Signature effect in the SU(6) particle-quadrupole phonon model

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Syatematic deviations from the J(J+1) energy rule in the SU(6) particle-quadrupole phonon model (PTQM) in the SU(3) limit are interpreted in terms of the signature. The signature parameters are extracted from the calculated spectrum and discussed.[1] Signature parameters from a typical parametrization for $j=\frac{11}{2}$ are:

K	$\frac{1}{2}$	$\frac{3}{2}$	$\frac{5}{2}$	$\frac{7}{2}$	$\frac{9}{2}$	$\frac{11}{2}$
A_{2K}	-4×10^{-2}	2×10^{-3}	-2×10^{-6}	4×10^{-9}	-2×10^{-12}	10^{-15}

Here, the approximate signature-dependent expressions are:

$$E(K,J) - E_K = AJ(J+1) + A_{2K}\,(-)^{K+J}\,J^{2K} \quad .$$

Thus, the correlations of PTQM simulate the effect of Coriolis force in deformed representation. Specifically, the signature parameter A_7 due to the Coriolis effect in the rotational model is estimated $A_7 \approx 10^{-9}$ [2]. The correlations of PTQM automatically generate A_7 of the same order of magnitude.

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1) V.Paar and S.Brant, Phys.Rev.Lett.

2) A.Bohr and B.R.Mottelson, Nuclear Structure (Benjamin, New York 1975) Vol.II