

Adopted Levels, Gammas

Type	History		Literature Cutoff Date
	Author	Citation	
Full Evaluation	Balraj Singh	ENSDF	08-Dec-2015

$Q(\beta^-) = -2230$ 40; $S(n) = 7680$ 40; $S(p) = 3190$ 40; $Q(\alpha) = 3310$ 50 [2012Wa38](#)

$S(2n) = 17330$ 40, $S(2p) = 8600$ 30 ([2012Wa38](#)).

[Additional information 1.](#)

Nuclear structure calculations (levels, moments etc.) and systematics: [2003Ya19](#), [2000Zh51](#), [1990Kr13](#), [1986So15](#).

 ^{172}Ta LevelsCross Reference (XREF) Flags

- A ^{172}W ε decay (6.6 min)
 B $^{159}\text{Tb}(^{18}\text{O}, 5n\gamma)$, $^{165}\text{Ho}(^{12}\text{C}, 5n\gamma)$
 C $^{159}\text{Tb}(^{18}\text{O}, 5n\gamma)$, $^{162}\text{Dy}(^{14}\text{N}, 4n\gamma)$

E(level) [†]	J ^π [‡]	T _{1/2} [#]	XREF	Comments
0.0 ^o	(3 ⁺)	36.8 min 3	ABC	% ε +% β^+ =100 J ^π : evidence of ε , β^+ feeding (log ft=7.2) of 2 ⁺ and 4 ⁺ levels in ^{172}Hf . Probable 3 ⁺ member of a doubly-decoupled structure (1988Kr19,2000Ho16), as also seen in ^{174}Ta . T _{1/2} : weighted average of 36.7 min 4 (1972Ch45) and 37.0 min 5 (1973Ca10). J ^π : (E1) γ from 93.2, (4 ⁻) level.
3.2? 4	(⁺)		AB	
38.9 4			A	
91.5 ^o 3	(5 ⁺)		BC	
93.2 ^m 3	(4 ⁻)	7 ns 2	AB	
127.1 4			A	
164.2 ^p 7	(4 ⁺)		B	
172.6 ⁿ 4	(5 ⁻)		B	
260.1 4			A	
265.2 ^o 5	(7 ⁺)		BC	
274.8 ^m 4	(6 ⁻)		B	
325.5 ^p 6	(6 ⁺)		B	
370.6 4			A	
400.5 ⁿ 5	(7 ⁻)		B	
462.3 4			A	
486.6? 5			A	Ordering of 63-226 cascade is not established. Reverse ordering will give a level at 324, instead.
514.5 5			A	
520.5 ^o 5	(9 ⁺)		BC	
533.1 4			A	
548.2 ^m 5	(8 ⁻)		B	
549.9 4			A	
573.8 ^p 5	(8 ⁺)		B	
584.6 4			A	
586.3 5			A	
607.6 5			A	
625.6 5			A	
717.3 ⁿ 5	(9 ⁻)		B	
851.4 ^o 6	(11 ⁺)		BC	
902.4 ^p 6	(10 ⁺)		B	
906.5 ^m 5	(10 ⁻)		B	
1113.7 ⁿ 5	(11 ⁻)		B	

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Adopted Levels, Gammas (continued) ^{172}Ta Levels (continued)

E(level) [†]	J ^{π‡}	T _{1/2} [#]	XREF	Comments
1249.5 ^o 7	(13 ⁺)		BC	
1303.9 ^p 6	(12 ⁺)		B	
1338.1 ^m 5	(12 ⁻)		B	
1574.9 ⁿ 6	(13 ⁻)		B	
1705.6 ^o 8	(15 ⁺)		BC	
1777.2 ^p 7	(14 ⁺)		B	
1829.1 ^m 6	(14 ⁻)		B	
2089.2 ⁿ 6	(15 ⁻)		B	
2214.1 ^o 8	(17 ⁺)		BC	
2321.5 ^p 8	(16 ⁺)		B	
2371.2 ^m 6	(16 ⁻)		B	
2655.4 ⁿ 6	(17 ⁻)		B	
2774.1 ^o 9	(19 ⁺)		BC	
2959.9 ^m 6	(18 ⁻)		B	
3265.0 ⁿ 7	(19 ⁻)		B	
3388.4 ^o 9	(21 ⁺)		BC	
3603.9 ^m 7	(20 ⁻)		B	
3937.0 ⁿ 7	(21 ⁻)		B	
4059.7 ^o 10	(23 ⁺)		B	
4788.8 ^o 10	(25 ⁺)		BC	
5574.8 ^o 11	(27 ⁺)		B	
6414.8 ^o 11	(29 ⁺)		B	
7304.8 ^o 12	(31 ⁺)		B	
0.0+x [@]	(4 ⁻)		B	Additional information 2.
23.7+x 6	(5 ⁻ ,6 ⁻)		B	
36.63+x ^{&} 24	(5 ⁻)		B	
73.0+x 5	(6 ⁺)	50 ns 2	B	
90.74+x [@] 24	(6 ⁻)		B	
151.1+x ^l 5	(7 ⁺)		B	
164.7+x ^{&} 3	(7 ⁻)		BC	
166.6+x ^j 5	(7 ⁺)		B	
251.4+x [@] 3	(8 ⁻)		BC	
253.0+x ^f 5	(7 ⁺)	37 ns 3	B	
265.0+x ^k 5	(8 ⁺)		BC	
278.1+x ^a 4	(8 ⁻)		B	
287.7+x ⁱ 5	(8 ⁺)		B	
293.3+x ^h 6	(5 ⁺)		B	
368.5+x ^{&} 4	(9 ⁻)		BC	
389.4+x ^b 5	(9 ⁻)		B	
404.1+x ^l 5	(9 ⁺)		BC	
407.5+x ^g 6	(6 ⁺)		B	
423.0+x ^e 5	(8 ⁺)		B	
435.4+x ^j 5	(9 ⁺)		B	
487.3+x [@] 4	(10 ⁻)		BC	
526.7+x ^a 5	(10 ⁻)		B	
540.9+x ^h 6	(7 ⁺)		B	
567.7+x ^k 5	(10 ⁺)		BC	
608.4+x ⁱ 5	(10 ⁺)		B	
613.1+x ^f 5	(9 ⁺)		B	

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Adopted Levels, Gammas (continued) ^{172}Ta Levels (continued)

E(level) [†]	J ^π [‡]	XREF
656.8+x ^{&} 4	(11 ⁻)	BC
689.4+x ^b 5	(11 ⁻)	B
702.8+x ^g 6	(8 ⁺)	B
755.9+x ^l 5	(11 ⁺)	BC
805.1+x ^j 5	(11 ⁺)	B
807.4+x [@] 4	(12 ⁻)	BC
821.3+x ^e 6	(10 ⁺)	B
877.9+x ^a 5	(12 ⁻)	B
890.4+x ^h 6	(9 ⁺)	B
966.7+x ^k 5	(12 ⁺)	BC
1025.0+x ⁱ 5	(12 ⁺)	B
1033.6+x ^{&} 5	(13 ⁻)	BC
1043.4+x ^f 6	(11 ⁺)	B
1058.8+x ^d 6	J1	B
1090.1+x ^b 5	(13 ⁻)	B
1103.3+x ^g 6	(10 ⁺)	B
1198.2+x ^l 5	(13 ⁺)	BC
1216.8+x [@] 5	(14 ⁻)	BC
1258.3+x ^d 7	J1+1	B
1264.1+x ^j 5	(13 ⁺)	B
1281.0+x ^e 6	(12 ⁺)	B
1326.1+x ^a 6	(14 ⁻)	B
1340.9+x ^h 7	(11 ⁺)	B
1450.3+x ^k 5	(14 ⁺)	BC
1490.6+x ^d 7	J1+2	B
1497.1+x ^{&} 5	(15 ⁻)	BC
1525.7+x ⁱ 6	(14 ⁺)	B
1537.3+x ^f 6	(13 ⁺)	B
1583.7+x ^b 6	(15 ⁻)	B
1602.4+x ^g 7	(12 ⁺)	B
1715.2+x [@] 5	(16 ⁻)	BC
1719.0+x ^l 5	(15 ⁺)	BC
1735.5+x ^d 7	J1+3	B
1779.7+x ^e 6	(14 ⁺)	B
1800.2+x ^j 6	(15 ⁺)	B
1841.6+x ^c 6	J2	B
1861.5+x ^a 6	(16 ⁻)	B
1886.5+x ^h 7	(13 ⁺)	B
2005.8+x ^k 5	(16 ⁺)	BC
2009.9+x ^d 7	J1+4	B
2039.8+x ^c 7	J2+1	B
2042.5+x ^{&} 5	(17 ⁻)	BC
2097.9+x ⁱ 6	(16 ⁺)	B
2160.7+x ^b 6	(17 ⁻)	B
2192.4+x ^g 7	(14 ⁺)	B
2293.9+x ^d 7	J1+5	B
2295.5+x ^c 7	J2+2	B

