^{170}Er(^{24}Mg,4nγ) 1986Hu02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, [1] and Jun Chen[2]	NDS 169, 1 (2020)	15-Oct-2020

1986Hu02: ^{170}Er(^{24}Mg,4nγ) and ^{170}Er(^{26}Mg,6nγ) E=120-130 MeV. Measured γ, $\gamma\gamma$, $\gamma(\theta)$. Total-Routhian surface and cranking-model calculations.

^{190}Hg Levels

The band labels and crossings are given in terms of single-particle (neutron) Routhians calculated (1986Hu02) for ^{194}Hg as follows:
A: ν1/2[660],α=+1/2.
B: ν1/2[660],α=−1/2.
C: ν3/2[651],α=+1/2.
D: ν3/2[651],α=−1/2.
E: ν1/2[521],α=+1/2.
F: ν1/2[521],α=−1/2.

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0[a]	0+	2620.8[@b] 6	12+	3703.4[b] 7	16+	4709.4[e] 7	19−
416.5[a] 2	2+	2724.0[f] 5	10−	3743.3[#] 6	(14+)[#]	5105.6[g] 8	20−
1041.8[a] 3	4+	2844.2[#] 5	(10−)[#]	3979.5[g] 6	14−	5228.7[c] 8	20+
1772.9[a] 4	6+	2865.4[d] 5	11−	4087.2[e] 6	15−	5334.4[e] 13	(21−)
1881.2[d] 4	5−	3006.7[#] 6	(11−)[#]	4242.8[g] 6	16−	5351.6[b] 8	(20+)
2078.3[d] 4	7−	3040.7[b] 6	14+	4258.5[#] 7	(15−)[#]	5794.7[c] 8	22+
2318.6[f] 5	8−	3277.3[#] 6	(12+)[#]	4326.2[e] 7	17−	6142.2[e] 13	(23−)
2335.4[d] 4	9−	3357.9[f] 5	12−	4359.1[#] 7	(16+)[#]	6335.1[&] 9	(24+)
2464.8[b] 4	8+	3493.2[#] 6	(13−)[#]	4492.4[b] 7	18+	6576.1[&c] 9	(24+)
2596.9[b] 5	10+	3548.6[d] 6	13−	4551.5[g] 7	18−		

† From least-squares fit to Eγ data.
‡ From 1986Hu02, based on $\gamma(\theta)$ data and band assignments. Exceptions are noted.
# From the Adopted Levels.
@ Uncertainty of 0.5 keV assigned for 23.9γ.
& Level not given by 1994Be27 or 1982Gu10.
a Band(A): g.s. band.
b Band(B): AB band,α=0.
c Band(C): ABCD band,α=0.
d Band(D): AE band,α=1.
e Band(E): AEBC band,α=1.
f Band(F): AF band,α=0.
g Band(G): AFBC band,α=0.

$\gamma(^{190}Hg)$

Eγ†	Iγ‡	Ei(level)	Jiπ	Ef	Jfπ	Mult.	α[b]	Comments
23.9 5	0.007 1	2620.8	12+	2596.9	10+	[E2]	5.2×10^3 6	α(L)=3.9×10^3 5; α(M)=1.00×10^3 12 α(N)=2.5×10^2 3; α(O)=40 5; α(P)=0.040 5
132.0 3	16 2	2596.9	10+	2464.8	8+	(E2)[&]	1.8	A_2=+0.19 7; A_4=−0.14 9

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^{170}Er(^{24}Mg,4nγ) 1986Hu02 (continued)

