Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 141, 1 (2017)	1-Feb-2017

Q(β^-)=−8.8×10^2 *4*; S(n)=7.43×10^3 *4*; S(p)=4.05×10^3 *3*; Q(α)=1.54×10^3 *5* 2017Wa10
Q(ε)=4.22×10^3 *3*; S(2n)=1.685×10^4 *4*; S(2p)=1.067×10^4 *3* 2017Wa10
Additional information 1.

^{158}Ho Levels

Cross Reference (XREF) Flags

- A ^{158}Er ε decay
- B ^{158}Ho IT decay (28 min)
- C ^{159}Tb(α,5nγ), ^{160}Dy(p,3nγ)
- D ^{152}Sm(^{11}B,5nγ),^{150}Nd(^{14}N,6nγ)

E(level)†	Jπ‡	$T_{1/2}$	XREF	Comments
0.0@	5$^+$	11.3 min *4*	ABCD	%ε+%β^+=100 μ=+3.77 *3*; Q=+4.2 *4* Jπ: J measured by atomic-beam magnetic resonance (1969Ek01) and laser spectroscopy (1988NeZZ). π from E3 γ from 2$^-$; π,7/2[523] is assigned to all odd-A Ho ground states (A=157 to 169) and ν,3/2[521] to the ground states of the N=91 nuclides ^{155}Gd, ^{157}Dy, ^{159}Er, and ^{161}Yb (1990Ja11). The 2$^+$ state resulting from the other coupling of these two states is reported at 74 keV. $T_{1/2}$: Weighted average of 11.5 m *5* (1962Sc10) and 10.9 m *6* (1965St08). μ,Q: Both from 1989Al27, and 2014StZZ compilation (μ), and 2016St14 evaluation (Q); measured by laser resonance ionization spectroscopy (data published in 1989Al27 as μ=3.76 *3* and Q=4.1 *4*). Evaluated RMS charge radius: <r^2>$^{1/2}$=5.1571 fm *316* (2013An02). Δ<r^2>(^{158}Ho−^{165}Ho)=0.454 fm^2 *4* from table in 1989Al27, and by subtraction of entries Δ<r^2>(^{156}Ho−^{158}Ho)=0.389 fm^2 *5*, Δ<r^2>(^{157}Ho−^{158}Ho)=0.036 fm^2 *5*, and Δ<r^2>(^{158}Ho−^{160}Ho)=0.091 fm^2 *5*.
67.20 *1*	2$^-$	28 min *2*	ABC	%ε+%β^+<19; %IT>81 μ=+2.44 *3*; Q=+1.66 *17* %ε+%β^+: From $I_{\gamma+ce}$(feeding 67 level)-$I_{\gamma+ce}$(67), assuming I_γ(67) was measured at equilibrium in ^{158}Er ε decay. Jπ: J measured by atomic-beam magnetic resonance (1969Ek01) and laser spectrometry (1988NeZZ). π from E1 γ from 2$^+$ level. Probable configuration ((π,7/2[404])(ν,3/2[521])) (1986So02). $T_{1/2}$: Average of 27 m *2* (1960Dn01) and 29 m *2* (1962Sc10); others: ≈ 30 m (1961Ba32), 30 m *5* (1961Bo24), and 27 m (1965St08). μ,Q: Both from 1989Al27, and 2014StZZ compilation (μ), and 2016St14 evaluation (Q); measured by laser resonance ionization spectroscopy (data published in 1989Al27 as μ=2.43 *3* and Q=1.62 *17*). Δ<r^2>(^{158}Ho(2$^-$)-^{158}Ho(5$^+$))=+0.158 fm^2 *5* from subtraction of entries in 1989Al27.
74.897 *11*	2$^+$	60 ns *10*	A	Jπ: From M1 γ from 1$^+$ level and missing population in ε decay from 0$^+$ parent. $T_{1/2}$: From ^{150}Ho ε decay, 2005KaZY, with uncertainty adjusted by V.G. Kalinnikov, priv. comm., 2010.
91.595 *12*	1$^-$,2$^-$,3$^-$	140 ns *25*	A	Jπ: From M1 γ to 2$^-$ level. $T_{1/2}$: From 2005KaZY in ^{150}Ho ε decay.
102.8@	(6$^+$)		D	
125.62 *5*	(2$^+$)#		A	Jπ: (M1,E2) γ from 1$^+$ and no ε feeding from 0$^+$ ^{158}Er parent.
137.099 *25*	(2$^-$)#		A	Jπ: E1 γ from 1$^+$ and and no ε feeding from 0$^+$ ^{158}Er parent.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{158}Ho Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
146.801 *11*	1^+	1.85 ns *10*	A	Jπ: From log *ft* = 4.8 for ε decay from 0^+ ^{158}Er used to eliminate 2^+ or 3^+ possibilities. $T_{1/2}$: From ^{158}Er ε+β+ decay (1978Sc10,1977AnZG); other: 1.7 ns *2* (1973BuZT).
156.9 *1*	(5^-)	29 ns *3*	C	Jπ: From γ to 5^+ level and expected presence of other pairing of Nilsson states involved in 2^- level at 67 keV. Probable configuration is ((π,7/2[404])(ν,3/2[521])) (1986So02). Other possibility is 6^- discussed in in-beam study (1976Ri09). $T_{1/2}$: From in-beam study (1976Ri09).
180 *CA*	(9^+)	21.3 min *23*	D	%ε+%$β^+$≥93; %IT≤7 E(level): From calculation of 1986So02. Jπ: From log *ft*=4.5 for ε+β+ decay to (8^+) level in ^{158}Dy (although the log *ft* value is not very reliable its low value is compatible with this assignment) and expected presence of configuration of ((π,7/2[523])(ν,11/2[505])). $T_{1/2}$: From IT decay (1974Al30); others: 19.5 m (1970ScZO) and 21 m *2* (1975Al13). %IT: The single-particle estimate of half-life for an E4 γ to 5^+ ground state is 325 min, which corresponds to 7% IT decay, so the unobserved IT decay should be less than this value.
190.243 *15*	$0^+,1^+,2^+$		A	Jπ: From M1+E2 γ to 1^+ level and (E2) γ to 2^+.
207.7[c]	(8^-)		D	
225.0[@]	(7^+)		D	
227.8[a] *1*	(6^-)		C	Jπ: From γ to (5^-) level and assumed band structure in ^{159}Tb(α,5n) and ^{160}Dy(p,3n) (1976Ri09).
240.75 *4*	$0^+,1^+$		A	Jπ: From M1 γ to 1^+ level and log *ft*=6.2 from 0^+ ^{158}Er.
255.034 *18*	(3^+)[#]		A	Jπ: γ's from, and to, 1^+ levels respectively, and no ε feeding from 0^+ ^{158}Er parent; no γ feeding from upper 0^+ levels makes 2^+ less likely.
278.5[c]	(9^-)		D	
279.2[b]	(7^+)		D	
328.4[a] *2*	(7^-)		C	
359.3[b]	(8^+)		D	
368.0[@]	(8^+)		D	
379.0[c]	(10^-)		D	
385.708 *19*	1^+		A	Jπ: From M1 γ's to 1^+ and 2^+ levels and log *ft*=5.6 from 0^+ ^{158}Er.
395.186 *18*	0,1		A	Jπ: Conflict on parity since have E1 γ to 1^+ level and M1,E2 γ to 0^+, 1^+, 2^+ level. Spin determined from log *ft*=5.7 from 0^+ ^{158}Er.
398.13? *5*	$0^+,1^+,2^+$		A	Jπ: From M1+E2 γ to $0^+,1^+,2^+$ level and log *ft*=7.2 from 0^+ ^{158}Er.
405.[&]	(10^+)		D	
433.168 *21*	1^+		A	Jπ: From M1 γ to 1^+ level and log *ft*=5.6 from 0^+ ^{158}Er.
443.5[a] *2*	(8^-)		C	
454.4[b]	(9^+)		D	
461.698 *22*	1^+		A	Jπ: From M1 γ's to 1^+ and 2^+ levels and log *ft*=5.2 from 0^+ ^{158}Er.
493.9[c]	(11^-)		D	
531.5[@]	(9^+)		D	
582.2[b]	(10^+)		D	
602.8[a] *2*	(9^-)		C	
652.[&]	(11^+)		D	
653.2[c]	(12^-)		D	
662.69 *4*	$0^+,1^+$		A	Jπ: From M1 γ's to 1^+ levels and log *ft*=5.2 from 0^+ ^{158}Er.
715.8[@]	(10^+)		D	
735.7[b]	(11^+)		D	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{158}Ho Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
768.9[a] 2	(10⁻)	C	
810.88 8	(1⁺)[#]	A	Jπ: log *ft*=4.4 in ε from 0⁺ ^{158}Er parent.
819.2[c]	(13⁻)	D	
917.2[@]	(11⁺)	D	
918.[&]	(12⁺)	D	
918.7[b]	(12⁺)	D	
982.7[a] 3	(11⁻)	C	
1032.5[c]	(14⁻)	D	
1111.4[@]	(12⁺)	D	
1120.0[b]	(13⁺)	D	
1200.[&]	(13⁺)	D	
1204.6[a] 3	(12⁻)	C	
1254.7[c]	(15⁻)	D	
1349.3[b]	(14⁺)	D	
1362.0[@]	(13⁺)	D	
1460.5[a] 3	(13⁻)	C	
1497.[&]	(14⁺)	D	
1510.2[c]	(16⁻)	D	
1557.2[@]	(14⁺)	D	
1590.1[b]	(15⁺)	D	
1737.9[a] 3	(14⁻)	C	
1788.2?[c]	(17⁻)	D	
1806.[&]	(15⁺)	D	
1859.9[b]	(16⁺)	D	
1868.3[@]	(15⁺)	D	
2013.7[@]	(16⁺)	D	
2024.3[a] 4	(15⁻)	C	
2074.2?[c]	(18⁻)	D	
2121.8[&]	(16⁺)	D	
2132.3[b]	(17⁺)	D	
2354.9?[a] 4	(16⁻)	C	
2404.1?[c]	(19⁻)	D	
2431.2[b]	(18⁺)	D	
2433.8[@]	(17⁺)	D	
2444.[&]	(17⁺)	D	
2710.9?[c]	(20⁻)	D	
2728.5[b]	(19⁺)	D	
2765.[&]	(18⁺)	D	
3051.6[b]	(20⁺)	D	
3085.7[c]	(21⁻)	D	
3366.[b]	(21⁺)	D	
3405.0[c]	(22⁻)	D	
3688.[b]	(22⁺)	D	
3813.1[c]	(23⁻)	D	
4001.[b]	(23⁺)	D	
4143.4[c]	(24⁻)	D	
4339.[b]	(24⁺)	D	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{158}Ho Levels (continued)

