Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 176, 1 (2021)	1-May-2021

Q(β^-)=−318 *29*; S(n)=7124 *15*; S(p)=4504 *15*; Q(α)=1284 *15* 2021Wa16
S(2n)=16340 *30*, S(2p)=11489 *15* (2021Wa16).
For a discussion of the systematic features of signature inversion in the (π $h_{11/2}$)(ν $i_{13/2}$) bands in nuclides in the mass region A≈160, see 2001Ri19. For other discussions, including theoretical calculations, see 1992Ja03, 1995Li40, 1996Zh22, 1997Zh13, 2000Lu07, 2000Xu01, 2001Zh16 and 2003Ya19.

^{160}Ho Levels

1970ScZO have proposed a J^π=1$^+$ isomeric state at E≈70 keV with $T_{1/2}$=7 min and a J^π=9$^+$ isomeric state at E≥300 keV with $T_{1/2}$≈ 1 h, based upon measurements following α-particle bombardment of Tb. 1974Al27 could find no evidence of states at these energies.

Cross Reference (XREF) Flags

A	^{160}Ho IT decay (5.02 h)
B	^{160}Ho IT decay (3.2 s)
C	^{160}Er ε decay
D	(HI,xnγ)

E(level)[†]	J^π[‡]	$T_{1/2}$[#]	XREF	Comments
0.0[@]	5$^+$	25.6 min *3*	ABCD	%ε+%β^+=100 μ=+3.71 *3*; Q=+4.0 *2* J^π: atomic beam (1969Ek01,1970LiZL) and collinear fast-beam LASER spectroscopy (1988NeZZ). π=+, from log *ft*=4.69 for the ε+β^+ transition to the 4$^+$, 1694 level in ^{160}Dy. This small log *ft* value indicates that this transition is allowed unhindered and, hence, that the odd proton in ^{160}Ho occupies the 7/2[523] Nilsson state. The odd neutron is assigned the configuration=3/2[521], since the N=93 nuclides ^{155}Sm, ^{157}Gd, ^{159}Dy and ^{161}Er all have this configuration in their ground states (1971Bu16). The K=5 coupling of these two orbitals is expected to lie below that with K=2. $T_{1/2}$: from γ(t) (1965St08). Other measurements: 22.5 min *5* (1950Wi13), 22 min (1954Ha19), 28 min *3* (1958To32), 25 min *1* (1966La11), 26 min (1969Ek01). μ: from 2014StZZ compilation (originally from 1989Al27, using laser resonance ionization mass spectroscopy, relative to ^{165}Ho). Q: from 2016St14 compilation (originally from 1989Al27, using laser resonance ionization mass spectroscopy, relative to ^{165}Ho). Δ<r^2>(^{160}Ho−^{165}Ho)=−0.363 fm^2 *2*, from measured hyperfine structure and isotope shift using resonance ionization spectroscopy (1989Al27). In an evaluation of nuclear rms charge radii, 2013An02 report <r^2>$^{1/2}$=5.17 fm *3*.
59.98 *3*	2$^-$	5.02 h *5*	A C	%ε+%β^+=23.8 *20*; %IT=76.2 *20* μ=+2.52 *3*; Q=+1.83 *17* %ε+%β^+,%IT: weighted average of %IT values (measured by almost the same group of authors by varied methods): 73.6 *52* (2002Ad34), 73.3 *30* (2003KaZR), 77.9 *20* (2006KaZX) (the smallest measured unc was adopted); other: 65 *3* (1974Al28). J^π: collinear fast-beam LASER spectroscopy (1988NeZZ), atomic beam (1969Ek01), E3 transition to g.s. $T_{1/2}$: from γ(t) (1965St08). Other measurements: 5.0 h (1969Ek01), 4.6 h *3* (1966La11), 5.0 h *2* (1963Ra15), 4.76 h *10* (1960Gr15), 5.3 h *2* (1957Dz60), 5.6 h *7* (1957Dz58), 5.0 h (1955Ne03).

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Adopted Levels, Gammas (continued)

^{160}Ho Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	XREF	Comments
				μ: from 2014StZZ compilation (originally from 1989Al27, using laser resonance ionization mass spectroscopy, relative to ^{165}Ho). Q: from 2016St14 compilation (originally from 1989Al27, using laser resonance ionization mass spectroscopy, relative to ^{165}Ho). from the hyperfine structure and isotope shifts measured using resonance ionization spectroscopy, 1989Al27 report that the difference between the mean square charge radii of this state and the ^{165}Ho g.s. is −0.446 fm^2 *5*. 1995Ga38 report −0.083 fm^2 *7* for the difference between the mean-square charge radii of this state and the ^{160}Ho g.s.
67.11[h] *3*	1+	28 ns *2*	C	Jπ: log *ft*=4.73 of the ε transition from the ^{160}Er g.s. (J^π=0+) requires J^π=1+ and also establishes the two-nucleon configuration (π 7/2[523] − ν 5/2[523]) as being at least a major component of this level. $T_{1/2}$: from 2006KaZX (^{160}Er ε decay) by measuring the retarded KX(Ho)-γ coincidences with respect to the time decrease in the 7.1γ intensity. Other: 30 ns *8* (2005KaZY, obtained by the same group).
107.27[@] *2*	6+	48 ns *10*	B D	Jπ: M1+E2 to g.s. indicates J^π=4+,5+ or 6+. First excited member of the g.s. rotational band.
118.441[a] *18*	6−	56 ns *8*	B D	Jπ: E1 transitions to 5+ (g.s.) and 6+ states establish π=− and J=5 or 6. Calculations (1996Dr03) of bandhead energies of the low-lying two-nucleon configurations indicate that the lowest such negative-parity bands expected are those from the K^π=6− and 1− couplings of the orbitals π 7/2[523] and ν 5/2[642], with 6− lying below 1−. The lowest expected K^π=5− band is expected higher in the level scheme. The hindrance factor of the E1 transition to the g.s. is consistent with that observed for E1 transitions between the same two (neutron) orbitals in several neighboring odd-A nuclides (1996Dr03), supporting the proposed configuration assignment and, hence, the J^π value.
169.56[b] *7*	7−		B D	Jπ: M1 to 6− level indicates π=−. Energy consistent with that expected for the 7− member of the proposed band.
169.56+x[d]	(9+)	3.2 s *2*	B D	%IT=100 E(level): x<55, from absence of K x ray associated with the deexciting γ. 2004Es01 report the level energy as 176 keV, but give no basis for it. Jπ: 1988Bh05 give J>7, based on absence of direct γ to 118 level. Of the bandheads having K(=J) larger than 7, only two (having K^π=9− and 9+) are expected at low energies. The configuration having 9+ agrees better with the information on this band than does that having 9−, as discussed by 1996Dr03. $T_{1/2}$: measured by 2005KaZX (^{160}Ho IT decay (3.2 s)) by the decrease of the 118γ.
175.6? *10*	(1−)		C	E(level),Jπ: level introduced by 2010VaZZ (^{160}Er ε decay) based on γ assumed to decay to 67, 1+ level with J^π value postulated by authors; because of the lack of evidence this level is questionable.
228.2			D	
232.90[&] *3*	7+		D	Jπ: M1+E2 γ to 6+ level indicates π=+. Energy consistent with that expected for the 7+ member of the proposed band.
242.55[a] *4*	8−		D	Jπ: M1+E2 to 7− indicates π=−. From expected band structure.
336.11[b] *4*	9−		D	Jπ: M1+E2 to 8− indicates π=−. From expected band structure.
376.47[@] *3*	8+		D	Jπ: γ's to 6+ and 7+ levels. From expected band structure.
389.538+x[c]	(10+)		D	
451.54[a] *4*	10−		D	Jπ: M1+E2 to 9− indicates π=−. From expected band structure.
536.96[&] *4*	9+		D	
586.44[b] *4*	11−		D	Jπ: M1+E2 to 10− indicates π=−. From expected band structure.
629.22+x[d]	(11+)		D	
708.32[@] *4*	10+		D	
738.2	10+		D	Jπ: γ to 8+, fed by a γ from 12+.
746.20[a] *4*	12−		D	Jπ: M1+E2 to 11− indicates π=−. From expected band structure.

