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Coupling of chiral and shape vibrations in the A=130 region[1]

DANIEL ALMEHED, STEFAN FRAUENDORF, University of Notre Dame — Several near degenerate $\Delta I = 1$ bands with the same parity have been found in the $A = 130$ and $A = 105$ regions. Some of these bands have been interpreted as chiral rotational bands within the Tilted Axis Cranking (TAC) model [V. I. Dimitrov *et al.*, PRL **84**, 5732 (2000)]. Chiral rotation can appear in triaxial nuclei when proton and neutrons align along different principal axes and the collective rotation occurs along the third. Candidates for chiral partner bands generally show a slowly decreasing or nearly constant energy splitting of a couple of 100 keV. This observation has been interpreted as appearance of a chiral vibration, which is a vibration of the orientation of the principal axes of the nucleus with respect to the angular momentum vector [K. Starosta *et al.*, PRL **86**, 971 (2001)]. The TAC calculations of chiral bands give potential energy surfaces that are soft in both the orientation and the γ deformation degree of freedom. This suggests that these collective vibrational excitations are in fact made up of a pure chiral vibration coupled with γ-vibration. To investigate the structure of these vibrations we performed RPA calculations on top of the planar TAC mean field solutions. This allows us studying the coupling of shape and orientation degrees of freedom. We will discuss how the different degrees of freedom contribute to the collective vibration and present energy systematics and transition rates.

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