E(level)†	Jπ‡	XREF	E(level)†	Jπ‡	XREF	E(level)†	Jπ‡	XREF	E(level)†	Jπ‡	XREF
4574.[c]	(25⁻)	D	6342.[b]	(29⁺)	D	8525.[c]	(34⁻)	D	10631.[b]	(38⁺)	D
4693.[b]	(25⁺)	D	6604.[c]	(30⁻)	D	8618.[b]	(34⁺)	D	11163.[b]	(39⁺)	D
4917.[c]	(26⁻)	D	6792.[b]	(30⁺)	D	9101.[b]	(35⁺)	D	11673.[c]	(40⁻)	D
5079.[b]	(26⁺)	D	7132.[c]	(31⁻)	D	9168.[c]	(35⁻)	D	11712.[b]	(40⁺)	D
5370.[c]	(27⁻)	D	7235.[b]	(31⁺)	D	9565.[c]	(36⁻)	D	12266.[b]	(41⁺)	D
5476.[b]	(27⁺)	D	7535.[c]	(32⁻)	D	9599.[b]	(36⁺)	D	12766.[c]	(42⁻)	D
5734.[c]	(28⁻)	D	7685.[b]	(32⁺)	D	10107.[b]	(37⁺)	D	12845.[b]	(42⁺)	D
5903.[b]	(28⁺)	D	8115.[c]	(33⁻)	D	10286.[c]	(37⁻)	D	13422.[b]	(43⁺)	D
6219.[c]	(29⁻)	D	8144.[b]	(33⁺)	D	10628.[c]	(38⁻)	D			

† From least-squares fits to γ energies in the individual decay or reaction. There are major discrepancies between the γ-ray energies in the ^{158}Er ε decay compared to the assigned uncertainties, e.g., as large as 0.2 keV vs 0.01 keV.

‡ The assignments for the high-spin levels from the ^{152}Sm(^{11}B,5nγ) and ^{150}Nd(^{14}N,6nγ) reactions are based on the usual systematics of increasing γ energy and decreasing intensity with increasing excitation energy and the band structures. Specific arguments are given for the levels observed in other decay modes.

Postulated by V.G. Kalinnikov, priv. comm., 2010 in ^{158}Er ε decay dataset. Specific arguments are given in comments.

@ Band(A): $K^\pi=5^+$ ground-state band, $\pi7/2[523]$ $\nu3/2[521]$.

& Band(B): $K^\pi=9^+$ $\pi7/2[523]$ $\nu11/2[505]$ band.

a Band(C): $K^\pi=(6^-)$ band, A=7.15, B=0.0015.

b Band(D): $K^\pi=5^+$ $\pi7/2[404]$ $\nu3/2[651]$ band.

c Band(E): $K^\pi=5^-$ $\pi7/2[523]$ $\nu3/3[651]$ band.

Adopted Levels, Gammas (continued)

γ(^{158}Ho)

For unplaced γ's see the ^{158}Er ε decay.

