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Nature of the four-quasiparticle negative-parity rotational bands in ^{194}Tl

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Abstract content
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Three negative-parity rotational bands have been identified in the ^{194}Tl [1-3] nucleus. All three bands are associated with a four-quasiparticle $\pi h_{9/2} \times \nu_{13/2}^{-3}$ configuration at high spins. Two of these bands show exceptionally close near-degeneracy in the excitation energies, and furthermore a close similarity in their other properties, e.g. alignments, $B(M1)/B(E2)$ ratios, etc. [1]. Based on these results the pair of four-quasiparticle negative-parity bands in ^{194}Tl was interpreted as perhaps the best chiral pair found to date [1]. The nature of the third $\pi h_{9/2} \times \nu_{13/2}^{-3}$ band, however, remains unclear. It was suggested [2], that this band could correspond to axially symmetric nuclear shape. As an alternative, the three bands could form a multiplet of chiral partners built on the same nucleon configuration [2]. In this work we aim at studying further the nature of the three negative-parity bands. We used the experimental data on the lifetime measurements for these bands [3] and performed multi-particle-plus-triaxial rotor model (MPR) [4] calculations. These calculations were carried out for both triaxial ($\beta_2 = 0.15$, $\gamma = 40^\circ$) and axially symmetric nuclear shape. The results will be presented and discussed.

[1] P.L. Masiteng et al., Phys. Lett. B719, 83 (2013).

[2] P.L. Masiteng et al., Submitted to Eur. Phys. J. A

[3] P.L. Masiteng, PhD thesis, University of the Western Cape, (2013).

[4] B.G. Carlsson and I. Ragnarsson, Phys. Rev. C74, 044310 (2006).

Apply to be considered for a student award (Yes / No)?

No

Level for award (Hons, MSc, PhD)?

None

Main supervisor (name and email) and his / her institution

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**Would you like to
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 Proceedings (Yes / No)?**

Yes

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