^{160}Gd(^{7}Li,5nγ) 2004Es01,2005Li63

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 195,1 (2024)	19-Sep-2023

Data are primarily from 2005Li63, which are more extensive that those of 2004Es01. Unless noted otherwise, the results from both studies agree where they overlap.

2005Li63: E(^{7}Li)=49 MeV. 4.5 mg/cm^2 self-supporting ^{160}Gd target. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$ (ADO ratios) using an array of 11 Compton-suppressed HPGe-BGO detectors. Data shown in the form of a level scheme only.

2004Es01: E(^{7}Li)=56 MeV. 3.9 mg/cm^2 ^{160}Gd target. Measured Eγ, $\gamma\gamma\gamma$. Level scheme constructed from analysis of $\gamma\gamma\gamma$ cube data obtained using the 40 Compton-suppressed Ge detectors of the GASP array and the 80-element BGO inner ball. Report only members of the negative-parity yrast band up through the 28$^-$ state, together with four members of a tentative band. This latter band was not reported in the subsequent study of 2005Li63. Data are shown in the form of a level scheme only.

^{162}Ho Levels

E(level)[†]	J$^\pi$[#]	T$_{1/2}$	Comments
0.0[&]	1$^+$		
38.3[@]	2$^+$		
96.1[&]	3$^+$		
105.87[a]	6$^-$	67.0 min *7*	%IT=63 Additional information 1. E(level): from ^{162}Ho IT decay.
171.7[@]	4$^+$		
176.5[b]	7$^-$		
179.8[d]	1$^-$		
184.8[e]	(6$^+$)		
266.8[a]	8$^-$		
270.0[&]	5$^+$		
301.2[f]	(7$^+$)		
377.4[b]	9$^-$		
385.9[@]	6$^+$		
389.7[c]	(6$^-$)		
437.1[e]	(8$^+$)		
476.0[d]	(7$^-$)		
507.8[a]	10$^-$		
521.5[&]	7$^+$		
563.0[c]	(8$^-$)		
592.3[f]	(9$^+$)		
658.2[b]	11$^-$		
672.8[@]	8$^+$		
687.4[d]	(9$^-$)		
765.8[e]	(10$^+$)		
811.2[c]	(10$^-$)		
828.2[a]	12$^-$		
846.4[&]	9$^+$		
940.1[f]	(11$^+$)		
978.6[d]	(11$^-$)		
1018.2[b]	13$^-$		
1030.8[@]	10$^+$		
1144.0[c]	(12$^-$)		

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^{160}Gd(^{7}Li,5nγ) 2004Es01,2005Li63 (continued)

^{162}Ho Levels (continued)

E(level)[†]	J$^{\pi}$[#]	Comments
1146.7[e]	(12$^+$)	
1225.8[a]	14$^-$	
1244.2[&]	11$^+$	
1355.0[f]	(13$^+$)	
1358.6[d]	(13$^-$)	
1456.2[b]	15$^-$	
1457.2[@]	12$^+$	
1566.7[c]	(14$^-$)	
1598.7?[e]	(14$^+$)	
1697.6[a]	16$^-$	
1709.1[&]	13$^+$	
1827.6[d]	(15$^-$)	
1834.5[f]	(15$^+$)	
1948.4[@]	14$^+$	
1970.5[b]	17$^-$	
2078.2[c]	(16$^-$)	
2234.6?[&]	15$^+$	
2241.2[a]	18$^-$	
2380.4[d]	(17$^-$)	
2559.2[b]	19$^-$	
2672.5[c]	(18$^-$)	
2852.7[a]	20$^-$	
3006.0[d]	(19$^-$)	
3216.7[b]	21$^-$	
3338.0[c]	(20$^-$)	
3529.1[a]	22$^-$	
3938.9[b]	23$^-$	
4265.0[‡a]	24$^-$	
4717.0[‡b]	25$^-$	
5053.0[‡a]	26$^-$	
5537.0[‡b]	27$^-$	
5882.0[‡a]	28$^-$	
0+x[h]	(5$^+$)	Additional information 2.
101.0+x[g]	(6$^+$)	
219.4+x[h]	(7$^+$)	
365.2+x[g]	(8$^+$)	
521.0+x[h]	(9$^+$)	
709.6+x[g]	(10$^+$)	
899.5+x[h]	(11$^+$)	
1129.3+x[g]	(12$^+$)	
0+y[j]	(9$^+$)	Additional information 3.
217.2+y[i]	(10$^+$)	
454.7+y[j]	(11$^+$)	
710.3+y[i]	(12$^+$)	
984.0+y[j]	(13$^+$)	

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^{160}Gd(^{7}Li,5nγ) 2004Es01,2005Li63 (continued)

^{162}Ho Levels (continued)

E(level)[†]	Jπ[#]
1272.6+y[i]	(14$^+$)
1581.5+y[j]	(15$^+$)

