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NEWBY SHIFTS IN ODD-ODD TRANSITIONAL NUCLEI AT A∼190

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Correct accounting for residual NN-interaction between valence particles is of utmost importance for structure interpretation of deformed odd-odd nuclei. This interaction manifests itself in such effects as the Gallagher-Moszkowski (GM) splitting of two-quasiparticle doublets, the Newby shift of odd-even spin value levels in K=0 rotational bands, as well as the ΔK=0 mixing of rotational bands due to non-diagonal matrix elements when wave function components of both valence particles exchange.

In two-particle plus rotor model calculations, one usually uses NN-interaction potential parameters obtained via a fit to empirical matrix element values derived from a wide range of well-deformed odd-odd nuclei (see, e.g., [1]). However, it is hard to perform similar studies for transitional nuclei due to a lack of confident experimental data about complete doublets.
Detailed experimental structure studies performed recently for ^{186,188}Re and ^{192}Ir [2-4] allowed to obtain empirical values for a number of residual NN-matrix elements responsible for GM-splittings and Newby shifts in transitional deformation region at A∼190. Especially unique are data obtained for ^{192}Ir where one has three confidently established K=0^- rotational bands.

The residual proton-neutron interaction matrix elements have been evaluated using expressions of [1]. The finite-range V_{np} potential with Gauss radial dependence included both the short, and the long range central forces with spin polarization, as well as the tensor interaction terms. The set of fitted empirical matrix elements included Newby shift values for nine K=0 rotational bands of ^{186,188}Re, and ^{190,192,194}Ir. For comparison of NN-interaction potential parameters, values of GM-splittings have been evaluated as well.
It has been found that the long-range NN-interaction can be compensated by variation of the short-range space-exchange Heizenberg interaction strength V_H. The latter parameter is most essential in order to reproduce both GM-splittings and Newby shifts. However, while GM-splittings show strong dependence also from spin-exchange Bartlett interaction strength V_B and core polarization, the Newby shifts practically do not depend on values of these parameters, but display dependence on tensor interaction, though weaker than that from V_H.

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2. J.Berzins *et al.* // Nucl. Phys. A947 (2016) 76.
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