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Adopted Levels, Gammas (continued)

^{160}Ho Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
886.82+x[c]	(12+)	D	
920.9[&]	11+	D	
924.54[b] 5	13−	D	Jπ: M1+E2 to 12− indicates π=−. From expected band structure.
1061[g]		D	
1119.0[@]	12+	D	
1128.00[a] 5	14−	D	
1161.23+x[d]	(13+)	D	
1276.2		D	
1347.3[&]	13+	D	
1352.88[b] 5	15−	D	
1449.50+x[c]	(14+)	D	
1484.3[g]		D	
1548.3[@]	14+	D	
1594.71[a] 5	16−	D	
1714.5		D	
1749.82+x[d]	(15+)	D	
1822.8[&]	15+	D	
1868.57[b] 5	17−	D	
1981.6[g]		D	
2040.1[@]	16+	D	
2059.9+x[c]	(16+)	D	
2141.29[a] 6	18−	D	
2253.7		D	
2333.7[&]	17+	D	
2373.7+x[d]	(17+)	D	
2448.5		D	
2464.67[b] 6	19−	D	
2537.6[g]		D	
2595.5[@]	18+	D	
2687.9+x[c]	(18+)	D	
2761.01[a] 7	20−	D	
2892.2[&]	19+	D	
2993.7+x[d]	(19+)	D	
3117.7		D	
3133.13[b] 9	21−	D	
3137?[g]		D	
3218.1[@]	20+	D	
3295.2+x[c]	(20+)	D	
3445.73[a] 10	22−	D	
3529[&]	21+	D	
3595.9+x[d]	(21+)	D	
3861.1[b] 4	23−	D	
3881[@]	22+	D	
3897+x?[c]	(22+)	D	
4184.6[a] 3	24−	D	
4197+x?[d]	(23+)	D	
4211?[&]	(23+)	D	
4506+x[c]	(24+)	D	

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Adopted Levels, Gammas (continued)

^{160}Ho Levels (continued)

E(level)[†]	Jπ[‡]	XREF	E(level)[†]	Jπ[‡]	XREF	E(level)[†]	Jπ[‡]	XREF
4577?[@]	(24+)	D	289.71+y[e] 4	(8−)	D	2050.7+y[f]	(15−)	D
4589.6[b]	25−	D	466.65+y[f] 5	(9−)	D	2384.4+y[e]	(16−)	D
4953.1[a]	26−	D	683.00+y[e] 5	(10−)	D	2728.6+y[f]	(17−)	D
5377.1[b]	27−	D	907.90+y[f] 6	(11−)	D	3022.5+y[e]	(18−)	D
5770?[a]	(28−)	D	1172.05+y[e] 9	(12−)	D	3691.0+y[e]	(20−)	D
y[e]	(6−)	D	1440.9+y[f]	(13−)	D	4388.0+y[e]	(22−)	D
126.45+y[f] 3	(7−)	D	1744.9+y[e]	(14−)	D			

† From least-squares fit to Eγ data (reduced χ^2=3.0 is greater than critical χ^2=1.5).

‡ For those levels populated only in the in-beam studies, these values are based to a considerable extent on the observed patterns of the γ decay and considerations of expected band structures. Additional reasoning for these values, in particular for the nucleon configurations assigned to the various bands, has been given by 1996Dr03, who present calculated bandhead energies, deduced K quantum numbers, alignments, and g factors for the bands. In addition to any specific arguments that are given for these levels, it is to be understood that the J^π values are based on these general considerations.

From (HI,xnγ), except where noted otherwise.

@ Band(A): g.s. band, signature=0 branch. Configuration=(π 7/2[523] + ν 3/2[521]) A=8.90 keV, B=+1.4 eV (from 5^+,6^+, and 7^+ levels).

& Band(a): g.s. band, signature=1 branch. Configuration=(π 7/2[523] + ν 3/2[521]) A=8.90 keV, B=+1.4 eV (from 5^+,6^+, and 7^+ levels).

a Band(B): Negative-parity yrast band, signature=0. Configuration=(π 7/2[523] + ν 5/2[642]) The Nilsson-orbital composition is given here, although, at higher spins, the classification according to spherical shell-model structure, namely configuration=((π $h_{11/2}$)(ν $i_{13/2}$)), might be more appropriate.

b Band(C): Negative-parity yrast band, signature=1. Configuration=(π 7/2[523] + ν 5/2[642]) See comment on the signature=0 portion of this band.

c Band(D): K^π=(9^+) band, signature=0 branch. Probable configuration=(π 7/2[523] + ν 11/2[505]) A=11.08 keV, B=−2.3 eV (from 9^+, 10^+, and 11^+ members).

d Band(d): K^π=(9^+) band, signature=1 branch. Probable configuration=(π 7/2[523] + ν 11/2[505]) A=11.08 keV, B=−2.3 eV (from 9^+, 10^+, and 11^+ members).

e Band(E): K^π=(6^-) band, signature=0 branch. Proposed configuration=(π 7/2[404] + ν 5/2[523]). This is the dominant configuration at low spins. For additional comments, see the discussion of this assignment in the (HI,xnγ) Data Set.

f Band(e): K^π=(6^-) band, signature=1 branch. Proposed configuration=(π 7/2[404] + ν 5/2[523]). See the comments on the signature=0 branch of this band, as well as in the (HI,xnγ) dataset.

g Band(F): suggested level sequence.

h Band(G): K^π=1^+ bandhead. Dominant Configuration=(π 7/2[523] − ν 5/2[523]).

