

One parameter deviation from SU(3) limit of SU(6) quadrupole
phonon Hamiltonian

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The SU(6) quadrupole-phonon Hamiltonian^{1,2)} reads:

$$H_{\text{IQM}} = h_1 \hat{N} + h_2 \left\{ (b_2^+ b_2)_0 \sqrt{(N - \hat{N})(N - \hat{N} - 1)} + \text{H.C.} \right\} + h_3 \left[(b_2^+ b_2^+ b_2)_0 \sqrt{N - \hat{N}} + \text{H.C.} \right] + \sum_{L=0,2,4} \left[(b_2^+ b_2^+)_L (b_2 b_2)_L \right]_0$$

In the SU(3) limit there is

$$H_{\text{IQM}} [\text{SU}(3)] = \alpha \frac{\sqrt{5}}{10} (Q_2 Q_2)_0 + \beta \frac{\sqrt{3}}{10} (I_1 I_1)_0,$$

with

$$Q_{2\mu} = b_{2\mu}^+ \sqrt{N - \hat{N}} + \sqrt{N - \hat{N}} \tilde{b}_{2\mu} + \frac{\sqrt{7}}{2} (b_2^+ b_2)_{2\mu}$$

$$I_{1\nu} = \sqrt{10} (b_2^+ b_2)_{1\nu}, \quad \hat{N} = \sqrt{5} (b_2^+ b_2)_0$$

We have investigated the sensitivity of spectra on the deviation of one of the six parameters $h_i = \{h_1, h_2, h_3, h_{40}, h_{42}, h_{44}\}$ from the SU(3) value. Specifically, in each case the two limits $h_i = 0$ and $h_i \rightarrow \infty$ have been studied. The most important parameter is h_{44} , while the sensitivity to h_3 and h_2 is small.

1) D. Janssen, R. V. Jolos and F. Dönau, Nucl. Phys. A224 (1974)93

2) V. Paar, S. Brant, L. F. Canto, G. Leander and M. Vouk, Nucl. Phys.