(HI,xnγ) 1996Dr03,2004Es01

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

Additional information 1.

2004Es01: ^{158}Gd(^{7}Li,5nγ), ^{160}Gd(^{7}Li,7nγ), E(^{7}Li)=56 MeV. Target thickness=3.7 mg/cm^2 and 3.9 mg/cm^2 for ^{158}Gd and ^{160}Gd, respectively. Enrichments not given. γ radiation observed in the 40 Compton-suppressed Ge detectors of the GASP array and an 80-element BGO inner ball. Measured and sorted γγγ coincidence "cube" to extend the ^{160}Ho level scheme to higher spins. Report Eγ to only the nearest 1 keV and present this information only on a proposed level scheme.

2003LuZY: ^{154}Sm(^{11}B,5nγ), E(^{11}B)=62 MeV. Enriched (99.5%) target 1.4 mg/cm^2 thick, backed with 10 mg/cm^2 Pb. γγ coin and DCO ratios measured using an array of 12 HPGe detectors, each equipped with a BGO Compton-suppression shield. Only data reported are Eγ values shown in a drawing of their proposed level scheme.

1996Dr03: ^{154}Sm(^{11}B,5nγ), E(^{11}B)=58.1, 61.6, 64.4, 66.8, 69.8 and 73.6 MeV. Self-supporting metallic Sm target, 3 mg/cm^2 thick, enriched to 98.3% in ^{154}Sm. γ singles measurements were made at five energies from 58.1 to 73.6 MeV using three intrinsic Ge detectors equipped with BGO-NaI(Tl) anti-Compton shields. The Ge detectors had photopeak efficiencies ranging from 8% to 20% and energy resolutions of 1.9 keV at 1.4 MeV and were located at 55° with respect to the beam direction. The spectra at the various bombarding energies were normalized relative to the target x-ray intensities. γγ-coin. measurements were made at E(^{11}B)=64.4 MeV using three Ge detectors with photopeak efficiencies ranging from 12% to 22% placed at 90° with respect to the beam line. Typical time resolutions were ≈20 ns. A total of 5×10^7 events was collected. Measured Eγ, Iγ, γγ. From the relative excitation functions, isotopic assignments were made for the observed γ′s and information on the spins of the excited states was obtained.

1990Sa19: ^{159}Tb(α,3nγ), E(α)=39.8 MeV, metallic target (99.9% pure). BGO-NaI(Tl) Compton-suppression spectrometer, 13 cm^3 intrinsic planar Ge detector, 1 mm-thick Ne102 plastic scintillator. Measured Eγ, Iγ, γ(θ) at 7 angles from θ=25° to θ=90° and γγ, γγ(t) at θ=55°. Results include: A_2, A_4, δ, $T_{1/2}$.

Others: 1984Pi04; 1990AnZZ; 1970Le22.

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.

The level scheme is largely based on the study of 1996Dr03, with extensions from 2003LuZY and 2004Es01.

^{160}Ho Levels

E(level)†	Jπ‡	$T_{1/2}$	Comments
0.0&	5$^+$		
107.271@ *17*	6$^+$	48 ns *10*	$T_{1/2}$: from 107γ(t) (1990Sa19).
118.441a *18*	6$^-$	56 ns *8*	$T_{1/2}$: from 118γ(t) (1990Sa19).
169.61b *3*	7$^-$		
169.61+x#d	(9$^+$)	≈3 s	E(level),$T_{1/2}$: 2004Es01 report the energy of this level as 176 keV, but give no basis for it. Also the $T_{1/2}$ value is given with no detail.
228.2			
232.90& *3*	7$^+$		
242.55a *3*	8$^-$		
336.11b *4*	9$^-$		
376.464@ *24*	8$^+$		
389.538+xc *20*	(10$^+$)		
451.54a *4*	10$^-$		
536.96& *4*	9$^+$		
586.44b *4*	11$^-$		
629.22+xd	(11$^+$)		
708.32@ *4*	10$^+$		E(level): value rounded off, and uncertainty increased, to reflect the poor energy fit (several standard deviations) of the two γ′s deexciting this level.

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(HI,xnγ) 1996Dr03,2004Es01 (continued)

^{160}Ho Levels (continued)

E(level)[†]	Jπ[‡]	Comments
738.2	10^+	Level reported only by 2004Es01.
746.20[a] *4*	12^-	
886.82+x[c]	(12^+)	
920.9[&]	11^+	
924.54[b] *4*	13^-	
1061[g]		
1119.0[@]	12^+	
1128.00[a] *4*	14^-	
1161.23+x[d]	(13^+)	
1276.2		
1347.3[&]	13^+	
1352.88[b] *4*	15^-	
1449.50+x[c]	(14^+)	
1484.3[g]		
1548.3[@]	14^+	
1594.71[a] *5*	16^-	
1714.5		
1749.82+x[d]	(15^+)	
1822.8[&]	15^+	
1868.57[b] *5*	17^-	
1981.6[g]		
2040.1[@]	16^+	
2059.9+x[c]	(16^+)	
2141.29[a] *6*	18^-	
2253.7		
2333.7[&]	17^+	
2373.7+x[d]	(17^+)	
2448.5		
2464.67[b] *6*	19^-	
2537.6[g]		
2595.5[@]	18^+	
2687.9+x[c]	(18^+)	
2761.01[a] *7*	20^-	
2892.2[&]	19^+	
2993.7+x[d]	(19^+)	
3117.7		
3133.13[b] *9*	21^-	
3137?[g]		
3218.1[@]	20^+	
3295.2+x[c]	(20^+)	
3445.73[a] *10*	22^-	
3529[&]	21^+	
3595.9+x[d]	(21^+)	
3861.1[b] *4*	23^-	
3881[@]	22^+	
3897+x?[c]	(22^+)	E(level): value based on this placement (from 2004Es01) of the 601 γ. These authors point out that the order of the 601 and 609 γ′s may be interchanged, in which case the energy of this level will be 8 keV higher. 2003LuZY place a 696.5 γ from the (22^+) member of this band.