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Adopted Levels, Gammas (continued) ^{172}Ta Levels (continued)

E(level) [†]	J ^π [‡]	XREF	Comments
2299.4+x [@] 5	(18 ⁻)	BC	
2299.9+x ^e 7	(16 ⁺)	B	
2307.1+x ^l 6	(17 ⁺)	BC	
2399.9+x ^j 6	(17 ⁺)	B	
2473.1+x ^a 6	(18 ⁻)	B	
2523.4+x ^h 7	(15 ⁺)	B	
2590.3+x ^c 7	J2+3	B	
2595.9+x ^d 7	J1+6	B	
2622.5+x ^k 6	(18 ⁺)	BC	
2663.3+x ^{&} 6	(19 ⁻)	BC	
2723.3+x ⁱ 6	(18 ⁺)	B	
2810.4+x ^b 6	(19 ⁻)	B	
2915.1+x ^c 7	J2+4	B	
2951.2+x ^l 6	(19 ⁺)	BC	
2963.9+x [@] 6	(20 ⁻)	BC	
3046.3+x ^j 7	(19 ⁺)	B	
3149.3+x ^a 7	(20 ⁻)	B	
3264.3+x ^c 8	J2+5	B	
3286.7+x ^k 6	(20 ⁺)	BC	
3344.5+x ⁱ 7	(20 ⁺)	B	
3353.9+x ^{&} 6	(21 ⁻)	BC	
3521.5+x ^b 7	(21 ⁻)	B	
3623.9+x ^l 6	(21 ⁺)	BC	
3630.0+x ^c 8	J2+6	B	
3703.4+x [@] 7	(22 ⁻)	BC	
3877.7+x ^a 7	(22 ⁻)	B	
3951.1+x ^k 6	(22 ⁺)	B	
4016.3+x ^c 8	J2+7	B	
4108.2+x ^{&} 7	(23 ⁻)	B	
4273.4+x ^b 7	(23 ⁻)	B	
4282.6+x ^l 7	(23 ⁺)	B	
4512.3+x [@] 7	(24 ⁻)	B	
4618.4+x ^a 7	(24 ⁻)	B	
4622.8+x ^k 7	(24 ⁺)	B	
4921.5+x ^{&} 7	(25 ⁻)	B	
4978.9+x ^l 8	(25 ⁺)	B	
5001.7+x ^b 7	(25 ⁻)	B	
5334.4+x ^a 8	(26 ⁻)	B	
5350.3+x ^k 8	(26 ⁺)	B	
5386.8+x [@] 8	(26 ⁻)	B	
5741.2+x ^b 8	(27 ⁻)	B	
0.0+y ^q	J3	B	Additional information 3.
108.45+y ^q 24	J3+1	B	
238.16+y ^q 24	J3+2	B	
380.5+y ^q 3	J3+3	B	
540.3+y ^q 3	J3+4	B	
715.3+y ^q 4	J3+5	B	
897.4+y ^q 4	J3+6	B	

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Adopted Levels, Gammas (continued) ^{172}Ta Levels (continued)

E(level) [†]	J ^π [‡]	XREF	E(level) [†]	J ^π [‡]	XREF	E(level) [†]	J ^π [‡]	XREF
1098.9+y ^q 4	J3+7	B	2274.5+y ^q 5	J3+12	B	3713.5+y ^q 7	J3+17	B
1311.3+y ^q 5	J3+8	B	2542.0+y ^q 6	J3+13	B	4037.5+y ^q 8	J3+18	B
1533.4+y ^q 5	J3+9	B	2822.5+y ^q 6	J3+14	B	4369.7+y ^q 8	J3+19	B
1768.9+y ^q 5	J3+10	B	3107.6+y ^q 6	J3+15	B			
2015.6+y ^q 5	J3+11	B	3410.0+y ^q 7	J3+16	B			

[†] From least-squares fit to E_γ values.

[‡] As proposed by [2000Ho16](#) based on multiplicities and ΔJ values from their γγ(θ)(DCO) data, band structures and decay pattern. Some of the multiplicities are from γ-intensity balances and conversion data.

From γ(t) in $^{159}\text{Tb}(^{18}\text{O},5n\gamma)$ ([2000Ho16](#)) for excited states.

@ Band(A): $\pi 1/2[541]\otimes \nu 7/2[633], \alpha=0$.

& Band(a): $\pi 1/2[541]\otimes \nu 7/2[633], \alpha=1$.

^a Band(B): $\pi 9/2[514]\otimes \nu 7/2[633], \alpha=0$.

^b Band(b): $\pi 9/2[514]\otimes \nu 7/2[633], \alpha=1$.

^c Band(C): Possible four-quasiparticle band #1.

^d Band(D): Possible four-quasiparticle band #2.

^e Band(E): $\pi 9/2[514]\otimes \nu 5/2[512], \alpha=0$.

^f Band(e): $\pi 9/2[514]\otimes \nu 5/2[512], \alpha=1$.

^g Band(F): $\pi 9/2[514]\otimes \nu 1/2[521], \alpha=0$.

^h Band(f): $\pi 9/2[514]\otimes \nu 1/2[521], \alpha=1$.

ⁱ Band(G): $\pi 7/2[404]\otimes \nu 7/2[633], \alpha=0$.

^j Band(g): $\pi 7/2[404]\otimes \nu 7/2[633], \alpha=1$. Negative parity shown in figure 1 of [2000Ho16](#) seems a misprint.

^k Band(H): $\pi 5/2[402]\otimes \nu 7/2[633], \alpha=0$.

^l Band(h): $\pi 5/2[402]\otimes \nu 7/2[633], \alpha=1$.

^m Band(I): (4⁻) band, $\alpha=0$. Configuration= $\pi 7/2[404]\otimes \nu 1/2[521]$ or $\pi 5/2[402]\otimes \nu 1/2[521]$.

ⁿ Band(i): (4⁻) band, $\alpha=1$. Configuration= $\pi 7/2[404]\otimes \nu 1/2[521]$ or $\pi 5/2[402]\otimes \nu 1/2[521]$.

^o Band(J): $\pi 1/2[541]\otimes \nu 1/2[521], \alpha=1$. Favored band.

^p Band(j): $\pi 1/2[541]\otimes \nu 1/2[521], \alpha=0$. Unfavored band.

^q Band(K): Possible negative-parity band. Configuration= $\pi 5/2[402]\otimes \nu 1/2[521]$ or $\pi 5/2[402]\otimes \nu 5/2[512]$.