† Calculated from a least-squares fit to the listed Eγ values. In this fit, uncertainties of 0.5 and 1 keV were arbitrarily assigned to the Eγ values 2005Li63 and 2004Es01, respectively. The energy of 106-keV level was kept fixed in the fitting procedure. Because of this arbitrariness, no uncertainties are given for the derived level energies.
‡ Value from 2004Es01. 2005Li63 do not report members of this band above the 24$^-$ level.
# Values for the 106 and lower-lying levels are from the Adopted Values. For the levels above this, the values are those of 2005Li63 and are based on the observed γ deexcitation and the usual considerations of expected band structure and the Nilsson orbitals expected to be available to the two odd nucleons in this mass region.
@ Band(A): K$^\pi$=1$^+$ g.s. band, α=0 branch. Configuration=(π 7/2[523])-(ν 5/2[523]).
& Band(a): K$^\pi$=1$^+$ g.s. band, α=1 branch. Configuration=(π 7/2[523])-(ν 5/2[523]).
a Band(B): K$^\pi$=6$^-$ yrast band, α=0 branch. Configuration=(π 7/2[523])+ (ν 5/2[642]).
b Band(b): K$^\pi$=6$^-$ yrast band, α=1 branch. Configuration=(π 7/2[523])+ (ν 5/2[642]).
c Band(C): K$^\pi$=1$^-$ band, α=0 branch. Configuration=(π 7/2[523])-(ν 5/2[642]). Members of this band above the (8$^-$) level were tentatively assigned to ^{161}Ho by 2004Es01.
d Band(c): K$^\pi$=1$^-$ band, α=1 branch. Configuration=(π 7/2[523])-(ν 5/2[642]). See the comment on the α=0 branch of this band.
e Band(D): K$^\pi$=6$^+$ band, α=0 branch. Configuration=(π 7/2[523])+(ν 5/2[523]).
f Band(d): K$^\pi$=6$^+$ band, α=1 branch. Configuration=(π 7/2[523])+(ν 5/2[523]).
g Band(E): K$^\pi$=5$^+$ band, α=0 branch. Configuration=(π 7/2[523])+(ν 3/2[521]).
h Band(e): K$^\pi$=5$^+$ band, α=1 branch. Configuration=(π 7/2[523])+(ν 3/2[521]).
i Band(F): K$^\pi$=9$^+$ band, α=0 branch. Configuration=(π 7/2[523])+(ν 11/2[505]).
j Band(f): K$^\pi$=9$^+$ band, α=1 branch. Configuration=(π 7/2[523])+(ν 11/2[505]).

γ(^{162}Ho)

Eγ[†]	Ei(level)	Jiπ	Ef	Jfπ	Mult.	Comments
9.80 *5*	105.87	6$^-$	96.1	3$^+$	E3	Eγ: from ^{162}Ho IT decay.
38.3	38.3	2$^+$	0.0	1$^+$		
57.8	96.1	3$^+$	38.3	2$^+$		
70.5	176.5	7$^-$	105.87	6$^-$		
75.6	171.7	4$^+$	96.1	3$^+$		
79.1	184.8	(6$^+$)	105.87	6$^-$		ADO=0.45 *11* suggests ΔJ=1 character.
86.5	476.0	(7$^-$)	389.7	(6$^-$)		
87.2	563.0	(8$^-$)	476.0	(7$^-$)		
90.4	266.8	8$^-$	176.5	7$^-$		
98.2	270.0	5$^+$	171.7	4$^+$		
100.9	101.0+x	(6$^+$)	0+x	(5$^+$)		
110.0	672.8	8$^+$	563.0	(8$^-$)		
110.5	377.4	9$^-$	266.8	8$^-$		
115.9	385.9	6$^+$	270.0	5$^+$		
116.5	301.2	(7$^+$)	184.8	(6$^+$)		
118.5	219.4+x	(7$^+$)	101.0+x	(6$^+$)		
124.0	811.2	(10$^-$)	687.4	(9$^-$)		
124.5	687.4	(9$^-$)	563.0	(8$^-$)		
124.7	301.2	(7$^+$)	176.5	7$^-$		
130.5	507.8	10$^-$	377.4	9$^-$		
131.5	521.5	7$^+$	389.7	(6$^-$)		
135.5	521.5	7$^+$	385.9	6$^+$		
136.0	437.1	(8$^+$)	301.2	(7$^+$)		

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^{160}Gd(^{7}Li,5nγ) 2004Es01,2005Li63 (continued)

$\gamma(^{162}Ho)$ (continued)

