B(M1) staggering in two-quasiparticle chiral bands *

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Strongly broken chirality is suggested to exhibit a pair of degenerate $\Delta I = 1$ rotational bands [1,2]. In order to form a chiral system, an aplanar orientation of the total angular momentum is required [1,2]. However, such an aplanar orientation is insufficient to ensure perfect degeneracy in chiral partner bands, rather strictly orthogonal individual angular momenta are required [3]. Such perfect orthogonality seems unlikely to occur in real nuclei. However, chiral degeneracy corresponding to a strongly broken chiral system, can be obtained in theoretical calculations, (by restricting the configuration to a pure particle/hole at the bottom/top of a high-j shell within the particle-rotor model [3]). Since the calculations can describe both a strongly broken as well as a weakly broken chiral systems, one has a useful tool to study other fingerprints of chirality too. It had been previously suggested that large staggering of the B(M1) intra- and inter-band transition probabilities indicates strongly broken chirality for the symmetric $\pi h_{11/2} \otimes \nu h_{11/2}^{-1}$ configuration [4,5]. We have examined the staggering in the B(M1) reduced transition probabilities, using the two-quasiparticle-plus-triaxial-rotor model codes of P.B. Semmes and I. Ragnarsson [6], for both strongly broken and weakly broken chiral systems. Furthermore we investigated such systems built on symmetric ($\pi h_{11/2} \otimes \nu h_{11/2}^{-1}$) and also on asymmetric ($\pi g_{9/2}^{-1} \otimes \nu h_{11/2}$ and $\pi h_{9/2} \otimes \nu i_{13/2}^{-1}$) configurations. Our results show that the staggering in the B(M1) probabilities does have largest amplitude for the optimal for chirality γ deformation. However, we have also found that equally strong or even stronger B(M1) staggering may occur for some weakly broken chiral systems too.
Results on the B(M1) staggering for the 100, 130 and 190 mass regions will be discussed.

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