Adopted Levels, Gammas (continued)

$\gamma(^{172}\text{Ta})$									
$E_i(\text{level})$	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult. #	$\alpha^@$	Comments	
38.9		38.9 4	100	0.0	(3 ⁺)				
91.5	(5 ⁺)	91.5 3		0.0	(3 ⁺)				
93.2	(4 ⁻)	90.1 3	100 6	3.2?	(⁺)	(E1)	0.477 8	B(E1)(W.u.)=2.2×10 ⁻⁵ 7	
		93.1 3	35 2	0.0	(3 ⁺)	(E1)	0.440 8	B(E1)(W.u.)=6.8×10 ⁻⁶ 21	
127.1		34.0 4	100	93.2	(4 ⁻)				
		127.1 4		0.0	(3 ⁺)				
172.6	(5 ⁻)	79.5 3		93.2	(4 ⁻)				
260.1		221.3 4	100	38.9					
265.2	(7 ⁺)	173.7 3		91.5	(5 ⁺)				
274.8	(6 ⁻)	102.3 3	100	172.6	(5 ⁻)	(M1(+E2))			
		181.5 3	50 9	93.2	(4 ⁻)	(E2)	0.413		
325.5	(6 ⁺)	161.3 3		164.2	(4 ⁺)				
370.6		331.7 4	100	38.9					
400.5	(7 ⁻)	125.6 3	100	274.8	(6 ⁻)				
		228.0 3	78 13	172.6	(5 ⁻)				
462.3		423.3 4	100	38.9					
486.6?		226.5 ‡& 5	100	260.1					
514.5		254.4 4	100 20	260.1					
		475.6 4		38.9					
520.5	(9 ⁺)	255.2 3		265.2	(7 ⁺)				
533.1		162.5 3	11 2	370.6					
		272.9 4	37 4	260.1					
		494.2 4	100 13	38.9					
548.2	(8 ⁻)	147.7 3	87 14	400.5	(7 ⁻)				
		273.3 3	100	274.8	(6 ⁻)				
549.9		63.3 ‡& 3		486.6?					
		87.5 3	100 7	462.3					
		289.8 3	54 8	260.1					
		511.1 5		38.9					
573.8	(8 ⁺)	248.3 3		325.5	(6 ⁺)				
		308.8 & 3		265.2	(7 ⁺)				
584.6		51.4 3	100 13	533.1					
		122.5 4	82 5	462.3					
		214.1 4		370.6					
		545.7 5	100 12	38.9					
		584.6 5	37 6	0.0	(3 ⁺)				
586.3		459.2 4	100	127.1					
607.6		480.5 4	100	127.1					
625.6		75.8 3	100 6	549.9					
		163.3 3	28 3	462.3					
		365.5 4	81 7	260.1					
717.3	(9 ⁻)	169.0 3	61 10	548.2	(8 ⁻)				

Adopted Levels, Gammas (continued)

$\gamma(^{172}\text{Ta})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$L_\gamma^\dagger$	E_f	J_f^π	Mult. #	$\alpha^@$	Comments
717.3	(9 ⁻)	316.9 3	100	400.5	(7 ⁻)			
851.4	(11 ⁺)	330.9 3		520.5	(9 ⁺)			
902.4	(10 ⁺)	328.7 3		573.8	(8 ⁺)			
		381.7 3		520.5	(9 ⁺)			
906.5	(10 ⁻)	189.3 3	42 7	717.3	(9 ⁻)			
		358.3 3	100	548.2	(8 ⁻)			
1113.7	(11 ⁻)	207.1 3	36 7	906.5	(10 ⁻)			
		396.4 3	100	717.3	(9 ⁻)			
1249.5	(13 ⁺)	398.1 3		851.4	(11 ⁺)			
1303.9	(12 ⁺)	401.5 3		902.4	(10 ⁺)			
1338.1	(12 ⁻)	224.2 3	27 7	1113.7	(11 ⁻)			
		431.6 3	100	906.5	(10 ⁻)			
1574.9	(13 ⁻)	236.7 3	26 5	1338.1	(12 ⁻)			
		461.3 3	100	1113.7	(11 ⁻)			
1705.6	(15 ⁺)	456.1 3		1249.5	(13 ⁺)			
1777.2	(14 ⁺)	473.3 3		1303.9	(12 ⁺)			
1829.1	(14 ⁻)	254.4 3	25 4	1574.9	(13 ⁻)			
		491.0 3	100	1338.1	(12 ⁻)			
2089.2	(15 ⁻)	260.0 3		1829.1	(14 ⁻)			
		514.2 3		1574.9	(13 ⁻)			
2214.1	(17 ⁺)	508.4 3		1705.6	(15 ⁺)			
2321.5	(16 ⁺)	544.3 3		1777.2	(14 ⁺)			
2371.2	(16 ⁻)	282.1 3		2089.2	(15 ⁻)			
		542.2 3		1829.1	(14 ⁻)			
2655.4	(17 ⁻)	284.2 3		2371.2	(16 ⁻)			
		566.0 3		2089.2	(15 ⁻)			
2774.1	(19 ⁺)	560.0 3		2214.1	(17 ⁺)			
2959.9	(18 ⁻)	304.4 3		2655.4	(17 ⁻)			
		588.9 3		2371.2	(16 ⁻)			
3265.0	(19 ⁻)	305.2 3		2959.9	(18 ⁻)			
		609.5 3		2655.4	(17 ⁻)			
3388.4	(21 ⁺)	614.3 3		2774.1	(19 ⁺)			
3603.9	(20 ⁻)	644.0 3		2959.9	(18 ⁻)			
3937.0	(21 ⁻)	672.0 3		3265.0	(19 ⁻)			
4059.7	(23 ⁺)	671.3 3		3388.4	(21 ⁺)			
4788.8	(25 ⁺)	729.1 3		4059.7	(23 ⁺)			
5574.8	(27 ⁺)	786.0 3		4788.8	(25 ⁺)			
6414.8	(29 ⁺)	840.0 3		5574.8	(27 ⁺)			
7304.8	(31 ⁺)	890.0 3		6414.8	(29 ⁺)			
36.63+x	(5 ⁻)	36.7 3		0.0+x	(4 ⁻)			
73.0+x	(6 ⁺)	49.3 3		23.7+x	(5 ⁻ ,6 ⁻)	(E1)	0.470 11	B(E1)(W.u.)=2.48×10 ⁻⁵ 11 Mult.: RUL=1 for M2 requires $\delta(M2/E1)<0.005$.
90.74+x	(6 ⁻)	54.2 3		36.63+x	(5 ⁻)			

Adopted Levels, Gammas (continued)

$\gamma(^{172}\text{Ta})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π	Mult.#	$\delta^\#$	$\alpha^\@$	Comments
90.74+x	(6 ⁻)	90.7 3		0.0+x	(4 ⁻)				
151.1+x	(7 ⁺)	77.8 3		73.0+x	(6 ⁺)				
164.7+x	(7 ⁻)	73.9 3	100	90.74+x	(6 ⁻)	(M1(+E2))			
		128.0 3	13 3	36.63+x	(5 ⁻)	(E2)		1.44	
166.6+x	(7 ⁺)	93.5 3		73.0+x	(6 ⁺)	(M1(+E2))			
251.4+x	(8 ⁻)	86.7 3	100	164.7+x	(7 ⁻)				
		160.7 3	28 6	90.74+x	(6 ⁻)				
253.0+x	(7 ⁺)	180.2 3		73.0+x	(6 ⁺)	M1+E2	1.2 4	0.59 8	B(M1)(W.u.)=2.6×10 ⁻⁵ 11; B(E2)(W.u.)=0.53 16
265.0+x	(8 ⁺)	98.6 3		166.6+x	(7 ⁺)				
		113.8 3	100	151.1+x	(7 ⁺)				
		192.3 3	33 7	73.0+x	(6 ⁺)				
278.1+x	(8 ⁻)	25.3 3		253.0+x	(7 ⁺)	(E1)		2.94 11	
		111.4 3		166.6+x	(7 ⁺)	(E1)		0.277 5	
		113.5 3		164.7+x	(7 ⁻)	M1		3.03 5	
287.7+x	(8 ⁺)	121.1 3		166.6+x	(7 ⁺)				
		136.5 3		151.1+x	(7 ⁺)				
		214.7 3		73.0+x	(6 ⁺)				
293.3+x	(5 ⁺)	220.4 3		73.0+x	(6 ⁺)	(M1+E2)	1.0 7	0.34 11	
368.5+x	(9 ⁻)	117.1 3	100	251.4+x	(8 ⁻)				
		203.8 3	55 9	164.7+x	(7 ⁻)				
389.4+x	(9 ⁻)	111.1 3		278.1+x	(8 ⁻)	(M1(+E2))			
		138 1		251.4+x	(8 ⁻)				
404.1+x	(9 ⁺)	116.3 3		287.7+x	(8 ⁺)				
		139.3 3	100	265.0+x	(8 ⁺)				
		252.7 3	92 19	151.1+x	(7 ⁺)				
407.5+x	(6 ⁺)	114.2 3		293.3+x	(5 ⁺)	(M1(+E2))			
		334 1		73.0+x	(6 ⁺)				
423.0+x	(8 ⁺)	170.2 3		253.0+x	(7 ⁺)	(M1(+E2))			
435.4+x	(9 ⁺)	148.0 3	100	287.7+x	(8 ⁺)				
		170.5 3		265.0+x	(8 ⁺)				
		268.8 3	48 10	166.6+x	(7 ⁺)				
487.3+x	(10 ⁻)	118.9 3	100	368.5+x	(9 ⁻)				
		236.0 3	98 15	251.4+x	(8 ⁻)				
526.7+x	(10 ⁻)	137.2 3	100	389.4+x	(9 ⁻)				
		248.7 3	5 1	278.1+x	(8 ⁻)				
540.9+x	(7 ⁺)	133.5 3		407.5+x	(6 ⁺)				
		247.5 3		293.3+x	(5 ⁺)				
567.7+x	(10 ⁺)	131.7 3		435.4+x	(9 ⁺)				
		163.6 3	38 6	404.1+x	(9 ⁺)				
		303.1 3	100	265.0+x	(8 ⁺)				
608.4+x	(10 ⁺)	173.6 3	100	435.4+x	(9 ⁺)				
		203.7 3	89 14	404.1+x	(9 ⁺)				
		320.4 3		287.7+x	(8 ⁺)				