E_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	E_γ [†]	E_i(level)	J_i^π	E_f	J_f^π
141.5	179.8	1^-	38.3	2^+	273.5	984.0+y	(13^+)	710.3+y	(12^+)
146.0	365.2+x	(8^+)	219.4+x	(7^+)	280.7	658.2	11^-	377.4	9^-
150.5	658.2	11^-	507.8	10^-	287.0	672.8	8^+	385.9	6^+
151.0	672.8	8^+	521.5	7^+	288.5	1272.6+y	(14^+)	984.0+y	(13^+)
155.5	592.3	(9^+)	437.1	(8^+)	291.1	592.3	(9^+)	301.2	(7^+)
155.6	521.0+x	(9^+)	365.2+x	(8^+)	291.3	978.6	(11^-)	687.4	(9^-)
159.0	846.4	9^+	687.4	(9^-)	292.0	2672.5	(18^-)	2380.4	(17^-)
160.5	266.8	8^-	105.87	6^-	293.5	2852.7	20^-	2559.2	19^-
165.3	1144.0	(12^-)	978.6	(11^-)	301.5	521.0+x	(9^+)	219.4+x	(7^+)
167.4	978.6	(11^-)	811.2	(10^-)	302.0	2380.4	(17^-)	2078.2	(16^-)
170.0	437.1	(8^+)	266.8	8^-	309.0	1581.5+y	(15^+)	1272.6+y	(14^+)
170.0	828.2	12^-	658.2	11^-	312.5	3529.1	22^-	3216.7	21^-
173.5	563.0	(8^-)	389.7	(6^-)	317.5	2559.2	19^-	2241.2	18^-
173.5	765.8	(10^+)	592.3	(9^+)	320.4	828.2	12^-	507.8	10^-
173.5	846.4	9^+	672.8	8^+	324.7	846.4	9^+	521.5	7^+
174.0	940.1	(11^+)	765.8	(10^+)	326[‡]	4265.0	24^-	3938.9	23^-
179.8	179.8	1^-	0.0	1^+	328.5	765.8	(10^+)	437.1	(8^+)
184.5	1030.8	10^+	846.4	9^+	332.7	1144.0	(12^-)	811.2	(10^-)
188.7	709.6+x	(10^+)	521.0+x	(9^+)	333.5	3006.0	(19^-)	2672.5	(18^-)
189.8	899.5+x	(11^+)	709.6+x	(10^+)	336[‡]	5053.0	26^-	4717.0	25^-
189.9	1018.2	13^-	828.2	12^-	344.6	709.6+x	(10^+)	365.2+x	(8^+)
196.7	672.8	8^+	476.0	(7^-)	345[‡]	5882.0	28^-	5537.0	27^-
201.0	377.4	9^-	176.5	7^-	348.0	940.1	(11^+)	592.3	(9^+)
206.5	1146.7	(12^+)	940.1	(11^+)	358.2	1030.8	10^+	672.8	8^+
207.5	1225.8	14^-	1018.2	13^-	360.0	1018.2	13^-	658.2	11^-
208.2	1566.7	(14^-)	1358.6	(13^-)	364.0	3216.7	21^-	2852.7	20^-
208.4	1355.0	(13^+)	1146.7	(12^+)	378.3	899.5+x	(11^+)	521.0+x	(9^+)
211.5	687.4	(9^-)	476.0	(7^-)	380.1	1358.6	(13^-)	978.6	(11^-)
213.0	1457.2	12^+	1244.2	11^+	381.0	1146.7	(12^+)	765.8	(10^+)
213.5	1244.2	11^+	1030.8	10^+	397.5	1244.2	11^+	846.4	9^+
214.3	385.9	6^+	171.7	4^+	397.7	1225.8	14^-	828.2	12^-
214.5	1358.6	(13^-)	1144.0	(12^-)	410.0	3938.9	23^-	3529.1	22^-
215.0	592.3	(9^+)	377.4	9^-	414.7	1355.0	(13^+)	940.1	(11^+)
217.4	217.2+y	(10^+)	0+y	(9^+)	420.0	1129.3+x	(12^+)	709.6+x	(10^+)
219.5	219.4+x	(7^+)	0+x	(5^+)	422.7	1566.7	(14^-)	1144.0	(12^-)
219.7	1030.8	10^+	811.2	(10^-)	426.7	1457.2	12^+	1030.8	10^+
229.5	1129.3+x	(12^+)	899.5+x	(11^+)	438.0	1456.2	15^-	1018.2	13^-
230.3	1456.2	15^-	1225.8	14^-	452.0[#]	1598.7?	(14^+)	1146.7	(12^+)
237.5	454.7+y	(11^+)	217.2+y	(10^+)	452[‡]	4717.0	25^-	4265.0	24^-
239.0	1948.4	14^+	1709.1	13^+	454.5	454.7+y	(11^+)	0+y	(9^+)
240.9	507.8	10^-	266.8	8^-	464.5	1709.1	13^+	1244.2	11^+
241.2	1697.6	16^-	1456.2	15^-	469.0	1827.6	(15^-)	1358.6	(13^-)
248.0	811.2	(10^-)	563.0	(8^-)	472.0	1697.6	16^-	1225.8	14^-
250.5	2078.2	(16^-)	1827.6	(15^-)	479.5	1834.5	(15^+)	1355.0	(13^+)
251.4	521.5	7^+	270.0	5^+	484[‡]	5537.0	27^-	5053.0	26^-
252.0	1709.1	13^+	1457.2	12^+	491.5	1948.4	14^+	1457.2	12^+
252.5	437.1	(8^+)	184.8	(6^+)	493.2	710.3+y	(12^+)	217.2+y	(10^+)
255.6	710.3+y	(12^+)	454.7+y	(11^+)	511.5	2078.2	(16^-)	1566.7	(14^-)
260.5	437.1	(8^+)	176.5	7^-	514.4	1970.5	17^-	1456.2	15^-
261.0	1827.6	(15^-)	1566.7	(14^-)	525.5[#]	2234.6?	15^+	1709.1	13^+
264.1	365.2+x	(8^+)	101.0+x	(6^+)	529.2	984.0+y	(13^+)	454.7+y	(11^+)
270.5	2241.2	18^-	1970.5	17^-	543.5	2241.2	18^-	1697.6	16^-
273.0	1970.5	17^-	1697.6	16^-	552.9	2380.4	(17^-)	1827.6	(15^-)

