PROPERTIES OF ROTATIONAL BANDS OF ISOTOPES Yb

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Present paper focuses on low–lying states of positive parity of isotopes ^{170,172,174}Yb. The calculation is conducted by utilizing a phenomenological model [1] which accounts Coriolis mixture all of the experimentally known low-lying rotational bands states with $K^{\pi}<3^{+}$. Experimentally observed K–forbidden transitions as well as non–adiabaticities of energy and in ratios of $E2$- transitions can be explained by Coriolis mixture states.

The calculations have been carried out for the ^{170,172,174}Yb isotopes. All experimentally known rotational bands of positive parity with $K^{\pi}<3^{+}$ have been included in basis states of Hamiltonian.

The reduced probability of $E2$-transitions and reduced probability of $M1$- transitions from the states I_iK_i to the level I_fK_f band are calculated. The reduced probabilities of $E2$ – transitions for ^{172}Yb are presented in Tables 1.

The experiment suggests that $m=5$ band with $K^{\pi}=0^{+}_{m}$, one band $\ell=1$ with $K^{\pi}=2^{+}_{\ell}$, and $\nu=19$ with $K^{\pi}=1^{+}_{\nu}$ states in ^{170}Yb [2]. These all $n=m+\ell+\nu=25$ rotational bands have been included in the basis states of Hamiltonian (1). For the isotopes ^{172,174}Yb, basis states of Hamiltonian include $n=m+\ell+\nu=15$ ($m=5$, $\ell=2$ and $\nu=8$) and $n=m+\ell+\nu=22$ ($m=5$, $\ell=2$ and $\nu=15$), correspondingly [3,4,5].

The energy and structure of wave functions of excited states are calculated. The reduced probabilities of $E2$– and $M1$– transitions are also calculated and comprised with experimental data which are gives satisfactory result.

Table 1. Reduced probability of $E2$– transitions in the ^{172}Yb

$I_iK_i \rightarrow I_f0_f$	Exp. [6]	Theory	$I_iK_i \rightarrow I_f0_f$	Exp.[4]	Theory
$22_1 \rightarrow 00_1$	74.6(57)	82	$20_2 \rightarrow 00_1$	14 (1)	13
$\rightarrow 20_1$	121 (12)	130	$\rightarrow 20_1$	45 (7)	23
$\rightarrow 40_1$	6.8 (7)	8.6	$\rightarrow 40_1$	142 (20)	74
$32_1 \rightarrow 20_1$	152 (11)	154	$20_3 \rightarrow 00_1$	0.4 (1)	3.6
$\rightarrow 40_1$	79 (6)	73	$\rightarrow 20_1$	0.6 (4)	3.0

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