$\gamma(^{190}Hg)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
162.4[#] *3*	1.5 *5*	3006.7	(11$^-$)	2844.2	(10$^-$)	(D)[a]	A_2=+0.37 *17*; A_4=−0.03 *30*
197.1 *3*	20 *2*	2078.3	7$^-$	1881.2	5$^-$	(E2)[&]	A_2=+0.27 *2*; A_4=−0.12 *3* I_γ: from $\gamma\gamma$. Complex peak.
239.0 *3*	7.4 *8*	4326.2	17$^-$	4087.2	15$^-$		A_2=+0.02 *20*
240.3 *3*	17 *2*	2318.6	8$^-$	2078.3	7$^-$	D[a]	A_2=−0.46 *8*; A_4=+0.08 *8*
257.2 *2*	20 *1*	2335.4	9$^-$	2078.3	7$^-$	(E2)[&]	A_2=+0.26 *5*; A_4=−0.11 *5*
261.5 *3*	1.0 *3*	2596.9	10$^+$	2335.4	9$^-$	D[a]	A_2=−0.32 *14*; A_4=+0.09 *15*
263.4 *3*	8 *1*	4242.8	16$^-$	3979.5	14$^-$	(E2)[&]	A_2=+0.27 *5*; A_4=−0.09 *5*
[x]296.0[@]							Complex peak. No intensity available.
305.4 *2*	27 *2*	2078.3	7$^-$	1772.9	6$^+$	D[a]	A_2=−0.29 *2*; A_4=+0.02 *3*
308.7 *3*	9 *1*	4551.5	18$^-$	4242.8	16$^-$	(E2)[&]	A_2=+0.25 *3*; A_4=−0.10 *3*
383.2 *3*	11 *1*	4709.4	19$^-$	4326.2	17$^-$	(E2)[&]	A_2=+0.29 *3*; A_4=−0.13 *4*
388.6 *3*	3.9 *12*	2724.0	10$^-$	2335.4	9$^-$	D+Q[a]	A_2=+0.27 *9*; A_4=+0.18 *11* Complex line. Iγ from $\gamma\gamma$.
405.3 *3*	7.3 *8*	2724.0	10$^-$	2318.6	8$^-$	(E2)[&]	A_2=+0.34 *7*; A_4=−0.13 *9*
416.5 *2*	100 *5*	416.5	2$^+$	0.0	0$^+$	(E2)[&]	A_2=+0.24 *1*; A_4=−0.09 *2*
419.9 *2*	35 *2*	3040.7	14$^+$	2620.8	12$^+$	(E2)[&]	A_2=+0.31 *2*; A_4=−0.12 *3*
466.0[#] *3*	6 *1*	3743.3	(14$^+$)	3277.3	(12$^+$)	(E2)[&]	A_2=+0.25 *7*; A_4=−0.10 *8* Complex line. Iγ from $\gamma\gamma$. Placement from the Adopted Levels, Gammas. See comment for 680.4γ.
486.5[#] *3*	8 *1*	3493.2	(13$^-$)	3006.7	(11$^-$)	Q[&]	A_2=+0.34 *3*; A_4=−0.09 *4*
525.6[#] *3*	6 *1*	2844.2	(10$^-$)	2318.6	8$^-$	(Q)[&]	A_2=+0.28 *8*; A_4=−0.07 *10*
530.0 *3*	17 *2*	2865.4	11$^-$	2335.4	9$^-$	Q[&]	A_2=+0.26 *3*; A_4=−0.08 *4*
538.6 *3*	11 *1*	4087.2	15$^-$	3548.6	13$^-$	Q[&]	A_2=+0.31 *3*; A_4=−0.13 *4*
539.4 *3*	1.9 *6*	4242.8	16$^-$	3703.4	16$^+$		A_2=+0.38 *24* A_2 for unresolved peaks.
540.4[@] *3*	3.8 *12*	6335.1	(24$^+$)	5794.7	22$^+$	(Q)[&]	A_2=+0.42 *11*; A_4=−0.12 *14*
554.1 *3*	5.6 *6*	5105.6	20$^-$	4551.5	18$^-$	Q[&]	A_2=+0.37 *7*; A_4=−0.18 *8*
566.0 *3*	8 *1*	5794.7	22$^+$	5228.7	20$^+$	(Q)	A_2=+0.26 *29*; A_4=−0.17 *19*
594.0[#] *3*	4.4 *13*	4087.2	15$^-$	3493.2	(13$^-$)	Q[&]	A_2=+0.26 *7*; A_4=−0.12 *7*
[x]600.0[@] *3*	1.0 *3*						A_2=0.00 *9* Complex peak. Iγ from $\gamma\gamma$.
615.8[#] *3*	0.9 *3*	4359.1	(16$^+$)	3743.3	(14$^+$)		A_2=+0.13 *10* Complex peak. Iγ from $\gamma\gamma$.
621.6 *3*	8 *1*	3979.5	14$^-$	3357.9	12$^-$	Q[&]	A_2=+0.32 *11*; A_4=−0.16 *14*
625 *1*	7 *4*	5334.4	(21$^-$)	4709.4	19$^-$		I_γ: from intensity balance, 3<Iγ<12.
625.3 *2*	96 *6*	1041.8	4$^+$	416.5	2$^+$	Q[&]	A_2=+0.22 *3*; A_4=−0.08 *4* I_γ: from total Iγ=103 *5* and estimated Iγ(625γ)=7 *4*.
633.9 *3*	9 *1*	3357.9	12$^-$	2724.0	10$^-$	Q[&]	A_2=+0.28 *4*; A_4=−0.10 *5*
[x]642.8[@] *3*	2.5 *8*					D[a]	A_2=−0.7 *3*
[x]648.3[@] *3*	2.5 *8*					Q[&]	A_2=+0.49 *10*; A_4=−0.18 *12*
662.7 *2*	27 *2*	3703.4	16$^+$	3040.7	14$^+$	Q[&]	A_2=+0.35 *3*; A_4=−0.12 *4*
680.4 *3*	6 *1*	3277.3	(12$^+$)	2596.9	10$^+$	(Q)[&]	A_2=+0.18 *6*; A_4=−0.05 *7* Placement from Adopted Levels, gammas. A reverse ordering of the 467-680 cascade feeding the 2465 level was tentatively suggested by 1986Hu02 which defined levels at 2931 (10$^+$) and 3611 (12$^+$) instead of the presently adopted 3277 (12$^+$) and 3743 (14$^+$), respectively.