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^{160}Gd(^{7}Li,5nγ) 2004Es01,2005Li63 (continued)

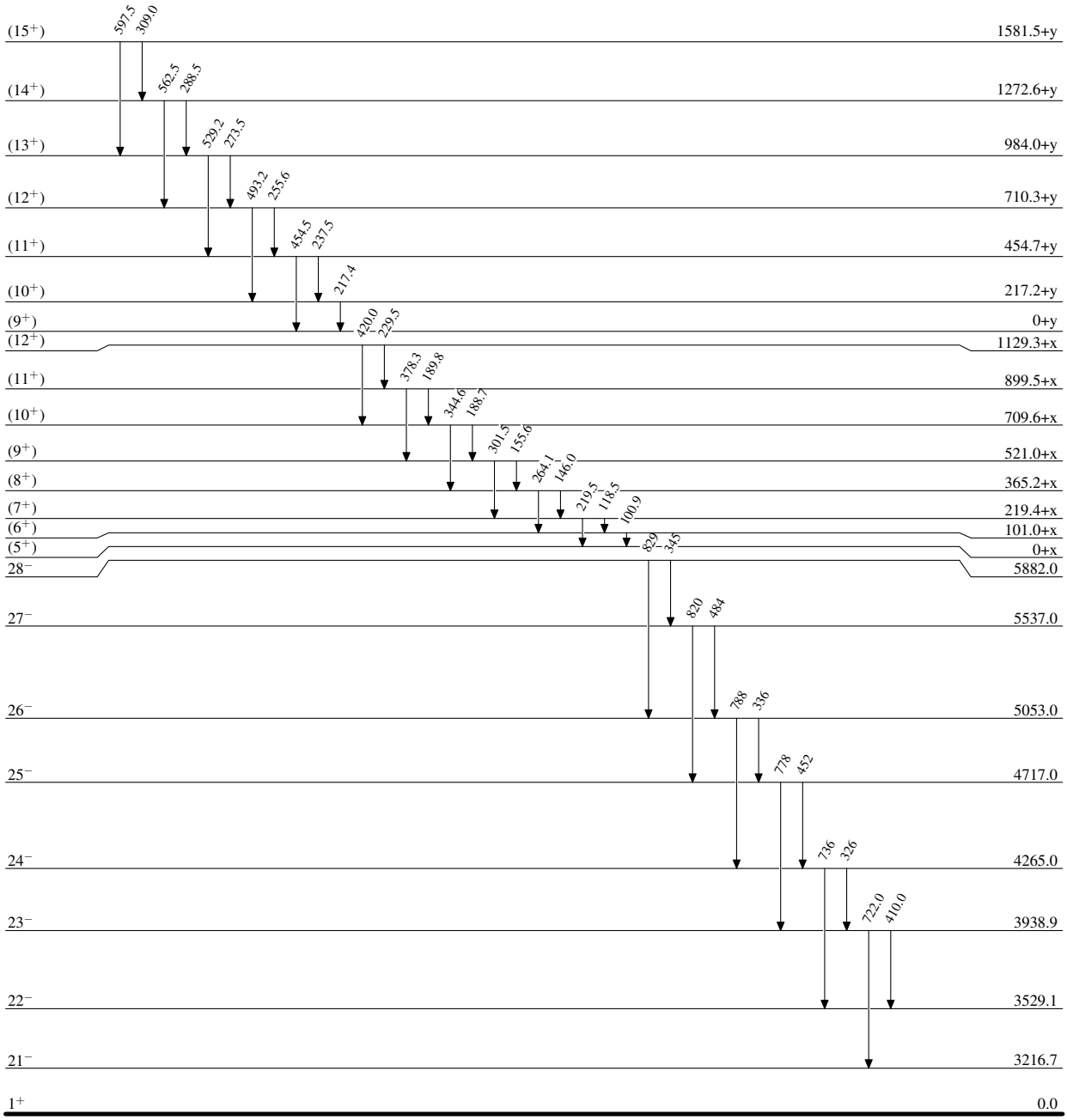
$\gamma(^{162}Ho)$ (continued)

E_γ †	E_i(level)	J_i^π	E_f	J_f^π	E_γ †	E_i(level)	J_i^π	E_f	J_f^π
562.5	1272.6+y	(14^+)	710.3+y	(12^+)	676.5	3529.1	22^-	2852.7	20^-
589.0	2559.2	19^-	1970.5	17^-	722.0	3938.9	23^-	3216.7	21^-
594.5	2672.5	(18^-)	2078.2	(16^-)	736‡	4265.0	24^-	3529.1	22^-
597.5	1581.5+y	(15^+)	984.0+y	(13^+)	778‡	4717.0	25^-	3938.9	23^-
611.5	2852.7	20^-	2241.2	18^-	788‡	5053.0	26^-	4265.0	24^-
625.5	3006.0	(19^-)	2380.4	(17^-)	820‡	5537.0	27^-	4717.0	25^-
657.5	3216.7	21^-	2559.2	19^-	829‡	5882.0	28^-	5053.0	26^-
665.5	3338.0	(20^-)	2672.5	(18^-)					

† Values quoted to tenths of a keV are from 2005Li63. Those quoted to the nearest keV are from 2004Es01, unless noted otherwise.
‡ Value from 2004Es01. 2005Li63 do not report data on the members of this band above the 24^- state.
# Placement of transition in the level scheme is uncertain.