$\gamma(^{160}Ho)$

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.†	δ†‡	α#	Comments
59.98	2^-	59.98 *3*	100	0.0	5^+	E3(+M4)	<0.017	930 *16*	B(E3)(W.u.)=1.30×10^{-5} *8*; B(M4)(W.u.)<11 α(K)=1.97 *7*; α(L)=698 *12*; α(M)=184 *4* α(N)=41.9 *8*; α(O)=4.75 *9*; α(P)=0.0035 *7* E_γ: from ^{160}Ho IT decay (5.02 h). Mult.: deduced by 1966Av03 from measured subshell ratios in 5.02-h ^{160}Ho IT decay. δ: %M4<0.03 (2010VaZZ, from α(K)exp, ^{160}Ho IT decay (5.02 h)).
67.11	1^+	7.133 *10*	100	59.98	2^-	E1(+M2)	<0.0006	17.4 *3*	α(M)=14.27 *22* α(N)=2.93 *5*; α(O)=0.230 *4*; α(P)=0.00379 *8* B(E1)(W.u.)=0.00124 *11* E_γ: from ^{160}Er ε decay. δ: from 1990Go02 in ^{160}Er ε decay. These authors conclude that, at the 99% confidence level, %M2<0.0006 in the 7.133 γ. α: calculated value for pure E1 transition.
107.27	6^+	107.28 *2*	100	0.0	5^+	M1+E2	0.25 *4*	2.14	α(K)=1.74 *3*; α(L)=0.307 *14*; α(M)=0.069 *4* α(N)=0.0159 *8*; α(O)=0.00223 *9*; α(P)=0.0001069 *21* B(M1)(W.u.)=1.11×10^{-4} *+30−20*; B(E2)(W.u.)=0.30 *+13−10*
118.441	6^-	(11.13 *7*)	2.39 *12*	107.27	6^+	[E1]		22.9 *5*	α(L)=17.8 *4*; α(M)=4.20 *10* α(N)=0.890 *20*; α(O)=0.0836 *17*; α(P)=0.00165 *3* B(E1)(W.u.)=4.0×10^{-5} *+7−5* Mult.: from level scheme, $\Delta\pi$=yes. From RUL, δ(M2/E1)<0.001.
		118.44 *2*	100 *1*	0.0	5^+	E1		0.202	α(K)=0.1687 *24*; α(L)=0.0260 *4*; α(M)=0.00572 *8* α(N)=0.001306 *19*; α(O)=0.0001781 *25*; α(P)=7.88×10^{-6} *11* B(E1)(W.u.)=1.39×10^{-6} *+24−17*
169.56	7^-	51.17 *2*	100	118.441	6^-	M1+E2	0.10 *+4−6*	3.3 *4*	α(L)=2.6 *3*; α(M)=0.58 *7* α(N)=0.134 *16*; α(O)=0.0189 *18*; α(P)=0.000947 *15* Mult.,δ: from α(K)exp in ^{160}Ho IT decay (3.2 s).
169.56+x	(9^+)	x		169.56	7^-				
175.6?	(1^-)	108.5& *10*	100	67.11	1^+	[E1,M2]		0.43 *18*	α(K)=0.35 *14*; α(L)=0.069 *36*; α(M)=0.0157 *84* α(N)=0.0036 *20*; α(O)=5.0×10^{-4} *28*; α(P)=2.3×10^{-5} *14* E_γ,I_γ: γ ray postulated by 2010VaZZ (^{160}Er ε decay) as observed in a "fresh" spectrum of ^{160}Er source with no evidence, reason for which its existence is questionable ($\Delta E\gamma$ is adopted by evaluator).
228.2		109.8	100	118.441	6^-				
232.90	7^+	125.67 *4*	100 *10*	107.27	6^+	M1+E2	0.33 *3*	1.346	α(K)=1.090 *18*; α(L)=0.199 *6*; α(M)=0.0448 *14* α(N)=0.0103 *4*; α(O)=0.00144 *4*; α(P)=6.64×10^{-5} *12*
		232.85 *5*	67 *8*	0.0	5^+				

From ENSDF

Adopted Levels, Gammas (continued)

γ(^{160}Ho) (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.†	δ†‡	α#	Comments
242.55	8⁻	72.95 *2*	100	169.56	7⁻	M1+E2	0.09 *8*	6.50 *11*	α(K)=5.41 *11*; α(L)=0.85 *10*; α(M)=0.189 *25* α(N)=0.044 *6*; α(O)=0.0063 *7*; α(P)=0.000337 *7*
		(124.11 *4*)		118.441	6⁻				
336.11	9⁻	93.56 *2*	100 *2*	242.55	8⁻	M1+E2	0.13 *5*	3.17	α(K)=2.63 *5*; α(L)=0.418 *22*; α(M)=0.093 *6* α(N)=0.0215 *12*; α(O)=0.00309 *14*; α(P)=0.000163 *3*
		166.47 *4*	19.8 *15*	169.56	7⁻				
376.47	8⁺	143.65 *3*	98 *6*	232.90	7⁺				
		269.19 *2*	100 *21*	107.27	6⁺				
389.538+x	(10⁺)	219.93 *2*	100	169.56+x	(9⁺)				
451.54	10⁻	115.43 *2*	100 *3*	336.11	9⁻	M1+E2	0.141 *12*	1.730	α(K)=1.442 *21*; α(L)=0.225 *4*; α(M)=0.0499 *8* α(N)=0.01158 *19*; α(O)=0.00167 *3*; α(P)=8.90×10^{-5} *13*
		208.98 *3*	18.8 *15*	242.55	8⁻				
536.96	9⁺	160.46 *3*	81 *9*	376.47	8⁺	M1+E2	0.45 *5*	0.654 *11*	α(K)=0.528 *12*; α(L)=0.098 *3*; α(M)=0.0220 *7* α(N)=0.00507 *16*; α(O)=0.000705 *17*; α(P)=3.18×10^{-5} *9*
		303.85 *5*	100 *18*	232.90	7⁺				
586.44	11⁻	134.94 *2*	100.0 *19*	451.54	10⁻	M1+E2	0.157 *20*	1.107	α(K)=0.924 *14*; α(L)=0.1431 *24*; α(M)=0.0318 *6* α(N)=0.00736 *13*; α(O)=0.001060 *17*; α(P)=5.69×10^{-5} *9*
		250.33 *2*	32.4 *17*	336.11	9⁻	E2		0.1173	α(K)=0.0832 *12*; α(L)=0.0264 *4*; α(M)=0.00618 *9* α(N)=0.001405 *20*; α(O)=0.000179 *3*; α(P)=4.15×10^{-6} *6*
629.22+x	(11⁺)	239.67 *4*	61 *5*	389.538+x	(10⁺)				
		459.69 *6*	100 *10*	169.56+x	(9⁺)				
708.32	10⁺	171.17 *4*	47 *4*	536.96	9⁺				
		332.05 *4*	100 *7*	376.47	8⁺				
		371		336.11	9⁻				
738.2	10⁺	201		536.96	9⁺				
		362		376.47	8⁺				
		401		336.11	9⁻				
746.20	12⁻	159.80 *2*	100 *4*	586.44	11⁻	M1+E2	0.155 *25*	0.686	α(K)=0.574 *9*; α(L)=0.0875 *14*; α(M)=0.0194 *4* α(N)=0.00450 *8*; α(O)=0.000649 *10*; α(P)=3.54×10^{-5} *6*
		294.57 *3*	48.0 *16*	451.54	10⁻				
886.82+x	(12⁺)	257.65 *4*	38 *5*	629.22+x	(11⁺)				
		497.25 *5*	100 *8*	389.538+x	(10⁺)				
920.9	11⁺	182		738.2	10⁺				
		212.3		708.32	10⁺				
		384.3		536.96	9⁺				
924.54	13⁻	178.35 *2*	100.0 *17*	746.20	12⁻	M1+E2	0.105 *20*	0.506 *8*	α(K)=0.425 *6*; α(L)=0.0634 *9*; α(M)=0.01400 *21* α(N)=0.00325 *5*; α(O)=0.000472 *7*; α(P)=2.62×10^{-5} *4*
		338.12 *3*	76.3 *20*	586.44	11⁻	E2		0.0466	α(K)=0.0354 *5*; α(L)=0.00873 *13*; α(M)=0.00201 *3* α(N)=0.000460 *7*; α(O)=6.06×10^{-5} *9*; α(P)=1.87×10^{-6} *3*
1061		475	100	586.44	11⁻				
1119.0	12⁺	198.7		920.9	11⁺				
		380		738.2	10⁺				
		411.0		708.32	10⁺				