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(HI,xnγ) 1996Dr03,2004Es01 (continued)

^{160}Ho Levels (continued)

E(level)[†]	Jπ[‡]	Comments
4184.6[a] *3*	24⁻	
4197+x?[d]	(23⁺)	
4211?[&]	(23⁺)	
4506+x[c]	(24⁺)	2004Es01 state that the ordering of the 601 and 609 γ's may may be interchanged. This will not affect the energy of this level, but it will affect the energy of the γ transition deexciting it.
4577?[@]	(24⁺)	
4589.6[b]	25⁻	2004Es01 report that this level is deexcited only by a 771 γ.
4953.1[a]	26⁻	
5377.1[b]	27⁻	
5770?[a]	(28⁻)	From 2004Es01. Previous studies do not report this level. Note: if the Eγ value deexciting the 26⁻ level is that of 2004Es01 rather than that of 2003LuZY (which is adopted here), then the energy of this level will have to be increased accordingly.
y[e]	(6⁻)	1996Dr03 state that a 112.06 γ involving no parity change deexcites this level. But, other than having negative parity, which of the established levels is the final state is not known.
126.45+y[f] *3*	(7⁻)	
289.71+y[e] *4*	(8⁻)	
466.65+y[f] *5*	(9⁻)	
683.00+y[e] *5*	(10⁻)	
907.90+y[f] *6*	(11⁻)	
1172.05+y[e] *9*	(12⁻)	
1440.9+y[f]	(13⁻)	
1744.9+y[e]	(14⁻)	
2050.7+y[f]	(15⁻)	
2384.4+y[e]	(16⁻)	
2728.6+y[f]	(17⁻)	E(level): from the evaluator's placement of the listed deexciting γ's. 2004Es01 show only a 660 γ from a (17⁻) level.
3022.5+y[e]	(18⁻)	E(level): from the evaluator's placement of the listed deexciting γ. 2004Es01 do not report levels in this band above a (17⁻) level.
3691.0+y[e]	(20⁻)	E(level): from the evaluator's placement of the listed deexciting γ's. 2004Es01 do not report levels in this band above a (17⁻) level.
4388.0+y[e]	(22⁻)	E(level): from the evaluator's placement of the listed deexciting γ's. 2004Es01 do not report levels in this band above the (17⁻) level.

[†] Calculated from a least-squares fit to the listed γ-ray energies, with χ^2(norm)=3.0 > χ^2(critical)=1.5. 2003LuZY and 2004Es01 do not quote uncertainties for their Eγ values. Where the level energy is based on these values only, no uncertainty is listed.

[‡] From adopted values. For those levels populated in the in-beam studies summarized here, these values are based to a considerable extent on the observed patterns of the γ decay and considerations of expected band structures. Additional support for these values, in particular for the nucleon configurations assigned to the various bands, has been discussed by 1996Dr03, who present calculated bandhead energies, deduced K quantum numbers, alignments and g factors for the bands.

[#] x<55.

[@] Band(A): g.s. band, α=0 branch. Configuration=(π 7/2[523] + ν 3/2[521]).

[&] Band(a): g.s. band, α=1 branch. Configuration=(π 7/2[523] + ν 3/2[521]).

[a] Band(B): Decoupled band. Configuration=(π 7/2[523] + ν 5/2[642]), α=0. 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): Decoupled band. Configuration=(π 7/2[523] + ν 5/2[642]), α=1. See comment on the α=0 portion of this band.

[c] Band(D): K^π=(9⁺) band, α=0 branch. Probable configuration=(π 7/2[523] + ν 11/2[505]).

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(HI,xnγ) 1996Dr03,2004Es01 (continued)

^{160}Ho Levels (continued)

[d] Band(d): $K^{\pi}=(9^+)$ band, α=1 branch. Probable configuration=(π 7/2[523] + ν 11/2[505]).

[e] Band(E): $K^{\pi}=(6^-)$ band, α=0 branch. Proposed configuration=(π 7/2[404] + ν 5/2[523]). This is the dominant configuration at low spins, and is that proposed by 1996Dr03 based on the small "staggering" within the band, deduced rotational constants, and intraband γ-ray transition probabilities. Note that these authors show this band as π=+ on their level scheme. 2000Lu07 propose configuration=(π 7/2[404] + ν 5/2[642]) for this band, from consideration of alignments and variation of the moment of inertia with the square of the rotational frequency. Where their two studies overlap, 2004Es01 and 1996Dr03 agree, with that of 2004Es01 reaching to higher spins. 2003LuZY show a somewhat different band structure at low spins and place the commonly reported γ's elsewhere in their band. They also assign it positive parity. They show two γ's deexciting the (10^+) member of their band to the 8^+ and 9^+ members of the g.s. band, which might make it possible to establish the position of this band in the ^{160}Ho level scheme. However, the γ's are shown as questionable and no Eγ values are given for them.

[f] Band(e): $K^{\pi}=(6^-)$ band, α=1 branch. Proposed configuration=(π 7/2[404] + ν 5/2[523]). See the comments on the α=0 branch of this band.

[g] Band(F): Suggested level sequence. Sequence suggested by 2004Es01.

