Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 194,460 (2024)	31-Oct-2022

Q(β^-)=−376.7 *10*; S(n)=7988.8 *11*; S(p)=6219.3 *7*; Q(α)=138.8 *13* 2021Wa16
S(2n)=14662.6 *7*, S(2p)=14880 *4* (2021Wa16).
^{165}Ho(μ^-,γ): 1988Do05.
Hyperfine structure and/or moments measurements: 2003Be28, 1998Gu22 (analysis), 1997Be64, 1993Bo32, 1990Wo08, 1989Bu04, 1989Al27, 1983Ol03 (also 1980OlZZ), 1982Bu13, 1972Ge21, 1972Me16, 1969Kr19, 1964Va27.
NMR measurement: 1993Mu27, 1985Bu21, 1983Sh21, 1983Pr06.
Measured K-x ray energy shifts, isotope shifts: 1980Bo26.
Pionic x rays: 1983Ol03 (also 1980OlZZ).
^{165}Ho(π^+,π^0),E=165 MeV: 1994Kn01, 1991Kn01.
^{165}Ho(π^+,π^+),(π+,X),(π^-,π^-),(π^-,X): 1983Je01.
^{165}Ho(pol p,p): 1984StZV.
^{165}Ho(^{3}He,^{3}He′) E=108.5 MeV: 1980Bu16: measured $\sigma(\theta)$, giant-monopole resonance.
^{165}Ho(p,p′γ): 1983Ra02: measured yields.
Additional information 1.
^{165}Ho(^{238}U,^{238}U) E=10 MeV/nucleon: 1985Kh06.
Nuclear structure calculations (levels and transition probabilities): 2017Ta12, 2006Sh08.
Theoretical calculations for structure, nuclear moments, and decay characteristics: about 80 references retrieved from the NSR database have been listed in ‘document’ records, which can be accessed via web retrieval of the ENSDF database.

^{165}Ho Levels

Cross Reference (XREF) Flags

A	^{165}Dy β^- decay (2.331 h)	F	^{165}Ho(γ,γ):Mossbauer	K	Coulomb excitation
B	^{165}Dy β^- decay (1.257 min)	G	^{165}Ho(γ,γ')	L	^{166}Er(d,^{3}He)
C	^{165}Er ε decay (10.36 h)	H	^{165}Ho(e,e′)	M	^{166}Er(pol t,α),(t,α)
D	^{164}Dy(^{3}He,d)	I	^{165}Ho(n,n′)		
E	^{164}Dy(α,t)	J	^{165}Ho(n,n′γ)		

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$[@]	XREF	Comments
0.0[&]	7/2$^-$	stable	ABCDEFG IJKLM	μ=+4.16 *3* (1972Ha45,1974Da11,2019StZV) Q=+3.58 *2* (1983Ol03,2021StZZ) <r^2>$^{1/2}$=5.202 fm *31* (2013An02 evaluation). Intrinsic hexadecapole moment=0.50 *23* (1976Po05); 0.50 *10* (1975Po03). Other: 1972DaYT. μ: +4.177 *5* from re−evaluation (by 1998Gu22) of measured result of +4.094 *45* (1972Ha45,atomic beam method). Other measurement: +4.1267 *11* (1997Be64, hyperfine structure by electron-beam method; systematic uncertainty, which may be few times the quoted value, is not included). Compilation by 1989Ra17 gives +4.17 *3* based on the original measurement of 1972Ha45 and subsequent re-evaluation by 1974Da11 and 1982Bu13 (who quote thesis by G. Nachtsheim (Bonn,1980)). Others: 1989Al27, 1987ArZT, 1968Su04, 1964Go09, 1963Bl25, 1962Wy04, 1962Li06, 1962Go20, 1962Fr14, 1958Hu17, 1958Ba35, 1958Be85. Q: pionic x rays (1983Ol03). Others: +3.49 *3* (muonic x rays, 1976Po05), 3.49 *3* (atomic beam,1974Da11,1972Ha45), 3.69 *3* (1977Ga08), 3.53 *8* (pionic x rays,1974Eb03,1978Eb01), 3.57 *4* (1978Ch37), 3.60 *2* (pionic x rays,1981Ba07), 3.41 *8* (kaonic x rays,1981Ba07). Note large discrepancy with other measurements: +2.716 *9* (atomic beam,1982Bu13), +2.73 *6* (atomic beam,1974Da10). Others: 1964Go09, 1963Bl25, 1962Wy04, 1958Ba35. $T_{1/2}$: >6×10^{16} y (1956Po16), from detection limit of α particles in the energy

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Adopted Levels, Gammas (continued)

^{165}Ho Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[@]	XREF	Comments
				region of 1500-2500 keV. Jπ: spin from optical spectroscopy (1935Sc02,1957Be39) and paramagnetic resonance (1958Ba35,1955Ba04,1958Hu17). Parity from L(t,α)=3.
94.700[a] *3*	9/2⁻	22.2 ps *8*	A DEFG IJKLM	μ=4.14 *17* (1972Ge21,2020StZV) Q=+3.52 *4* (1976Po05,2021StZZ) μ: from μ(94.7)/μ(g.s.)=0.99 *4* (Mossbauer effect,1972Ge21) and μ(g.s.)=+4.177 *5*. Q: muonic x rays (1976Po05). $T_{1/2}$: weighted average of 23.6 ps *18* (from B(E2) in Coulomb excitation), 22.0 ps *4* (in (γ,γ):Mossbauer (1970BlZT)); and 28.4 ps *24* (microwave method in (α,α′γ) (1970Ar02)). Other: 25 ps *10* (γγ(t) in ^{165}Dy β⁻ decay, 1967Ba27). Jπ: M1+E2 γ to 7/2⁻; L(t,α)=5.
209.804[&] *11*	11/2⁻	12.7 ps *14*	A DE G IJKLM	Jπ: M1+E2 γ to 9/2⁻; L(pol t,α)=5, L+(1/2) from Ay(θ).
345.01[a] *9*	13/2⁻	7.1 ps *15*	E IJK M	Jπ: γs to 9/2⁻ and 11/2⁻; member of a rotational band.
361.675[d] *11*	3/2⁺	1.512 μs *4*	AB E IJKLM	%IT=100 $T_{1/2}$: from β decay (1959Cr80). Other: 1.65 μs *20* (1958Ka10). Jπ: M2 γ to 7/2⁻; L(t,α)=2.
419.544[e] *11*	5/2⁺		AB DE IJKLM	Jπ: M1+E2 γ to 3/2⁺; L(pol t,α)=2, L(+1/2) from Ay(θ) in (pol t,α).
429.388[h] *11*	1/2⁺[#]		AB DE IJ L	Jπ: M1 γ to 3/2⁺.
449.259[h] *11*	3/2⁺		AB DE IJKLM	Jπ: L(pol t,α)=2, L-(1/2) from Ay(θ) in (pol t,α).
491.047[d] *14*	7/2⁺		A e IJKLm	XREF: e(498)m(497). Jπ: M1(+E2) γ to 5/2⁺; β feeding from 7/2⁺; band member.
499.34[&] *16*	15/2⁻	4.3 ps *9*	e IJK m	XREF: e(498)m(497). Jπ: 7/2⁺ and 15/2⁻ assigned to a doublet of 491+499 from σ(θ) and cross-section ratio data in (α,t) and analyzing powers in (pol t,α); the 491-keV component is assigned with Jπ=7/2⁺; member of a rotational band.
515.476[c] *11*	3/2⁻	10.4 ps *11*	AB IJK	Jπ: log *ft*=5.2 from 1/2⁻; strong (E2) γ to 7/2⁻. $T_{1/2}$: other: <0.1 ns in β⁻ decay.
539.011[h] *13*	5/2⁺		AB DE J LM	Jπ: L(pol t,α)=2, L+(1/2) from Ay(θ) in (pol t,α).
566.77[c] *19*	(5/2)⁻	27 ps *10*	A E IJK	Jπ: M1+E2 γ to 7/2⁻; possible γ to 3/2⁺; band member.
589.803[h] *18*	7/2⁺		A DE IJKLM	XREF: M(596). E(level): in (t,α), two levels are reported at 596 keV *2*, a doublet with Jπ=7/2⁺ and 9/2⁺, and another one at 604 keV *1* with Jπ=9/2⁺. Jπ: L(^{3}He,d)=4; γs to 3/2⁺.
601.35[e] *19*	9/2⁺		IJK M	XREF: M(604). E(level): in (t,α), two levels are reported at 596 keV *2*, a doublet with Jπ=7/2⁺ and 9/2⁺, and another one at 604 keV *1* with Jπ=9/2⁺. Jπ: γs to 5/2⁺ and 7/2⁺; rotational band member.
638.27[c] *24*	(7/2)⁻		DE IJK M	Jπ: M1+E2 γ to 9/2⁻; γs to 5/2⁻ and 11/2⁻; band assignment. $T_{1/2}$: B(E2) values and branching ratios are not known well to determine half-life.
672.82[a] *20*	17/2⁻	1.8 ps *8*	JK	Jπ: γs to 13/2⁻ and 15/2⁻; member of a rotational band.
680.4[i] *7*	(1/2)⁻		B DE J L	Jπ: L(^{3}He,d)=1; possible band member.
688.5[b] *3*	(11/2⁻)	4.6 ps *4*	IJK M	Jπ: (E2) γ to 7/2⁻; yield in Coul. ex. from 7/2⁻; probable bandhead.
701.2[i] *10*	5/2⁻		DE J L	Jπ: L(^{3}He,d)=3; γ to 3/2⁺.
703.9[d] *5*	11/2⁺		K	Jπ: γs to 7/2⁺ and 9/2⁺; rotational band member.
715.332[j] *11*	7/2⁺	<0.1 μs	A DE IJ M	$T_{1/2}$: from β decay (1958Ka10).

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Adopted Levels, Gammas (continued)

^{165}Ho Levels (continued)

E(level)†	Jπ‡	XREF	Comments
730.38[c] 22	(9/2−)	d IJK	Jπ: L(pol t,α)=4, L-(1/2) from Ay(θ) in (pol t,α). XREF: d(736). Jπ: γs to 7/2− and 11/2−; band member.
744.0[h] 3	9/2+	d J	XREF: d(736). Jπ: L(α,t)=4,5 from 0+; 205γ to 5/2+; band assignment.
790.74[i] 6	3/2−	B DE J	Jπ: L(^{3}He,d)=1; γ to 5/2+;
802.4[i] 4	9/2−	DE J LM	Jπ: L(pol t,α)=5, L-(1/2) from Ay(θ) in (pol t,α).
819.82[b] 19	(13/2−)	iJK	Jπ: γs to 9/2− and 13/2−; band member.
820.108[j] 16	(9/2+)#	A DE iJ M	XREF: D(?). Jπ: γs to 7/2− and 11/2−, band member.
827.1[h] 7	(11/2+)	K	Jπ: γs to 7/2+ and 9/2+; band member.
842.0[c] 3	(11/2−)	IJK	Jπ: γs to (7/2)−, 9/2− and 13/2−; band member.
863.2[&] 3	19/2−	JK	Jπ: 190.5γ to 17/2−; rotational band member.
870.8[e] 6	13/2+	K	Jπ: 167γ to 11/2+; rotational band member.
945.7[j] 4	(11/2+)	IJ	Jπ: γs to 9/2− and 11/2−; band member.
955.74[i] 24	(7/2−)	DE IJ	Jπ: γs to 5/2+ and (9/2−); possible band member.
968.8[b] 3	(15/2−)	JK	
972.6[c] 4	(13/2−)	JK	
986.2[f] 7	(13/2)	K	
995.095[k] 11	5/2+	A DE IJ LM	Jπ: M1+E2 γ to 3/2+; log *ft*=5.7 from 7/2+.
997.8[d] 6	15/2+	K	
1037.7[o] 10	(1/2+)	B J	Jπ: γ to 3/2+; log *ft*≈7.4 from 1/2−; band assignment.
1055.761[l] 25	5/2+	A DE IJ M	Jπ: L(pol t,α)=2, L+(1/2) from Ay(θ) in (pol t,α); L(^{3}He,d)=2.
1066.7[o] 7	(3/2+)	B J	Jπ: γs 3/2+ and 5/2+; band member.
1072.8[a] 5	21/2−	K	
1076? 10	(5/2−,7/2−)	D	Jπ: L(^{3}He,d)=(3).
1079.621[k] 17	7/2+	A E IJ LM	Jπ: L(pol t,α)=4, L-(1/2) from Ay(θ) in (pol t,α).
1093.5[j] 5	(13/2+)	IJ	
1122.6[c] 4	(15/2−)	K	
1129.3[o] 5	(5/2+)	DE J	Jπ: γ to 1/2+; band member.
1136.6[b] 4	(17/2−)	K	
1140.36[l] 5	7/2+#	A DE IJ	XREF: D(1144). Jπ: γs to 7/2− and 9/2−; band member.
1152.1[h] 12	15/2+	K	
1170.3[g] 10	(15/2)	K	
1186.59[k] 6	9/2+	A DE IJ M	XREF: D(1194). Jπ: L(pol t,α)=4, L+(1/2) from Ay(θ) in (pol t,α).
1195.7 5		J	
1221.3[e] 7	17/2+	K	
1237.5 7		J M	Jπ: γ to 3/2+.
1247.5[f] 9	(17/2)	K	
1248.0[l] 6	(9/2+)	D J	Jπ: γ to 9/2−; band member.
1288 3		DE M	
1292.2[c] 4	(17/2−)	K	
1295.1[&] 5	23/2−	K	
1313.8[k] 10	(11/2+)	J M	Jπ: γ to 9/2−; band member.
1321.5[b] 5	(19/2−)	K	
1338.3 15		DE J	Jπ: L(^{3}He,d)=2 gives 3/2+,5/2+; but γs to 7/2− and 9/2− suggest 5/2−,7/2,9/2,11/2−. There may be two different levels near this energy.