From ENSDF

$^{160}_{67}Ho_{93}$-6

γ(^{160}Ho) (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.†	δ†‡	α#	Comments
1128.00	14⁻	203.48 *2*	78 *4*	924.54	13⁻				
		381.77 *3*	100 *3*	746.20	12⁻	E2		0.0328	α(K)=0.0254 *4*; α(L)=0.00576 *8*; α(M)=0.001321 *19* α(N)=0.000302 *5*; α(O)=4.03×10⁻⁵ *6*; α(P)=1.369×10⁻⁶ *20*
1161.23+x	(13⁺)	274.48 *7*	27 *10*	886.82+x	(12⁺)				
		531.94 *7*	100 *14*	629.22+x	(11⁺)				
1276.2		530.0	100	746.20	12⁻				
1347.3	13⁺	228.2		1119.0	12⁺				
		426.8		920.9	11⁺				
1352.88	15⁻	224.89@ *2*	82@ *8*	1128.00	14⁻	M1+E2	0.164 *3*	0.265	α(K)=0.222 *4*; α(L)=0.0332 *5*; α(M)=0.00734 *11* α(N)=0.001704 *24*; α(O)=0.000247 *4*; α(P)=1.367×10⁻⁵ *20*
		428.33 *2*	100 *8*	924.54	13⁻				
1449.50+x	(14⁺)	289.3		1161.23+x	(13⁺)				
		562.54		886.82+x	(12⁺)				
1484.3		423		1061					
		559.5		924.54	13⁻				
1548.3	14⁺	201.1		1347.3	13⁺				
		429.3		1119.0	12⁺				
1594.71	16⁻	241.87 *3*	59 *3*	1352.88	15⁻	M1+E2	0.126 *15*	0.218	α(K)=0.183 *3*; α(L)=0.0271 *4*; α(M)=0.00598 *9* α(N)=0.001389 *20*; α(O)=0.000202 *3*; α(P)=1.127×10⁻⁵ *16*
		466.68 *3*	100 *3*	1128.00	14⁻				
1714.5		586.5	100	1128.00	14⁻				
1749.82+x	(15⁺)	300.4 *2*	≤32	1449.50+x	(14⁺)				
		588.57 *12*	100 *20*	1161.23+x	(13⁺)				
1822.8	15⁺	475.5	100	1347.3	13⁺				
1868.57	17⁻	273.84 *3*	84 *4*	1594.71	16⁻	M1+E2	0.095 *23*	0.1562 *23*	α(K)=0.1315 *19*; α(L)=0.0193 *3*; α(M)=0.00425 *6* α(N)=0.000987 *14*; α(O)=0.0001436 *21*; α(P)=8.07×10⁻⁶ *12*
		515.68 *4*	100 *12*	1352.88	15⁻				
1981.6		497		1484.3					
		629.0		1352.88	15⁻				
2040.1	16⁺	217		1822.8	15⁺				
		491.9		1548.3	14⁺				
2059.9+x	(16⁺)	310.8		1749.82+x	(15⁺)				
		610.34 *15*		1449.50+x	(14⁺)				
2141.29	18⁻	272.71 *4*	76 *8*	1868.57	17⁻				
		546.63 *5*	100 *15*	1594.71	16⁻	E2		0.01258	α(K)=0.01016 *15*; α(L)=0.00188 *3*; α(M)=0.000425 *6* α(N)=9.77×10⁻⁵ *14*; α(O)=1.345×10⁻⁵ *19*; α(P)=5.69×10⁻⁷ *8*
2253.7		659.0	100	1594.71	16⁻				
2333.7	17⁺	511.1	100	1822.8	15⁺				
2373.7+x	(17⁺)	313.4		2059.9+x	(16⁺)				
		624.3		1749.82+x	(15⁺)				
2448.5		580.2	100	1868.57	17⁻				
2464.67	19⁻	323.37 *4*	77 *11*	2141.29	18⁻				
		596.08 *4*	100 *24*	1868.57	17⁻				

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γ(^{160}Ho) (continued)