(HI,xnγ) 1996Dr03,2004Es01 (continued)

γ(^{160}Ho)

E_γ[†]	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ[&]	$I_{(\gamma+ce)}$	Comments
(11.17 *3*)		118.441	6^-	107.271	6^+	[E1]		57 *3*	E_γ: from level-energy difference. Mult.: from level scheme, Δπ=yes. From RUL, δ(M2/E1)<0.001. $I_{(\gamma+ce)}$: from I(γ+ce)(11.1)/Iγ(118γ)=0.57 *3* in ^{160}Ho IT decay (3.2 s).
51.17 *2*	29 *5*	169.61	7^-	118.441	6^-	M1+E2			Mult.: from α(K)exp in ^{160}Ho IT decay (3.2 s) and calculated E2 admixture.
72.95 *2*	16.7 *9*	242.55	8^-	169.61	7^-	M1+E2	0.09 *8*		
93.56 *2*	38.9 *8*	336.11	9^-	242.55	8^-	M1+E2	0.13 *5*		
107.28 *2*	24.9 *4*	107.271	6^+	0.0	5^+	M1+E2	0.25 *4*		
109.8		228.2		118.441	6^-				
115.43 *2*	33.0 *9*	451.54	10^-	336.11	9^-	M1+E2	0.141 *12*		
118.44 *2*	100.0 *11*	118.441	6^-	0.0	5^+	E1			Mult.: from α(K)exp in ^{160}Ho IT decay (3.2 s). (A small amount of M2 is not excluded by this value.).
(124.11 *4*)		242.55	8^-	118.441	6^-				E_γ: from level-energy difference. γ shown on level scheme given by 1996Dr03, but not listed in their tables of data.
125.67 *4*	6.0 *6*	232.90	7^+	107.271	6^+	M1+E2	0.33 *3*		
126.44 *3*	5.3 *4*	126.45+y	(7^-)	y	(6^-)				
134.94 *2*	36.1 *7*	586.44	11^-	451.54	10^-	M1+E2	0.157 *20*		
143.65 *3*	4.6 *3*	376.464	8^+	232.90	7^+				
159.80 *2*	31.2 *14*	746.20	12^-	586.44	11^-	M1+E2	0.155 *25*		
160.46 *3*	4.6 *5*	536.96	9^+	376.464	8^+	M1+E2	0.45 *5*		
163.24 *3*	4.76 *22*	289.71+y	(8^-)	126.45+y	(7^-)				
166.47 *4*	7.7 *6*	336.11	9^-	169.61	7^-				
171.17 *4*	3.1 *3*	708.32	10^+	536.96	9^+				
177.05 *5*	4.5 *4*	466.65+y	(9^-)	289.71+y	(8^-)				
178.35 *2*	26.9 *5*	924.54	13^-	746.20	12^-	M1+E2	0.105 *20*		
182		920.9	11^+	738.2	10^+				
198.7		1119.0	12^+	920.9	11^+				
201		738.2	10^+	536.96	9^+				
201.1		1548.3	14^+	1347.3	13^+				
203.48 *2*	15.9 *9*	1128.00	14^-	924.54	13^-				
208.98 *3*	6.2 *5*	451.54	10^-	242.55	8^-				
212.3		920.9	11^+	708.32	10^+				
216.37 *3*	4.9 *4*	683.00+y	(10^-)	466.65+y	(9^-)				
217		2040.1	16^+	1822.8	15^+				
219.93 *2*	10.7 *4*	389.538+x	(10^+)	169.61+x	(9^+)				
224.89[a] *2*	4.7[a] *12*	907.90+y	(11^-)	683.00+y	(10^-)				I_γ: split of γ intensity as reported by 1996Dr03 from analysis of coin. data.
224.89[a] *2*	11.9[a] *11*	1352.88	15^-	1128.00	14^-	M1+E2	0.164 *3*		I_γ: split of γ intensity as reported by 1996Dr03 from analysis of coin. data.
228.2		1347.3	13^+	1119.0	12^+				

(HI,xnγ) 1996Dr03,2004Es01 (continued)

γ(^{160}Ho) (continued)