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.[†]	δ[‡a]	α[&]	Comments
67.20	2⁻	67.200 *10*	100	0.0	5⁺	E3		477	B(E3)(W.u.)=0.000149 *19* α(K)=3.85 *6*; α(L)=356 *5*; α(M)=93.1 *13* α(N)=21.1 *3*; α(O)=2.41 *4*; α(P)=0.001608 *23*
74.897	2⁺	7.697 *4*	100	67.20	2⁻	E1		14.14	α(M)=11.56 *17* α(N)=2.38 *4*; α(O)=0.193 *3*; α(P)=0.00327 *5* B(E1)(W.u.)=0.00056 *10*
91.595	1⁻,2⁻,3⁻	24.395 *6*	100	67.20	2⁻	M1+E2	0.071 *10*	34.2 *25*	B(M1)(W.u.)=0.00031 *6*; B(E2)(W.u.)=1.3 *5* α(L)=26.6 *19*; α(M)=6.0 *5* α(N)=1.38 *10*; α(O)=0.190 *12*; α(P)=0.00847 *12*
102.8	(6⁺)	102.7		0.0	5⁺				
125.62	(2⁺)	50.7 *1*	100	74.897	2⁺	[M1,E2]		23 *21*	α(L)=18 *16*; α(M)=4.3 *38* α(N)=0.97 *85*; α(O)=0.114 *97*; α(P)=5.9×10^{-4} *40*
137.099	(2⁻)	45.4 *1*	≈100	91.595	1⁻,2⁻,3⁻	[M1,E2]		39 *36*	α(L)=30 *27*; α(M)=7.3 *66* α(N)=1.6 *15*; α(O)=0.19 *17*; α(P)=8.0×10^{-4} *56*
		69.91 *3*	24 *5*	67.20	2⁻	[M1,E2]		9.4 *21*	α(K)=4.2 *20*; α(L)=4.0 *31*; α(M)=0.96 *76* α(N)=0.22 *17*; α(O)=0.026 *20*; α(P)=2.4×10^{-4} *15*
146.801	1⁺	71.903 *2*	100 *11*	74.897	2⁺	M1+E2	0.068 *15*	6.77	B(M1)(W.u.)=0.0041 *7*; B(E2)(W.u.)=1.9 *9* α(K)=5.65 *8*; α(L)=0.873 *18*; α(M)=0.193 *4* α(N)=0.0448 *9*; α(O)=0.00647 *12*; α(P)=0.000352 *5*
		79.603 *10*	0.89 *10*	67.20	2⁻	[E1]		0.580	B(E1)(W.u.)=2.8×10^{-7} *5* α(K)=0.479 *7*; α(L)=0.0785 *11*; α(M)=0.01734 *25* α(N)=0.00394 *6*; α(O)=0.000523 *8*; α(P)=2.12×10^{-5} *3*
156.9	(5⁻)	156.9 *1*	100	0.0	5⁺	[E1]		0.0954	B(E1)(W.u.)=1.89×10^{-6} *20* α(K)=0.0801 *12*; α(L)=0.01197 *17*; α(M)=0.00263 *4* α(N)=0.000603 *9*; α(O)=8.34×10^{-5} *12*; α(P)=3.89×10^{-6} *6*
190.243	0⁺,1⁺,2⁺	43.43 *2*	100 *10*	146.801	1⁺	M1+E2	0.050 *23*	5.0 *3*	α(L)=3.89 *20*; α(M)=0.86 *5* α(N)=0.200 *11*; α(O)=0.0287 *13*; α(P)=0.001542 *22*
		115.40 *2*	38 *3*	74.897	2⁺	(E2)		1.661	α(K)=0.765 *11*; α(L)=0.688 *10*; α(M)=0.1656 *24* α(N)=0.0374 *6*; α(O)=0.00447 *7*; α(P)=3.21×10^{-5} *5*
225.0	(7⁺)	121.8		102.8	(6⁺)				
		224.9		0.0	5⁺				
227.8	(6⁻)	70.9 *1*	100	156.9	(5⁻)				
240.75	0⁺,1⁺	50.68 *4*	100 *13*	190.243	0⁺,1⁺,2⁺	M1+E2	0.21 *+5−3*	4.7 *9*	α(L)=3.7 *7*; α(M)=0.84 *16* α(N)=0.19 *4*; α(O)=0.026 *4*; α(P)=0.000948 *22*
		93.68 *5*	78 *7*	146.801	1⁺	[M1,E2]		3.38 *24*	α(K)=1.96 *69*; α(L)=1.09 *70*; α(M)=0.26 *18* α(N)=0.059 *39*; α(O)=0.0072 *43*; α(P)=1.09×10^{-4} *56*
255.034	(3⁺)	64.89[@] *1*	25 *8*	190.243	0⁺,1⁺,2⁺	[M1,E2]		12.3 *32*	α(K)=5.0 *27*; α(L)=5.6 *45*; α(M)=1.4 *11* α(N)=0.30 *25*; α(O)=0.036 *28*; α(P)=3.0×10^{-4} *18*

Adopted Levels, Gammas (continued)

γ(^{158}Ho) (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.[†]	α[&]	Comments
255.034	(3$^+$)	107.48[@] *3*	100 *16*	146.801	1$^+$	[E2]	2.16	α(K)=0.920 *13*; α(L)=0.950 *14*; α(M)=0.229 *4* α(N)=0.0516 *8*; α(O)=0.00616 *9*; α(P)=3.83×10^{-5} *6*
278.5	(9$^-$)	70.8		207.7	(8$^-$)			
279.2	(7$^+$)	176.		102.8	(6$^+$)			
		279.3		0.0	5$^+$			
328.4	(7$^-$)	100.6 *2*	100	227.8	(6$^-$)			
		171.5 *3*		156.9	(5$^-$)			
359.3	(8$^+$)	80.2		279.2	(7$^+$)			
		134.2		225.0	(7$^+$)			
		257.		102.8	(6$^+$)			
368.0	(8$^+$)	142.9		225.0	(7$^+$)			
		265.5		102.8	(6$^+$)			
379.0	(10$^-$)	100.3		278.5	(9$^-$)			
		171.3		207.7	(8$^-$)			
385.708	1$^+$	131.65[@] *8*	7.6 *5*	255.034	(3$^+$)	[E2]	1.033	α(K)=0.536 *8*; α(L)=0.382 *6*; α(M)=0.0916 *13* α(N)=0.0207 *3*; α(O)=0.00250 *4*; α(P)=2.30×10^{-5} *4*
		195.42 *2*	80 *4*	190.243	0$^+$,1$^+$,2$^+$	M1	0.394	α(K)=0.332 *5*; α(L)=0.0487 *7*; α(M)=0.01076 *15* α(N)=0.00250 *4*; α(O)=0.000364 *5*; α(P)=2.05×10^{-5} *3*
		238.86 *3*	13.6 *12*	146.801	1$^+$	M1	0.227	α(K)=0.191 *3*; α(L)=0.0280 *4*; α(M)=0.00617 *9* α(N)=0.001434 *20*; α(O)=0.000209 *3*; α(P)=1.177×10^{-5} *17*
		310.82 *3*	100 *2*	74.897	2$^+$	M1	0.1116	α(K)=0.0941 *14*; α(L)=0.01368 *20*; α(M)=0.00301 *5* α(N)=0.000700 *10*; α(O)=0.0001020 *15*; α(P)=5.77×10^{-6} *8*
395.186	0,1	204.16 *3*	5.3 *13*	190.243	0$^+$,1$^+$,2$^+$	M1+E2	0.29 *6*	α(K)=0.222 *72*; α(L)=0.051 *8*; α(M)=0.0117 *23* α(N)=0.0027 *5*; α(O)=0.00036 *4*; α(P)=1.27×10^{-5} *55*
		248.580 *15*	100 *6*	146.801	1$^+$	E1	0.0287	α(K)=0.0242 *4*; α(L)=0.00350 *5*; α(M)=0.000768 *11* α(N)=0.0001766 *25*; α(O)=2.49×10^{-5} *4*; α(P)=1.240×10^{-6} *18*
398.13?	0$^+$,1$^+$,2$^+$	207.89 *4*	100	190.243	0$^+$,1$^+$,2$^+$	M1+E2	0.27 *6*	α(K)=0.211 *69*; α(L)=0.048 *7*; α(M)=0.0110 *20* α(N)=0.0025 *5*; α(O)=0.00034 *4*; α(P)=1.20×10^{-5} *52*
405.	(10$^+$)	225.0	100	180	(9$^+$)			
433.168	1$^+$	286.40 *5*	8.2 *4*	146.801	1$^+$	M1+(E2)	0.108 *31*	α(K)=0.087 *31*; α(L)=0.0165 *7*; α(M)=0.00373 *7* α(N)=0.000857 *20*; α(O)=0.000118 *10*; α(P)=5.0×10^{-6} *22*
		296.07 *3*	41 *2*	137.099	(2$^-$)	E1	0.0185	α(K)=0.01560 *22*; α(L)=0.00223 *4*; α(M)=0.000489 *7* α(N)=0.0001127 *16*; α(O)=1.595×10^{-5} *23*; α(P)=8.13×10^{-7} *12*
		307.7 *1*	1.2 *5*	125.62	(2$^+$)			
		341.58 *3*	53 *7*	91.595	1$^-$,2$^-$,3$^-$	E1	0.0453	α(K)=0.0344 *5*; α(L)=0.00842 *12*; α(M)=0.00194 *3* α(N)=0.000444 *7*; α(O)=5.85×10^{-5} *9*; α(P)=1.82×10^{-6} *3*
		358.24 *3*	100 *9*	74.897	2$^+$	M1	0.0766	α(K)=0.0646 *9*; α(L)=0.00935 *13*; α(M)=0.00206 *3* α(N)=0.000478 *7*; α(O)=6.97×10^{-5} *10*; α(P)=3.95×10^{-6} *6*
443.5	(8$^-$)	115.1 *2*	100 *10*	328.4	(7$^-$)			
		215.7 *2*	82 *9*	227.8	(6$^-$)			
454.4	(9$^+$)	95.4		359.3	(8$^+$)			
		174.9		279.2	(7$^+$)			