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Adopted Levels, Gammas (continued)

^{165}Ho Levels (continued)

E(level)[†]	J^{π}[‡]	XREF	Comments
1368.0[d] *7*	19/2$^+$	K	
1374.6[l] *10*	(11/2$^+$)	J	
1381 *1*	(5/2,7/2,9/2)	G	
1389 *1*	(5/2,7/2,9/2)	DE G	
1409.8 *8*	(5/2,7/2,9/2)	G J	
1416.4[m] *10*	(5/2$^-$)	GH J	J^{π}: γ to 7/2$^-$; (M1) excitation in (e,e′) from 7/2$^-$; possible bandhead.
1465.9 *7*	(9/2$^-$)	de GH	XREF: d(1471)e(1470). J^{π}: (γ,γ') excitation from 7/2$^-$; (M1) excitation in (e,e′) from 7/2$^-$; L(^{3}He,d)=L(α,t)=(5) from 0$^+$ for a group around 1470.
1476.0[c] *5*	(19/2$^-$)	K	
1476.3[g] *14*	(19/2)	K	
1479.7[n] *10*	(9/2$^-$)	de J	XREF: d(1471)e(1470). J^{π}: γ to 7/2$^-$; possible π9/2[514] bandhead; L(^{3}He,d)=L(α,t)=(5) from 0$^+$ for a group around 1470.
1482.7[m] *10*	7/2$^-$	DE J M	XREF: D(1486)E(1484). J^{π}: L(pol t,α)=3, L+(1/2) from Ay(θ) in (pol t,α).
1505 *15*	11/2$^-$,9/2$^-$	L	J^{π}: L(d,^{3}He)=5.
1523.2[b] *5*	(21/2$^-$)	K	
1533.8 *15*		DE J	
1536.7[a] *7*	25/2$^-$	K	
1547 *2*		J M	
1554.1[h] *16*	19/2$^+$	K	
1574.0[m] *10*	(9/2$^-$)	J	J^{π}: γ to 11/2$^-$; band member.
1590.8[n] *7*	11/2$^-$	DE J M	J^{π}: L(pol t,α)=5, L+(1/2) from Ay(θ) in (pol t,α).
1591.5[f] *13*	(21/2)	K	
1606 *1*	(5/2,7/2,9/2)	G	
1615 *1*	(5/2,7/2,9/2)	G	
1616 *2*	(1/2$^+$)	DE	J^{π}: L(^{3}He,d)=(0).
1627 *1*	(5/2,7/2,9/2)	G	
1643.7[e] *9*	21/2$^+$	K	
≈1649		DE M	XREF: E(1652).
1674[m] *2*	11/2$^-$	E M	XREF: E(1675). J^{π}: L(pol t,α)=5, L+(1/2) from Ay(θ) in (pol t,α).
1679.2[c] *5*	(21/2$^-$)	K	
1704[p] *15*	(1/2$^+$)	L	J^{π}: L(d,^{3}He)=(0).
1705.9 *7*	(7/2,9/2)	Gh	
1711 *1*	(5/2,7/2,9/2)	Gh	
1720 *5*		M	
1740.3[b] *5*	(23/2$^-$)	K	
1756 *1*	(5/2,7/2,9/2)	de G	XREF: d(1760)e(1760). J^{π}: γ to 7/2$^-$. L(^{3}He,d)=(3) suggests (5/2$^-$,7/2$^-$) for 1756 and/or 1766 levels.
1762 *2*	(1/2$^+$)	e M	XREF: e(1760). J^{π}: L(pol t,α)=(0).
1766 *1*	(5/2,7/2,9/2)	de G	XREF: d(1760)e(1760). J^{π}: γ to 7/2$^-$. L(^{3}He,d)=(3) suggests (5/2$^-$,7/2$^-$) for 1756 and/or 1766 levels.
1776 *5*		M	
1786.1[&] *8*	27/2$^-$	K	
1789 *1*	(5/2,7/2,9/2)	G	
1797[p] *15*	(5/2)$^+$	L	J^{π}: L(d,^{3}He)=2; band member.
1807 *1*	(5/2$^-$,7/2$^-$,9/2$^-$)	GH	J^{π}: (M1) excitation in (e,e′) from 7/2$^-$.
1807.8[d] *8*	23/2$^+$	K	
1816 *1*	(5/2,7/2,9/2)	G	

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Adopted Levels, Gammas (continued)

^{165}Ho Levels (continued)

E(level)[†]	J^{π}[‡]	XREF	Comments
1827.9 7	(7/2,9/2)	G	
1835 5	(1/2$^+$)	M	J^{π}: L(pol t,α)=(0).
1844 3		DE	
1864.3[g] 18	(23/2)	K	
1873 15	7/2$^+$,9/2$^+$	L	J^{π}: L(d,^{3}He)=4.
1896.3[c] 6	(23/2$^-$)	K	
1902.9 7	(9/2)	G	
1907 5	(11/2)$^-$	M	J^{π}: L(pol t,α)=5; (L+(1/2)) from Ay(θ).
1939 3	(7/2,9/2$^+$)	DE M	J^{π}: 7/2$^-$ from L(pol t,α)=(3); (L+(1/2)) from Ay(θ), but L=2 and 4 are not excluded, thus (3/2$^+$,5/2$^+$) and (7/2$^+$,9/2$^+$) are also possible. L=(4) from σ(^{3}He,d)/σ(α,t) suggests 7/2$^+$,9/2$^+$.
1972.2[b] 6	(25/2$^-$)	K	
1984 1	(5/2,7/2,9/2)	G	
1986 5		M	
2011.5[f] 17	(25/2)	K	
2012 1	(5/2,7/2,9/2)	D G	
2025 5		M	
2053 3		D	
2056.3[a] 10	29/2$^-$	K	
2085 3	(3/2$^+$,5/2$^+$)	DE	J^{π}: L=(2) from σ(^{3}He,d)/σ(α,t).
2099 1	(5/2,7/2,9/2)	d G	XREF: d(2111). J^{π}: γ to 7/2$^-$. L=(3) from σ(^{3}He,d)/σ(α,t) suggests (5/2$^-$,7/2$^-$) for 2099 and/or 2106 levels.
2106 3		dE	XREF: d(2111). J^{π}: L=(3) from σ(^{3}He,d)/σ(α,t) suggests (5/2$^-$,7/2$^-$) for 2099 and/or 2106 levels.
2121 3	(3/2$^+$,5/2$^+$)	DE	J^{π}: L=(2) from σ(^{3}He,d)/σ(α,t).
2124.9 7	(9/2)	G	
2128.7[e] 13	25/2$^+$	K	
2130.4[c] 6	(25/2$^-$)	K	
2146 1	(5/2,7/2,9/2)	G	
2171 1	(5/2,7/2,9/2)	G	
2178 1	(5/2,7/2,9/2)	G	
2194 1	(5/2,7/2,9/2)	G	
2218.4[b] 7	(27/2$^-$)	K	
2233 1	(5/2,7/2,9/2)	G	
2265.0 10	(5/2,7/2,9/2)	G	
2309[d] 1	27/2$^+$	K	
2328.2[&] 11	31/2$^-$	K	
2329 1	(5/2,7/2,9/2)	G	
2337 1	(5/2,7/2,9/2)	G	
2340 1	(5/2,7/2,9/2)	G	
2355.9 7	(9/2)	G	
2377 1	(5/2,7/2,9/2)	G	
2377.1[c] 8	(27/2$^-$)	K	
2447 1	(5/2,7/2,9/2)	G	
2477.2[b] 9	(29/2$^-$)	K	
2480 1	(5/2,7/2,9/2)	G	
2491.9 7	(7/2,9/2)	G	
2503[f] 2	(29/2)	K	
2509 1	(5/2,7/2,9/2)	G	
2519 1	(5/2,7/2,9/2)	G	
2538 1	(5/2,7/2,9/2)	G	
2550.9 7	(7/2,9/2)	G	

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Adopted Levels, Gammas (continued)

^{165}Ho Levels (continued)

E(level)[†]	Jπ[‡]	XREF	E(level)[†]	Jπ[‡]	XREF
2561 *1*	(5/2,7/2,9/2)	G	3167 *1*	(5/2,7/2,9/2)	G
2571 *1*	(5/2,7/2,9/2)	G	3182.9 *7*	(9/2)	G
2580 *1*	(5/2,7/2,9/2)	G	3187 *1*	(5/2,7/2,9/2)	G
2592 *1*	(5/2,7/2,9/2)	G	3190.9 *7*	(9/2)	G
2595.9 *7*	(7/2,9/2)	G	3199.3[c] *11*	(33/2⁻)	K
2601 *1*	(5/2,7/2,9/2)	G	3213 *1*	(5/2,7/2,9/2)	G
2623.2[a] *12*	33/2⁻	K	3220 *1*	(5/2,7/2,9/2)	G
2632 *1*	(5/2,7/2,9/2)	G	3230.1[a] *13*	37/2⁻	K
2638.6[c] *9*	(29/2⁻)	K	3236.9 *7*	(9/2)	G
2652 *1*	(5/2,7/2,9/2)	G	3247 *1*	(5/2,7/2,9/2)	G
2656 *1*	(5/2,7/2,9/2)	G	3259 *1*	(5/2,7/2,9/2)	G
2663 *1*	(5/2,7/2,9/2)	G	3287 *1*	(5/2,7/2,9/2)	G
2666 *1*	(5/2,7/2,9/2)	G	3313 *1*	(5/2,7/2,9/2)	G
2667.7[e] *17*	29/2⁺	K	3321.2[b] *12*	(35/2⁻)	K
2672 *1*	(5/2,7/2,9/2)	G	3329 *1*	(5/2,7/2,9/2)	G
2675 *1*	(5/2,7/2,9/2)	G	3352 *1*	(5/2,7/2,9/2)	G
2682.9 *7*	(9/2)	G	3357.9 *7*	(9/2)	G
2689 *1*	(5/2,7/2,9/2)	G	3371 *1*	(5/2,7/2,9/2)	G
2748.4[b] *10*	(31/2⁻)	K	3400 *1*	(5/2,7/2,9/2)	G
2752 *1*	(5/2,7/2,9/2)	G	3407 *1*	(5/2,7/2,9/2)	G
2768 *1*	(5/2,7/2,9/2)	G	3418 *1*	(5/2,7/2,9/2)	G
2806 *1*	(5/2,7/2,9/2)	G	3423 *1*	(5/2,7/2,9/2)	G
2816 *1*	(5/2,7/2,9/2)	G	3427 *1*	(5/2,7/2,9/2)	G
2819.9 *7*	(7/2,9/2)	G	3439 *1*	(5/2,7/2,9/2)	G
2836 *1*	(5/2,7/2,9/2)	G	3455 *1*	(5/2,7/2,9/2)	G
2839 *1*	(5/2,7/2,9/2)	G	3468 *1*	(5/2,7/2,9/2)	G
2855 *1*	(5/2,7/2,9/2)	G	3471.9 *7*	(7/2,9/2)	G
2858 *1*	(5/2,7/2,9/2)	G	3478 *1*	(5/2,7/2,9/2)	G
2864.2[d] *14*	31/2⁺	K	3503 *1*	(5/2,7/2,9/2)	G
2878 *1*	(5/2,7/2,9/2)	G	3508.9 *7*	(7/2,9/2)	G
2896 *1*	(5/2,7/2,9/2)	G	3513 *1*	(5/2,7/2,9/2)	G
2911.0[c] *10*	(31/2⁻)	K	3525 *1*	(5/2,7/2,9/2)	G
2912.3[&] *12*	35/2⁻	K	3529.7[&] *14*	39/2⁻	K
2913 *1*	(5/2,7/2,9/2)	G	3544 *1*	(5/2,7/2,9/2)	G
2917 *1*	(5/2,7/2,9/2)	G	3549 *1*	(5/2,7/2,9/2)	G
2921 *1*	(5/2,7/2,9/2)	G	3559 *1*	(5/2,7/2,9/2)	G
2951 *1*	(5/2,7/2,9/2)	G	3589 *1*	(5/2,7/2,9/2)	G
2958 *1*	(5/2,7/2,9/2)	G	3598 *1*	(5/2,7/2,9/2)	G
2963 *1*	(5/2,7/2,9/2)	G	3604 *1*	(5/2,7/2,9/2)	G
2972.9 *7*	(7/2,9/2)	G	3619[b] *2*	(37/2⁻)	K
2990.9 *7*	(9/2)	G	3651 *1*	(5/2,7/2,9/2)	G
3001.9 *7*	(7/2,9/2)	G	3679 *1*	(5/2,7/2,9/2)	G
3030.0[b] *11*	(33/2⁻)	K	3701.9 *7*	(9/2)	G
3035 *1*	(5/2,7/2,9/2)	G	3728 *1*	(5/2,7/2,9/2)	G
3077 *1*	(5/2,7/2,9/2)	G	3734.9 *7*	(7/2,9/2)	G
3085.9 *7*	(7/2,9/2)	G	3756 *1*	(5/2,7/2,9/2)	G
3093.9 *7*	(9/2)	G	3762 *1*	(5/2,7/2,9/2)	G
3105 *1*	(5/2,7/2,9/2)	G	3773 *1*	(5/2,7/2,9/2)	G
3120 *1*	(5/2,7/2,9/2)	G	3779 *1*	(5/2,7/2,9/2)	G
3124.9 *7*	(7/2)	G	3808.9 *7*	(7/2,9/2)	G
3131 *1*	(5/2,7/2,9/2)	G	3818 *1*	(5/2,7/2,9/2)	G
3134 *1*	(5/2,7/2,9/2)	G	3839 *1*	(5/2,7/2,9/2)	G
3144 *1*	(5/2,7/2,9/2)	G	3843 *1*	(5/2,7/2,9/2)	G
3147 *1*	(5/2,7/2,9/2)	G	3858 *1*	(5/2,7/2,9/2)	G

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{165}Ho Levels (continued)

E(level)[†]	J^{π}[‡]	XREF	E(level)[†]	J^{π}[‡]	XREF
3891 *1*	(5/2,7/2,9/2)	G	3974 *1*	(5/2,7/2,9/2)	G
3895 *1*	(5/2,7/2,9/2)	G	3999 *1*	(5/2,7/2,9/2)	G
3900 *1*	(5/2,7/2,9/2)	G	4060.7 *1*	(5/2,7/2,9/2)	G
3918 *1*	(5/2,7/2,9/2)	G	4109.6 *1*	(5/2,7/2,9/2)	G

[†] From least-squares fit to Eγ data for levels populated in γ-ray studies.

[‡] For high-spin (J>11/2) states populated in Coulomb Excitation, the assignments are based on the rotational band assignments. These assignments are considered more definitive for bands based on intrinsic states 7/2[523], 3/2[411] and 1/2[411], than for other bands. For levels populated in (γ,γ'), the assignments for most levels are limited to (5/2,7/2,9/2) due to dipole excitation from $7/2^-$ g.s. These are further restricted to (7/2,9/2) or (9/2) depending on deexcitation to either or both the first two excited states at 94.7, $9/2^-$ and 209.8, $11/2^-$.

[#] Rotational band member from "fingerprint" method in (^{3}He,d), (α,t) and (t,α) where bandhead has a firm J^π assignment, in addition to other supporting arguments as specified.

[@] From B(E2) in Coulomb excitation and adopted γ-ray branching ratios, unless otherwise stated.

[&] Band(A): π7/2[523] band,α=−1/2. A=10.4 keV.

[a] Band(a): π7/2[523] band,α=+1/2. A=10.3 keV.

[b] Band(B): $K^\pi=11/2^-$ band. K+2 γ vibration built on 7/2[523].

[c] Band(C): $K^\pi=3/2^-$ band. K-2 γ vibration built on 7/2[523].

[d] Band(D): π3/2[411] band,α=−1/2. A=10.7 keV.

[e] Band(d): π3/2[411] band,α=+1/2. A=11.3 keV.

[f] Band(E): Band based on (13/2),α=+1/2.

[g] Band(e): Band based on (15/2),α=−1/2.

[h] Band(F): π1/2[411] band,α=−1/2. A=12.3 keV, a=−0.46.

[i] Seq.(N): π1/2[541] Sequence. A=9.4 keV, a=2.9.

[j] Band(G): π7/2[404] band. A=11.5 keV.

[k] Band(H): π5/2[413] band. A=11.9 keV.

[l] Band(I): π5/2[402] band. A=12.0 keV.

[m] Band(J): π5/2[532] band. A=9.8 keV.

[n] Band(K): π9/2[514] band. A=10.2 keV.

[o] Band(L): $K^\pi=1/2^+$ band. K-2 γ vibration built on 3/2[411].

[p] Band(M): π1/2[402] band. A=11.1 keV, a=0.127.