E_γ[†]	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ[&]	Comments
232.85 *5*	4.0 *5*	232.90	7^+	0.0	5^+			
239.67 *4*	3.5 *3*	629.22+x	(11^+)	389.538+x	(10^+)			
241.87 *3*	11.4 *6*	1594.71	16^-	1352.88	15^-	M1+E2	0.126 *15*	
250.33 *2*	11.7 *6*	586.44	11^-	336.11	9^-	E2		
257.65 *4*	3.3 *5*	886.82+x	(12^+)	629.22+x	(11^+)			
262		2595.5	18^+	2333.7	17^+			
264.53 *11*	2.3 *4*	1172.05+y	(12^-)	907.90+y	(11^-)			
268.7[‡]		1440.9+y	(13^-)	1172.05+y	(12^-)			
269.19 *2*	4.7 *10*	376.464	8^+	107.271	6^+			
272.71 *4*	5.0 *5*	2141.29	18^-	1868.57	17^-			
273.84 *3*	9.5 *5*	1868.57	17^-	1594.71	16^-	M1+E2	0.095 *23*	
274.48 *7*	1.5 *6*	1161.23+x	(13^+)	886.82+x	(12^+)			
289.3		1449.50+x	(14^+)	1161.23+x	(13^+)			
289.75 *6*	1.5 *3*	289.71+y	(8^-)	y	(6^-)			
294.0[#]		3022.5+y	(18^-)	2728.6+y	(17^-)			
294.57 *3*	15.0 *5*	746.20	12^-	451.54	10^-			
296.33 *4*	8.1 *5*	2761.01	20^-	2464.67	19^-			
300.4 *2*	≤1.4	1749.82+x	(15^+)	1449.50+x	(14^+)			E_γ: from 1996Dr03. 2003LuZY report Eγ=300.5.
303.85 *5*	5.7 *10*	536.96	9^+	232.90	7^+			
304.0[‡]		1744.9+y	(14^-)	1440.9+y	(13^-)			E_γ: 2004Es01 report Eγ=303.
306.0[‡]		2050.7+y	(15^-)	1744.9+y	(14^-)			E_γ: 2004Es01 report Eγ=305.
310.8		2059.9+x	(16^+)	1749.82+x	(15^+)			
312.60 *4*	2.3 *5*	3445.73	22^-	3133.13	21^-			
313.4		2373.7+x	(17^+)	2059.9+x	(16^+)			2004Es01 do not show this γ.
[x]315.4								γ placed by 2003LuZY from the (19^+) member of the (9^+) band. However, the energy of this level implied by this placement differs by ≈10 keV from that implied by the 620.0 γ also proposed to deexcite this level. The study of 2004Es01 also places a 620 γ from this level, suggesting that the 315.4 γ does not deexcite this level. The evaluator has chosen to show the 315.4 γ as unplaced.
323.37 *4*	6.4 *10*	2464.67	19^-	2141.29	18^-			
332.05 *4*	6.6 *5*	708.32	10^+	376.464	8^+			
334.0[‡]		2384.4+y	(16^-)	2050.7+y	(15^-)			E_γ: 2004Es01 report Eγ=333.
338.12 *3*	20.5 *6*	924.54	13^-	586.44	11^-	E2		
340.28 *8*	3.0 *5*	466.65+y	(9^-)	126.45+y	(7^-)			
344.0[#]		2728.6+y	(17^-)	2384.4+y	(16^-)			
362		738.2	10^+	376.464	8^+			
371		708.32	10^+	336.11	9^-			
372.13 *7*	3.1 *5*	3133.13	21^-	2761.01	20^-	M1		
380		1119.0	12^+	738.2	10^+			
381.77 *3*	20.5 *6*	1128.00	14^-	746.20	12^-	E2		
384.3		920.9	11^+	536.96	9^+			

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

(HI,xnγ) 1996Dr03,2004Es01 (continued)

γ(^{160}Ho) (continued)

E_γ [†]	I_γ [@]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [&]	Comments
393.08 *6*	4.6 *5*	683.00+y	(10^-)	289.71+y	(8^-)		
401		738.2	10^+	336.11	9^-		
404.5		4589.6	25^-	4184.6	24^-		
411.0		1119.0	12^+	708.32	10^+		
414.6		3861.1	23^-	3445.73	22^-		E_γ: from 2003LuZY. γ not reported by 1996Dr03.
423		1484.3		1061			
426.8		1347.3	13^+	920.9	11^+		
428.33 *2*	14.5 *12*	1352.88	15^-	924.54	13^-		
429.3		1548.3	14^+	1119.0	12^+		
441.44 *7*	7.2 *8*	907.90+y	(11^-)	466.65+y	(9^-)		
459.69 *6*	5.7 *6*	629.22+x	(11^+)	169.61+x	(9^+)		
466.68 *3*	19.4 *7*	1594.71	16^-	1128.00	14^-		
475		1061		586.44	11^-		
475.5		1822.8	15^+	1347.3	13^+		
488.84 *8*	5.3 *6*	1172.05+y	(12^-)	683.00+y	(10^-)		
491.9		2040.1	16^+	1548.3	14^+		
497		1981.6		1484.3			
497.25 *5*	8.6 *7*	886.82+x	(12^+)	389.538+x	(10^+)		
511.1		2333.7	17^+	1822.8	15^+		
515.68 *4*	11.3 *14*	1868.57	17^-	1352.88	15^-		
530.0		1276.2		746.20	12^-		
531.94 *7*	5.6 *8*	1161.23+x	(13^+)	629.22+x	(11^+)		
533.5[‡]		1440.9+y	(13^-)	907.90+y	(11^-)		
546.63 *5*	6.6 *10*	2141.29	18^-	1594.71	16^-	E2	
555.2		2595.5	18^+	2040.1	16^+		
556		2537.6		1981.6			
558.5		2892.2	19^+	2333.7	17^+		
559.5		1484.3		924.54	13^-		
562.54		1449.50+x	(14^+)	886.82+x	(12^+)		E_γ: 2003LuZY report Eγ=568.4, but this leads to a bad energy fit for the deexciting γ′s.
572.6[‡]		1744.9+y	(14^-)	1172.05+y	(12^-)		
580.2		2448.5		1868.57	17^-		
586.5		1714.5		1128.00	14^-		
588.57 *12*	4.4 *9*	1749.82+x	(15^+)	1161.23+x	(13^+)		
596.08 *4*	8.3 *20*	2464.67	19^-	1868.57	17^-		
599[b]		3137?		2537.6			
601[b]		3897+x?	(22^+)	3295.2+x	(20^+)		The ordering of the 601 and 609 γ′s is uncertain (2004Es01).
601[b]		4197+x?	(23^+)	3595.9+x	(21^+)		E_γ: from 2004Es01. 2003LuZY report that the 23^+ band member is deexcited by a 723.0 γ.
602.2		3595.9+x	(21^+)	2993.7+x	(19^+)		
607.3		3295.2+x	(20^+)	2687.9+x	(18^+)		
609[b]		4506+x	(24^+)	3897+x?	(22^+)		The ordering of the 601 and 609 γ′s is uncertain (2004Es01).

