

Effects of Coupling of Single Particle States to Charge Exchange Excitations

D. Tarpanov

Institute for Nuclear Research and Nuclear Energy, 1784 Sofia, Bulgaria

Background: Single particle states could couple to proton-neutron excitations via the same mechanism they couple to vibrational phonons. Still it has never been explored the effect of such a coupling on the energies of single-particle states (SPE) in nuclei.

Purpose: In our work with aim to evaluate the contribution of this effect to the energy of single-particle states, and to explore if it could improve the spectroscopic characteristics of Skyrme functionals.

Method: To do so we have used the standard fully self-consistent proton-neutron Random Phase Approximation (pnRPA) to generate the phonons, the coupling has been taken in the standard perturbation Particle Vibration Coupling (PVC) scheme.

Results: Our calculations show that the coupling to pn excitations could lead to correction to the SPEs of same magnitude as the correction due to PVC itself.

Conclusions: This is why advocate that it is important to take into account these corrections in all PVC calculations. However, taking into account these corrections, we still do not find any measurable improvement in the description of the SPEs using the current form of Energy Density Functionals (EDFs).

Acknowledgements

This work was supported by *The Program to help young scientists at BAS*, under contract DFNP-50/21.04.2016