$\gamma(^{165}$Ho)

E_i(level)	J^π_i	E_γ †	I_γ †	E_f	J^π_f	Mult. ‡	δ ‡	α @	Comments
94.700	9/2⁻	94.700 3	100	0.0	7/2⁻	M1+E2	+0.160 5	3.06 4	B(M1)(W.u.)=0.281 11; B(E2)(W.u.)=384 27 δ: weighted average of 0.168 9 from subshell ratios in ^{165}Dy ε decay (2.334 h) and +0.157 5 from E2 and M1 matrix elements in Coulomb excitation.
209.804	11/2⁻	115.104 10	100 7	94.700	9/2⁻	M1+E2	+0.17# +1−3	1.744 24	B(M1)(W.u.)=0.384 22; B(E2)(W.u.)=4.0×10^2 +5−10
		209.70 25	11.2 6	0.0	7/2⁻	E2		0.2084 30	B(E2)(W.u.)=80 +13−10
345.01	13/2⁻	135.2 1	100 8	209.804	11/2⁻	[M1+E2]	+0.138# 9	1.102 16	B(M1)(W.u.)=0.526 +50−43; B(E2)(W.u.)=262 +44−37
		250.1 3	24	94.700	9/2⁻	[E2]		0.1177 17	B(E2)(W.u.)=153 +52−39
361.675	3/2⁺	266.80 15	0.13 4	94.700	9/2⁻	[E3]		0.446 6	B(E3)(W.u.)=5.3 17
		361.68 2	100.0 5	0.0	7/2⁻	M2+E3	0.33 4	0.265 5	B(M2)(W.u.)=0.0784 +18−20; B(E3)(W.u.)=48 +11−10
419.544	5/2⁺	57.864 5	100	361.675	3/2⁺	M1+E2	0.130 +46−30	12.77 24	
429.388	1/2⁺	67.712 4	100	361.675	3/2⁺	M1		8.03 11	
449.259	3/2⁺	29.715 3	30 15	419.544	5/2⁺	M1		14.61 20	
		87.585 4	100 10	361.675	3/2⁺	M1(+E2)	<0.32	3.86 7	
491.047	7/2⁺	71.502 10	100 14	419.544	5/2⁺	M1(+E2)	<0.41	7.12 27	
		129.39 3	21 7	361.675	3/2⁺				
499.34	15/2⁻	154.3 2	100 11	345.01	13/2⁻	[M1+E2]	+0.139# 13	0.758 11	B(M1)(W.u.)=0.60 +16−11; B(E2)(W.u.)=233 +82−55 I_γ: from (n,n′γ). Other: 100 14 from Coulomb excitation.
		289.3 3	48 11	209.804	11/2⁻	[E2]		0.0746 11	B(E2)(W.u.)=255 +86−65 I_γ: from (n,n′γ). Other: 36 from Coulomb excitation.
515.476	3/2⁻	95.931 4	2.55 20	419.544	5/2⁺	[E1]		0.354 5	B(E1)(W.u.)=5.11×10^{-4} +74−65
		153.803 6	15.8 5	361.675	3/2⁺	[E1]		0.1006 14	B(E1)(W.u.)=7.68×10^{-4} +94−79
		515.467 25	100 3	0.0	7/2⁻	(E2)		0.0146 2	B(E2)(W.u.)=22.7 +24−20
539.011	5/2⁺	89.753 8	40 8	449.259	3/2⁺	M1(+E2)	<0.5	3.63 9	
		109.59 3	7.9 22	429.388	1/2⁺				
		119.47 3	100 7	419.544	5/2⁺	M1(+E2)	<0.6	1.556 26	
566.77	(5/2)⁻	205.0 3	<20	361.675	3/2⁺	[E1]		0.0472 7	B(E1)(W.u.)<2.0×10^{-4} E_γ,I_γ: from (n,n′γ) only.
		472.1 3	57 4	94.700	9/2⁻	[E2]		0.0184 3	B(E2)(W.u.)=5.6 +36−16
		566.9 5	100	0.0	7/2⁻	M1+E2	−1.0# 2	0.0174 13	B(M1)(W.u.)=0.00132 +86−42; B(E2)(W.u.)=2.0 +12−7 δ: other: −0.09 5 from A_2 in $\gamma(\theta)$ in Coul. ex.
589.803	7/2⁺	98.80 15	27 6	491.047	7/2⁺				
		140.544 20	69 7	449.259	3/2⁺				
		170.22 3	100 11	419.544	5/2⁺				
		228.3 3	15 7	361.675	3/2⁺				
601.35	9/2⁺	110		491.047	7/2⁺				
		181.8 2	100	419.544	5/2⁺				
638.27	(7/2)⁻	71		566.77	(5/2)⁻				
		428.7 5	43 24	209.804	11/2⁻				

$^{165}_{67}$Ho$_{98}$-8

$\gamma(^{165}Ho)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.‡	δ‡	α@	Comments
638.27	(7/2)⁻	543.5 *4*	≤260	94.700	9/2⁻	[M1+E2]	+0.15# *+15−9*	0.0257 *9*	α(K)=0.0217 *8*; α(L)=0.00311 *9*; α(M)=0.000684 *18* α(N)=0.000159 *4*; α(O)=2.32×10^{-5} *7*; α(P)=1.32×10^{-6} *5* δ: other: −0.35 *17* from A_2 in γ(θ) in Coul. ex.
		637.9 *6*	100 *19*	0.0	7/2⁻	[M1+E2]	+0.09# *+6−2*	0.0173 *3*	
672.82	17/2⁻	173.5 *2*	100 *17*	499.34	15/2⁻	[M1+E2]	+0.17# *+7−5*	0.544 *9*	B(M1)(W.u.)=1.21 *+88−40*; B(E2)(W.u.)=5.6×10^{2} *+84−30*
		327.9 *3*	32 *16*	345.01	13/2⁻	[E2]		0.0511 *7*	B(E2)(W.u.)=2.6×10^{2} *+23−13* I_γ: from (n,n′γ). Other: 56 fro Coulomb excitation.
680.4	(1/2)⁻	230.3		449.259	3/2⁺				
		251.9	100	429.388	1/2⁺				
688.5	(11/2⁻)	478.5 *5*	3.9 *7*	209.804	11/2⁻	M1+E2	≥0.74	0.024 *6*	B(M1)(W.u.)<0.0013; B(E2)(W.u.)=1.0 *+33−4*
		593.8 *5*	25.0 *22*	94.700	9/2⁻	M1+E2	+0.073 *23*	0.0207 *3*	B(M1)(W.u.)=0.0044 *+10−7*; B(E2)(W.u.)=0.032 *+25−17*
		688.6 *5*	100	0.0	7/2⁻	[E2]		0.0072 *1*	B(E2)(W.u.)=11.4 *12*
701.2	5/2⁻	251.9	100	449.259	3/2⁺				
703.9	11/2⁺	102		601.35	9/2⁺				
		213		491.047	7/2⁺				
715.332	7/2⁺	620.635 *20*	17.4 *2*	94.700	9/2⁻	[E1]		0.00336 *5*	B(E1)(W.u.)>1.4×10^{-9}
		715.328 *20*	100.0 *7*	0.0	7/2⁻	[E1]		2.50×10^{-3} *4*	B(E1)(W.u.)>5.1×10^{-9}
730.38	(9/2⁻)	92		638.27	(7/2)⁻				
		164		566.77	(5/2)⁻	[E2]		0.478 *7*	
		240		491.047	7/2⁺				
		520.5 *4*	47 *10*	209.804	11/2⁻				
		635.3 *5*	100 *13*	94.700	9/2⁻				
		731.0	27 *13*	0.0	7/2⁻				
744.0	9/2⁺	205.0 *3*	100	539.011	5/2⁺				
790.74	3/2⁻	251.73 *5*		539.011	5/2⁺				
		341.5		449.259	3/2⁺				
		361.7		429.388	1/2⁺				
		371.3		419.544	5/2⁺				
802.4	9/2⁻	201.1 *3*	94 *22*	601.35	9/2⁺				
		212.5	≤410	589.803	7/2⁺				
		311.2	100 *22*	491.047	7/2⁺				
819.82	(13/2⁻)	131.0		688.5	(11/2⁻)	[M1+E2]		1.13 *8*	B(E2)(W.u.)=145 *+145−80*
		475		345.01	13/2⁻				
		609.0 *8*		209.804	11/2⁻				
		725.2 *2*		94.700	9/2⁻	[E2]		0.00641 *9*	B(E2)(W.u.)=31 *4*

$\gamma(^{165}Ho)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	δ[‡]	α[@]	Comments
820.108	(9/2+)	610.29 *5*	38 *4*	209.804	11/2−				
		725.39 *3*	100 *10*	94.700	9/2−				
		820.106 *25*	58 *4*	0.0	7/2−				
827.1	(11/2+)	226		601.35	9/2+				
		237		589.803	7/2+				
842.0	(11/2−)	111		730.38	(9/2−)				
		203		638.27	(7/2)−				
		496.8 *5*	29 *19*	345.01	13/2−				
		632.5 *6*	100 *19*	209.804	11/2−				
		747.7 *6*	43 *14*	94.700	9/2−				
863.2	19/2−	190.5 *3*		672.82	17/2−				
		361		499.34	15/2−	[E2]		0.0385 *5*	B(E2)(W.u.)=500 +*100*−*50*
870.8	13/2+	167		703.9	11/2+				
		269		601.35	9/2+				
945.7	(11/2+)	736.1 *6*	100 *22*	209.804	11/2−				
		850.8 *5*	100 *22*	94.700	9/2−				
955.74	(7/2−)	225.5 *3*	48 *16*	730.38	(9/2−)				
		253.3[a]	≤290	701.2	5/2−				
		416.6 *3*	100 *29*	539.011	5/2+				
		537.2[a]	32 *10*	419.544	5/2+				
968.8	(15/2−)	149		819.82	(13/2−)				
		280		688.5	(11/2−)				
		469		499.34	15/2−				
		623.9 *6*		345.01	13/2−				
		759.1 *5*		209.804	11/2−				
972.6	(13/2−)	130		842.0	(11/2−)				
		241		730.38	(9/2−)				
		268		703.9	11/2+				
		473		499.34	15/2−				
		627		345.01	13/2−				
		763.9 *5*	100	209.804	11/2−				
986.2	(13/2)	144		842.0	(11/2−)				
		159		827.1	(11/2+)				
995.095	5/2+	174.96 *3*	0.19 *4*	820.108	(9/2+)				
		279.763 *12*	87.2 *5*	715.332	7/2+	M1+E2	−0.38 +*3*−*1*	0.1398 *23*	
		405.25 *3*	1.9 *1*	589.803	7/2+				
		456.093 *25*	7.4 *2*	539.011	5/2+	M1+E2	−0.52 +*14*−*26*	0.036 *4*	
		479.622 *25*	7.6 *2*	515.476	3/2−				
		504.10 *15*	0.19 *5*	491.047	7/2+				
		545.834 *20*	28.1 *9*	449.259	3/2+	M1+E2	+0.14 *6*	0.0255 *4*	
		565.718 *20*	22.3 *2*	429.388	1/2+				

$^{165}_{67}Ho_{98}$-10

Adopted Levels, Gammas (continued)

$\gamma(^{165}Ho)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡]	δ[‡]	α[@]	Comments
995.095	5/2+	575.558 *20*	13.2 *2*	419.544	5/2+	M1+E2	−0.35 *+6−4*	0.0212 *5*	
		633.415 *20*	100 *1*	361.675	3/2+	M1+E2	+0.18 *1*	0.0174 *3*	
		900.41 *5*	0.43 *4*	94.700	9/2−				
		995.089 *25*	10.3 *2*	0.0	7/2−				
997.8	15/2+	127		870.8	13/2+				
		294		703.9	11/2+				
1037.7	(1/2+)	676.0 *10*	100	361.675	3/2+				
1055.761	5/2+	694.08 *4*	36 *2*	361.675	3/2+				
		1055.76 *3*	100 *5*	0.0	7/2−	D+Q	+0.32 *+32−18*		
1066.7	(3/2+)	647.3		419.544	5/2+				
		704.9		361.675	3/2+				
1072.8	21/2−	209		863.2	19/2−				
		400		672.82	17/2−	[E2]		0.0288 *4*	B(E2)(W.u.)=305 *75*
1079.621	7/2+	259.53 *5*	15.6 *4*	820.108	(9/2+)				
		489.90 *10*	3.7 *4*	589.803	7/2+				
		512.57[a] *25*	3.4 *7*	566.77	(5/2)−				
		540.52 *5*	6.0 *6*	539.011	5/2+				
		588.57 *5*	3.5 *4*	491.047	7/2+				
		660.08 *3*	28.1 *4*	419.544	5/2+	M1(+E2)	+0.37 *+11−99*	0.0150 *13*	
		984.92 *4*	6.8 *5*	94.700	9/2−				
		1079.63 *3*	100.0 *12*	0.0	7/2−				
1093.5	(13/2+)	747.7 *6*	100 *33*	345.01	13/2−				
		884.4 *6*	100 *33*	209.804	11/2−				
1122.6	(15/2−)	151		972.6	(13/2−)				
		281		842.0	(11/2−)				
		450		672.82	17/2−				
		623		499.34	15/2−				
		777		345.01	13/2−				
1129.3	(5/2+)	699.9 *5*	100	429.388	1/2+				
1136.6	(17/2−)	168		968.8	(15/2−)				
		317		819.82	(13/2−)				
		464		672.82	17/2−				
		637		499.34	15/2−				
		792		345.01	13/2−				
1140.36	7/2+	1045.60 *15*	37 *6*	94.700	9/2−				
		1140.36 *5*	100 *8*	0.0	7/2−				
1152.1	15/2+	325		827.1	(11/2+)				
1170.3	(15/2)	184		986.2	(13/2)				
1186.59	9/2+	976.74 *20*	23 *5*	209.804	11/2−				
		1091.91 *8*	100 *11*	94.700	9/2−				
		1186.56 *10*	46 *5*	0.0	7/2−				
1195.7		451.8 *5*	100 *42*	744.0	9/2+				

Adopted Levels, Gammas (continued)

$\gamma(^{165}Ho)$ (continued)

E_i(level)	J^π_i	E_γ †	I_γ †	E_f	J^π_f
1195.7		557.4 *6*	33 *25*	638.27	(7/2)⁻
1221.3	17/2⁺	224		997.8	15/2⁺
		350		870.8	13/2⁺
1237.5		788 *1*		449.259	3/2⁺
		876		361.675	3/2⁺
1247.5	(17/2)	77		1170.3	(15/2)
		250		997.8	15/2⁺
		261		986.2	(13/2)
1248.0	(9/2⁺)	1153.3 *6*	100	94.700	9/2⁻
1292.2	(17/2⁻)	170		1122.6	(15/2⁻)
		294		997.8	15/2⁺
		320		972.6	(13/2⁻)
		429		863.2	19/2⁻
		619		672.82	17/2⁻
		793		499.34	15/2⁻
1295.1	23/2⁻	222		1072.8	21/2⁻
		432		863.2	19/2⁻
1313.8	(11/2⁺)	1219.1 *10*	100	94.700	9/2⁻
1321.5	(19/2⁻)	185		1136.6	(17/2⁻)
		353		968.8	(15/2⁻)
		458		863.2	19/2⁻
		649		672.82	17/2⁻
		822		499.34	15/2⁻
1338.3		1243.5 *20*	100	94.700	9/2⁻
		1338.3 *20*	29	0.0	7/2⁻
1368.0	19/2⁺	147		1221.3	17/2⁺
		370		997.8	15/2⁺
1374.6	(11/2⁺)	1164.8 *10*	100	209.804	11/2⁻
1381	(5/2,7/2,9/2)	1381 *1*		0.0	7/2⁻
1389	(5/2,7/2,9/2)	1389 *1*		0.0	7/2⁻
1409.8	(5/2,7/2,9/2)	1409.8 *8*	100	0.0	7/2⁻
1416.4	(5/2⁻)	1416.4 *10*	100	0.0	7/2⁻
1465.9	(9/2⁻)	1371 *1*	26 *5*	94.700	9/2⁻
		1466 *1*	100	0.0	7/2⁻
1476.0	(19/2⁻)	184		1292.2	(17/2⁻)
		354		1122.6	(15/2⁻)
		403		1072.8	21/2⁻
		613		863.2	19/2⁻
		803		672.82	17/2⁻
1476.3	(19/2)	306		1170.3	(15/2)
1479.7	(9/2⁻)	1479.7 *10*	100	0.0	7/2⁻
1482.7	7/2⁻	1388	100	94.700	9/2⁻