$^{158}_{67}Ho_{91}$-6

Adopted Levels, Gammas (continued)

γ(^{158}Ho) (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.[†]	α[&]	Comments
454.4	(9$^+$)	246.6		207.7	(8$^-$)			
461.698	1$^+$	28.7 *2*	0.19 *6*	433.168	1$^+$	M1	16.2 *4*	α(L)=12.7 *4*; α(M)=2.80 *7* α(N)=0.649 *17*; α(O)=0.0941 *24*; α(P)=0.00525 *14*
		271.45 *5*	2.8 *3*	190.243	0$^+$,1$^+$,2$^+$	M1	0.1605	α(K)=0.1353 *19*; α(L)=0.0197 *3*; α(M)=0.00435 *6* α(N)=0.001010 *15*; α(O)=0.0001472 *21*; α(P)=8.31×10^{-6} *12*
		314.89 *3*	3.5 *3*	146.801	1$^+$	M1	0.1078	α(K)=0.0909 *13*; α(L)=0.01321 *19*; α(M)=0.00291 *4* α(N)=0.000676 *10*; α(O)=9.85×10^{-5} *14*; α(P)=5.57×10^{-6} *8*
		336.02 *6*	1.5 *2*	125.62	(2$^+$)	(M1,E2)	0.069 *22*	α(K)=0.056 *21*; α(L)=0.0100 *11*; α(M)=0.00225 *20* α(N)=0.00052 *5*; α(O)=7.2×10^{-5} *11*; α(P)=3.3×10^{-6} *14*
		386.82 *3*	100 *5*	74.897	2$^+$	M1	0.0626	α(K)=0.0528 *8*; α(L)=0.00763 *11*; α(M)=0.001679 *24* α(N)=0.000390 *6*; α(O)=5.69×10^{-5} *8*; α(P)=3.23×10^{-6} *5*
493.9	(11$^-$)	115.1		379.0	(10$^-$)			
		215.7		278.5	(9$^-$)			
531.5	(9$^+$)	163.4		368.0	(8$^+$)			
		306.4		225.0	(7$^+$)			
582.2	(10$^+$)	127.4		454.4	(9$^+$)			
		222.9		359.3	(8$^+$)			
		303.7		278.5	(9$^-$)			
602.8	(9$^-$)	159.3 *2*	100 *10*	443.5	(8$^-$)			
		274.4 *3*	37 *4*	328.4	(7$^-$)			
652.	(11$^+$)	247.3		405.	(10$^+$)			
		472.1		180	(9$^+$)			
653.2	(12$^-$)	159.4		493.9	(11$^-$)			
		274.1		379.0	(10$^-$)			
662.69	0$^+$,1$^+$	200.2[b] *3*	≤5.2	461.698	1$^+$			
		276.98 *10*	4.9 *10*	385.708	1$^+$	(M1,E2)	0.119 *34*	α(K)=0.095 *33*; α(L)=0.0183 *5*; α(M)=0.00415 *7* α(N)=0.000955 *14*; α(O)=0.000131 *9*; α(P)=5.5×10^{-6} *24*
		472.42 *6*	97 *4*	190.243	0$^+$,1$^+$,2$^+$	M1	0.0372	α(K)=0.0315 *5*; α(L)=0.00451 *7*; α(M)=0.000993 *14* α(N)=0.000231 *4*; α(O)=3.37×10^{-5} *5*; α(P)=1.91×10^{-6} *3*
		515.86 *6*	100 *9*	146.801	1$^+$	M1	0.0297	α(K)=0.0251 *4*; α(L)=0.00359 *5*; α(M)=0.000790 *11* α(N)=0.000183 *3*; α(O)=2.68×10^{-5} *4*; α(P)=1.526×10^{-6} *22*
		587.90 *8*	13.9 *26*	74.897	2$^+$			
715.8	(10$^+$)	183.9		531.5	(9$^+$)			
		348.1		368.0	(8$^+$)			
735.7	(11$^+$)	153.3		582.2	(10$^+$)			
		281.6		454.4	(9$^+$)			
		356.4		379.0	(10$^-$)			
768.9	(10$^-$)	166.1 *1*	100 *10*	602.8	(9$^-$)			I_γ: may include a transition in ^{159}Ho.
		325.4 *2*	84 *8*	443.5	(8$^-$)			
810.88	(1$^+$)	425.2 *1*	100 *20*	385.708	1$^+$			
		620.6 *1*	60 *12*	190.243	0$^+$,1$^+$,2$^+$			
819.2	(13$^-$)	165.7		653.2	(12$^-$)			

$^{158}_{67}Ho_{91}$-7

Adopted Levels, Gammas (continued)