E_i(level)	J^{π}_i	E_γ†	I_γ†	E_f	J^{π}_f	Mult.†	α#	Comments
2537.6		556	100	1981.6				
2595.5	18+	262		2333.7	17+			
		555.2		2040.1	16+			
2687.9+x	(18+)	628.0	100	2059.9+x	(16+)			
2761.01	20−	296.33 4	70 4	2464.67	19−			
		619.78 7	100 8	2141.29	18−			
2892.2	19+	558.5	100	2333.7	17+			
2993.7+x	(19+)	620.0	100	2373.7+x	(17+)			
3117.7		652.8		2464.67	19−			
		669.5		2448.5				
3133.13	21−	372.13 7	72 12	2761.01	20−	M1	0.0693	α(K)=0.0585 9; α(L)=0.00845 12; α(M)=0.00186 3 α(N)=0.000432 6; α(O)=6.30×10^{-5} 9; α(P)=3.57×10^{-6} 5
		668.0 3	100 21	2464.67	19−			
3137?		599&	100	2537.6				
3218.1	20+	622.6	100	2595.5	18+			
3295.2+x	(20+)	607.3	100	2687.9+x	(18+)			
3445.73	22−	312.60 4	53 12	3133.13	21−			
		684.78 14	100 21	2761.01	20−			
3529	21+	637	100	2892.2	19+			
3595.9+x	(21+)	602.2	100	2993.7+x	(19+)			
3861.1	23−	414.6		3445.73	22−			
		728.2 4		3133.13	21−			
3881	22+	663	100	3218.1	20+			
3897+x?	(22+)	601&	100	3295.2+x	(20+)			
4184.6	24−	738.8 3	100	3445.73	22−			
4197+x?	(23+)	601&	100	3595.9+x	(21+)			
4211?	(23+)	681&	100	3529	21+			
4506+x	(24+)	609&	100	3897+x?	(22+)			
4577?	(24+)	695&	100	3881	22+			
4589.6	25−	404.5		4184.6	24−			
		729.0		3861.1	23−			
4953.1	26−	768.5	100	4184.6	24−			
5377.1	27−	787.5	100	4589.6	25−			
5770?	(28−)	817&	100	4953.1	26−			
126.45+y	(7−)	126.44 3	100	y	(6−)			
289.71+y	(8−)	163.24 3	100 5	126.45+y	(7−)			
		289.75 6	31 6	y	(6−)			
466.65+y	(9−)	177.05 5	100 9	289.71+y	(8−)			
		340.28 8	67 11	126.45+y	(7−)			
683.00+y	(10−)	216.37 3	100 8	466.65+y	(9−)			
		393.08 6	94 10	289.71+y	(8−)			

Adopted Levels, Gammas (continued)

γ(^{160}Ho) (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f
907.90+y	(11$^-$)	224.89@ 2	65@ 17	683.00+y	(10$^-$)
		441.44 7	100 11	466.65+y	(9$^-$)
1172.05+y	(12$^-$)	264.53 11	43 8	907.90+y	(11$^-$)
		488.84 8	100 11	683.00+y	(10$^-$)
1440.9+y	(13$^-$)	268.7		1172.05+y	(12$^-$)
		533.5		907.90+y	(11$^-$)
1744.9+y	(14$^-$)	304.0		1440.9+y	(13$^-$)
		572.6		1172.05+y	(12$^-$)
2050.7+y	(15$^-$)	306.0		1744.9+y	(14$^-$)
2050.7+y	(15$^-$)	610.1		1440.9+y	(13$^-$)
2384.4+y	(16$^-$)	334.0		2050.7+y	(15$^-$)
		639.0		1744.9+y	(14$^-$)
2728.6+y	(17$^-$)	344.0		2384.4+y	(16$^-$)
		678.0		2050.7+y	(15$^-$)
3022.5+y	(18$^-$)	294.0		2728.6+y	(17$^-$)
		638.0		2384.4+y	(16$^-$)
3691.0+y	(20$^-$)	668.5	100	3022.5+y	(18$^-$)
4388.0+y	(22$^-$)	697.0	100	3691.0+y	(20$^-$)

† From (HI,xnγ), except where noted otherwise.

‡ Additional information 1.

Additional information 2.

@ Multiply placed with intensity suitably divided.

& Placement of transition in the level scheme is uncertain.

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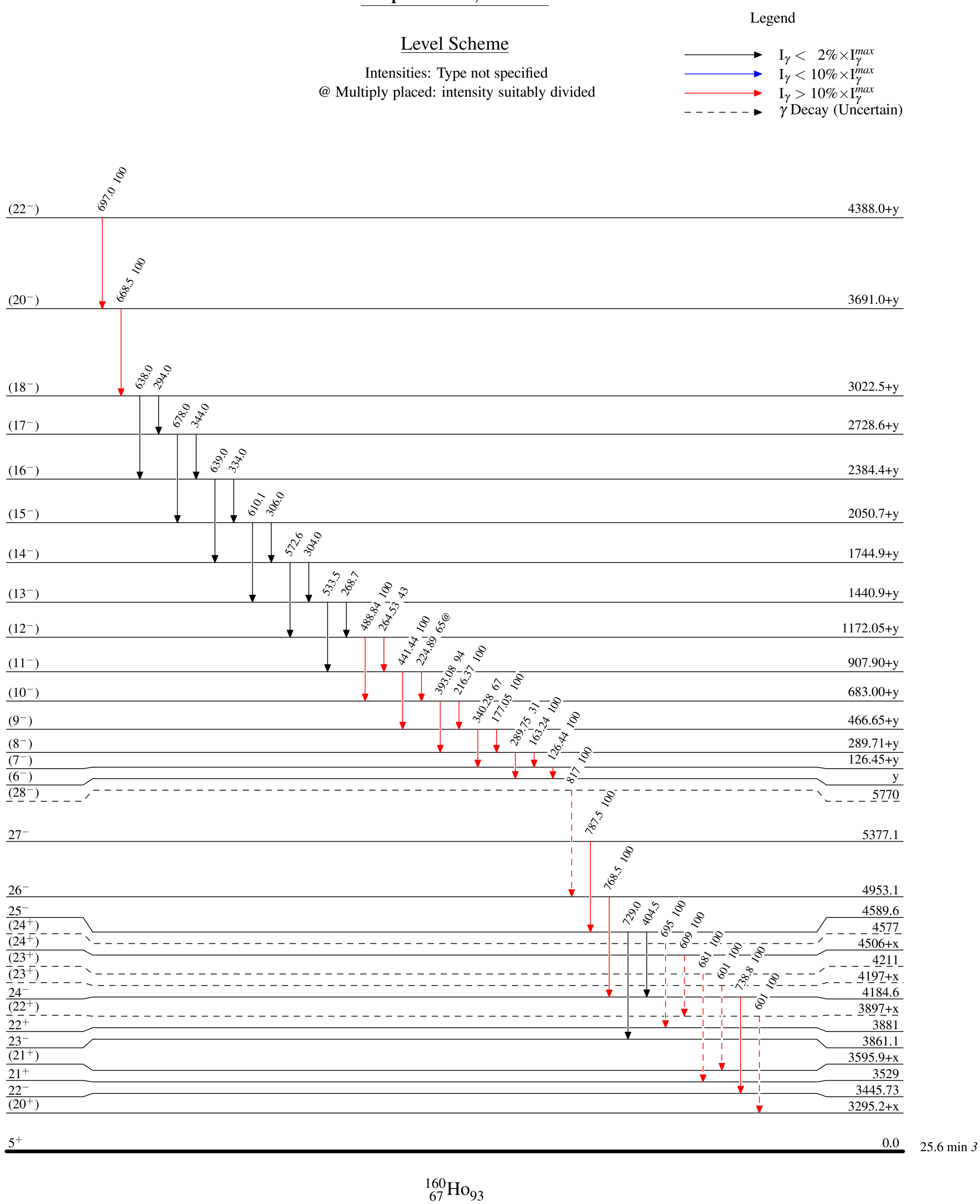
Adopted Levels, Gammas