E_i(level)	J^π_i	E_γ †	I_γ †	E_f	J^π_f
1523.2	(21/2⁻)	202		1321.5	(19/2⁻)
		387		1136.6	(17/2⁻)
		450		1072.8	21/2⁻
		660		863.2	19/2⁻
		850		672.82	17/2⁻
1533.8		1324 *2*	100	209.804	11/2⁻
		1439 *2*	17	94.700	9/2⁻
1536.7	25/2⁻	242		1295.1	23/2⁻
		464		1072.8	21/2⁻
1547		1547 *2*	100	0.0	7/2⁻
1554.1	19/2⁺	402		1152.1	15/2⁺
1574.0	(9/2⁻)	1364.2 *10*	100	209.804	11/2⁻
1590.8	11/2⁻	769.7	100	820.108	(9/2⁺)
		1497	81	94.700	9/2⁻
1591.5	(21/2)	344		1247.5	(17/2)
1606	(5/2,7/2,9/2)	1606 *1*		0.0	7/2⁻
1615	(5/2,7/2,9/2)	1615 *1*		0.0	7/2⁻
1627	(5/2,7/2,9/2)	1627 *1*		0.0	7/2⁻
1643.7	21/2⁺	276		1368.0	19/2⁺
		422		1221.3	17/2⁺
1679.2	(21/2⁻)	203		1476.0	(19/2⁻)
		311		1368.0	19/2⁺
		384		1295.1	23/2⁻
		387		1292.2	(17/2⁻)
		607		1072.8	21/2⁻
		816		863.2	19/2⁻
1705.9	(7/2,9/2)	1611 *1*	19 *5*	94.700	9/2⁻
		1706 *1*	100	0.0	7/2⁻
1711	(5/2,7/2,9/2)	1711 *1*		0.0	7/2⁻
1740.3	(23/2⁻)	217		1523.2	(21/2⁻)
		419		1321.5	(19/2⁻)
		445		1295.1	23/2⁻
		668		1072.8	21/2⁻
		877		863.2	19/2⁻
1756	(5/2,7/2,9/2)	1756 *1*		0.0	7/2⁻
1766	(5/2,7/2,9/2)	1766 *1*		0.0	7/2⁻
1786.1	27/2⁻	249		1536.7	25/2⁻
		491		1295.1	23/2⁻
1789	(5/2,7/2,9/2)	1789 *1*		0.0	7/2⁻
1807	(5/2⁻,7/2⁻,9/2⁻)	1807 *1*		0.0	7/2⁻
1807.8	23/2⁺	164		1643.7	21/2⁺
		440		1368.0	19/2⁺

Adopted Levels, Gammas (continued)

$\gamma(^{165}Ho)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f
1816	(5/2,7/2,9/2)	1816 *1*		0.0	$7/2^-$
1827.9	(7/2,9/2)	1733 *1*	24 *5*	94.700	$9/2^-$
		1828 *1*	100	0.0	$7/2^-$
1864.3	(23/2)	388		1476.3	(19/2)
1896.3	$(23/2^-)$	217		1679.2	$(21/2^-)$
		421		1476.0	$(19/2^-)$
		601		1295.1	$23/2^-$
		823		1072.8	$21/2^-$
1902.9	(9/2)	1808 *1*	1.6×10^3 *3*	94.700	$9/2^-$
		1903 *1*	100	0.0	$7/2^-$
1972.2	$(25/2^-)$	232		1740.3	$(23/2^-)$
		449		1523.2	$(21/2^-)$
		677		1295.1	$23/2^-$
		899		1072.8	$21/2^-$
1984	(5/2,7/2,9/2)	1984 *1*		0.0	$7/2^-$
2011.5	(25/2)	420		1591.5	(21/2)
2012	(5/2,7/2,9/2)	2012 *1*		0.0	$7/2^-$
2056.3	$29/2^-$	270		1786.1	$27/2^-$
		520		1536.7	$25/2^-$
2099	(5/2,7/2,9/2)	2099 *1*		0.0	$7/2^-$
2124.9	(9/2)	2030 *1*	18 *3*	94.700	$9/2^-$
		2125 *1*	100	0.0	$7/2^-$
2128.7	$25/2^+$	485		1643.7	$21/2^+$
2130.4	$(25/2^-)$	234		1896.3	$(23/2^-)$
		323		1807.8	$23/2^+$
		451		1679.2	$(21/2^-)$
		594		1536.7	$25/2^-$
		835		1295.1	$23/2^-$
2146	(5/2,7/2,9/2)	2146 *1*		0.0	$7/2^-$
2171	(5/2,7/2,9/2)	2171 *1*		0.0	$7/2^-$
2178	(5/2,7/2,9/2)	2178 *1*		0.0	$7/2^-$
2194	(5/2,7/2,9/2)	2194 *1*		0.0	$7/2^-$
2218.4	$(27/2^-)$	246		1972.2	$(25/2^-)$
		478		1740.3	$(23/2^-)$
		682		1536.7	$25/2^-$
2233	(5/2,7/2,9/2)	2233 *1*		0.0	$7/2^-$
2265.0	(5/2,7/2,9/2)	2265 *1*		0.0	$7/2^-$
2309	$27/2^+$	501		1807.8	$23/2^+$
2328.2	$31/2^-$	272		2056.3	$29/2^-$
		542		1786.1	$27/2^-$
2329	(5/2,7/2,9/2)	2329 *1*		0.0	$7/2^-$
2337	(5/2,7/2,9/2)	2337 *1*		0.0	$7/2^-$
2340	(5/2,7/2,9/2)	2340 *1*		0.0	$7/2^-$
2355.9	(9/2)	2261 *1*	17 *3*	94.700	$9/2^-$
		2356 *1*	100	0.0	$7/2^-$
2377	(5/2,7/2,9/2)	2377 *1*		0.0	$7/2^-$
2377.1	$(27/2^-)$	247		2130.4	$(25/2^-)$
		481		1896.3	$(23/2^-)$
2447	(5/2,7/2,9/2)	2447 *1*		0.0	$7/2^-$
2477.2	$(29/2^-)$	259		2218.4	$(27/2^-)$
		505		1972.2	$(25/2^-)$
2480	(5/2,7/2,9/2)	2480 *1*		0.0	$7/2^-$
2491.9	(7/2,9/2)	2397 *1*	230 *80*	94.700	$9/2^-$
		2492 *1*	100	0.0	$7/2^-$
2503	(29/2)	491		2011.5	(25/2)
2509	(5/2,7/2,9/2)	2509 *1*		0.0	$7/2^-$
2519	(5/2,7/2,9/2)	2519 *1*		0.0	$7/2^-$
2538	(5/2,7/2,9/2)	2538 *1*		0.0	$7/2^-$
2550.9	(7/2,9/2)	2456 *1*	21 *4*	94.700	$9/2^-$
		2551 *1*	100	0.0	$7/2^-$
2561	(5/2,7/2,9/2)	2561 *1*		0.0	$7/2^-$
2571	(5/2,7/2,9/2)	2571 *1*		0.0	$7/2^-$
2580	(5/2,7/2,9/2)	2580 *1*		0.0	$7/2^-$
2592	(5/2,7/2,9/2)	2592 *1*		0.0	$7/2^-$
2595.9	(7/2,9/2)	2501 *1*	19 *4*	94.700	$9/2^-$
		2596 *1*	100	0.0	$7/2^-$
2601	(5/2,7/2,9/2)	2601 *1*		0.0	$7/2^-$
2623.2	$33/2^-$	295		2328.2	$31/2^-$
		567		2056.3	$29/2^-$
2632	(5/2,7/2,9/2)	2632 *1*		0.0	$7/2^-$
2638.6	$(29/2^-)$	262		2377.1	$(27/2^-)$
		329		2309	$27/2^+$
		508		2130.4	$(25/2^-)$
2652	(5/2,7/2,9/2)	2652 *1*		0.0	$7/2^-$
2656	(5/2,7/2,9/2)	2656 *1*		0.0	$7/2^-$
2663	(5/2,7/2,9/2)	2663 *1*		0.0	$7/2^-$
2666	(5/2,7/2,9/2)	2666 *1*		0.0	$7/2^-$
2667.7	$29/2^+$	539		2128.7	$25/2^+$
2672	(5/2,7/2,9/2)	2672 *1*		0.0	$7/2^-$
2675	(5/2,7/2,9/2)	2675 *1*		0.0	$7/2^-$
2682.9	(9/2)	2588 *1*	158 *36*	94.700	$9/2^-$
		2683 *1*	100	0.0	$7/2^-$
2689	(5/2,7/2,9/2)	2689 *1*		0.0	$7/2^-$
2748.4	$(31/2^-)$	271		2477.2	$(29/2^-)$

γ(^{165}Ho) (continued)

E_i(level)	J^{π}_i	E_{γ}†	I_{γ}†	E_f	J^{π}_f
2748.4	(31/2$^-$)	530		2218.4	(27/2$^-$)
2752	(5/2,7/2,9/2)	2752 *1*		0.0	7/2$^-$
2768	(5/2,7/2,9/2)	2768 *1*		0.0	7/2$^-$
2806	(5/2,7/2,9/2)	2806 *1*		0.0	7/2$^-$
2816	(5/2,7/2,9/2)	2816 *1*		0.0	7/2$^-$
2819.9	(7/2,9/2)	2725 *1*	19 *4*	94.700	9/2$^-$
		2820 *1*	100	0.0	7/2$^-$
2836	(5/2,7/2,9/2)	2836 *1*		0.0	7/2$^-$
2839	(5/2,7/2,9/2)	2839 *1*		0.0	7/2$^-$
2855	(5/2,7/2,9/2)	2855 *1*		0.0	7/2$^-$
2858	(5/2,7/2,9/2)	2858 *1*		0.0	7/2$^-$
2864.2	31/2$^+$	555		2309	27/2$^+$
2878	(5/2,7/2,9/2)	2878& *1*		0.0	7/2$^-$
2896	(5/2,7/2,9/2)	2896& *1*		0.0	7/2$^-$
2911.0	(31/2$^-$)	273		2638.6	(29/2$^-$)
		534		2377.1	(27/2$^-$)
2912.3	35/2$^-$	289		2623.2	33/2$^-$
		584		2328.2	31/2$^-$
2913	(5/2,7/2,9/2)	2913 *1*		0.0	7/2$^-$
2917	(5/2,7/2,9/2)	2917 *1*		0.0	7/2$^-$
2921	(5/2,7/2,9/2)	2921 *1*		0.0	7/2$^-$
2951	(5/2,7/2,9/2)	2951 *1*		0.0	7/2$^-$
2958	(5/2,7/2,9/2)	2958 *1*		0.0	7/2$^-$
2963	(5/2,7/2,9/2)	2963 *1*		0.0	7/2$^-$
2972.9	(7/2,9/2)	2878& *1*	<32	94.700	9/2$^-$
		2973& *1*	<100	0.0	7/2$^-$
2990.9	(9/2)	2896& *1*	<201	94.700	9/2$^-$
		2991& *1*	<100	0.0	7/2$^-$
3001.9	(7/2,9/2)	2907 *1*	350 *70*	94.700	9/2$^-$
		3002 *1*	100	0.0	7/2$^-$
3030.0	(33/2$^-$)	281		2748.4	(31/2$^-$)
		553		2477.2	(29/2$^-$)
3035	(5/2,7/2,9/2)	3035 *1*		0.0	7/2$^-$
3077	(5/2,7/2,9/2)	3077 *1*		0.0	7/2$^-$
3085.9	(7/2,9/2)	2991& *1*	<27	94.700	9/2$^-$
		3086 *1*	100	0.0	7/2$^-$
3093.9	(9/2)	2884 *1*	145 *34*	209.804	11/2$^-$
		3094 *1*	100	0.0	7/2$^-$
3105	(5/2,7/2,9/2)	3105 *1*		0.0	7/2$^-$

E_i(level)	J^{π}_i	E_{γ}†	I_{γ}†	E_f	J^{π}_f
3120	(5/2,7/2,9/2)	3120 *1*		0.0	7/2$^-$
3124.9	(7/2)	3030 *1*	45 *12*	94.700	9/2$^-$
		3125 *1*	100	0.0	7/2$^-$
3131	(5/2,7/2,9/2)	3131 *1*		0.0	7/2$^-$
3134	(5/2,7/2,9/2)	3134 *1*		0.0	7/2$^-$
3144	(5/2,7/2,9/2)	3144 *1*		0.0	7/2$^-$
3147	(5/2,7/2,9/2)	3147 *1*		0.0	7/2$^-$
3167	(5/2,7/2,9/2)	3167 *1*		0.0	7/2$^-$
3182.9	(9/2)	2973& *1*	<147	209.804	11/2$^-$
		3183 *1*	100	0.0	7/2$^-$
3187	(5/2,7/2,9/2)	3187 *1*		0.0	7/2$^-$
3190.9	(9/2)	2981 *1*	137 *29*	209.804	11/2$^-$
		3191 *1*	100	0.0	7/2$^-$
3199.3	(33/2$^-$)	289		2911.0	(31/2$^-$)
		560		2638.6	(29/2$^-$)
3213	(5/2,7/2,9/2)	3213 *1*		0.0	7/2$^-$
3220	(5/2,7/2,9/2)	3220 *1*		0.0	7/2$^-$
3230.1	37/2$^-$	318		2912.3	35/2$^-$
		607		2623.2	33/2$^-$
3236.9	(9/2)	3027 *1*	250 *80*	209.804	11/2$^-$
		3237 *1*	100	0.0	7/2$^-$
3247	(5/2,7/2,9/2)	3247 *1*		0.0	7/2$^-$
3259	(5/2,7/2,9/2)	3259 *1*		0.0	7/2$^-$
3287	(5/2,7/2,9/2)	3287 *1*		0.0	7/2$^-$
3313	(5/2,7/2,9/2)	3313 *1*		0.0	7/2$^-$
3321.2	(35/2$^-$)	291		3030.0	(33/2$^-$)
		573		2748.4	(31/2$^-$)
3329	(5/2,7/2,9/2)	3329 *1*		0.0	7/2$^-$
3352	(5/2,7/2,9/2)	3352 *1*		0.0	7/2$^-$
3357.9	(9/2)	3263 *1*	140 *50*	94.700	9/2$^-$
		3358 *1*	100	0.0	7/2$^-$
3371	(5/2,7/2,9/2)	3371 *1*		0.0	7/2$^-$
3400	(5/2,7/2,9/2)	3400 *1*		0.0	7/2$^-$
3407	(5/2,7/2,9/2)	3407 *1*		0.0	7/2$^-$
3418	(5/2,7/2,9/2)	3418 *1*		0.0	7/2$^-$
3423	(5/2,7/2,9/2)	3423 *1*		0.0	7/2$^-$
3427	(5/2,7/2,9/2)	3427 *1*		0.0	7/2$^-$
3439	(5/2,7/2,9/2)	3439 *1*		0.0	7/2$^-$
3455	(5/2,7/2,9/2)	3455 *1*		0.0	7/2$^-$

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Adopted Levels, Gammas (continued)

γ(^{165}Ho) (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f
3468	(5/2,7/2,9/2)	3468 *1*		0.0	7/2⁻
3471.9	(7/2,9/2)	3377 *1*	38 *9*	94.700	9/2⁻
		3472 *1*	100	0.0	7/2⁻
3478	(5/2,7/2,9/2)	3478 *1*		0.0	7/2⁻
3503	(5/2,7/2,9/2)	3503 *1*		0.0	7/2⁻
3508.9	(7/2,9/2)	3414 *1*	260 *80*	94.700	9/2⁻
		3509 *1*	100	0.0	7/2⁻
3513	(5/2,7/2,9/2)	3513 *1*		0.0	7/2⁻
3525	(5/2,7/2,9/2)	3525 *1*		0.0	7/2⁻
3529.7	39/2⁻	300		3230.1	37/2⁻
		617		2912.3	35/2⁻
3544	(5/2,7/2,9/2)	3544 *1*		0.0	7/2⁻
3549	(5/2,7/2,9/2)	3549 *1*		0.0	7/2⁻
3559	(5/2,7/2,9/2)	3559 *1*		0.0	7/2⁻
3589	(5/2,7/2,9/2)	3589 *1*		0.0	7/2⁻
3598	(5/2,7/2,9/2)	3598 *1*		0.0	7/2⁻
3604	(5/2,7/2,9/2)	3604 *1*		0.0	7/2⁻
3619	(37/2⁻)	589		3030.0	(33/2⁻)
3651	(5/2,7/2,9/2)	3651 *1*		0.0	7/2⁻
3679	(5/2,7/2,9/2)	3679 *1*		0.0	7/2⁻
3701.9	(9/2)	3607 *1*	147 *43*	94.700	9/2⁻
		3702 *1*	100	0.0	7/2⁻
3728	(5/2,7/2,9/2)	3728 *1*		0.0	7/2⁻
3734.9	(7/2,9/2)	3640 *1*	39 *11*	94.700	9/2⁻
		3735 *1*	100	0.0	7/2⁻
3756	(5/2,7/2,9/2)	3756 *1*		0.0	7/2⁻
3762	(5/2,7/2,9/2)	3762 *1*		0.0	7/2⁻
3773	(5/2,7/2,9/2)	3773 *1*		0.0	7/2⁻
3779	(5/2,7/2,9/2)	3779 *1*		0.0	7/2⁻
3808.9	(7/2,9/2)	3714 *1*	180 *90*	94.700	9/2⁻
		3809 *1*	100	0.0	7/2⁻
3818	(5/2,7/2,9/2)	3818 *1*		0.0	7/2⁻
3839	(5/2,7/2,9/2)	3839 *1*		0.0	7/2⁻
3843	(5/2,7/2,9/2)	3843 *1*		0.0	7/2⁻
3858	(5/2,7/2,9/2)	3858 *1*		0.0	7/2⁻
3891	(5/2,7/2,9/2)	3891 *1*		0.0	7/2⁻
3895	(5/2,7/2,9/2)	3895 *1*		0.0	7/2⁻
3900	(5/2,7/2,9/2)	3900 *1*		0.0	7/2⁻
3918	(5/2,7/2,9/2)	3918 *1*		0.0	7/2⁻
3974	(5/2,7/2,9/2)	3974 *1*		0.0	7/2⁻
3999	(5/2,7/2,9/2)	3999 *1*		0.0	7/2⁻
4060.7	(5/2,7/2,9/2)	4060.6 *1*		0.0	7/2⁻
4109.6	(5/2,7/2,9/2)	4109.5 *1*		0.0	7/2⁻

† For γ rays from levels below 1600, values are mainly from ^{165}Dy β^- decay (2.334 h), with the exception of a few Eγ values which are reported in (n,n′γ) only. Above 1600 excitation, values are from (γ,γ') or Coulomb excitation, where levels are populated independently in each of the two reactions. Weighted averages are taken where comparable values are available from different datasets.

