Role of Newby Shift of K=0 in K=1 band of ^{180}Ta

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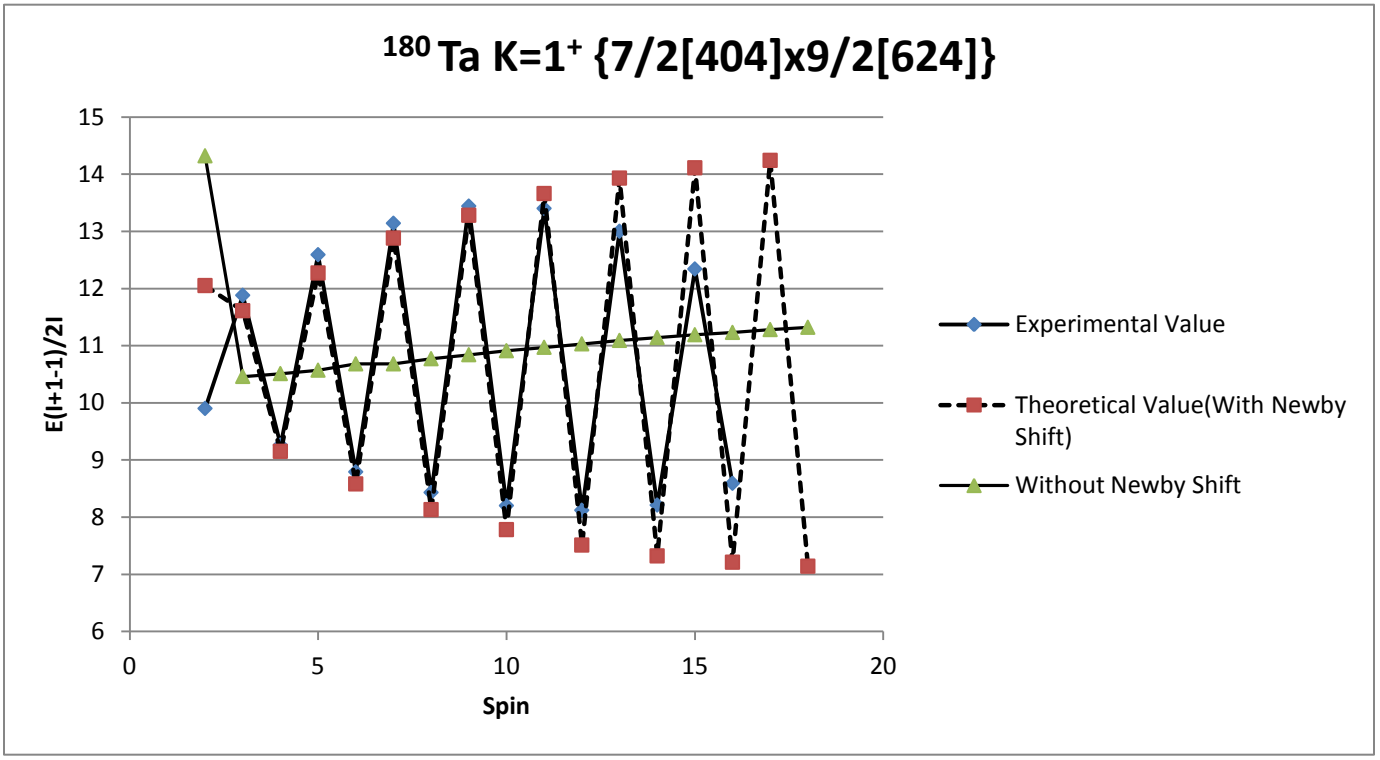
I. Introduction

The most important effects of n-p interaction in odd-odd nuclei are the Gallaher-Moszkowski (GM) splitting and the Newby-Shift (N). In the past, lot of the work has been done to emphasize the importance of n-p interaction in explaining the odd-even staggering in K≠0 bands; the most important mechanism responsible for it being the direct Coriolis mixing with K=0 band. Also, the signature inversion phenomenon and the odd-even staggering can be reasonably explained by the two-quasiparticle plus rotor model (TQPRM). We have done TQPRM calculations to explain the odd-even staggering observed in K = $1^+\{7/2[404]_p$ x $9/2[624]_n\}$ band of ^{180}Ta. The magnitude of the staggering is well reproduced by our calculation. There is a strong mixing between K = $1^+\{7/2[404]_p$ x $9/2[624]_n\}$and K = $0^+\{7/2[404]_p$ x$7/2[633]_n\}$ band .The wave function of the states of the K=1 band contain significant components (almost 35%-40%) of the states of the K=0 band. The Newby Shift of K=0 band plays an important role in explaining staggering feature in K=1 band of ^{180}Ta. Although the K=0 band is not an experimentally known band but this K=0 band is a must to obtain the magnitude of odd-even staggering in K=1 band. The comparison with the experimental data of K=1 band with and without Newby Shift of K=0 band is as shown in Fig. 1. The unknown K=0 band is found to be lying at an energy of E_α = 945.4Kev and Newby shift E_N = 97.9Kev. which is obtained after fitting. In the figure The experimental plot is shown by solid line and TQPRM calculations by dashed line. When the Newby shift E_N =0 for K=0 band ,the odd-even staggering of K=1 band disappeared . Therefore Newby shift is responsible for the behaviour of K=1 band in ^{180}Ta.



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