^{160}Gd(^{7}Li,5nγ) 2004Es01,2005Li63

Level Scheme



$^{162}_{67}Ho_{95}$

Legend

γ Decay (Uncertain)

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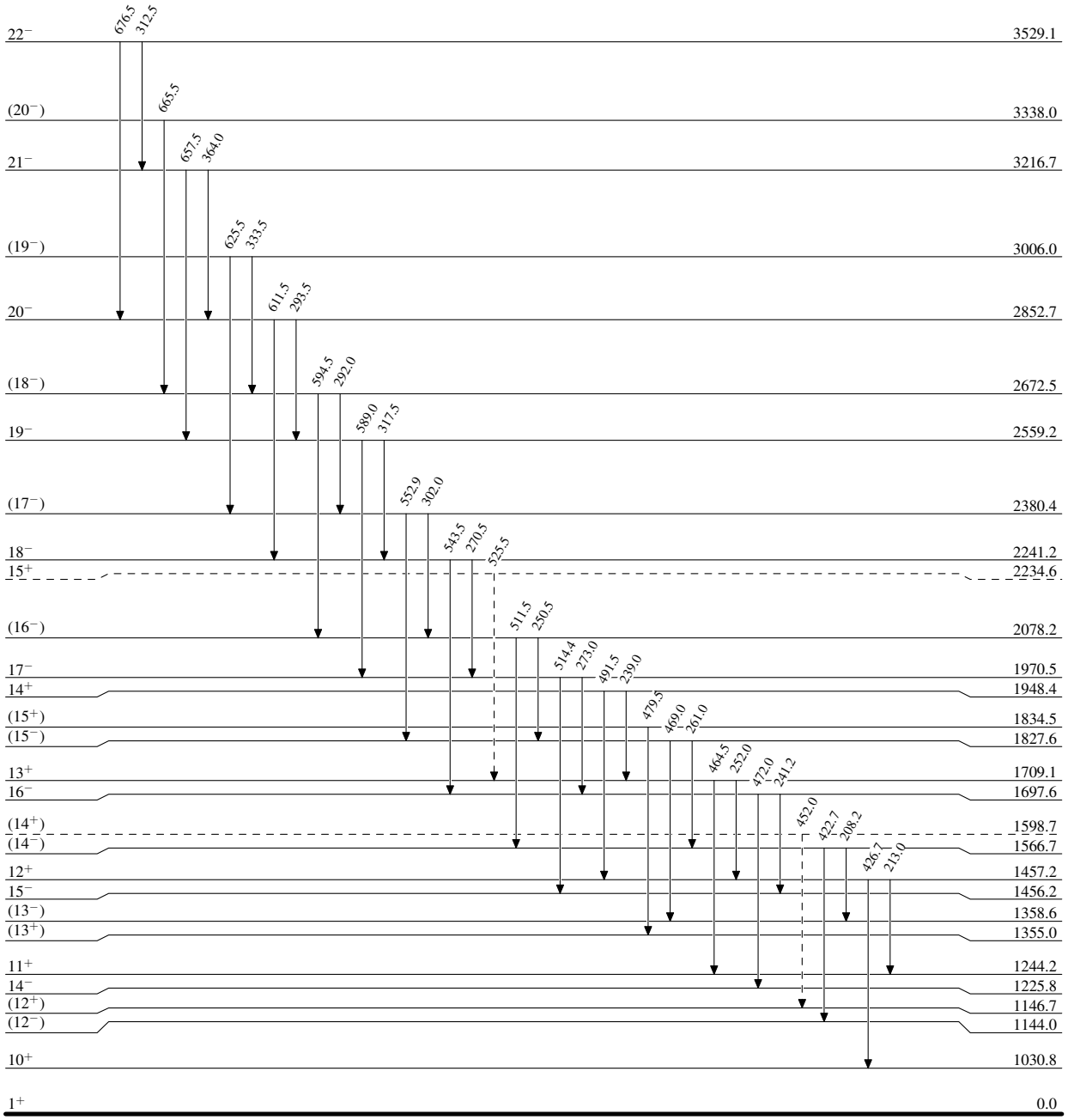
Level Scheme (continued)