Adopted Levels, Gammas (continued)

$\gamma(^{172}\text{Ta})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π	Mult. #	$\delta^\#$	$\alpha^@$
613.1+x	(9 ⁺)	190.5 3	100	423.0+x	(8 ⁺)			
		359.9 3	66 11	253.0+x	(7 ⁺)			
656.8+x	(11 ⁻)	169.5 3	92 14	487.3+x	(10 ⁻)	(M1+E2)	-0.30 5	0.936
		288.3 3	100	368.5+x	(9 ⁻)			
689.4+x	(11 ⁻)	162.8 3	100	526.7+x	(10 ⁻)	(M1+E2)	+0.45 8	1.01 3
		300.0 3	42 6	389.4+x	(9 ⁻)			
702.8+x	(8 ⁺)	162.0 3		540.9+x	(7 ⁺)	(M1+E2)	>+0.38	0.8 2
		295.3 3		407.5+x	(6 ⁺)			
755.9+x	(11 ⁺)	147.3 3		608.4+x	(10 ⁺)			
		188.0 3	16 2	567.7+x	(10 ⁺)			
		352.2 3	100	404.1+x	(9 ⁺)			
805.1+x	(11 ⁺)	196.4 3	67 10	608.4+x	(10 ⁺)			
		369.8 3	100	435.4+x	(9 ⁺)			
807.4+x	(12 ⁻)	150.7 3	33.2 5	656.8+x	(11 ⁻)			
		320.1 3	100	487.3+x	(10 ⁻)			
821.3+x	(10 ⁺)	208.6 3	100	613.1+x	(9 ⁺)	(M1+E2)	+0.30 18	0.52 3
		398.3 3	97 19	423.0+x	(8 ⁺)			
877.9+x	(12 ⁻)	188.5 3	100	689.4+x	(11 ⁻)			
		351.3 3	40 6	526.7+x	(10 ⁻)			
890.4+x	(9 ⁺)	187.5 3		702.8+x	(8 ⁺)			
		349.5 3		540.9+x	(7 ⁺)			
966.7+x	(12 ⁺)	159.3 3	100	807.4+x	(12 ⁻)			
		210.9 3	19 4	755.9+x	(11 ⁺)			
		398.9 3		567.7+x	(10 ⁺)			
1025.0+x	(12 ⁺)	219.8 3	41 6	805.1+x	(11 ⁺)			
		416.7 3	100	608.4+x	(10 ⁺)			
1033.6+x	(13 ⁻)	226.2 3	58 7	807.4+x	(12 ⁻)			
		376.7 3	100	656.8+x	(11 ⁻)			
1043.4+x	(11 ⁺)	222.4 3	93 19	821.3+x	(10 ⁺)			
		430.0 3	100	613.1+x	(9 ⁺)			
1058.8+x	J1	180.9 3		877.9+x	(12 ⁻)			
1090.1+x	(13 ⁻)	212.3 3	100	877.9+x	(12 ⁻)			
		400.6 3	64 10	689.4+x	(11 ⁻)			
1103.3+x	(10 ⁺)	213.2 3		890.4+x	(9 ⁺)			
		400.6 3		702.8+x	(8 ⁺)			
1198.2+x	(13 ⁺)	231.8 3	13 2	966.7+x	(12 ⁺)			
		442.4 3	100	755.9+x	(11 ⁺)			
1216.8+x	(14 ⁻)	183.3 3	19 3	1033.6+x	(13 ⁻)			
		409.3 3	100	807.4+x	(12 ⁻)			
1258.3+x	J1+1	199.3 3		1058.8+x	J1			
1264.1+x	(13 ⁺)	239.3 3	43 9	1025.0+x	(12 ⁺)			
		459.1 3	100	805.1+x	(11 ⁺)			
1281.0+x	(12 ⁺)	237.6 3	52 10	1043.4+x	(11 ⁺)			

Adopted Levels, Gammas (continued)

$\gamma(^{172}\text{Ta})$ (continued)								
$E_i(\text{level})$	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult. #	δ #	α @
1281.0+x	(12 ⁺)	459.6 3	100	821.3+x	(10 ⁺)			
1326.1+x	(14 ⁻)	236.1 3	100	1090.1+x	(13 ⁻)			
		448.1 3	94 10	877.9+x	(12 ⁻)			
1340.9+x	(11 ⁺)	237.4 3		1103.3+x	(10 ⁺)			
		450.0 3		890.4+x	(9 ⁺)			
1450.3+x	(14 ⁺)	252.7 3		1198.2+x	(13 ⁺)			
		483.1 3		966.7+x	(12 ⁺)			
1490.6+x	J1+2	232.3 3	100	1258.3+x	J1+1			
		432.0 3	66 15	1058.8+x	J1			
1497.1+x	(15 ⁻)	280.5 3	43 6	1216.8+x	(14 ⁻)			
		463.5 3	100	1033.6+x	(13 ⁻)			
1525.7+x	(14 ⁺)	261.6 3	24 4	1264.1+x	(13 ⁺)			
		500.4 3	100	1025.0+x	(12 ⁺)			
1537.3+x	(13 ⁺)	256.5 3		1281.0+x	(12 ⁺)			
		494.0 3		1043.4+x	(11 ⁺)			
1583.7+x	(15 ⁻)	257.9 3	87 12	1326.1+x	(14 ⁻)			
		493.5 3	100	1090.1+x	(13 ⁻)			
1602.4+x	(12 ⁺)	261.6 3		1340.9+x	(11 ⁺)			
		499.7 3		1103.3+x	(10 ⁺)			
1715.2+x	(16 ⁻)	218.2 3	8.1 1	1497.1+x	(15 ⁻)			
		498.4 3	100	1216.8+x	(14 ⁻)			
1719.0+x	(15 ⁺)	268.7 3	12 2	1450.3+x	(14 ⁺)	(M1+E2)	+0.36 10	0.254 11
		520.7 3	100	1198.2+x	(13 ⁺)			
1735.5+x	J1+3	244.6 3	100	1490.6+x	J1+2			
		477.1 3	86 15	1258.3+x	J1+1			
1779.7+x	(14 ⁺)	242.6 3		1537.3+x	(13 ⁺)			
		498.5 3		1281.0+x	(12 ⁺)			
1800.2+x	(15 ⁺)	274.2 3	18 4	1525.7+x	(14 ⁺)			
		536.4 3	100	1264.1+x	(13 ⁺)			
1841.6+x	J2	963.7 3		877.9+x	(12 ⁻)			
1861.5+x	(16 ⁻)	277.8 3	94 17	1583.7+x	(15 ⁻)			
		535.3 3	100	1326.1+x	(14 ⁻)			
1886.5+x	(13 ⁺)	284.8 3		1602.4+x	(12 ⁺)			
		545.0 3		1340.9+x	(11 ⁺)			
2005.8+x	(16 ⁺)	287.1 3	11 2	1719.0+x	(15 ⁺)			
		555.7 3	100	1450.3+x	(14 ⁺)			
2009.9+x	J1+4	274.4 3	68 12	1735.5+x	J1+3			
		519.7 3	100	1490.6+x	J1+2			
2039.8+x	J2+1	198.2 3		1841.6+x	J2			
2042.5+x	(17 ⁻)	327.4 3		1715.2+x	(16 ⁻)			
		545.3 3		1497.1+x	(15 ⁻)			
2097.9+x	(16 ⁺)	297.6 3		1800.2+x	(15 ⁺)			
		572.2 3		1525.7+x	(14 ⁺)			