Level Scheme

Intensities: Type not specified

@ Multiply placed: intensity suitably divided



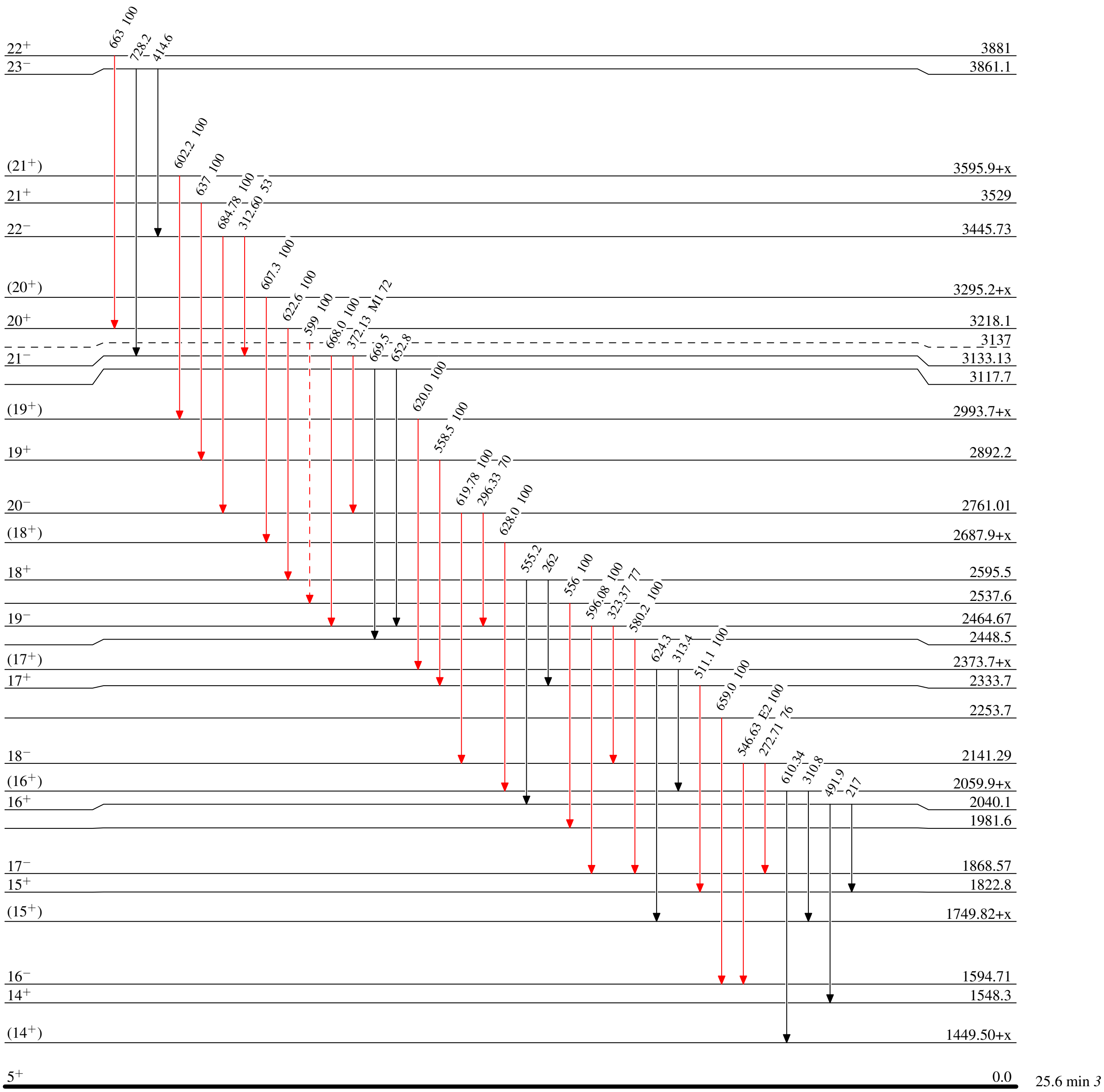
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified
@ Multiply placed: intensity suitably divided

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)