$^{162}_{67}Ho_{95}$

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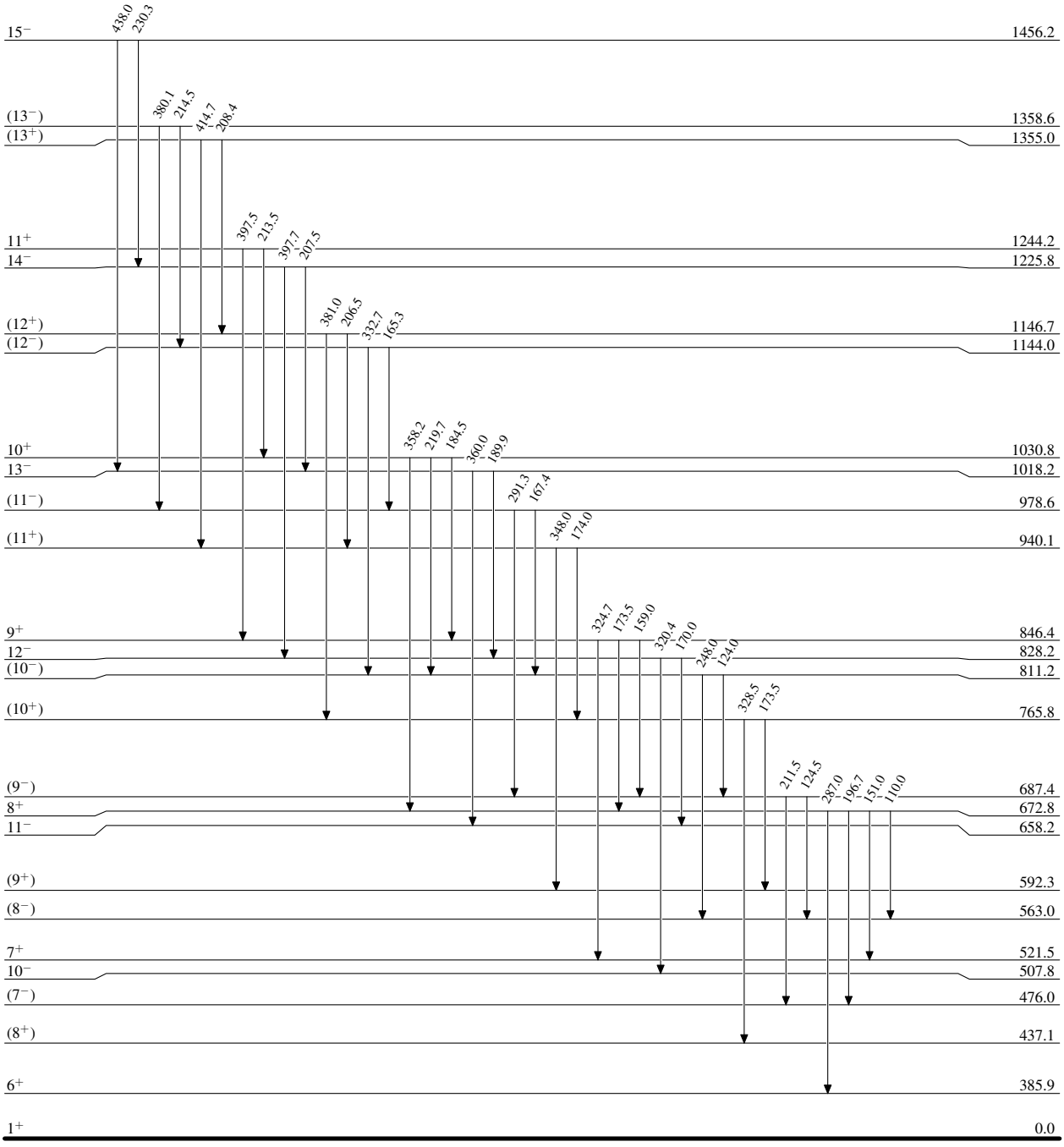
Level Scheme (continued)