Adopted Levels, Gammas (continued)

$\gamma(^{172}\text{Ta})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ †	I_γ †	E_f	J_f^π	$E_i(\text{level})$	J_i^π	E_γ †	I_γ †	E_f	J_f^π
2160.7+x	(17 ⁻)	299.3 3	76 13	1861.5+x	(16 ⁻)	3344.5+x	(20 ⁺)	621.2 3		2723.3+x	(18 ⁺)
		577.0 3	100	1583.7+x	(15 ⁻)	3353.9+x	(21 ⁻)	389.8 3		2963.9+x	(20 ⁻)
2192.4+x	(14 ⁺)	305.7 3		1886.5+x	(13 ⁺)			690.7 3		2663.3+x	(19 ⁻)
		590.0 3		1602.4+x	(12 ⁺)	3521.5+x	(21 ⁻)	372.4 3		3149.3+x	(20 ⁻)
2293.9+x	J1+5	284.3 3	94 17	2009.9+x	J1+4			711.0 3		2810.4+x	(19 ⁻)
		558.0 3	100	1735.5+x	J1+3	3623.9+x	(21 ⁺)	337.0 3		3286.7+x	(20 ⁺)
2295.5+x	J2+2	255.6 3		2039.8+x	J2+1			673.2 3		2951.2+x	(19 ⁺)
2299.4+x	(18 ⁻)	256.9 3		2042.5+x	(17 ⁻)	3630.0+x	J2+6	365.8 3		3264.3+x	J2+5
		584.2 3		1715.2+x	(16 ⁻)			714.7 3		2915.1+x	J2+4
2299.9+x	(16 ⁺)	520.2 3		1779.7+x	(14 ⁺)	3703.4+x	(22 ⁻)	739.5 3		2963.9+x	(20 ⁻)
2307.1+x	(17 ⁺)	301.4 3	8 2	2005.8+x	(16 ⁺)	3877.7+x	(22 ⁻)	356.7 3		3521.5+x	(21 ⁻)
		587.6 3	100	1719.0+x	(15 ⁺)			728.2 3		3149.3+x	(20 ⁻)
2399.9+x	(17 ⁺)	302.0 3		2097.9+x	(16 ⁺)	3951.1+x	(22 ⁺)	327.5 3		3623.9+x	(21 ⁺)
		599.7 3		1800.2+x	(15 ⁺)			664.0 3		3286.7+x	(20 ⁺)
2473.1+x	(18 ⁻)	312.3 3	56 10	2160.7+x	(17 ⁻)	4016.3+x	J2+7	386.3 3		3630.0+x	J2+6
		611.5 3	100	1861.5+x	(16 ⁻)			752.0 3		3264.3+x	J2+5
2523.4+x	(15 ⁺)	331.0 3		2192.4+x	(14 ⁺)	4108.2+x	(23 ⁻)	754.3 3		3353.9+x	(21 ⁻)
		637.0 3		1886.5+x	(13 ⁺)	4273.4+x	(23 ⁻)	395.9 3		3877.7+x	(22 ⁻)
2590.3+x	J2+3	294.7 3	100	2295.5+x	J2+2			751.7 3		3521.5+x	(21 ⁻)
		550.5 3	17 4	2039.8+x	J2+1	4282.6+x	(23 ⁺)	658.7 3		3623.9+x	(21 ⁺)
2595.9+x	J1+6	302.0 3		2293.9+x	J1+5	4512.3+x	(24 ⁻)	808.9 3		3703.4+x	(22 ⁻)
		586.0 3		2009.9+x	J1+4	4618.4+x	(24 ⁻)	345.1 3		4273.4+x	(23 ⁻)
2622.5+x	(18 ⁺)	316.2 3	7 1	2307.1+x	(17 ⁺)			740.6 3		3877.7+x	(22 ⁻)
		616.9 3	100	2005.8+x	(16 ⁺)	4622.8+x	(24 ⁺)	671.7 3		3951.1+x	(22 ⁺)
2663.3+x	(19 ⁻)	364.0 3		2299.4+x	(18 ⁻)	4921.5+x	(25 ⁻)	813.3 3		4108.2+x	(23 ⁻)
		620.7 3		2042.5+x	(17 ⁻)	4978.9+x	(25 ⁺)	696.3 3		4282.6+x	(23 ⁺)
2723.3+x	(18 ⁺)	323.5 3		2399.9+x	(17 ⁺)	5001.7+x	(25 ⁻)	383.3 3		4618.4+x	(24 ⁻)
		625.3 3		2097.9+x	(16 ⁺)			728.3 3		4273.4+x	(23 ⁻)
2810.4+x	(19 ⁻)	337.2 3	41 9	2473.1+x	(18 ⁻)	5334.4+x	(26 ⁻)	716.0 3		4618.4+x	(24 ⁻)
		649.9 3	100	2160.7+x	(17 ⁻)	5350.3+x	(26 ⁺)	727.5 3		4622.8+x	(24 ⁺)
2915.1+x	J2+4	324.9 3	100	2590.3+x	J2+3	5386.8+x	(26 ⁻)	874.5 3		4512.3+x	(24 ⁻)
		619.6 3	35 7	2295.5+x	J2+2	5741.2+x	(27 ⁻)	739.5 3		5001.7+x	(25 ⁻)
2951.2+x	(19 ⁺)	329.7 3		2622.5+x	(18 ⁺)	108.45+y	J3+1	108.6 3		0.0+y	J3
		643.2 3		2307.1+x	(17 ⁺)	238.16+y	J3+2	129.9 3	100	108.45+y	J3+1
2963.9+x	(20 ⁻)	300.4 3		2663.3+x	(19 ⁻)			238.0 3	42 10	0.0+y	J3
		664.6 3		2299.4+x	(18 ⁻)	380.5+y	J3+3	142.3 3	79 15	238.16+y	J3+2
3046.3+x	(19 ⁺)	646.4 3		2399.9+x	(17 ⁺)			272.0 3	100	108.45+y	J3+1
3149.3+x	(20 ⁻)	339.0 3		2810.4+x	(19 ⁻)	540.3+y	J3+4	159.8 3	93 16	380.5+y	J3+3
		676.2 3		2473.1+x	(18 ⁻)			302.2 3	100	238.16+y	J3+2
3264.3+x	J2+5	349.3 3	100	2915.1+x	J2+4	715.3+y	J3+5	175.1 3	46 7	540.3+y	J3+4
		674.0 3	44 9	2590.3+x	J2+3			334.7 3	100	380.5+y	J3+3
3286.7+x	(20 ⁺)	335.0 3		2951.2+x	(19 ⁺)	897.4+y	J3+6	182.3 3	48 9	715.3+y	J3+5
		664.2 3		2622.5+x	(18 ⁺)			357.0 3	100	540.3+y	J3+4

Adopted Levels, Gammas (continued)

$\gamma(^{172}\text{Ta})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π	$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π
1098.9+y	J3+7	201.5 3	34 6	897.4+y	J3+6	2274.5+y	J3+12	259.0 3	35 8	2015.6+y	J3+11
		383.6 3	100	715.3+y	J3+5			505.6 3	100	1768.9+y	J3+10
1311.3+y	J3+8	212.5 3	33 6	1098.9+y	J3+7	2542.0+y	J3+13	267.5 3		2274.5+y	J3+12
		414.0 3	100	897.4+y	J3+6			526.4 3		2015.6+y	J3+11
1533.4+y	J3+9	222.1 3	23 4	1311.3+y	J3+8	2822.5+y	J3+14	548.0 3		2274.5+y	J3+12
		434.4 3	100	1098.9+y	J3+7	3107.6+y	J3+15	565.6 3		2542.0+y	J3+13
1768.9+y	J3+10	235.5 3	33 6	1533.4+y	J3+9	3410.0+y	J3+16	587.5 3		2822.5+y	J3+14
		457.7 3	100	1311.3+y	J3+8	3713.5+y	J3+17	605.9 3		3107.6+y	J3+15
2015.6+y	J3+11	246.8 3	15 3	1768.9+y	J3+10	4037.5+y	J3+18	627.5 3		3410.0+y	J3+16
		482.0 3	100	1533.4+y	J3+9	4369.7+y	J3+19	656.2 3		3713.5+y	J3+17

[†] Most data are from $^{159}\text{Tb}(^{18}\text{O},5\text{n}\gamma)$ (2000Ho16). Some levels up to 626 keV are populated only in ^{172}W ε decay (1990Me12).