γ(^{158}Ho) (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Comments
819.2	(13$^-$)	325.3		493.9	(11$^-$)	
917.2	(11$^+$)	201.4		715.8	(10$^+$)	
		385.9		531.5	(9$^+$)	
918.	(12$^+$)	265.6		652.	(11$^+$)	
		513.4		405.	(10$^+$)	
918.7	(12$^+$)	182.5		735.7	(11$^+$)	
		336.3		582.2	(10$^+$)	
		425.2		493.9	(11$^-$)	
982.7	(11$^-$)	213.8 *2*	95 *10*	768.9	(10$^-$)	I_γ: may include a transition in ^{158}Dy.
		379.9 *2*	100 *11*	602.8	(9$^-$)	
1032.5	(14$^-$)	213.7		819.2	(13$^-$)	
		379.6		653.2	(12$^-$)	
1111.4	(12$^+$)	194.3		917.2	(11$^+$)	
		395.3		715.8	(10$^+$)	
1120.0	(13$^+$)	201.0		918.7	(12$^+$)	
		384.5		735.7	(11$^+$)	
		466.9		653.2	(12$^-$)	
1200.	(13$^+$)	282.1		918.	(12$^+$)	
		548.4		652.	(11$^+$)	
1204.6	(12$^-$)	221.9 *2*	36 *5*	982.7	(11$^-$)	
		435.8 *2*	100 *10*	768.9	(10$^-$)	
1254.7	(15$^-$)	221.8		1032.5	(14$^-$)	
		435.2		819.2	(13$^-$)	
1349.3	(14$^+$)	229.3		1120.0	(13$^+$)	
		430.7		918.7	(12$^+$)	
		529.8		819.2	(13$^-$)	
1362.0	(13$^+$)	250.9		1111.4	(12$^+$)	
		444.9		917.2	(11$^+$)	
1460.5	(13$^-$)	255.9 *3*	51 *7*	1204.6	(12$^-$)	
		477.8 *2*	100 *12*	982.7	(11$^-$)	
1497.	(14$^+$)	296.1		1200.	(13$^+$)	
		578.9		918.	(12$^+$)	
1510.2	(16$^-$)	255.4		1254.7	(15$^-$)	
		477.3		1032.5	(14$^-$)	
1557.2	(14$^+$)	195.7		1362.0	(13$^+$)	
		445.4		1111.4	(12$^+$)	
1590.1	(15$^+$)	240.6		1349.3	(14$^+$)	
		470.1		1120.0	(13$^+$)	
		559.		1032.5	(14$^-$)	
1737.9	(14$^-$)	277.4 *4*	23 *8*	1460.5	(13$^-$)	
		533.3 *2*	100 *10*	1204.6	(12$^-$)	
1788.2?	(17$^-$)	277.3		1510.2	(16$^-$)	
		532.9		1254.7	(15$^-$)	

$^{158}_{67}Ho_{91}$-8

Adopted Levels, Gammas (continued)

γ(^{158}Ho) (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π
1806.	(15$^+$)	309.3		1497.	(14$^+$)
		605.6		1200.	(13$^+$)
1859.9	(16$^+$)	270.7		1590.1	(15$^+$)
		510.6		1349.3	(14$^+$)
		605.		1254.7	(15$^-$)
1868.3	(15$^+$)	506.3		1362.0	(13$^+$)
2013.7	(16$^+$)	456.5		1557.2	(14$^+$)
2024.3	(15$^-$)	286.4 *4*	26 *9*	1737.9	(14$^-$)
		563.8 *3*	100 *15*	1460.5	(13$^-$)
2074.2?	(18$^-$)	285.6		1788.2?	(17$^-$)
		564.6		1510.2	(16$^-$)
2121.8	(16$^+$)	315.9		1806.	(15$^+$)
		624.8		1497.	(14$^+$)
2132.3	(17$^+$)	272.5		1859.9	(16$^+$)
		542.4		1590.1	(15$^+$)
		622.		1510.2	(16$^-$)
2354.9?	(16$^-$)	617.0[b] *3*	100	1737.9	(14$^-$)
2404.1?	(19$^-$)	329.8		2074.2?	(18$^-$)
		615.8		1788.2?	(17$^-$)
2431.2	(18$^+$)	299.3		2132.3	(17$^+$)
		571.9		1859.9	(16$^+$)
		642.		1788.2?	(17$^-$)
2433.8	(17$^+$)	565.5		1868.3	(15$^+$)
2444.	(17$^+$)	638.5		1806.	(15$^+$)
2710.9?	(20$^-$)	307.2		2404.1?	(19$^-$)
		636.4		2074.2?	(18$^-$)
2728.5	(19$^+$)	298.		2431.2	(18$^+$)
		595.9		2132.3	(17$^+$)
		655.		2074.2?	(18$^-$)
2765.	(18$^+$)	642.9		2121.8	(16$^+$)
3051.6	(20$^+$)	324.		2728.5	(19$^+$)
		620.0		2431.2	(18$^+$)
		647.		2404.1?	(19$^-$)
3085.7	(21$^-$)	374.5		2710.9?	(20$^-$)
		681.4		2404.1?	(19$^-$)
3366.	(21$^+$)	315.		3051.6	(20$^+$)
		638.		2728.5	(19$^+$)
3405.0	(22$^-$)	319.0		3085.7	(21$^-$)
		694.6		2710.9?	(20$^-$)
3688.	(22$^+$)	321.		3366.	(21$^+$)
		636.		3051.6	(20$^+$)
3813.1	(23$^-$)	408.0		3405.0	(22$^-$)
		727.4		3085.7	(21$^-$)
4001.	(23$^+$)	313.		3688.	(22$^+$)
		635.		3366.	(21$^+$)
4143.4	(24$^-$)	330.0		3813.1	(23$^-$)
		738.5		3405.0	(22$^-$)
4339.	(24$^+$)	337.		4001.	(23$^+$)
		652.		3688.	(22$^+$)
4574.	(25$^-$)	430.		4143.4	(24$^-$)
		761.[#]		3813.1	(23$^-$)
4693.	(25$^+$)	353.		4339.	(24$^+$)
		692.		4001.	(23$^+$)
4917.	(26$^-$)	342.		4574.	(25$^-$)
		774.		4143.4	(24$^-$)
5079.	(26$^+$)	385.		4693.	(25$^+$)
		740.		4339.	(24$^+$)
5370.	(27$^-$)	453.		4917.	(26$^-$)
		797.		4574.	(25$^-$)
5476.	(27$^+$)	396.		5079.	(26$^+$)
		783.		4693.	(25$^+$)
5734.	(28$^-$)	363.		5370.	(27$^-$)
		817.		4917.	(26$^-$)
5903.	(28$^+$)	426.		5476.	(27$^+$)
		824.		5079.	(26$^+$)
6219.	(29$^-$)	485.		5734.	(28$^-$)
		849.		5370.	(27$^-$)
6342.	(29$^+$)	439.		5903.	(28$^+$)
		868.		5476.	(27$^+$)
6604.	(30$^-$)	384.		6219.	(29$^-$)
		871.		5734.	(28$^-$)
6792.	(30$^+$)	889.		5903.	(28$^+$)
7132.	(31$^-$)	527.		6604.	(30$^-$)
		913.		6219.	(29$^-$)
7235.	(31$^+$)	443.		6792.	(30$^+$)
		893.		6342.	(29$^+$)
7535.	(32$^-$)	931.		6604.	(30$^-$)
7685.	(32$^+$)	893.		6792.	(30$^+$)
8115.	(33$^-$)	983.		7132.	(31$^-$)
8144.	(33$^+$)	909.		7235.	(31$^+$)
8525.	(34$^-$)	990.		7535.	(32$^-$)
8618.	(34$^+$)	933.		7685.	(32$^+$)
9101.	(35$^+$)	957.		8144.	(33$^+$)
9168.	(35$^-$)	1053.		8115.	(33$^-$)
9565.	(36$^-$)	1040.		8525.	(34$^-$)
9599.	(36$^+$)	981.		8618.	(34$^+$)