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^{170}Er(^{24}Mg,4nγ) 1986Hu02 (continued)

γ(^{190}Hg) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
683.2 *3*	15 *2*	3548.6	13^-	2865.4	11^-	Q[&]	A_2=+0.28 *3*; A_4=−0.07 *4*
691.9 *2*	55 *3*	2464.8	8^+	1772.9	6^+	Q[&]	A_2=+0.22 *2*; A_4=−0.09 *2*
709.0[#] *3*	2.1 *6*	4258.5	(15^-)	3548.6	13^-	(Q)	A_2=+0.47 *10*
731.1 *2*	88 *5*	1772.9	6^+	1041.8	4^+	Q[&]	A_2=+0.24 *3*; A_4=−0.09 *3*
736.3 *3*	8 *1*	5228.7	20^+	4492.4	18^+	Q[&]	A_2=+0.27 *8*; A_4=−0.11 *8*
781.4[@] *3*	1.6 *5*	6576.1	(24^+)	5794.7	22^+	(Q)[&]	A_2=+0.25 *16*; A_4=−0.15 *20*
789.0 *3*	15 *2*	4492.4	18^+	3703.4	16^+	Q[&]	A_2=+0.31 *6*; A_4=−0.14 *7*
807.8 *3*	4.1 *12*	6142.2	(23^-)	5334.4	(21^-)	Q[&]	A_2=+0.40 *8*; A_4=−0.20 *10*
839.4 *3*	16 *2*	1881.2	5^-	1041.8	4^+	D[a]	A_2=−0.24 *3*; A_4=+0.04 *4*
859.2 *3*	2.1 *6*	5351.6	(20^+)	4492.4	18^+	(Q)	A_2=+0.27 *14*

[†] Uncertainty assigned by evaluators as 0.2 for I$\gamma\geq$20 and 0.3 for Iγ<20 based on a comment by 1986Hu02 that it varies from 0.2 to 0.3 keV.

[‡] Most likely for ^{170}Er(^{24}Mg,4nγ) reaction. 1986Hu02 quote uncertainty of 5 to 30%. The uncertainties assigned (evaluators) are: 5% for I$\gamma\geq$20, 10% for Iγ=5-20 and 30% for Iγ<5.