[‡] Ordering of 63-226 cascade is not established.

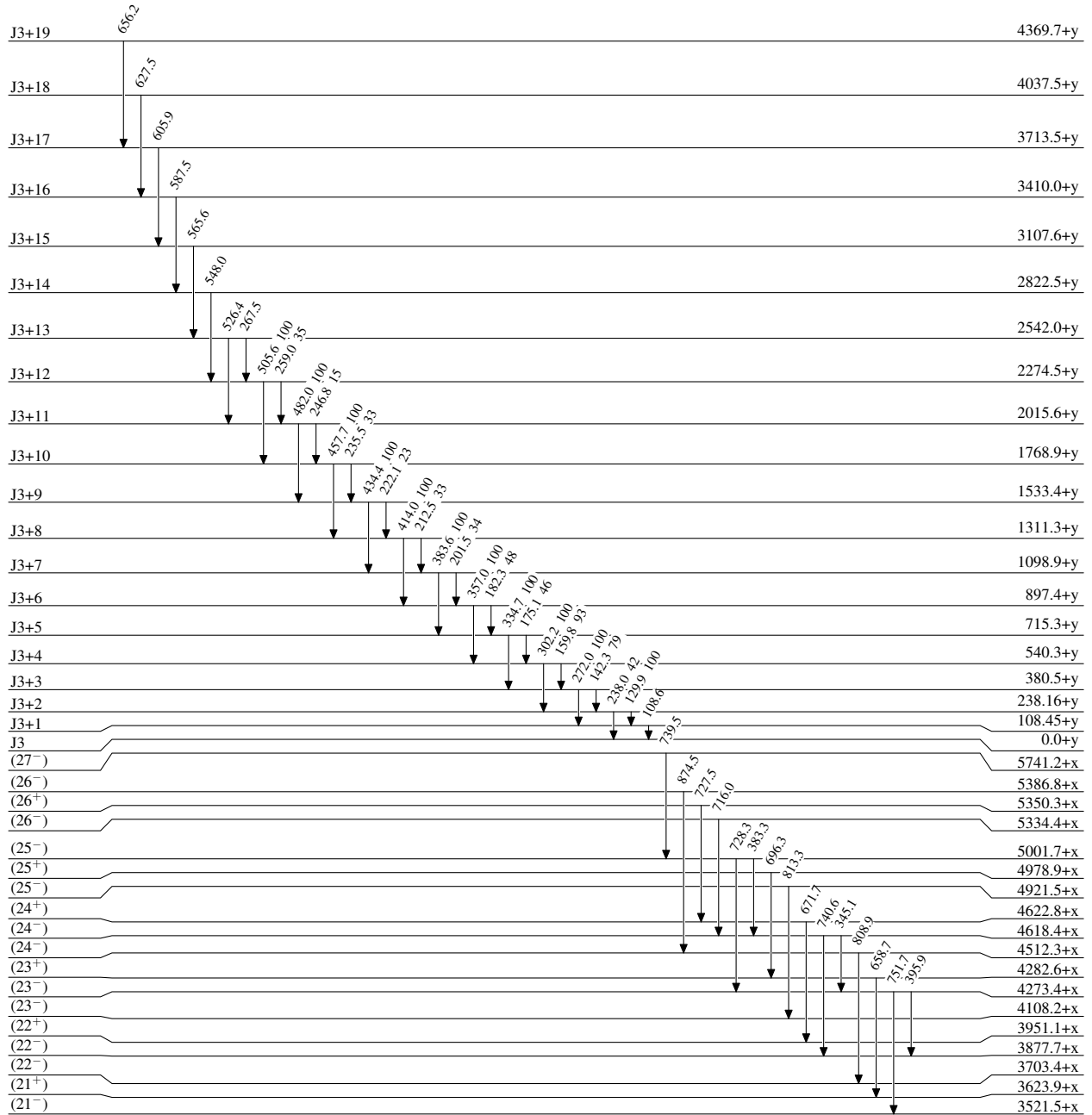
From intensity balance considerations in $^{159}\text{Tb}(^{18}\text{O},5\text{n}\gamma)$ (2000Ho16), except for 113.5 γ and 180.2 γ which are from ce data in $^{165}\text{Ho}(^{12}\text{C},5\text{n}\gamma)$ (2000Ho16).

@ 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.

& Placement of transition in the level scheme is uncertain.

Adopted Levels, GammasLevel Scheme

Intensities: Relative photon branching from each level



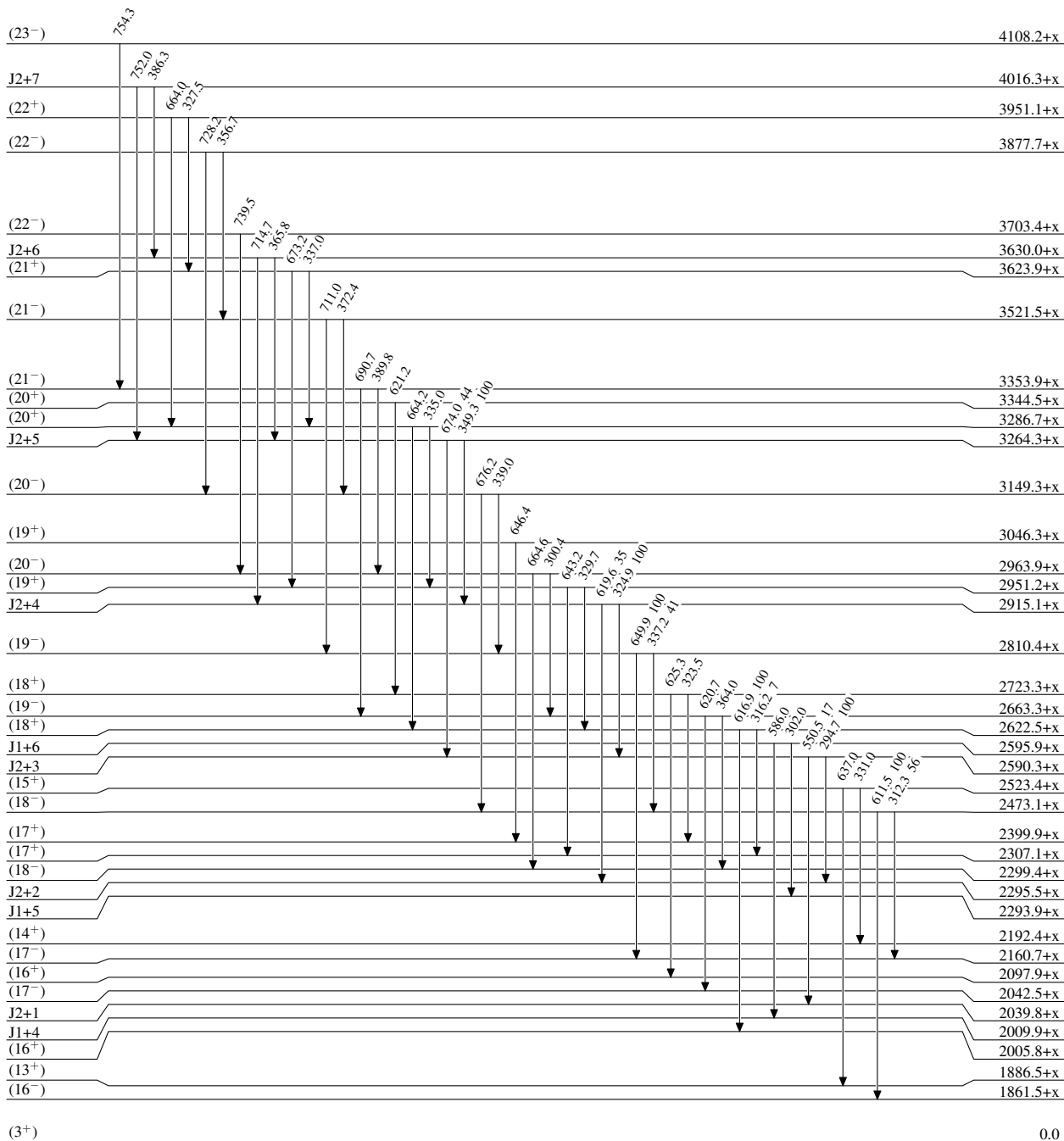
(3+)

