductor effect, in which one of the quasiparticles starts to have negative energy, begins with the 10^+ states. The calculated quadruple moment does not change much as function of the spin of state I, although there is a delicate change corresponding to backbending.

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2. K.Baktybaev, Yadern. Phys. 42 (1978) 1031.

ANALYTIC PROPERTIES OF FORM FACTORS AND ASYMPTOTICS OF NUCLEAR WAVE FUNCTIONS IN TWO-FRAGMENT CHANNELS

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Define the overlap integral (OI) corresponding to the virtual dissociation $a \to b + c$

$$I(\vec{r}) = \int \Psi_b^*(\tau_b)\Psi_c^*(\tau_c)\Psi_a(\tau_a, \tau_b, \tau_c), \qquad (1)$$

where $\Psi_i(\tau_i)$ is the internal wave function of the system i. For brevity we neglect the long-range Coulomb interaction and consider spinless systems a, b and c, hence $I(\vec{r}) = I(r)$, r being the distance between b and c. In the general case the results given below are valid for the radial OI $I_{ls}(r)$ corresponding to specific values of a channel orbital momentum l and channel spin s. For a wide class of processes, main contributions to their amplitudes come from the values of OI's at large r. In particular, the asymptotics of OI's determines the cross sections for certain reactions, which are of interest for nuclear astrophysics [1]. Relating the