$^{158}_{67}Ho_{91}$-9

Adopted Levels, Gammas (continued)

$\gamma(^{158}Ho)$ (continued)

E_i(level)	J_i^π	E_γ	E_f	J_f^π	E_i(level)	J_i^π	E_γ	E_f	J_f^π	E_i(level)	J_i^π	E_γ	E_f	J_f^π
10107.	(37^+)	1006.	9101.	(35^+)	11163.	(39^+)	1056.	10107.	(37^+)	12766.	(42^-)	1093.	11673.	(40^-)
10286.	(37^-)	1118.	9168.	(35^-)	11673.	(40^-)	1045.	10628.	(38^-)	12845.	(42^+)	1133.	11712.	(40^+)
10628.	(38^-)	1063.	9565.	(36^-)	11712.	(40^+)	1081.	10631.	(38^+)	13422.	(43^+)	1156.	12266.	(41^+)
10631.	(38^+)	1032.	9599.	(36^+)	12266.	(41^+)	1103.	11163.	(39^+)					

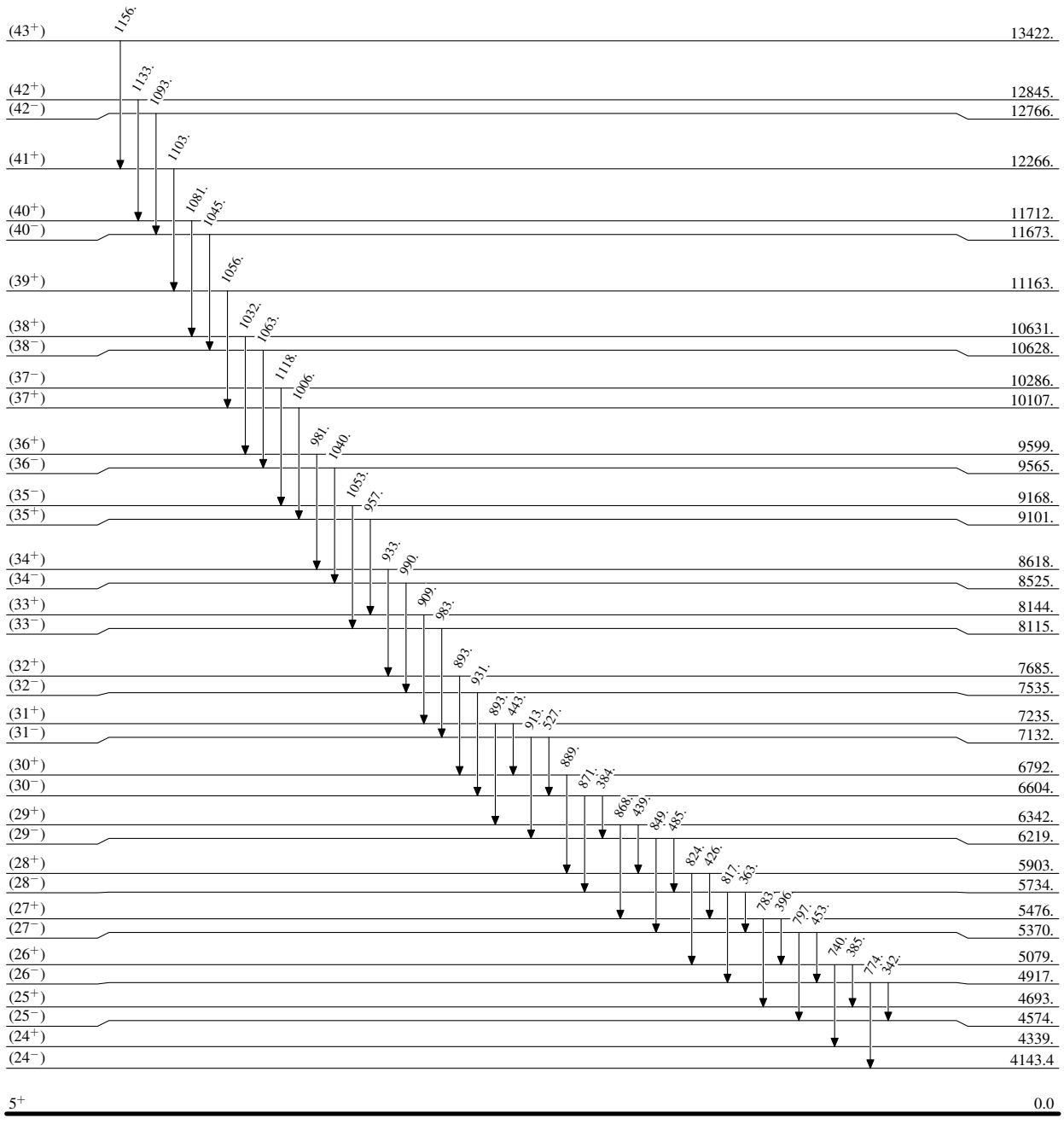
† From I_{ce} and I_γ data of 1977AnYX and 1982Vy06 and ε data of 1972Ha41.
‡ From 1972Ha41 and 1982Vy06.
# From 1996YuZY; other: 772.0 from 1999Lu03, but this γ is placed from 4915 level.
@ Differs by 4σ or more from calculated value.
& Additional information 2.
a Additional information 3.
b Placement of transition in the level scheme is uncertain.