0.0

36.8 min 3

Adopted Levels, Gammas**Level Scheme (continued)**

Intensities: Relative photon branching from each level

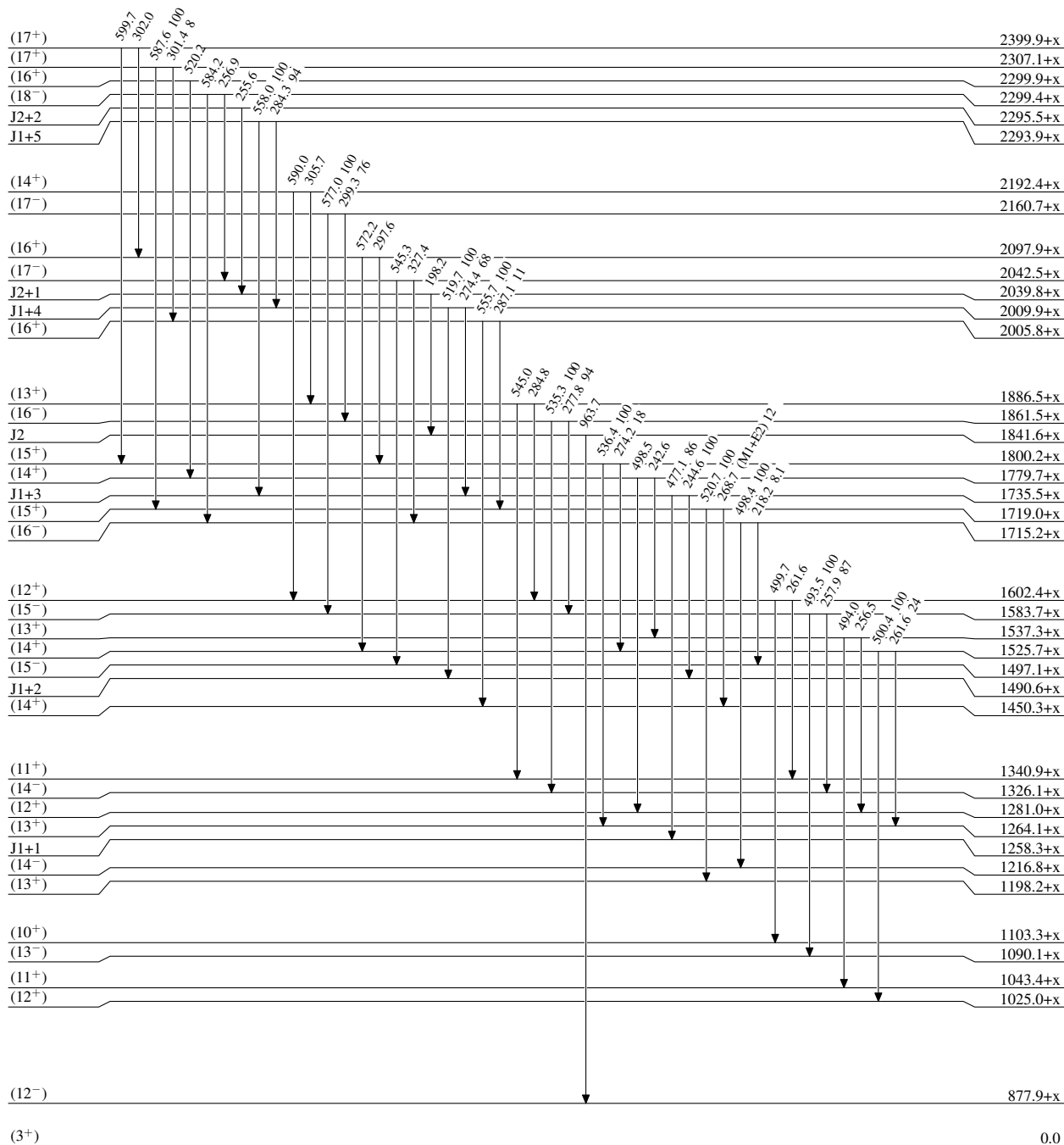
(3⁺)

0.0

36.8 min 3

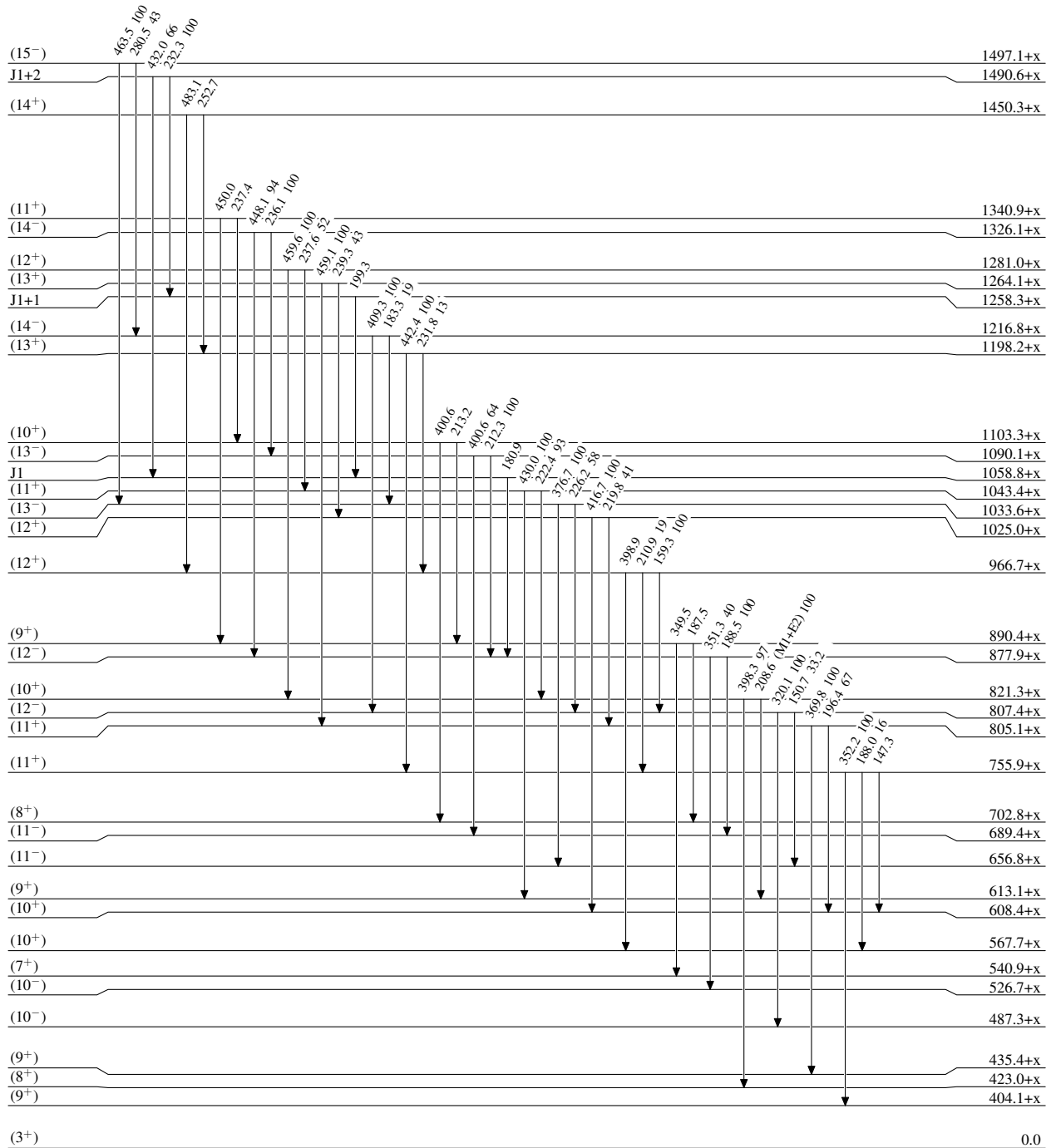
Adopted Levels, Gammas**Level Scheme (continued)**