$^{162}_{67}Ho_{95}$

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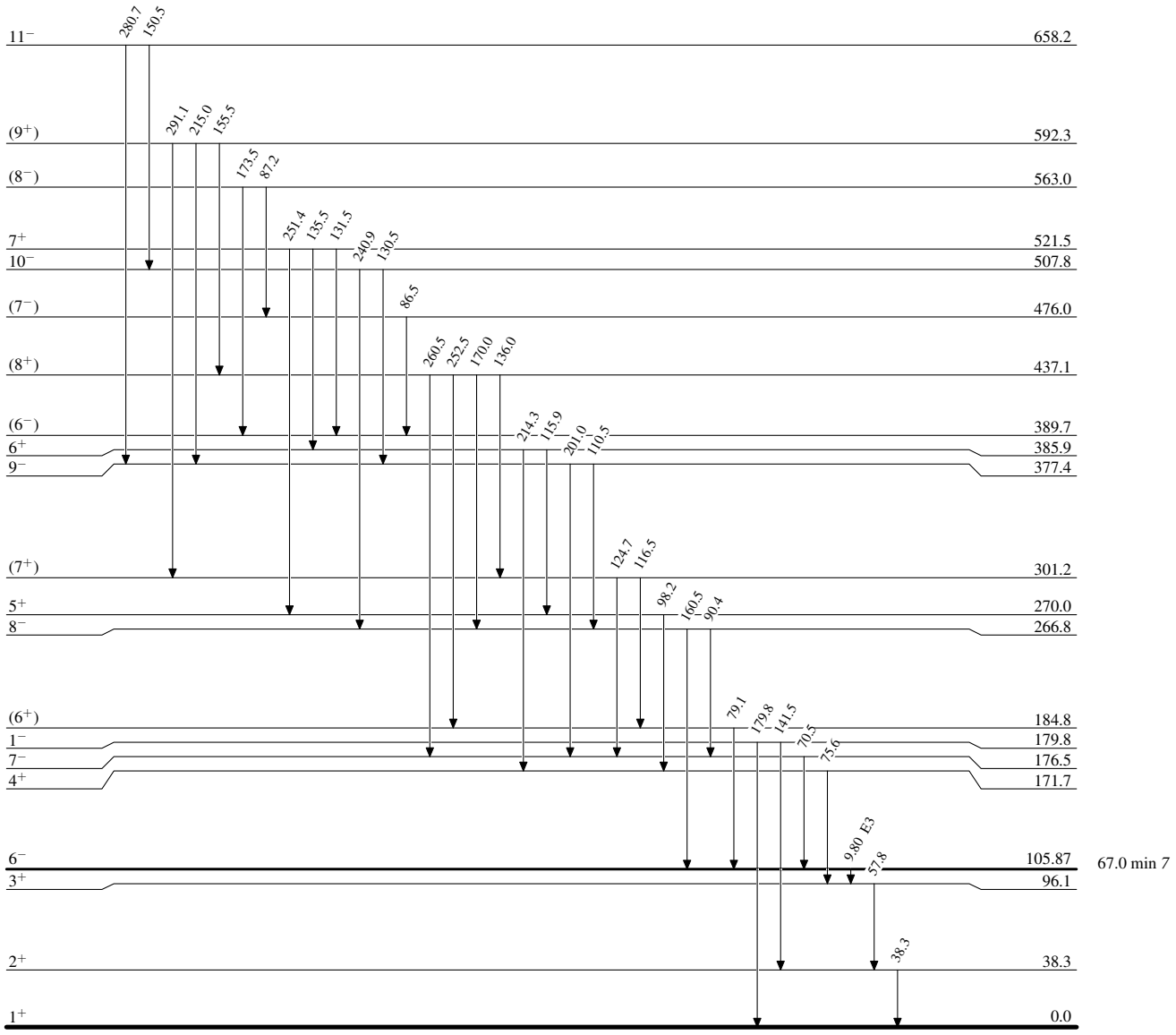
Level Scheme (continued)