‡ From ce and $\gamma(\theta$,t) data in ^{165}Dy β^- decay (2.334 h), unless otherwise stated. When significant Q+D admixture is indicated in $\gamma(\theta$,t) data, transition is assigned as M1+E2 based on Weisskopf estimates for transition probabilities.

From E2 and M1 matrix elements in Coulomb excitation.

@ 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.

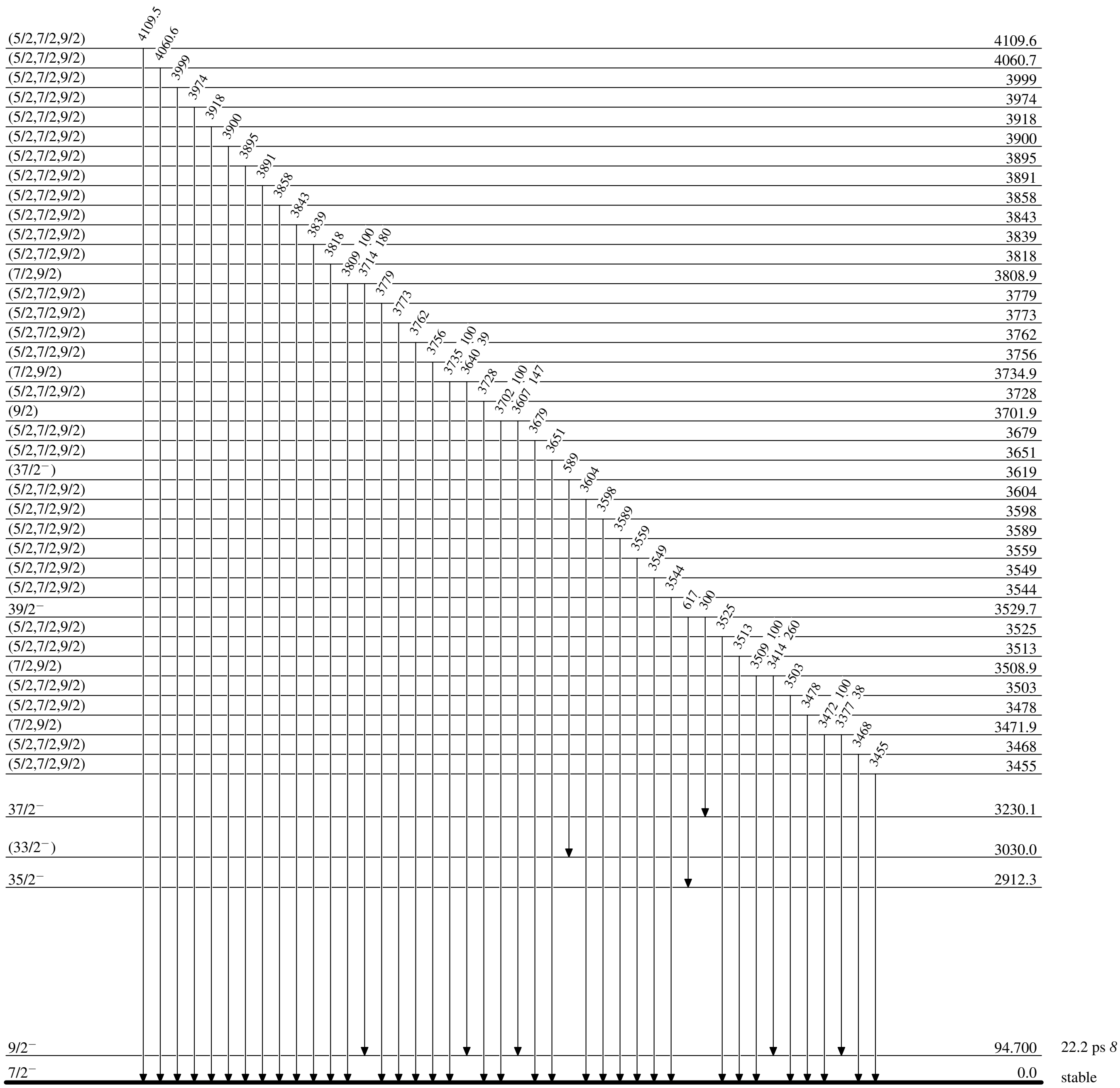
& Multiply placed.

^{a} Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

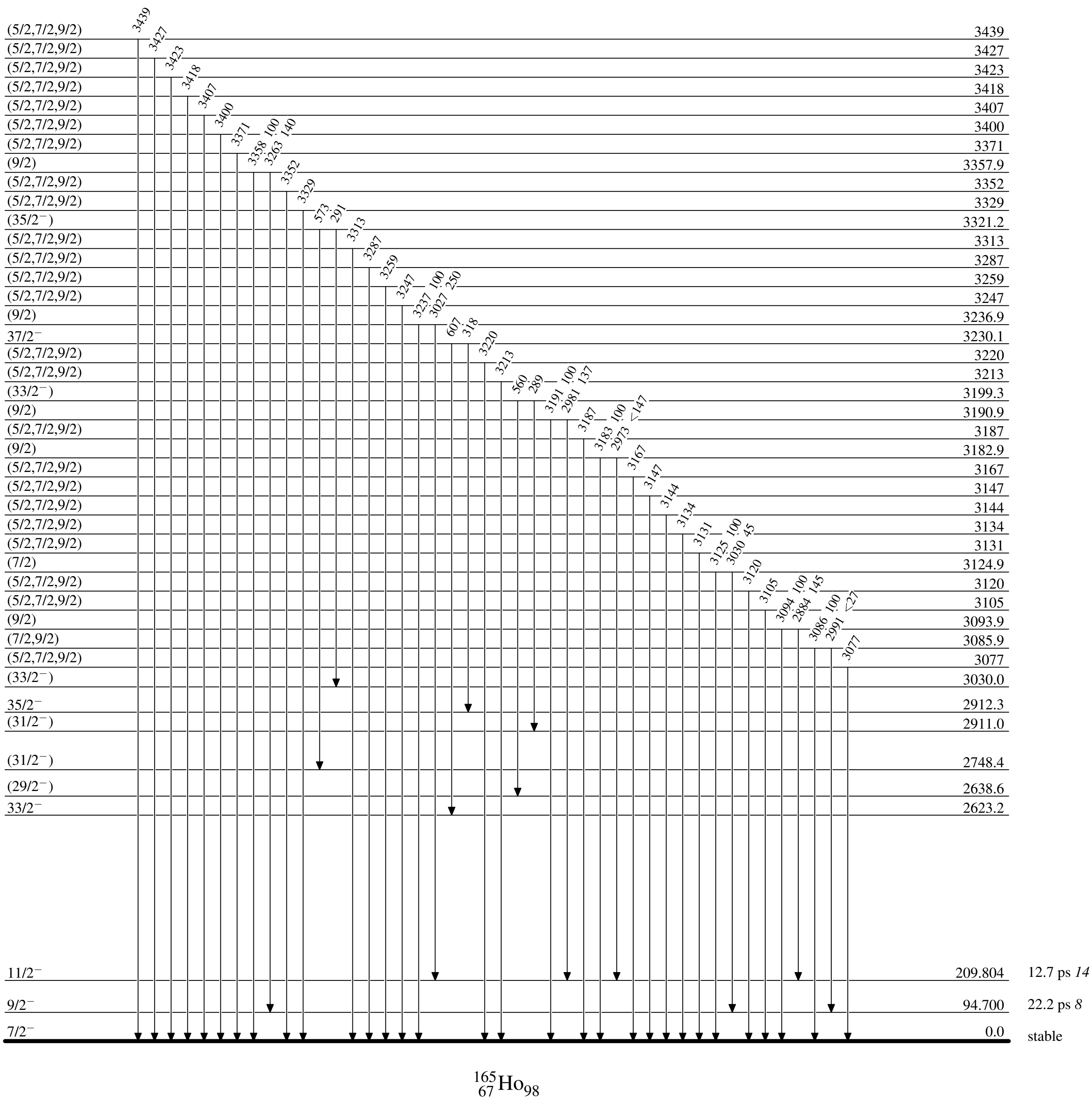


$^{165}_{67}Ho_{98}$

Adopted Levels, Gammas

Level Scheme (continued)

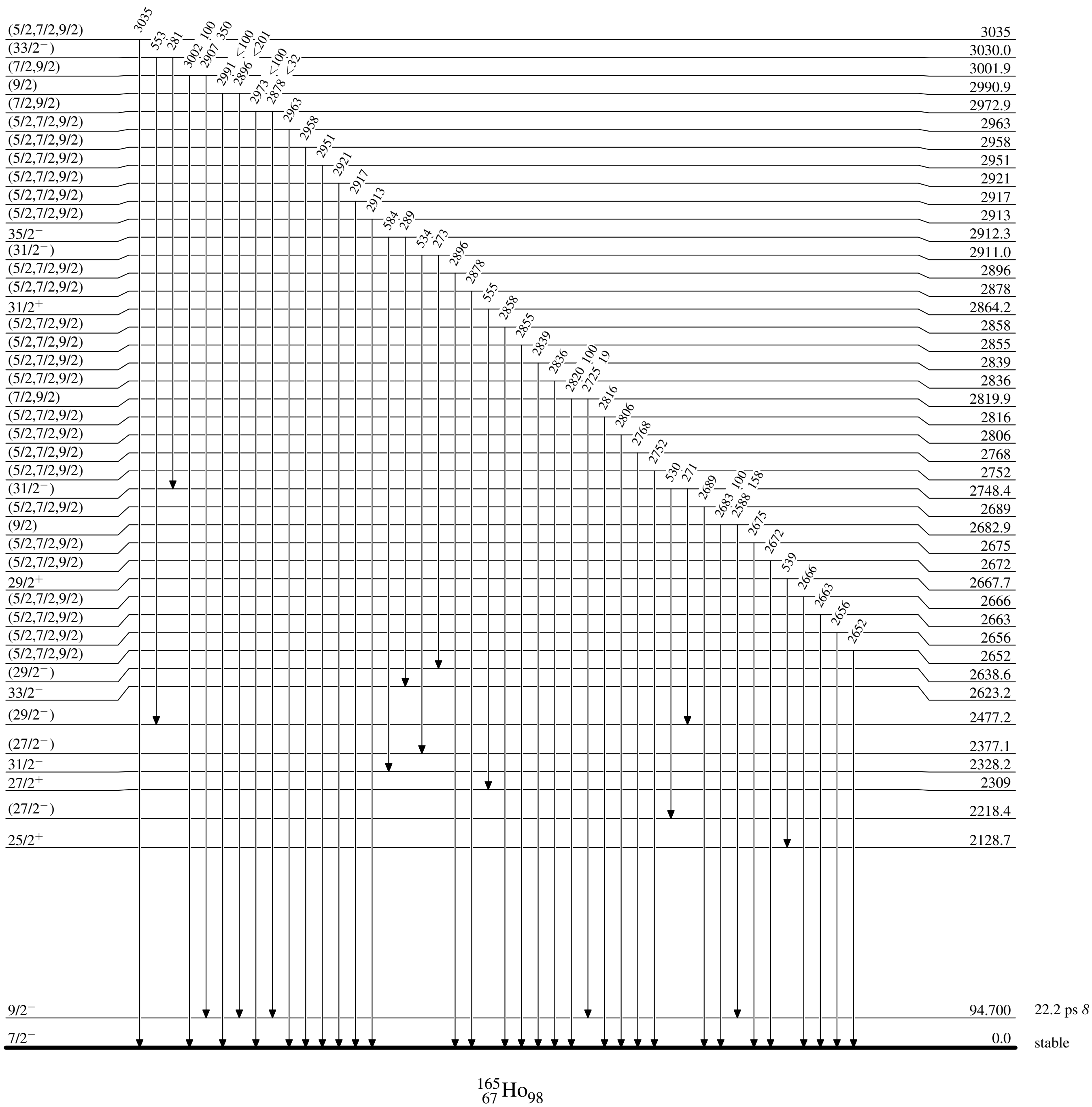
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

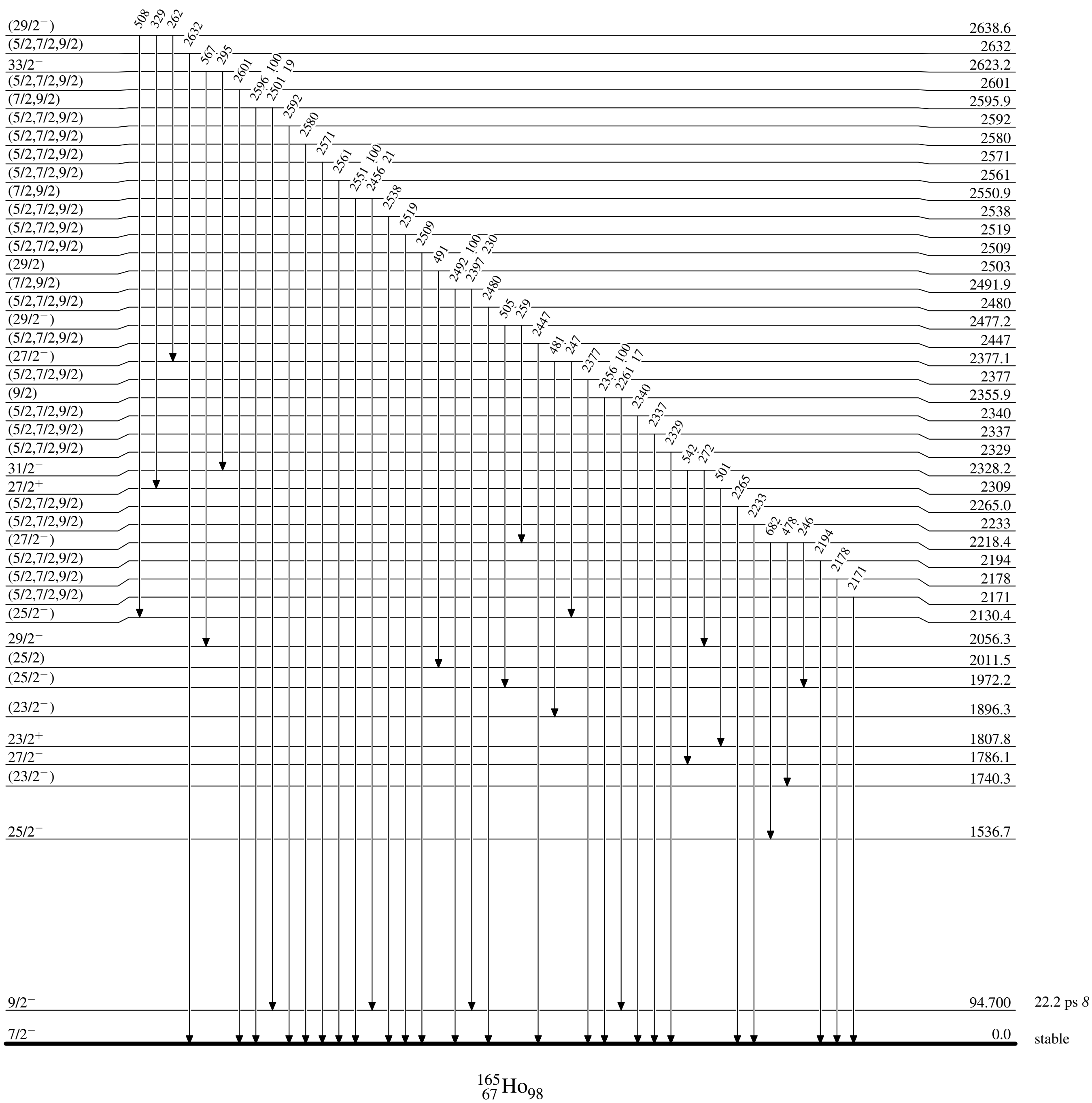
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