$^{160}_{67}Ho_{93}$-7

(HI,xnγ) 1996Dr03,2004Es01 (continued)

γ(^{160}Ho) (continued)

E_γ [†]	I_γ [@]	E_i(level)	J_i^π	E_f	J_f^π	Comments
610.1[‡]		2050.7+y	(15^-)	1440.9+y	(13^-)	E_γ: 2004Es01 report Eγ=609.
610.34 *15*	5.2 *9*	2059.9+x	(16^+)	1449.50+x	(14^+)	E_γ: from 1996Dr03. 2003LuZY report Eγ=611.2. 2004Es01 list 610.
619.78 *7*	11.6 *9*	2761.01	20^-	2141.29	18^-	
620.0		2993.7+x	(19^+)	2373.7+x	(17^+)	
622.6		3218.1	20^+	2595.5	18^+	
624.3		2373.7+x	(17^+)	1749.82+x	(15^+)	
628.0		2687.9+x	(18^+)	2059.9+x	(16^+)	
629.0		1981.6		1352.88	15^-	The evaluator assumes that this is the same as the 627 γ from 2004Es01.
637		3529	21^+	2892.2	19^+	
638.0[#]		3022.5+y	(18^-)	2384.4+y	(16^-)	
639.0[‡]		2384.4+y	(16^-)	1744.9+y	(14^-)	E_γ: 2004Es01 report Eγ=638.
652.8		3117.7		2464.67	19^-	
659.0		2253.7		1594.71	16^-	
663		3881	22^+	3218.1	20^+	
668.0 *3*	4.3 *9*	3133.13	21^-	2464.67	19^-	
668.5[#]		3691.0+y	(20^-)	3022.5+y	(18^-)	
669.5		3117.7		2448.5		
678.0[#]		2728.6+y	(17^-)	2050.7+y	(15^-)	
681[b]		4211?	(23^+)	3529	21^+	
684.78 *14*	4.3 *9*	3445.73	22^-	2761.01	20^-	
695[b]		4577?	(24^+)	3881	22^+	
697.0[#]		4388.0+y	(22^-)	3691.0+y	(20^-)	
728.2 *4*	1.6 *6*	3861.1	23^-	3133.13	21^-	E_γ: from 2003LuZY. 1996Dr03 report Eγ=725.0.
729.0		4589.6	25^-	3861.1	23^-	
738.8 *3*	3.2 *10*	4184.6	24^-	3445.73	22^-	
768.5		4953.1	26^-	4184.6	24^-	2004Es01 show a 781 γ deexciting this level.
787.5		5377.1	27^-	4589.6	25^-	
817[b]		5770?	(28^-)	4953.1	26^-	

[†] From 1996Dr03, unless noted otherwise. Eγ values given only to the nearest 0.1 keV are those reported by 2003LuZY, unless noted otherwise. Those given only to the nearest 1 keV are from 2004Es01, unless noted otherwise. Note that the Eγ values of 2004Es01 generally are ≈1 keV smaller than those of 2003LuZY.

[‡] Value from 2003LuZY, but placement is that of 2004Es01.

[#] From 2003LuZY, but placed by them from a different level. This placement is that of the evaluator.

[@] Values from the (^{11}B,5nγ) reaction, measured at E(^{11}B)=61.6 MeV (1996Dr03). 2003LuZY and 2004Es01 do not report Iγ values.

[&] From 1990Sa19, γ(θ), unless noted otherwise. From the assignment of these γ′s as intraband transitions, it is assumed that those with nonzero δ values are M1+E2 rather than E1+M2 and that those whose mults are found to be Q are E2 rather than M2.

[a] Multiply placed with intensity suitably divided.

(HI,xnγ) 1996Dr03,2004Es01 (continued)

$\gamma(^{160}Ho)$ (continued)