$^{158}_{67}Ho_{91}$-10

Adopted Levels, Gammas

Level Scheme

Intensities: Type not specified



$^{158}_{67}Ho_{91}$

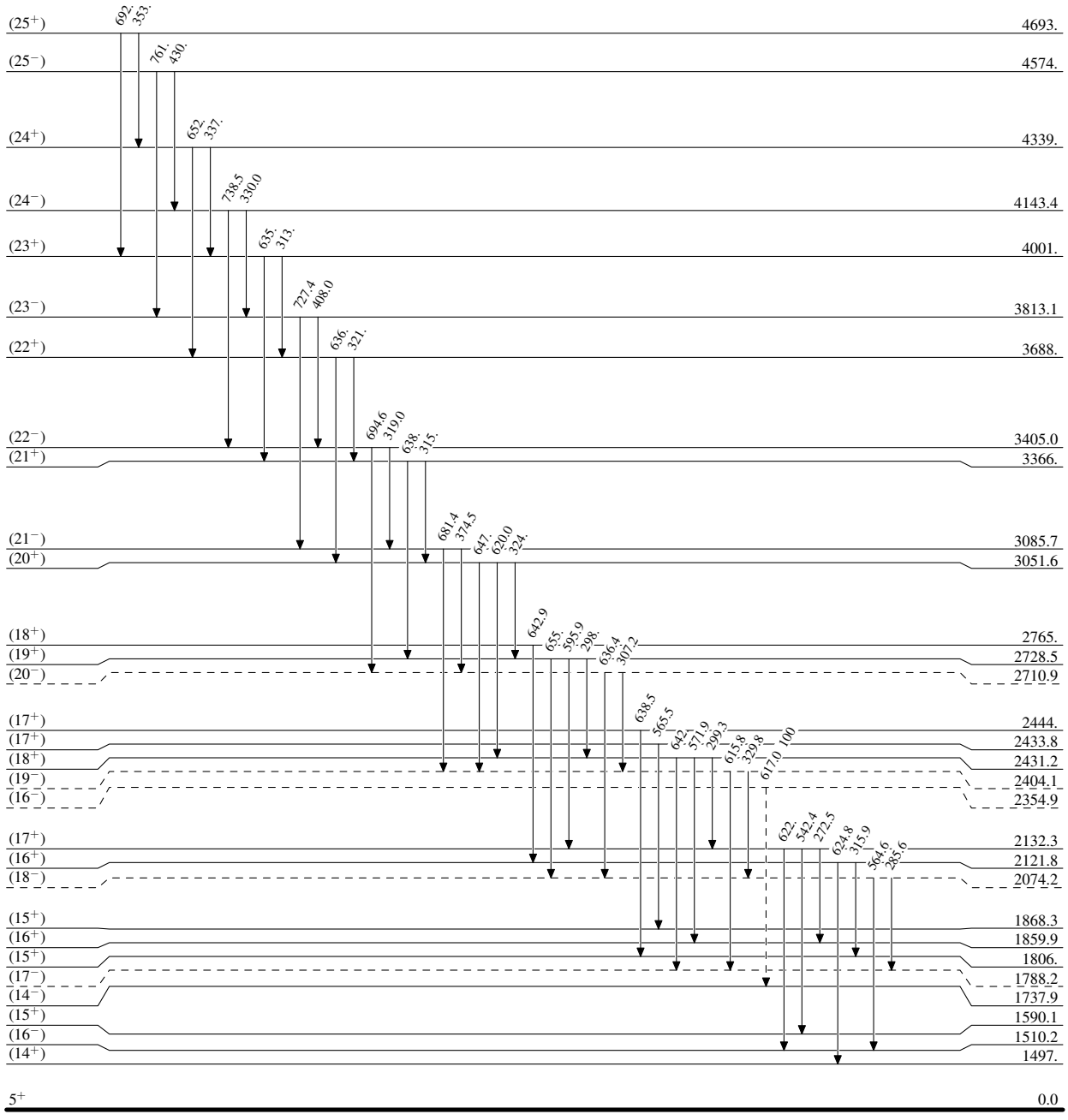
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Type not specified

γ Decay (Uncertain)