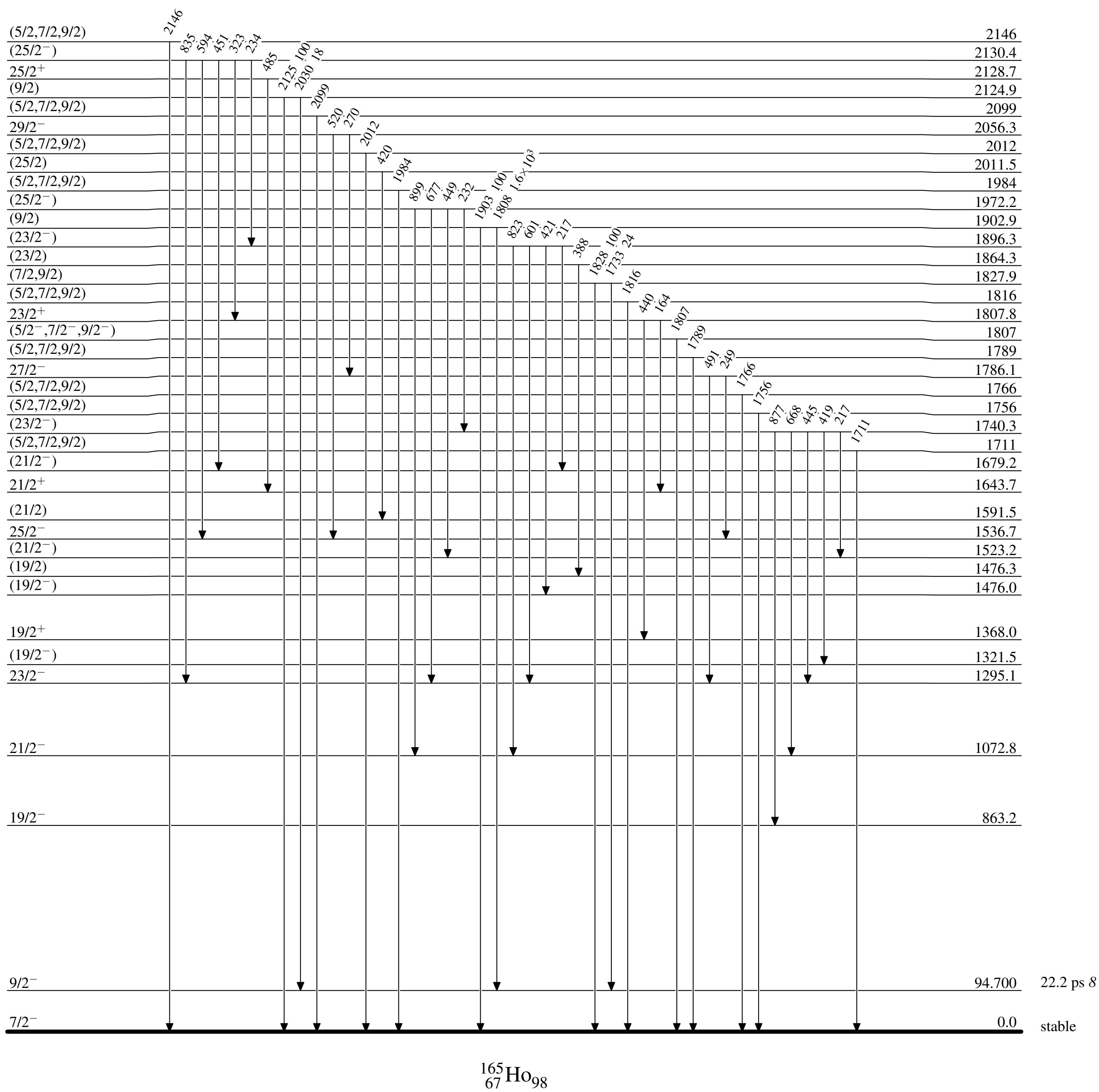
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

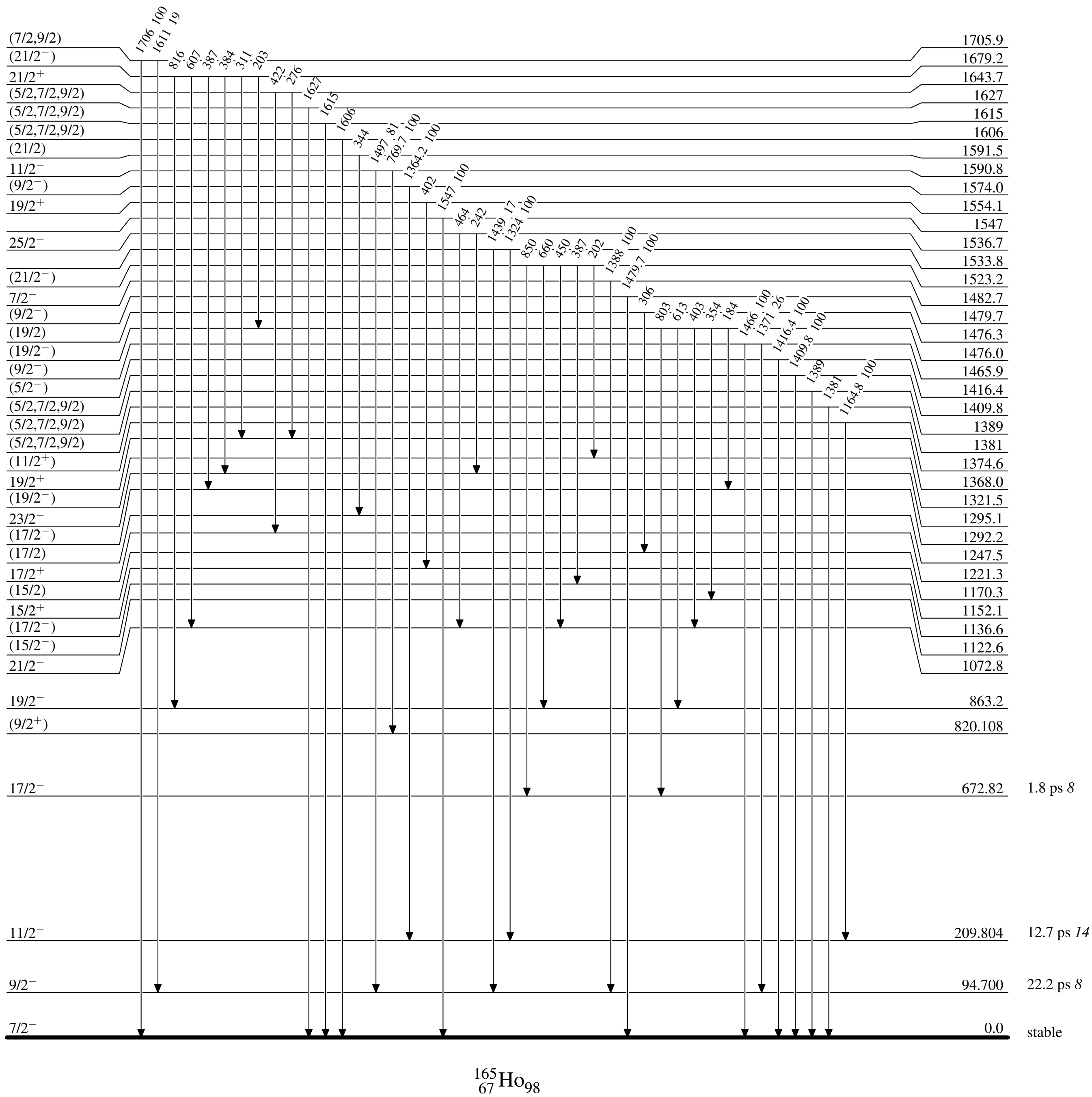
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

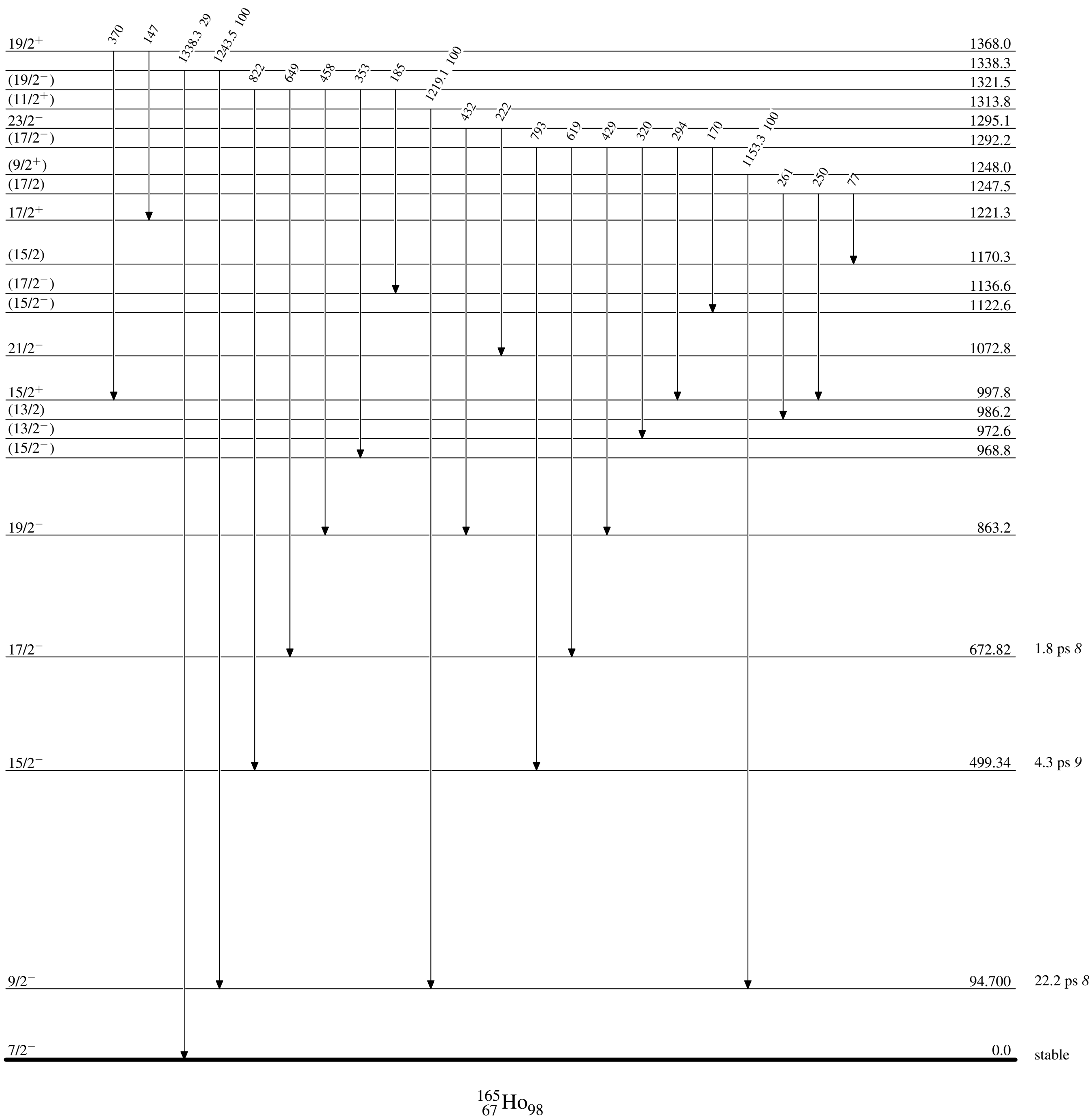
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

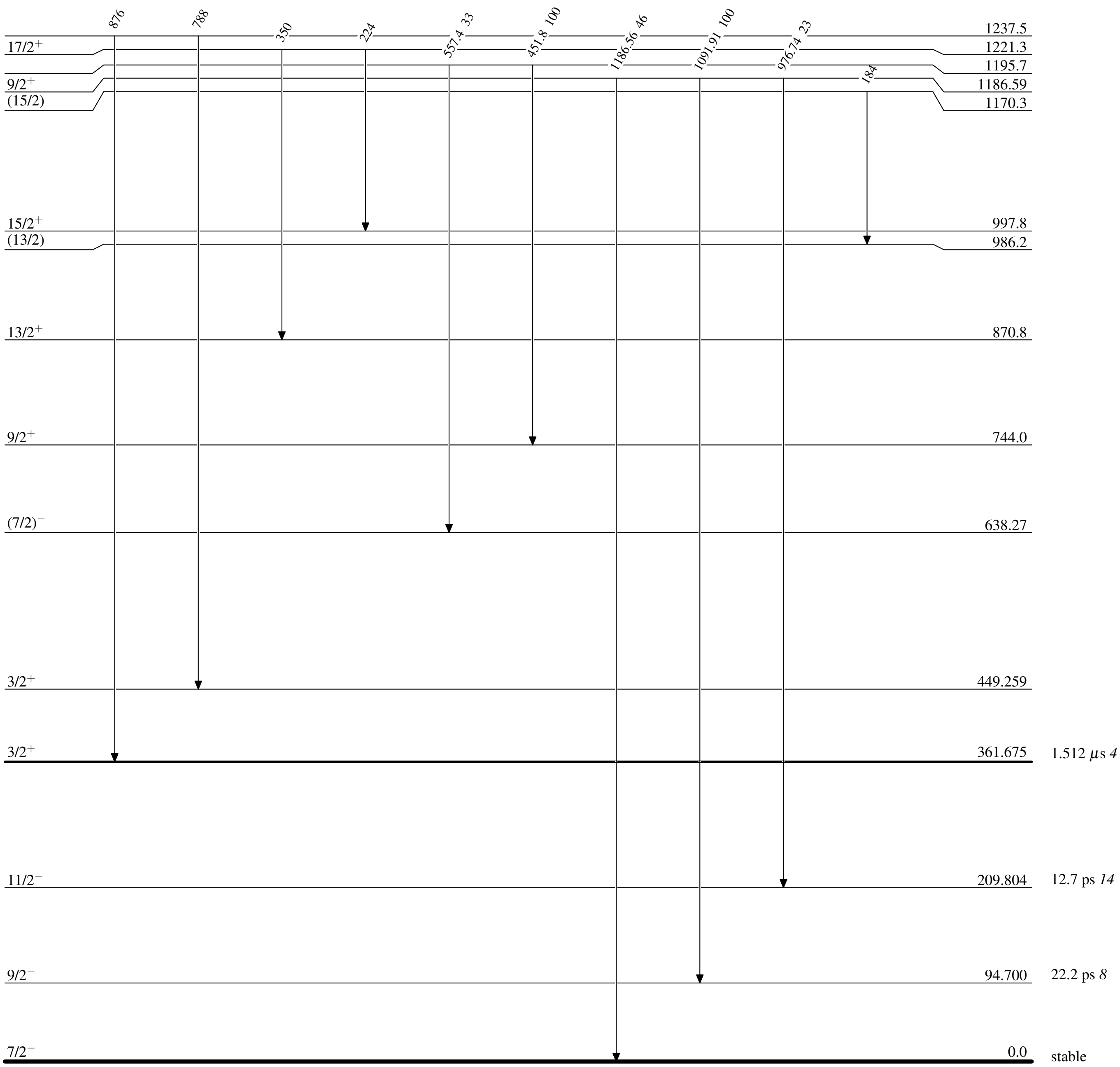
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