[#] Placement from Adopted Levels, gammas. Unplaced in 1986Hu02.

[@] Not reported in other in-beam γ-ray studies (1994Be27,1982Gu10).

[&] $\gamma(\theta)$ data indicate ΔJ=2, quadrupole (likely E2). Evaluators assign (E2) for Eγ<500 keV based on RUL for E2 and M2, assuming level half-lives are less than <20 ns or so from timing resolution in $\gamma\gamma$-coin arrangement.

[a] $\gamma(\theta)$ data indicate ΔJ=1, dipole.

[b] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

[x] γ ray not placed in level scheme.

^{170}Er(^{24}Mg,4nγ) 1986Hu02

Level Scheme

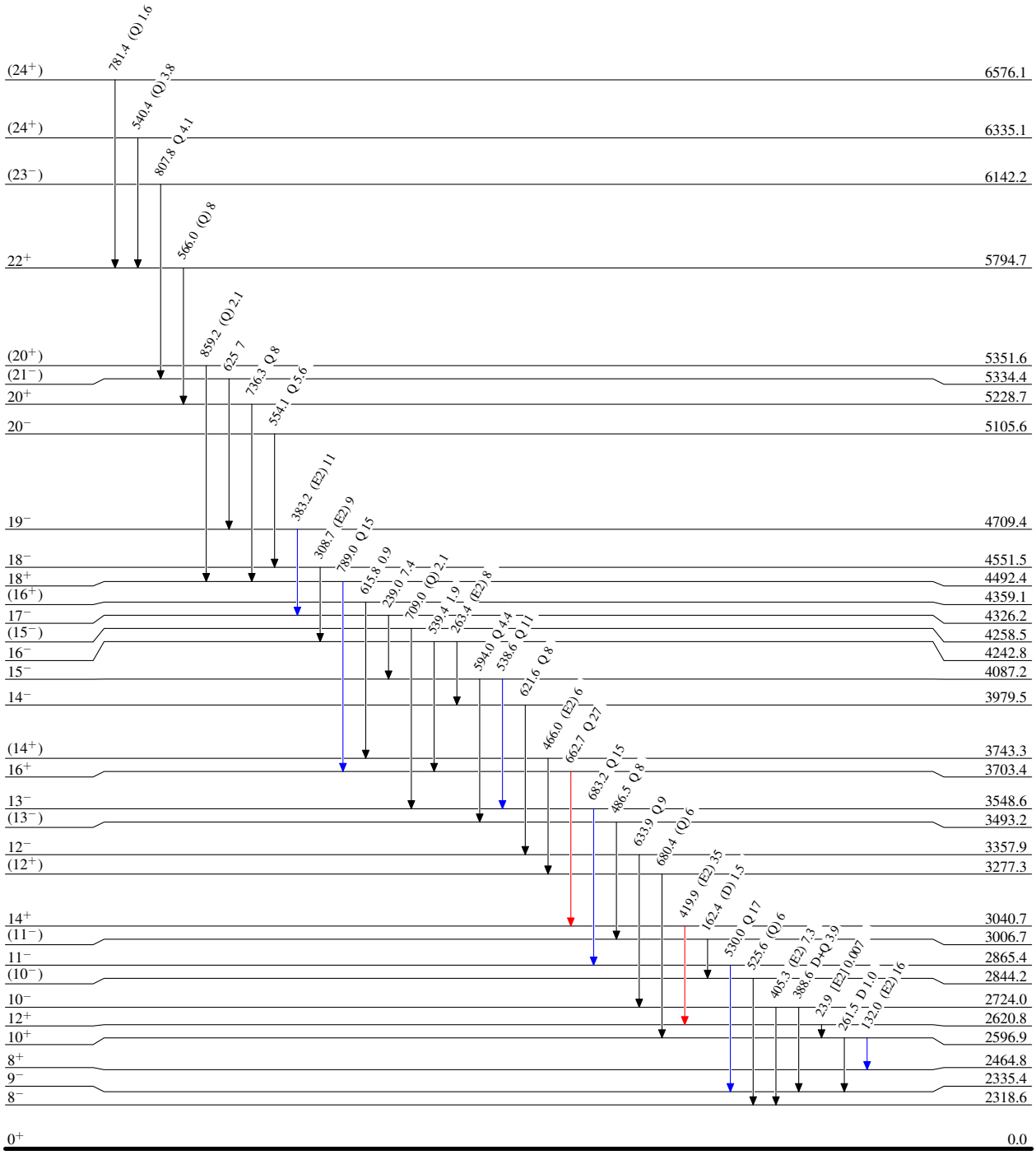
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