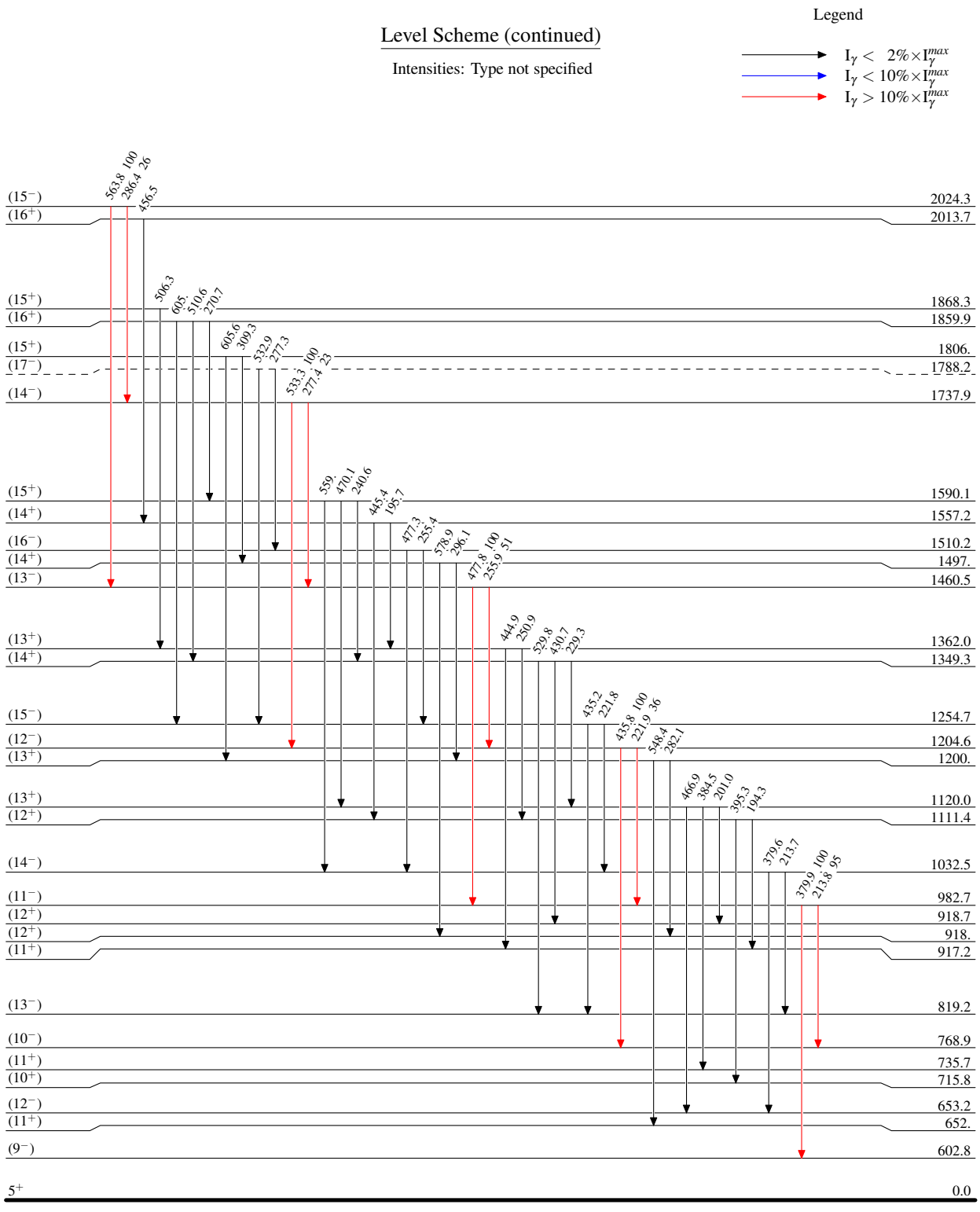


$^{158}_{67}Ho_{91}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

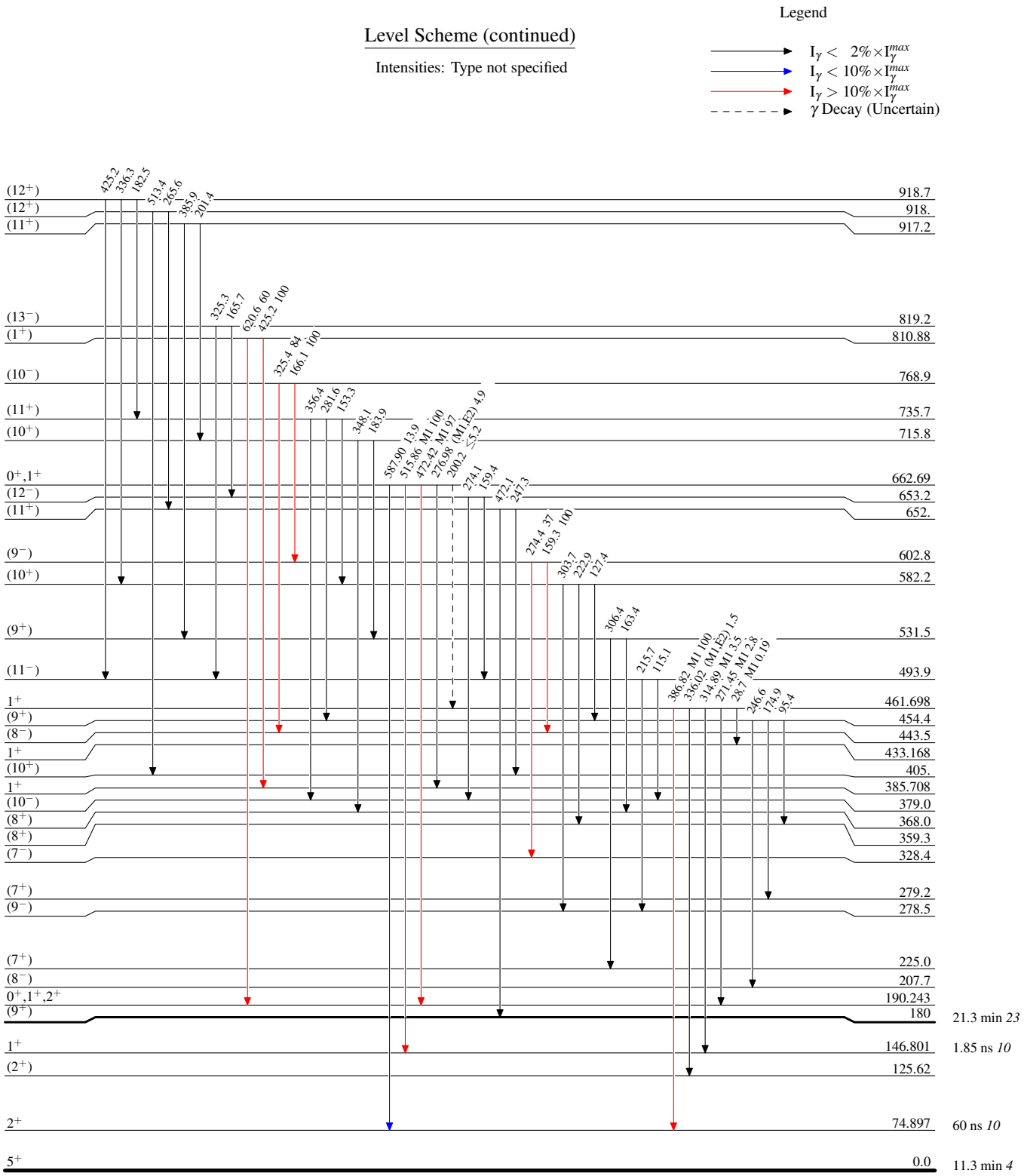


$^{158}_{67}Ho_{91}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

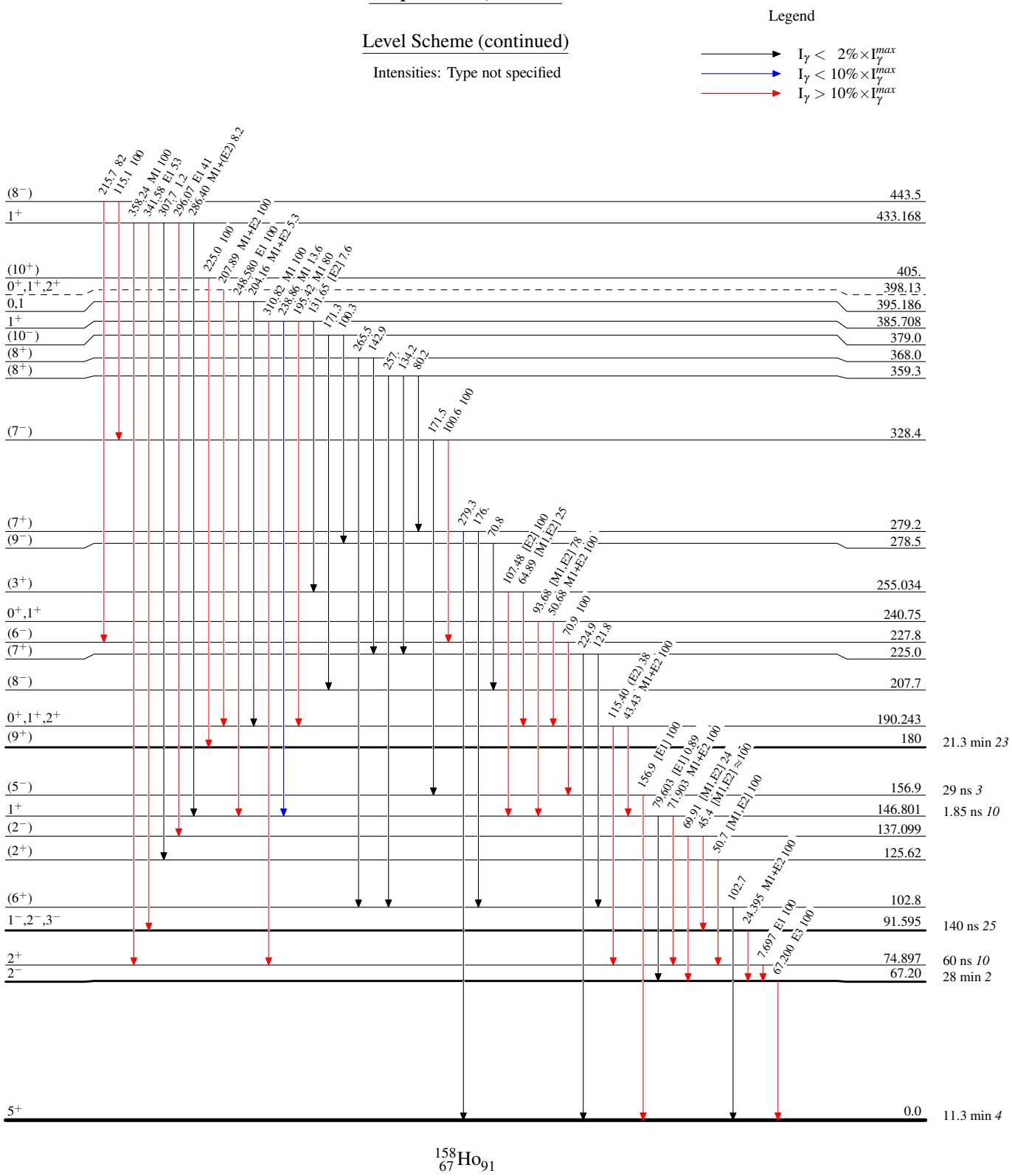


$^{158}_{67}Ho_{91}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified



$^{158}_{67}Ho_{91}$

Adopted Levels, Gammas