[b] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

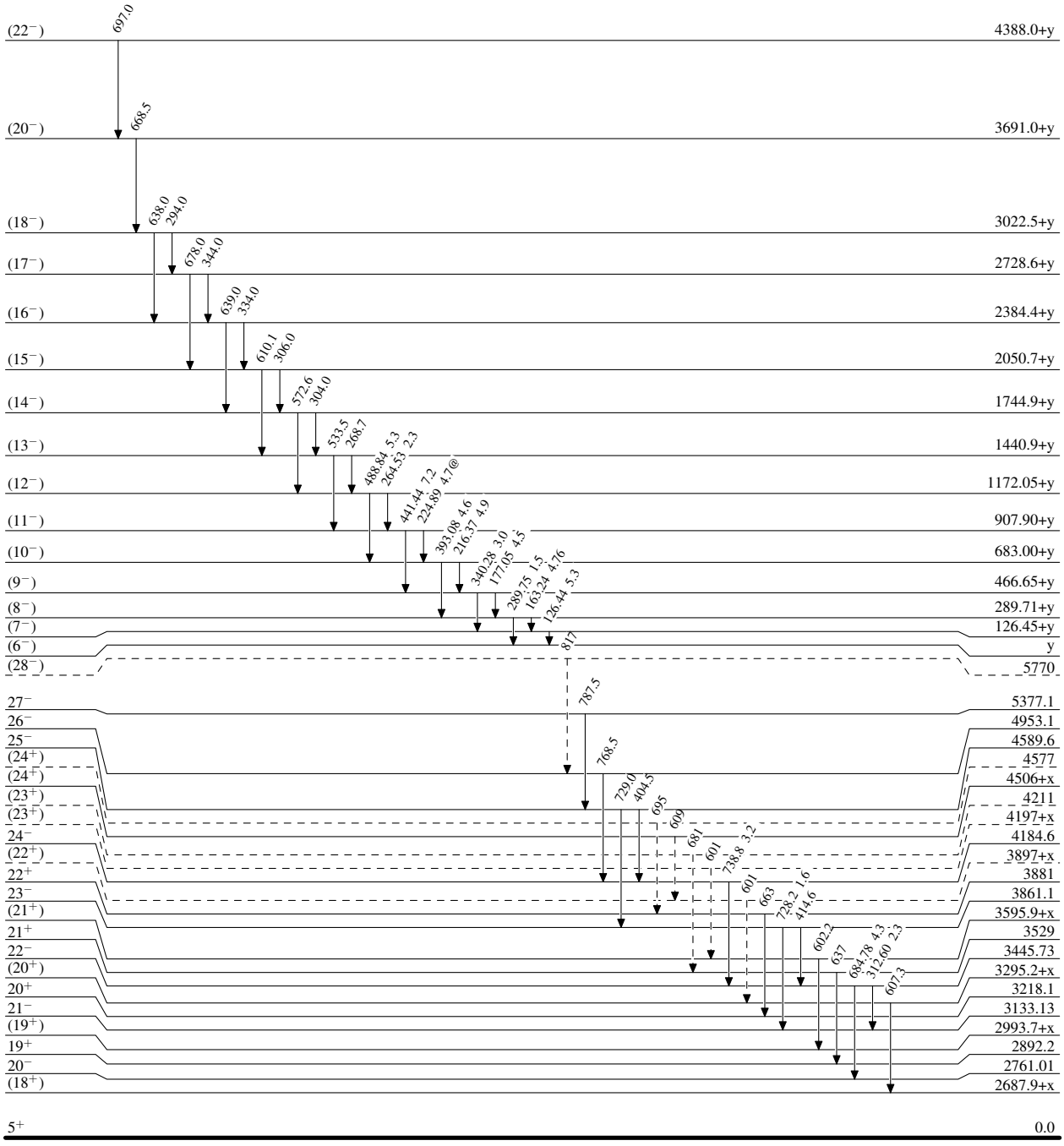
$^{160}_{67}Ho_{93}$-9

(HI,xnγ) 1996Dr03,2004Es01

Level Scheme

Intensities: Relative I_γ
@ 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)



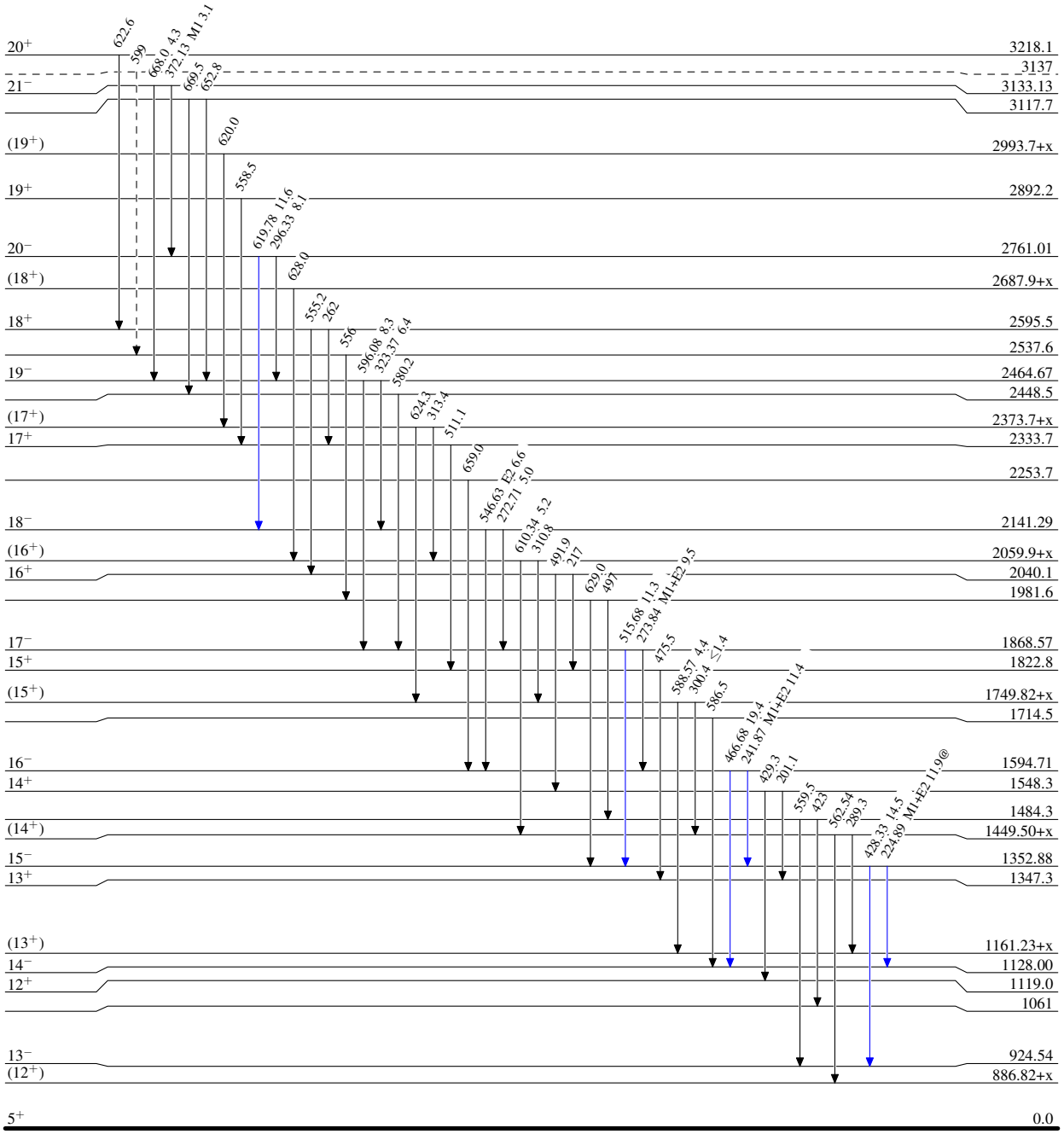
$^{160}_{67}Ho_{93}$

(HI,xnγ) 1996Dr03,2004Es01

Level Scheme (continued)