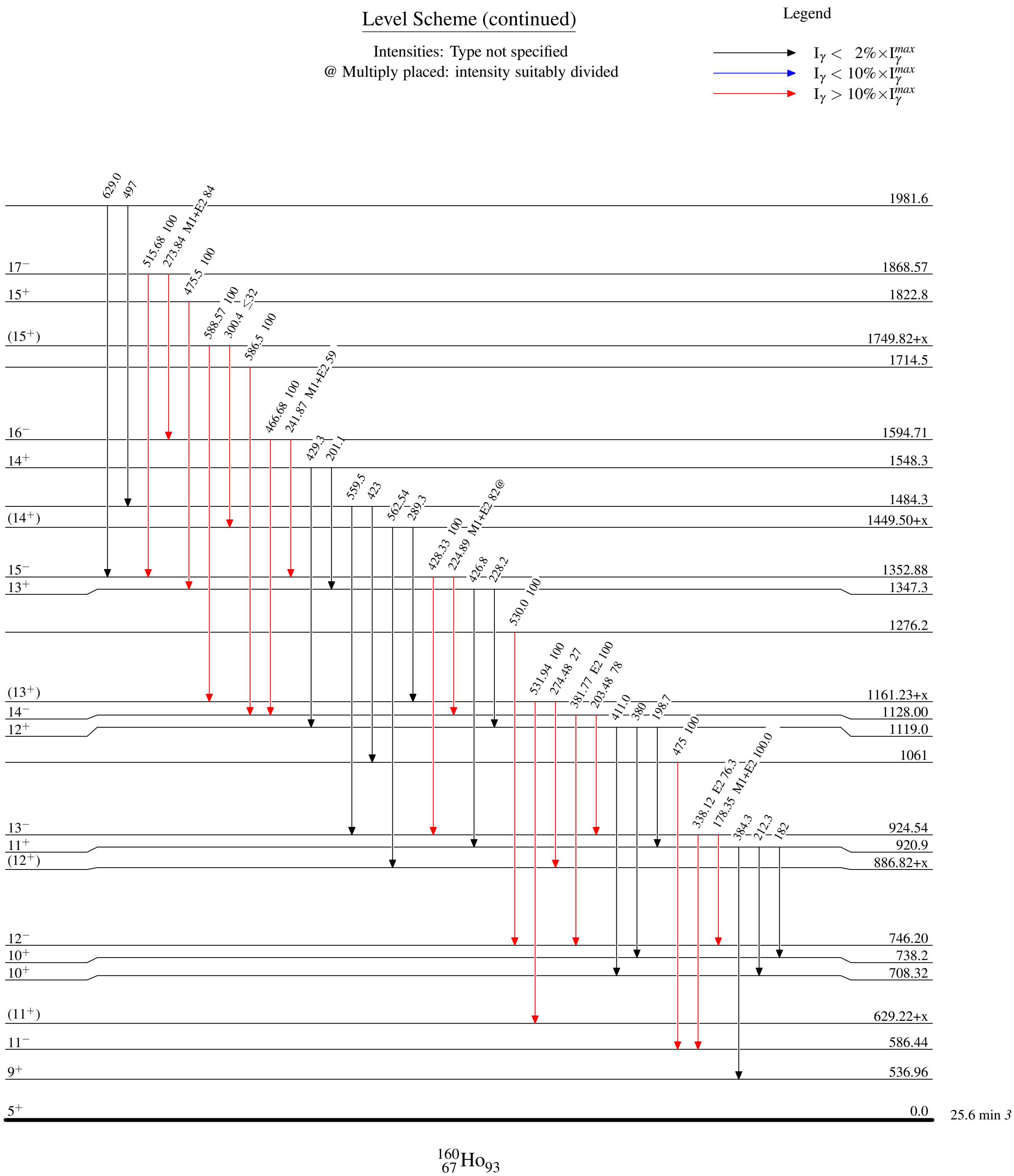


$^{160}_{67}Ho_{93}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified
@ Multiply placed: intensity suitably divided



Adopted Levels, Gammas

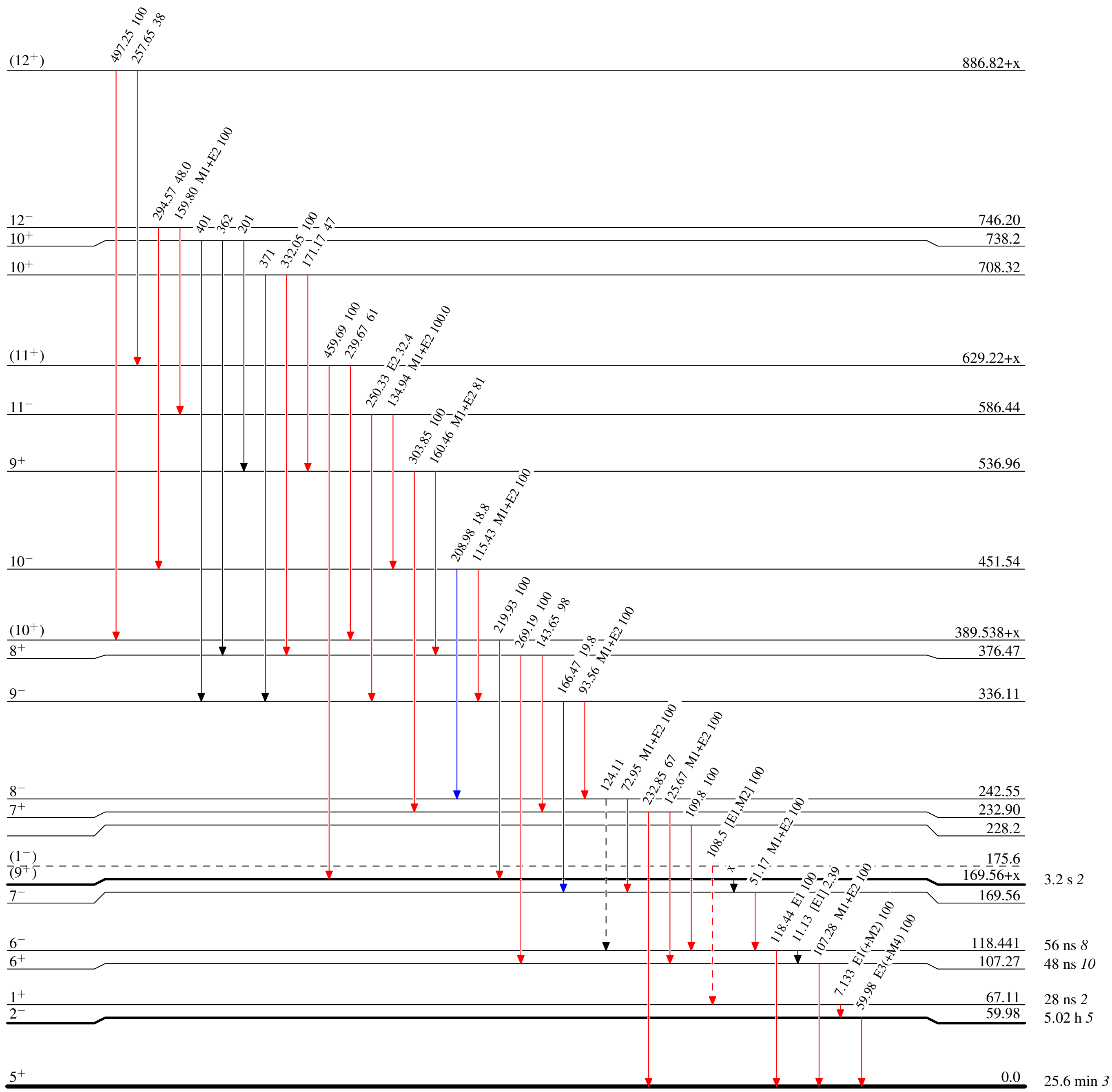
Level Scheme (continued)

