



Contribution ID: 296

Type: Poster Presentation

Multiple chiral bands associated with the same strongly asymmetric many-particle nucleon configuration

Wednesday, 1 July 2015 16:10 (1h 50m)

Abstract content
 (Max 300 words)
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A nuclear chiral system is formed when the total angular momentum of the nucleus is aplanar, i.e. when it has significant projections along all three nuclear axes [1]. It is revealed by the observation of degenerate $\Delta I = 1$ partner bands [1]. Up to date, chiral candidates showing two- or multi-quasiparticle partner bands have been observed in several nuclei in $A \sim 80, 100, 130$ and 190 mass regions. The existence of multiple chiral partner bands (M χ D) with large triaxial deformation, but with different particle-hole configuration was proposed in a single nucleus [2]. The M χ D existence has been experimentally confirmed in ^{133}Ce [3].

Contrary to M χ D that differ from each other in their particle-hole configurations and may correspond to different triaxial deformations. We investigated the existence of multiple chiral bands built on the same configuration. Our calculations using the two-quasiparticle-plus-triaxial-rotor model (TQPRM), confirm that more than one pair of chiral bands may exist in a nucleus with the same two-quasiparticle configuration (this was also reported in [1]). The present work studies the existence and properties of multi chiral bands built on the same many-particle nucleon configuration. Multi-particle-plus-triaxial-rotor (MPR) model calculations were performed for chiral partner bands associated with strongly asymmetric many-particle nucleon configuration in the $100, 130$ and 190 mass regions. Multiple chiral systems were found, but they may not necessarily form well defined pairs of near-degenerate bands. The results from these calculations will be presented and discussed.

[1] S. Frauendorf, J. Meng, Nucl. Phys. A617, (1997)131

[2] J. Meng et al., Phys. Rev. C73, (2006)037303

[3] A.D. Ayangeakaa et al., Phys. Rev. Lett. 110, (2013)172504

This work is supported by the NRF, South Africa.

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Session Classification: Poster2

Track Classification: Track B - Nuclear, Particle and Radiation Physics