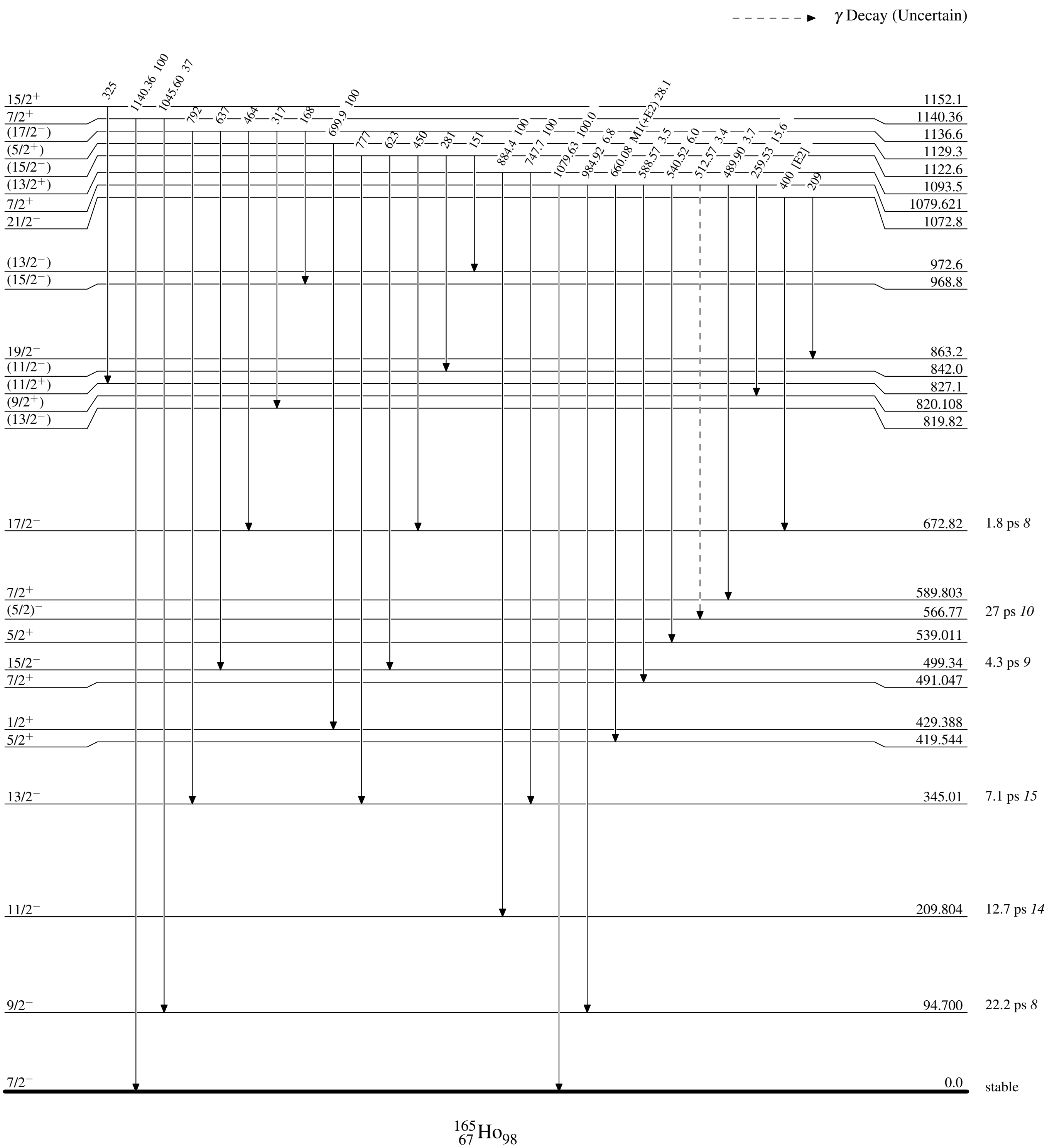


$^{165}_{67}Ho_{98}$

Adopted Levels, Gammas

Level Scheme (continued)

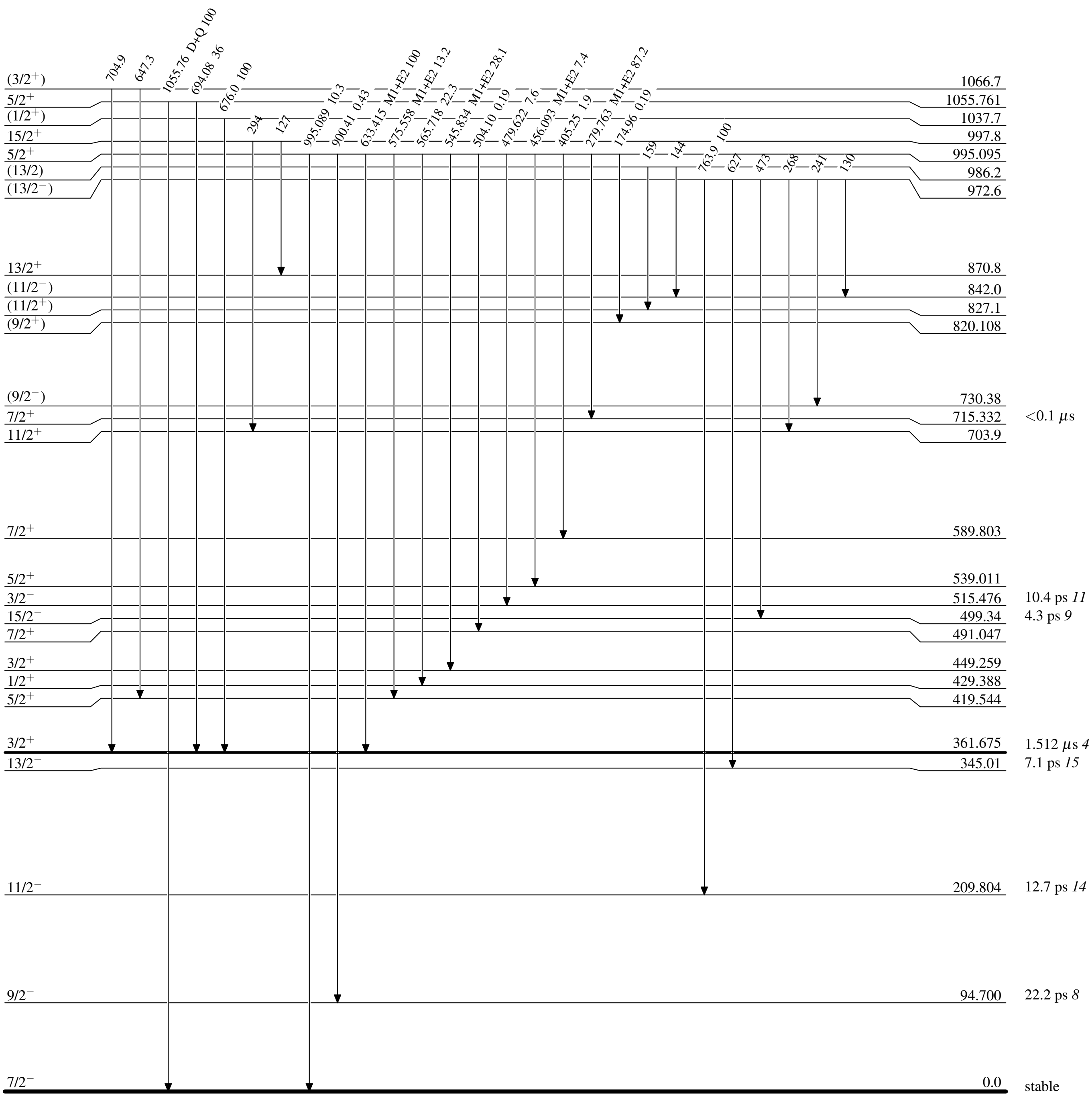
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{165}_{67}Ho_{98}$

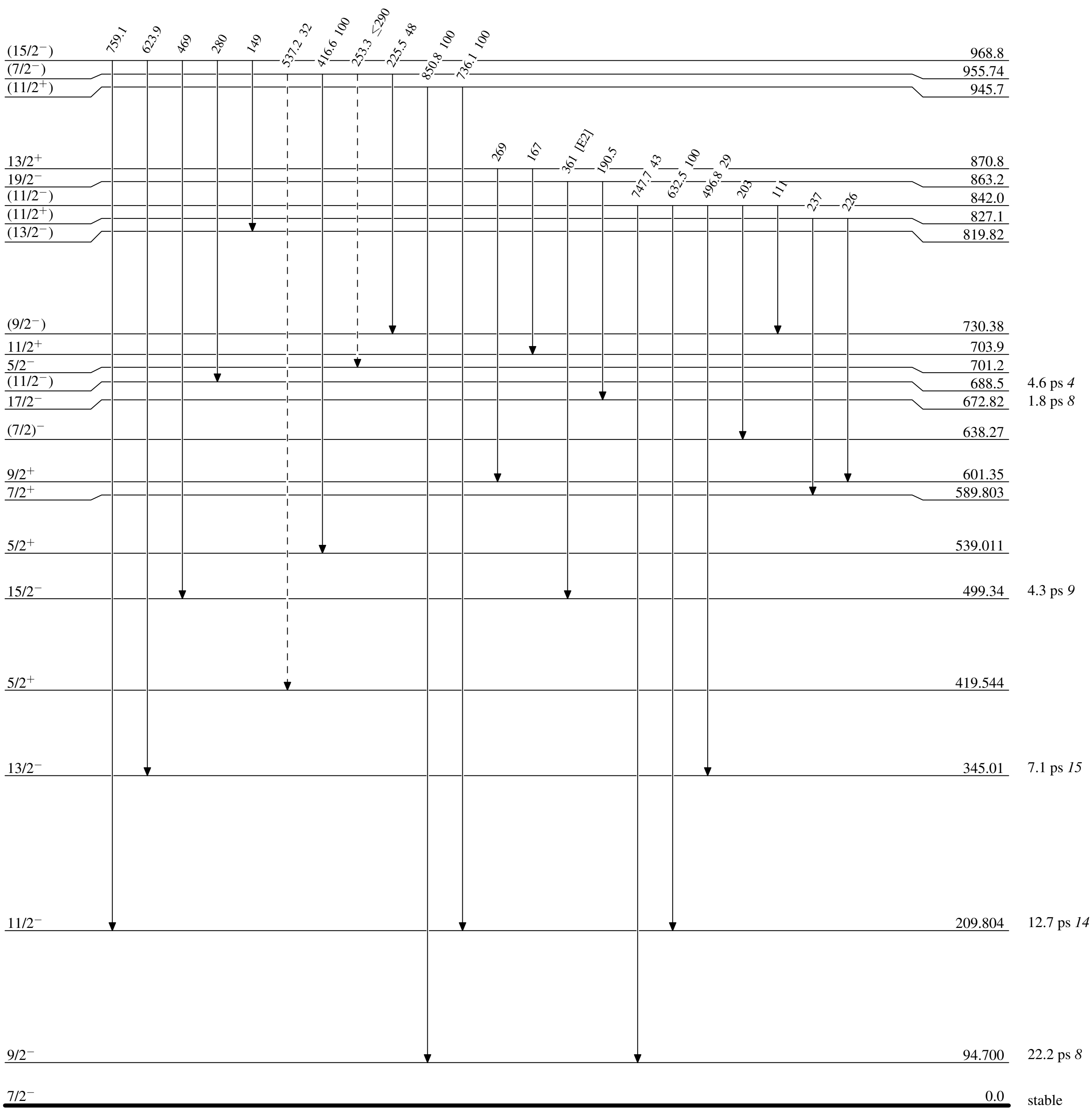
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