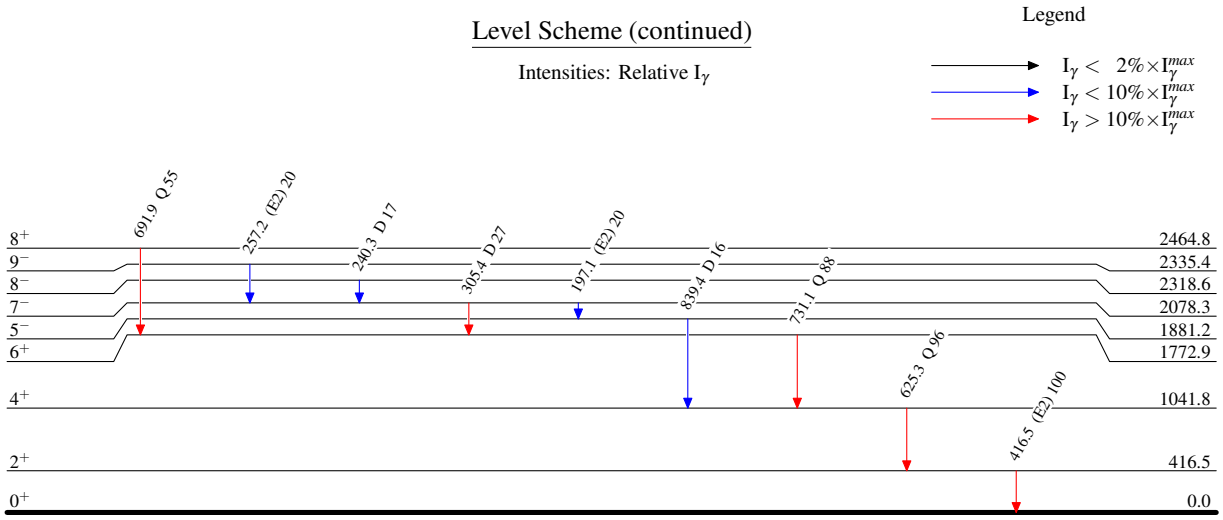


$^{190}_{80}Hg_{110}$

^{170}Er(^{24}Mg,4nγ) 1986Hu02

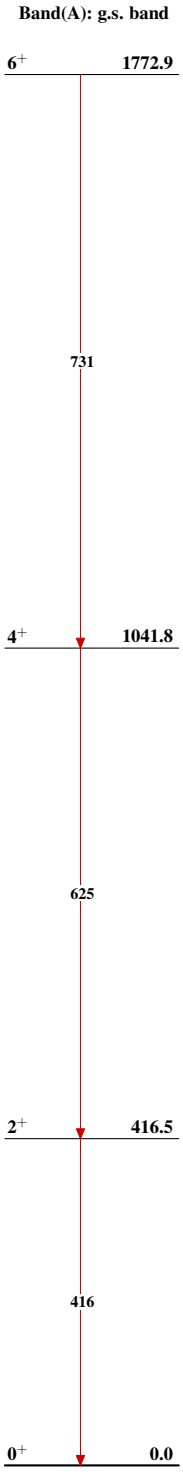
Level Scheme (continued)

