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PARAMETERIZATION OF ROTATIONAL SPECTRA

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The "strongly" deformed nuclei that are commonly encountered in the "rare-earth" region (e. g., $150 < A < 190$) and the actinide region (e. g., $A > 220$) are very interesting ones for basic reseachers of the nuclear structure. The rotational spectra of the strongly deformed nuclei with low rotational frequencies and weak band mixture are generally analyzed by

$$E(k,J) = E_k + AX + BX^2 + CX^3 + \dots + (-1)^{J+K} \prod_{i=1-K}^{K} (J+i) \{A_{2k} + B_{2K}X + \cdots\} \quad (1)$$

where J is total angular momentum quantum number of the intrinsic state which describes rotational motion, K is the projection of the J onto the nuclear symmetry axis, and X represents either $J(J+1)$ or $J(J+1)-K^2$.

In the derivation of the relationship expressed in Eq. (1), it is assumed that K is, at least approximately, a good quantum number. This means that the coupling (mixing) of the band under consideration with other band in the same nucleus is not too strong and that rotational frequencies of the states are not too high. In such cases, the fitting coefficients (e. g., A, B and A_{2k}) are small.

The typical fitting works with level-energy differences only and the parameter E_K, which serves to locate the energy of the band head, can be neglected. The fitting code has been studied and a lot of data has been analyzed by it. From the analysis we have done, a lot of rotational band knowledges can be given:

1. The fitting parameter B is small, the order of magnitude $B / A \approx 10^{-3}$, and the typical value of the rotational constant A is about 12 keV in the "rare–earth" region and about 6 keV in the actinide region, respectively.
2. The new members of the band under consideration can be predicted by using known fitting parameters.
3. For the $K = 1/2$ band, the decoupling parameter a ($a = A_{2k} / A$, $K = 1/2$) provides almost unique information about the nature and extent of the single–particle (or one–quasiparticle) content of the band.
4. The rotational constant $A(= \hbar^2 / 2Z)$ gives the information about the effective moment of inertia (Z) of the band.
5. The parameters A_{2k} and B_{2k} give a shift of a relative placements of the odd and even–spin within the band. The magnitudes of these parameters are decreased rapidly with increasing K value and their effects are the most readily apparent in those bands having the smaller K value.
6. Physically meaningful results are obtained by only a few fitting parameters in Eq. (1).

EVALUATIONS OF INTERNAL CONVERSION COEFFICIENTS

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The calculations of internal conversion coefficients in nuclear structure and decay data evaluations have been studied. The two cases of L and L+1 multiporality mixture have been paid more attention to :

1. Mixing With Measured α_k (or α_L)

If α_k is measured internal conversion coefficient of K–shell for L and L+1 multiporality mixture, δ is the mixing ratio for L and L+1 multiporality mixture components, and $\alpha_k(L)$ and $\alpha_k(L+1)$ are the theoretical internal conversion coefficients of K–shell for L and L+1 multiporality,