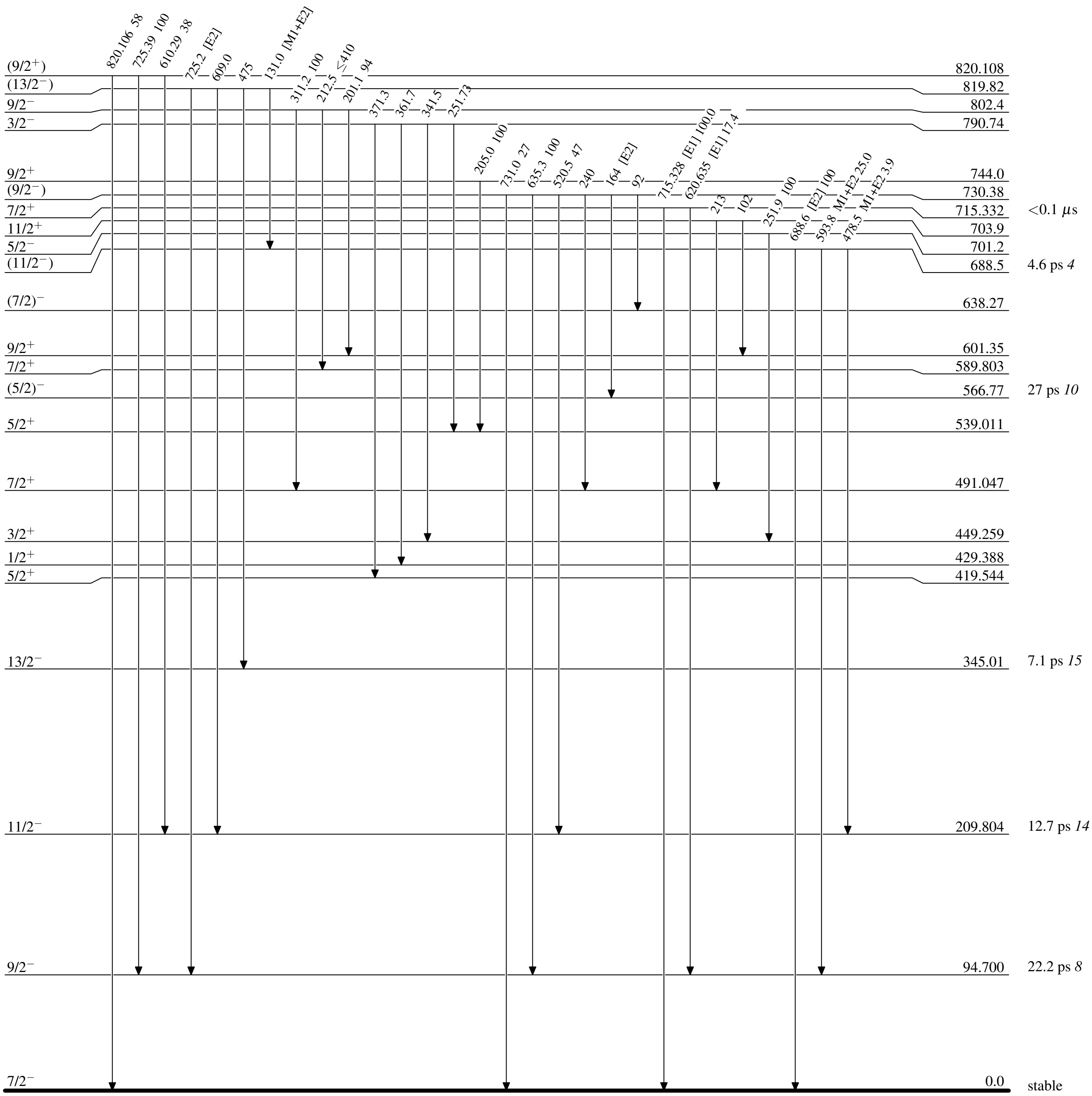


$^{165}_{67}Ho_{98}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

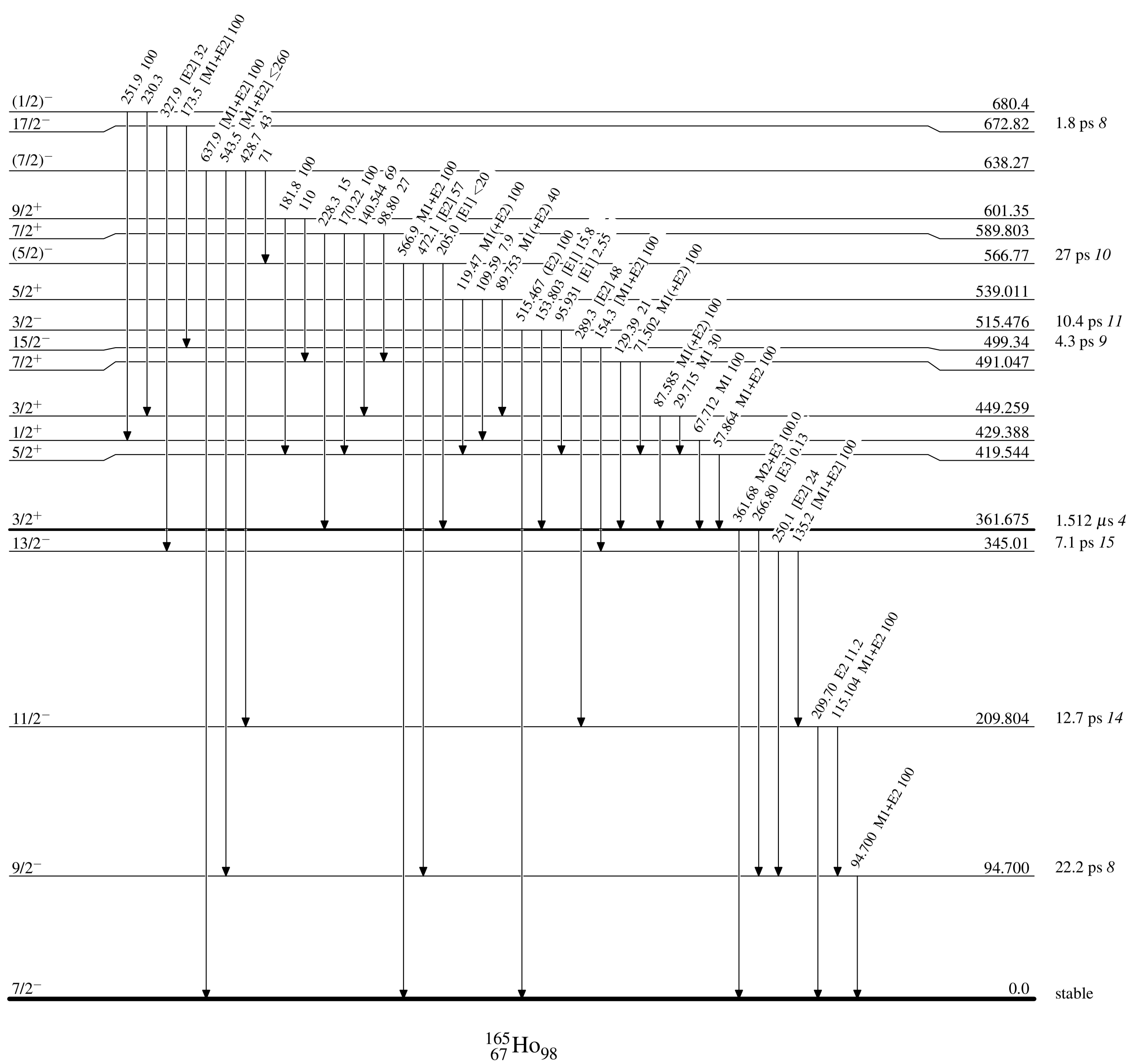


$^{165}_{67}Ho_{98}$

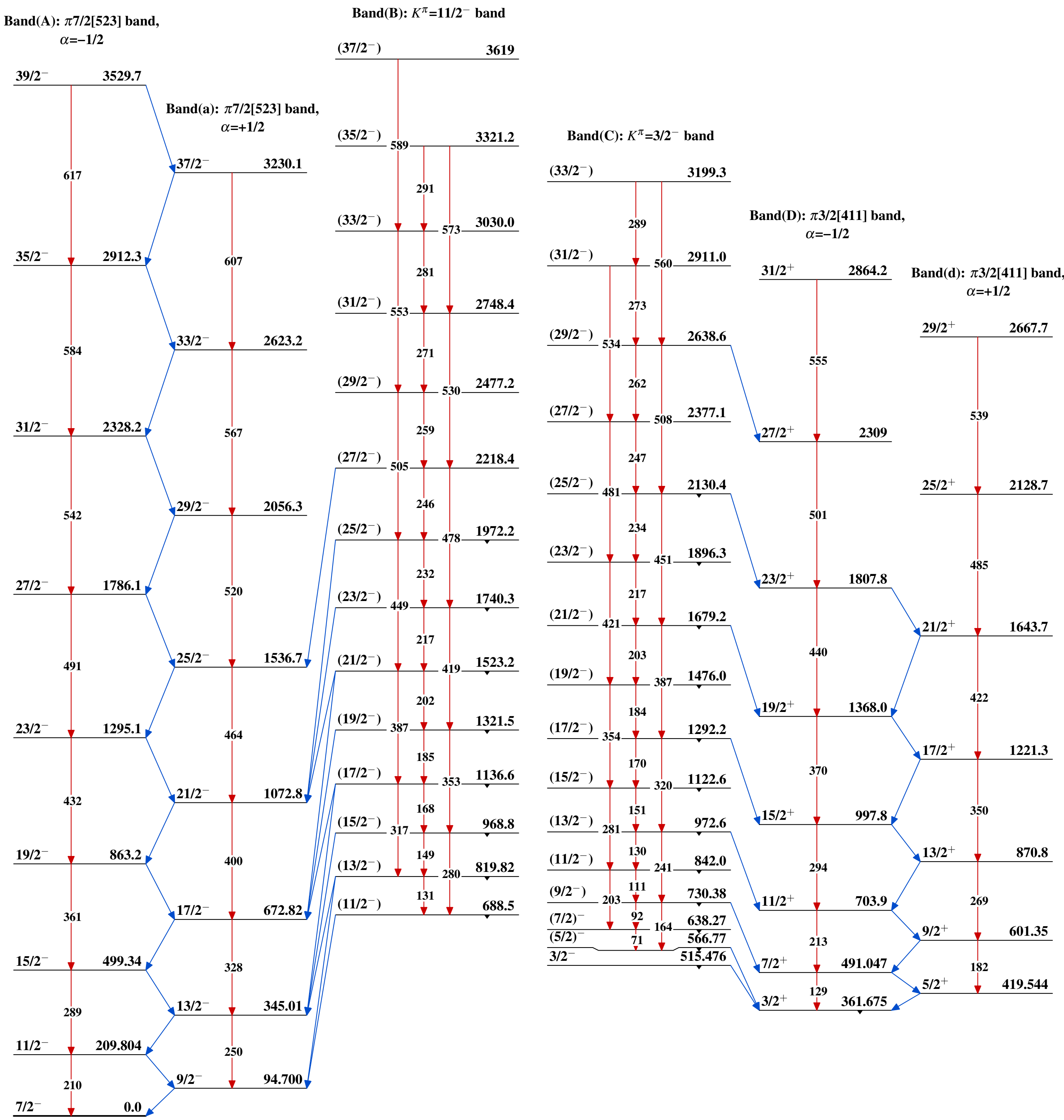
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

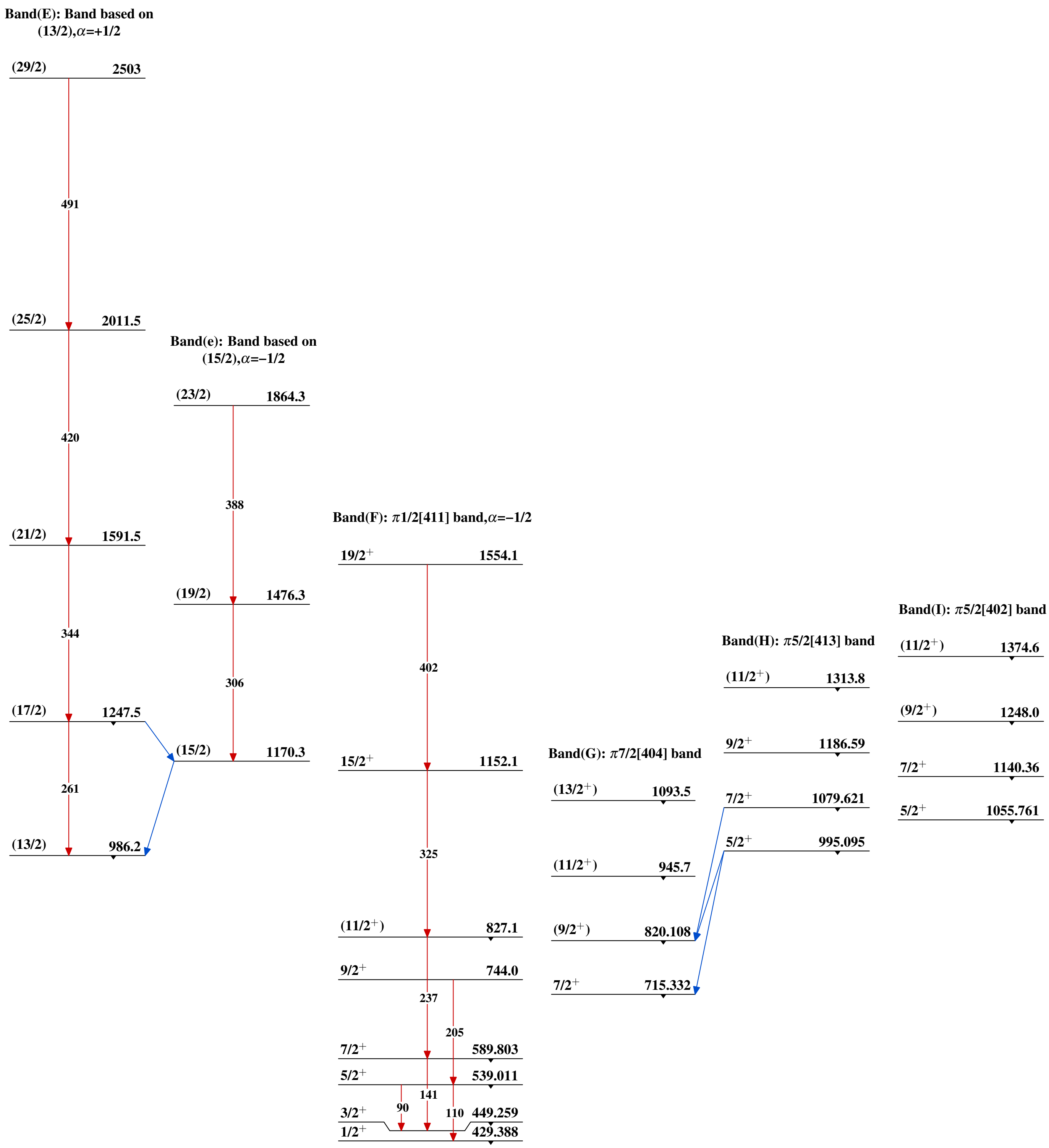


Adopted Levels, Gammas



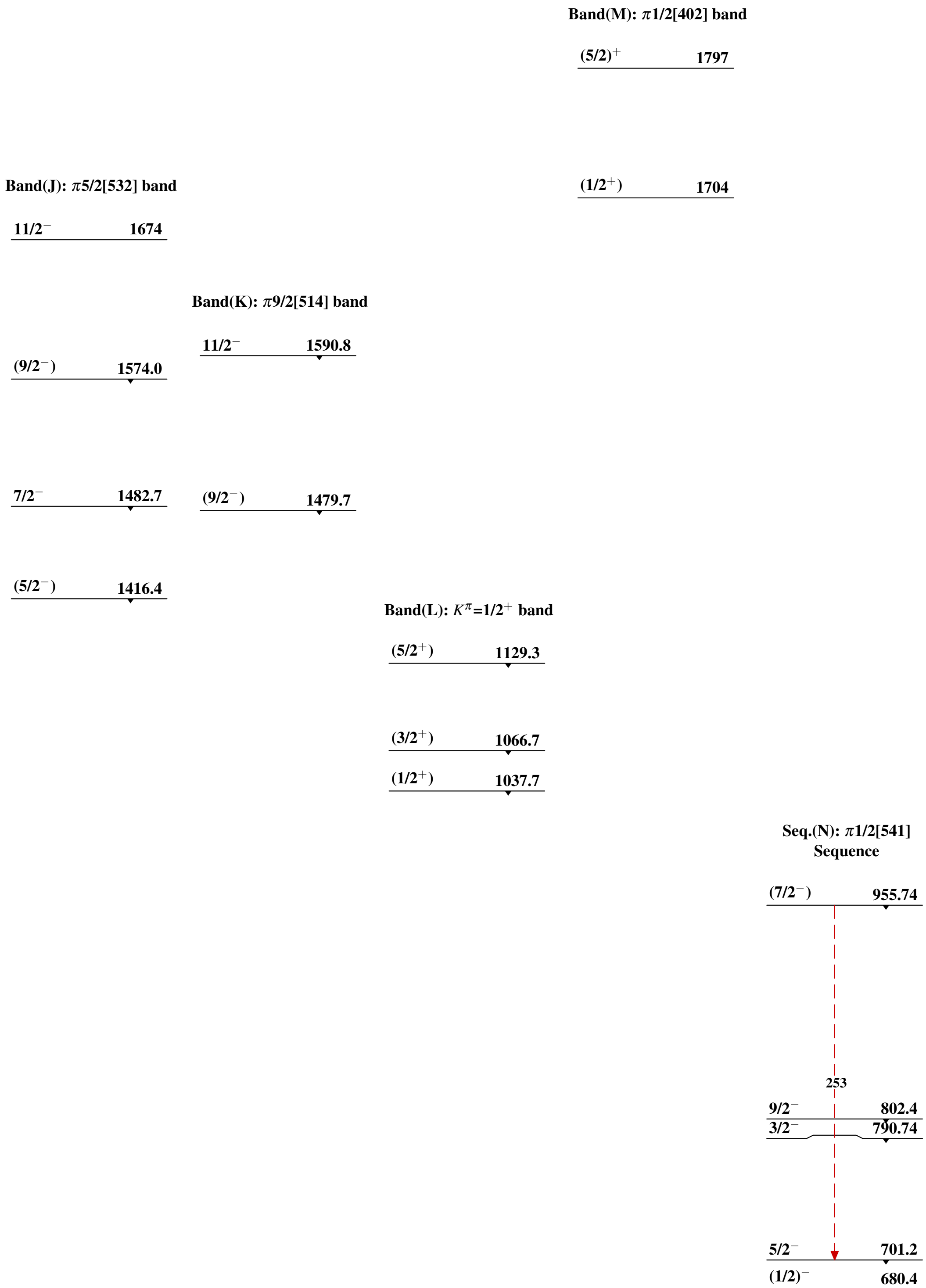
$^{165}_{67}Ho_{98}$

Adopted Levels, Gammas (continued)



$^{165}_{67}Ho_{98}$

Adopted Levels, Gammas (continued)



$^{165}_{67}Ho_{98}$