Intensities: Relative I_γ



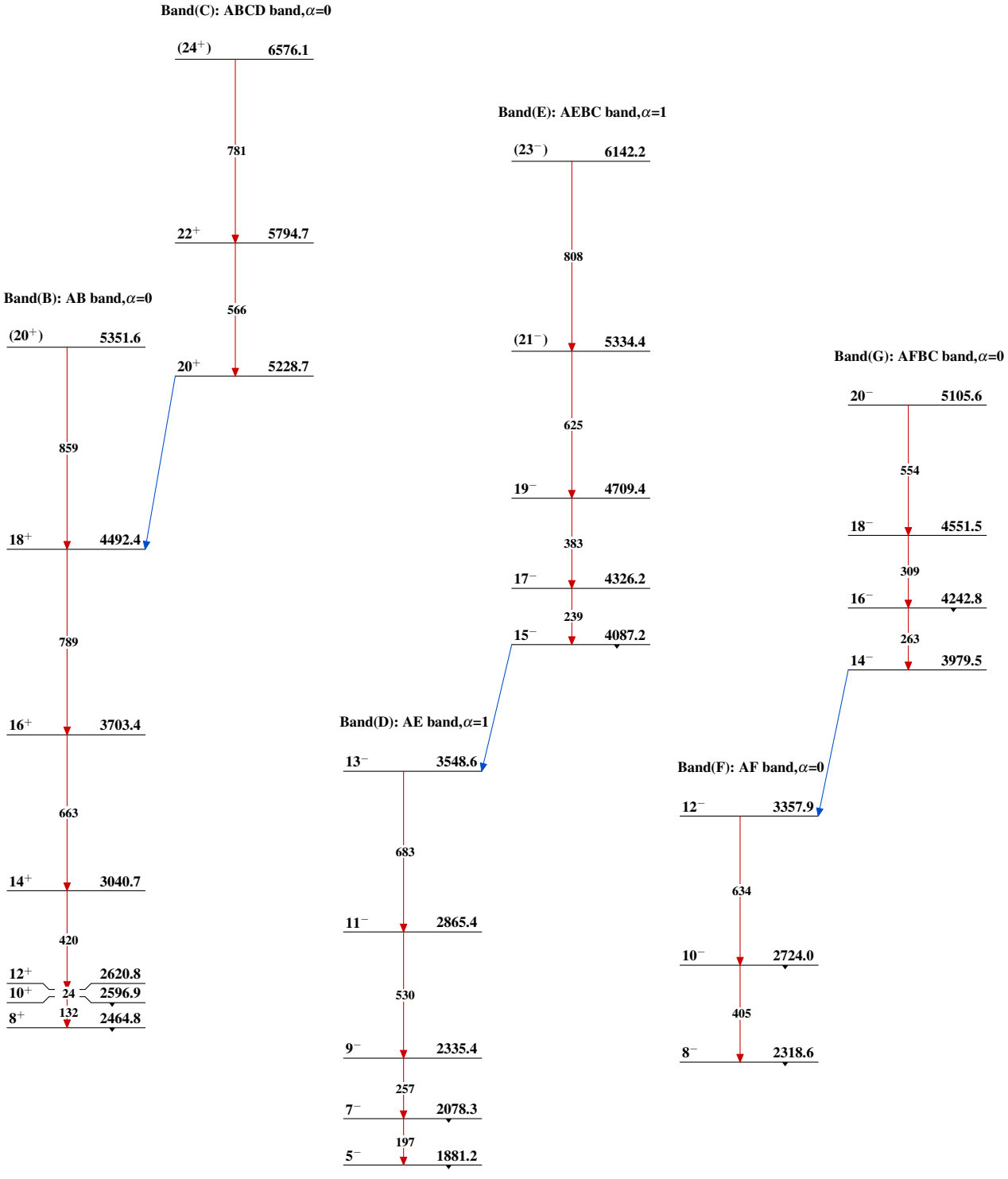
$^{190}_{80}Hg_{110}$

^{170}Er(^{24}Mg,4nγ) 1986Hu02



$^{190}_{80}Hg_{110}$

^{170}Er(^{24}Mg,4nγ) 1986Hu02 (continued)



$^{190}_{80}Hg_{110}$