Intensities: Relative I_γ
@ 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)



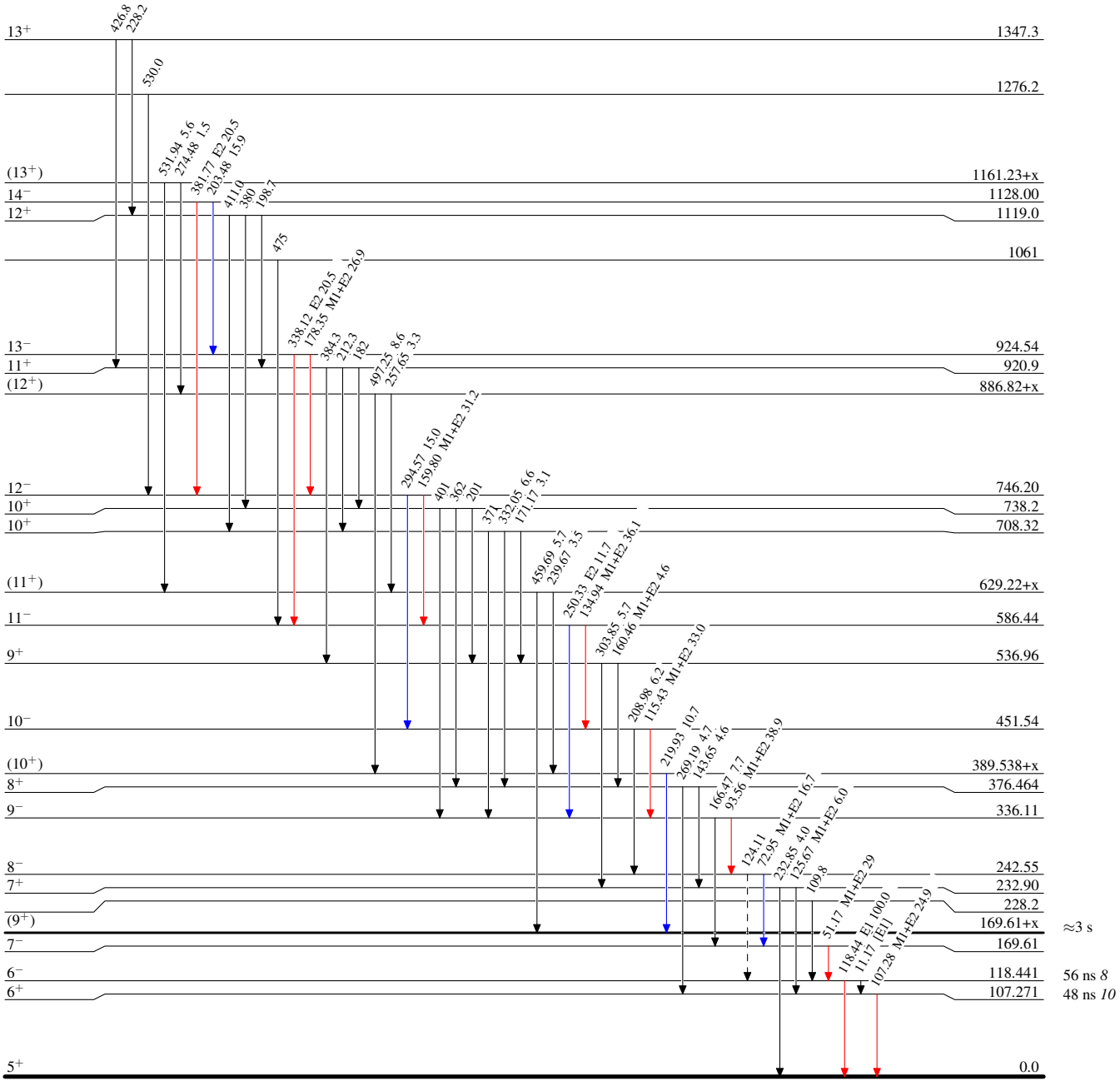
$^{160}_{67}Ho_{93}$

(HI,xnγ) 1996Dr03,2004Es01

Level Scheme (continued)

