

Phase transition into spontaneous chiral symmetry breaking

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Exploration of spontaneous time-reversal symmetry breaking in nuclear physics –widely known as nuclear chirality –is the subject of intensive theoretical as well as experimental study since more than one decade. At the beginning of the present century structures resembling theoretically predicted chiral partner bands were identified in several nuclei with help of gamma correlation measurements[1,2]. The origin of these bands have been than verified by applying lifetime measurements methods [3,4,5, 6] leading to discovery of first chiral nuclei in nature[3]. At present the gamma spectroscopy focuses its interest in search of new mass regions where appearance of nuclear chirality is pronounced as well as in study of electromagnetic features of chiral nuclei like –gamma selection rules[7, 8] and search for chiral phase transition in form of critical rotational frequency. The letter one will be the main subject of the presentation.

Summary

It is expected that the transition into the chiral configuration happens rapidly as a function of total angular momentum at some critical rotational frequency[9]. Some experimental premises like staggering of energies of partner bands levels indicating existence of chiral phase transition will be discussed.

References:

- [1] K.Starosta et al., Nuclear Physics A682, 375 (2001)
- [2] T.Koike, PHYSICAL REVIEW C93, 061304R (2001)
- [3] E. Grodner et al., PRL 97, 172501 (2006)
- [4] E. Grodner et al., PLB 703 (2011) 46–50
- [5] S. Mukhopadhyay et al., PRL 99, 172501 (2007)
- [6] D.Tonev et al., PRL 96, 052501 (2006)
- [7] T. Koike et al., PRL 93,172502-1(2004)
- [8] L. Prochniak et al., Acta.Phys.Pol B32, 465(2011)
- [9] P. Olbratowskiet al., PRL 93,052501-1(2004)

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