Intensities: Type not specified

@ Multiply placed: intensity suitably divided

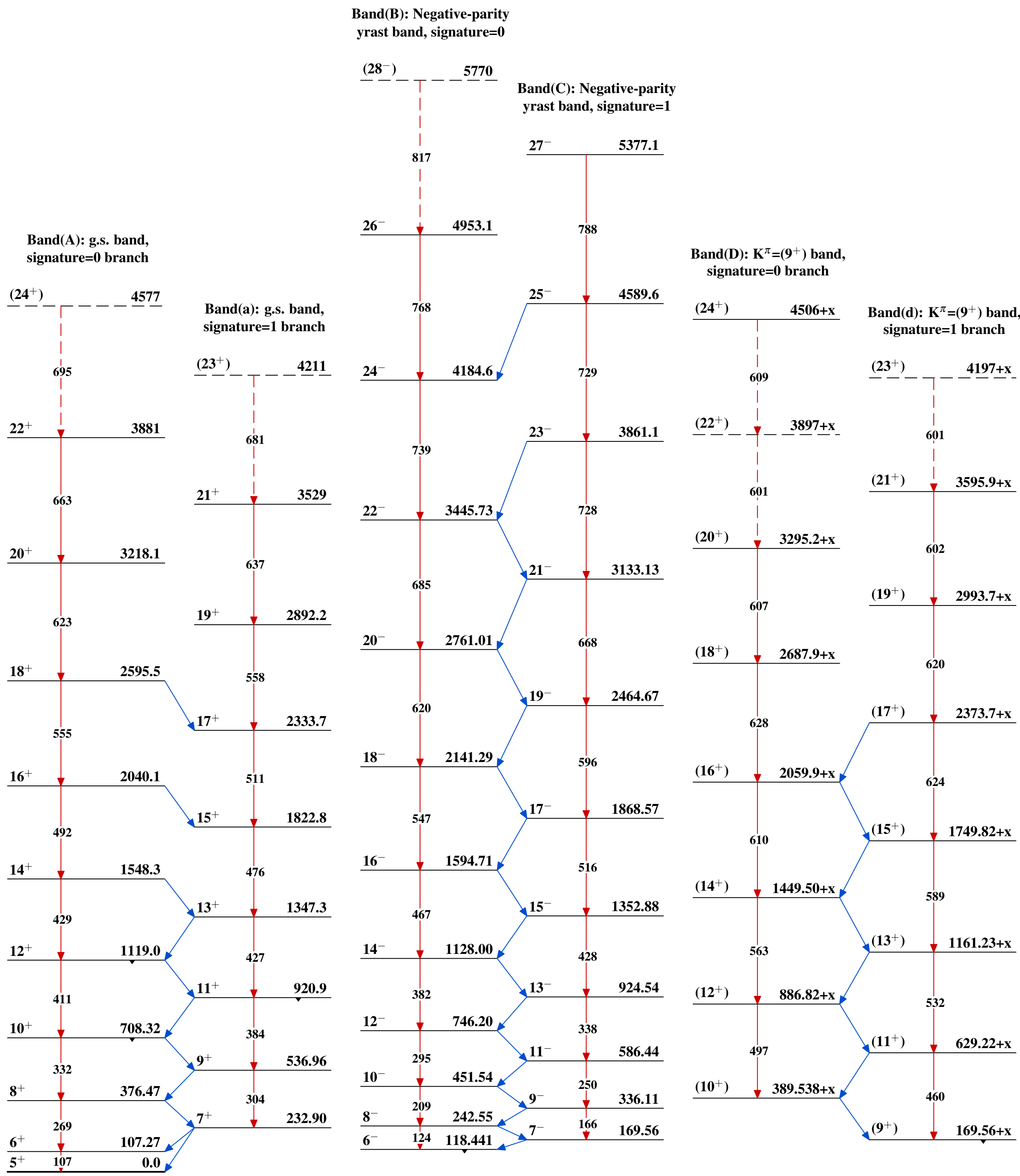
Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)



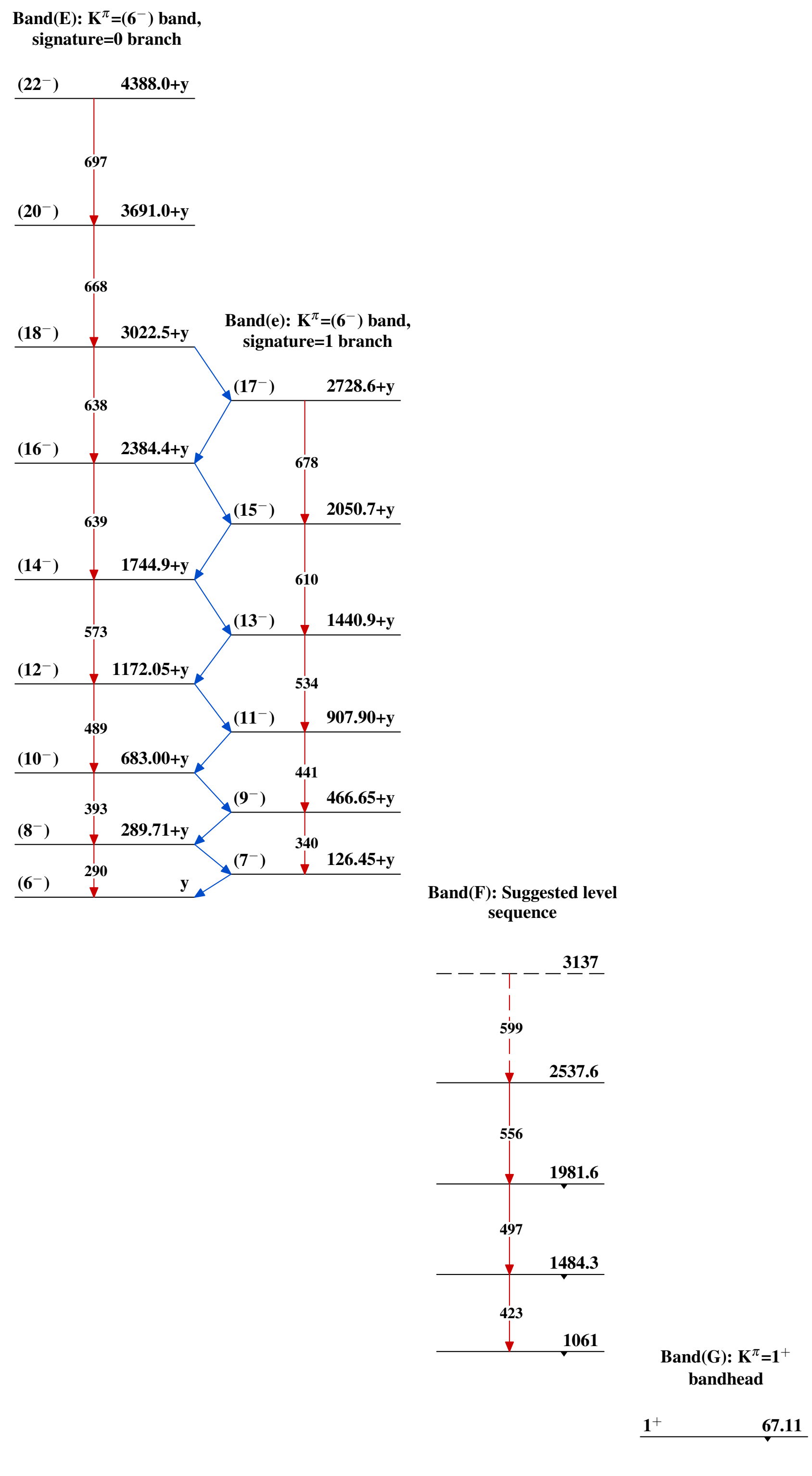
$^{160}_{67}Ho_{93}$

Adopted Levels, Gammas



$^{160}_{67}Ho_{93}$

Adopted Levels, Gammas (continued)



$^{160}_{67}Ho_{93}$