$^{162}_{67}Ho_{95}$

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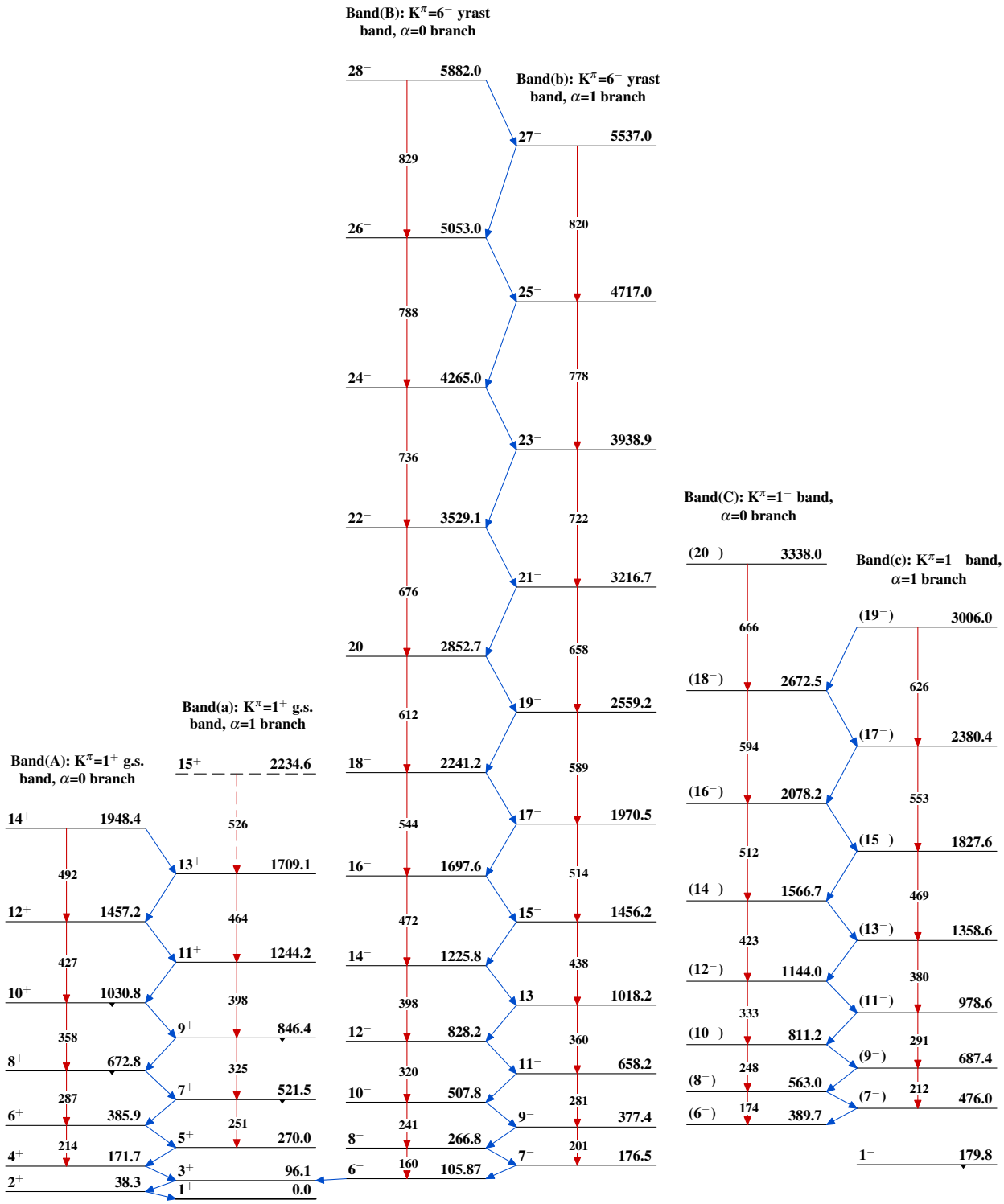
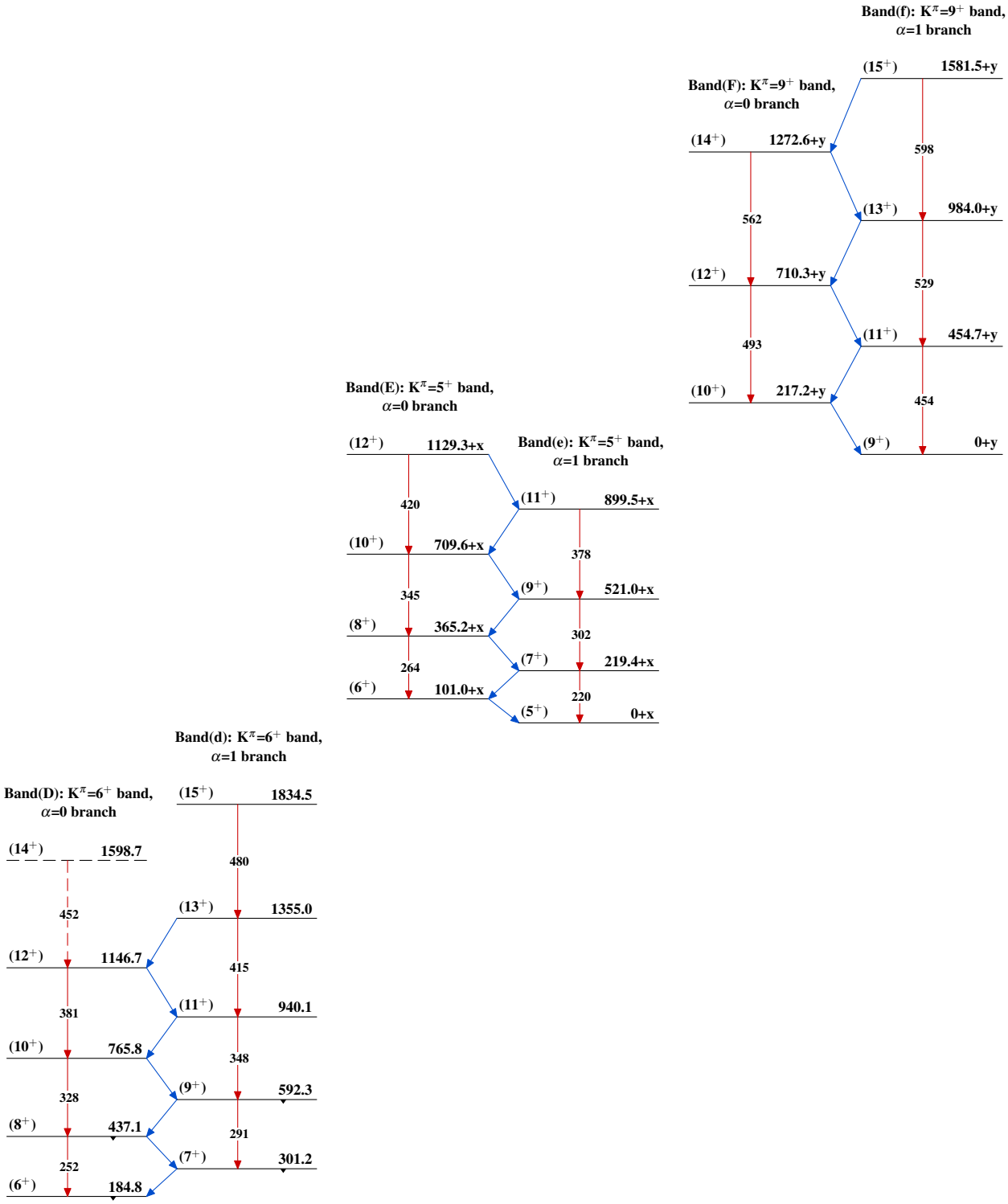


$^{162}_{67}Ho_{95}$

^{160}Gd(^{7}Li,5nγ) 2004Es01,2005Li63 (continued)



$^{162}_{67}Ho_{95}$