SD-NUCLEON-PAIR SHELL DESCRIPTION OF THE COLLECTIVE EXCITATIONS OF SPHERICAL NUCLEI

Baktybayev K.[1], Dalelkhankyzy, Koilyk N.[1], Baktybayev M.K.[2]
[1]*Al-Farabi Kazakh National University, Almaty, Kazakhstan;*
[2]*Institute of Nuclear Physics, Almaty, Kazakhstan*
E-mail: murat.baktybayev@yandex.ru

The desciption of the collective properties of nuclei of medium and heavy atomic weight in the exact shell-model spaced remain very difficult problem because of their huge size. In recent years, therefore, the methods of cutoff of the Hilbert space have been used to optain a collective paired subspace with a small number of degrees o freedom [1, 2], which provided a fruitful explanation of the considered phenomena.

In this paper, we give a microscopic justification of the interacting boson model (IBM) for the description of low-energy collective excitations of the nucleon systems, and it is provided quite well by taking into account the *S* and *D*–paired shell states in them. In addition, this allows to avoid the well – known computational difficulties in the microscopic examination of the *s* and *d* –bosons of IBM as mappings of the *S* and *D* pairs of valents nucleons in nuclei.

As the mapping method of the fermion pair states in the boson the Otsuka – Arima – Yakello (OAY) method is taken. In this model space the Hamiltonian of the system is easily diagonalized and it satisfactorily reproduces the spectra and electromagnetic transition probabilities of vibrational, γ – unstable nuclei. Thus the microscopic phenomenological model is constructed for the nuclear system, the free parameters of the model are calculated as the fermionic matrix elements of the pair forces of nucleon interaction.

The theory is applied to studying the properties of even spherical isotopes of $^{102, 104, 106, 108}$Pd.The energy states and relative values of the reduced probabilies of γ – transitions are compared with experimental data.

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