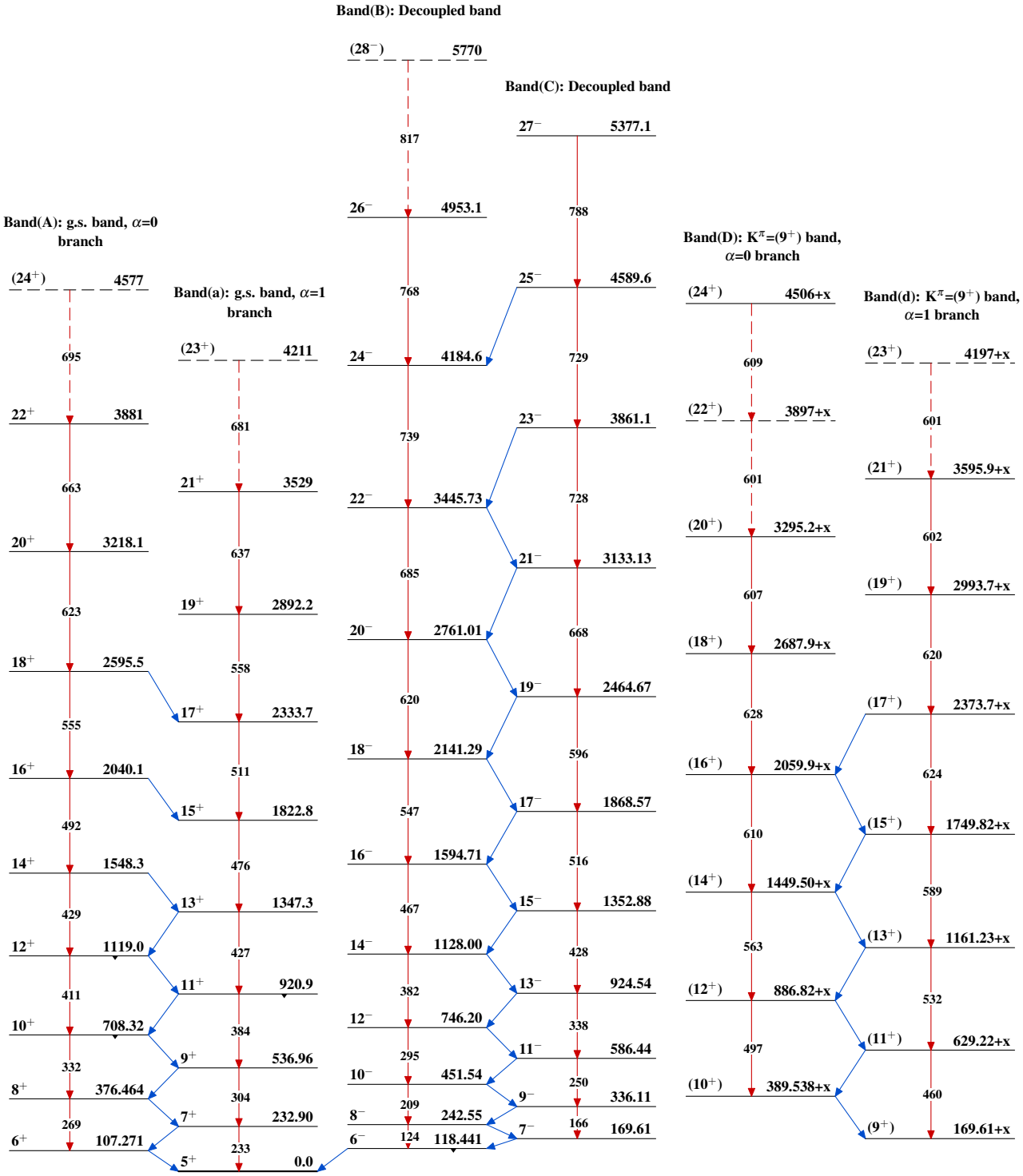
Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

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)



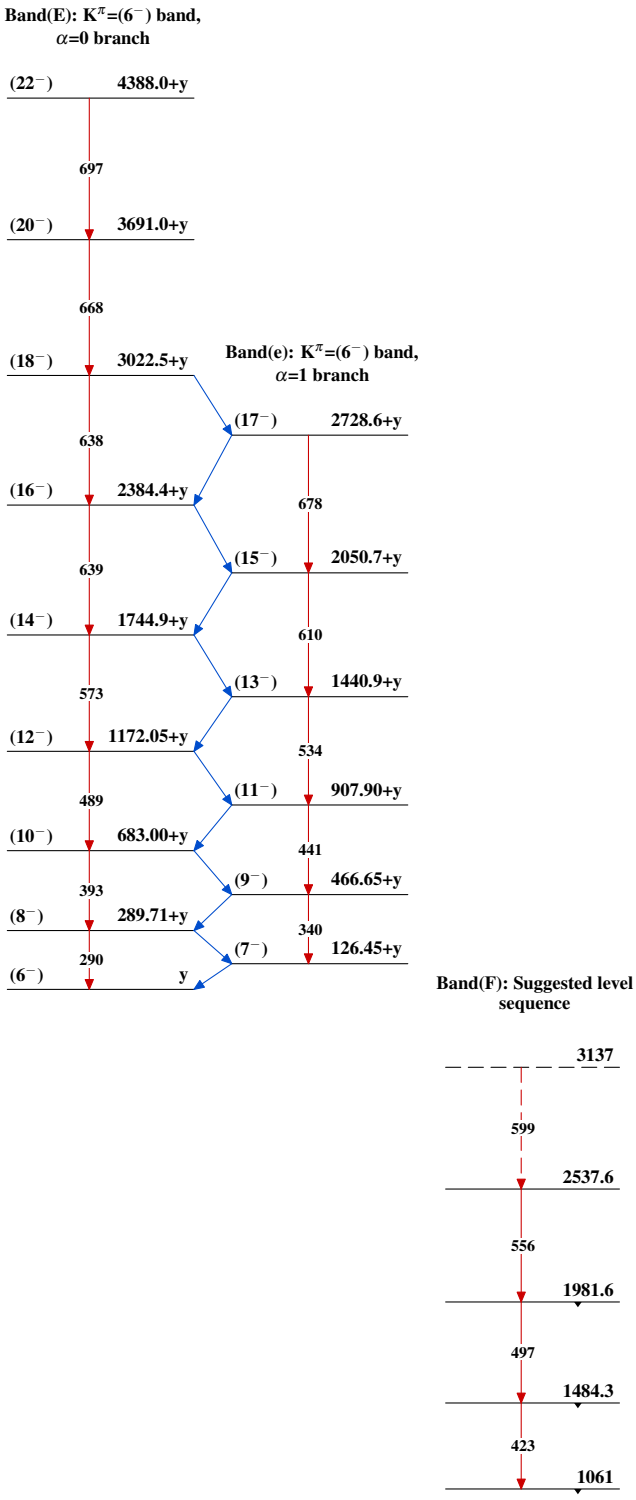
$^{160}_{67}Ho_{93}$

(HI,xnγ) 1996Dr03,2004Es01



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

(HI,xnγ) 1996Dr03,2004Es01 (continued)



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