Intensities: Relative photon branching from each level



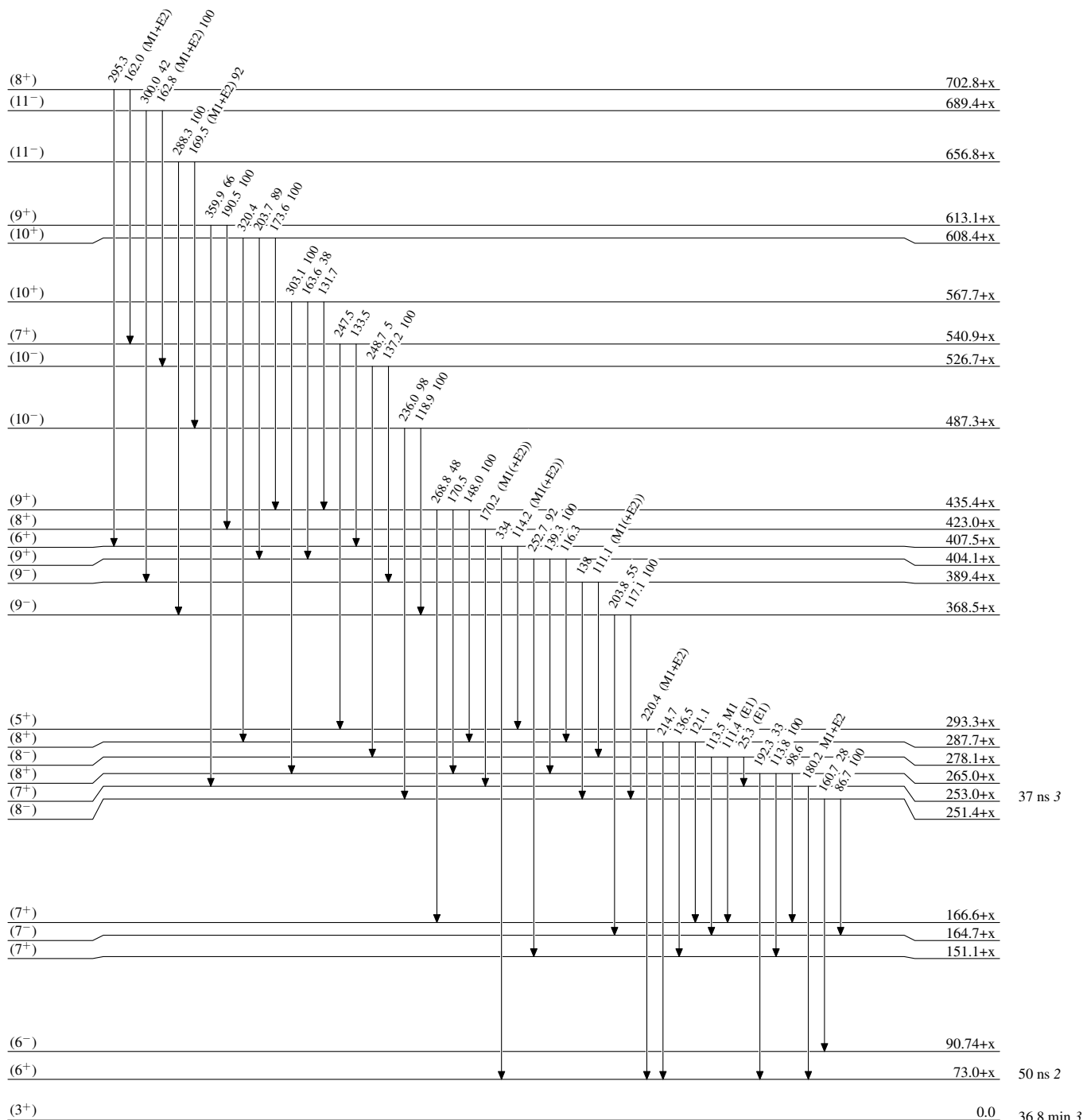
Adopted Levels, Gammas**Level Scheme (continued)**

Intensities: Relative photon branching from each level



Adopted Levels, Gammas**Level Scheme (continued)**

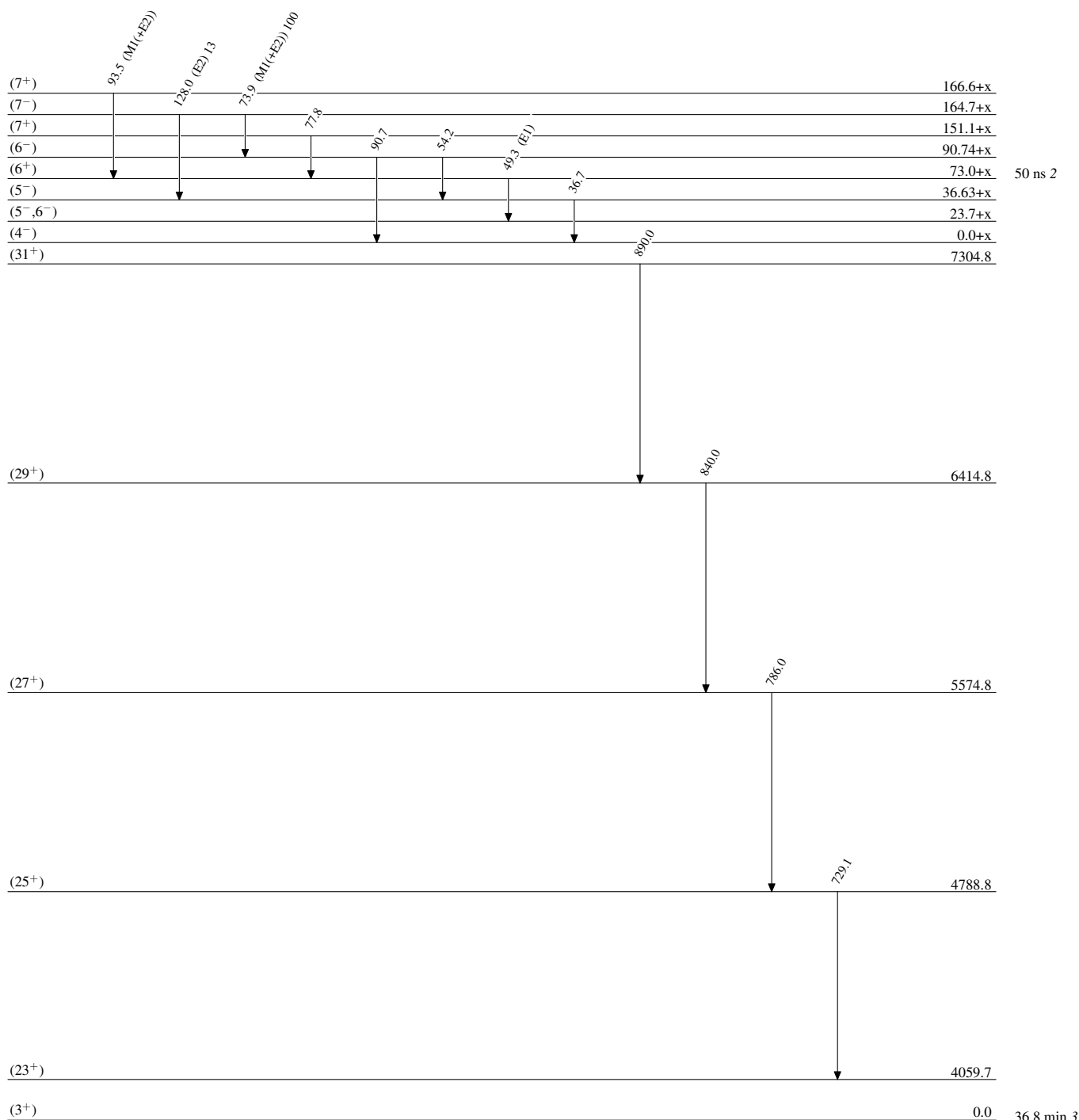
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

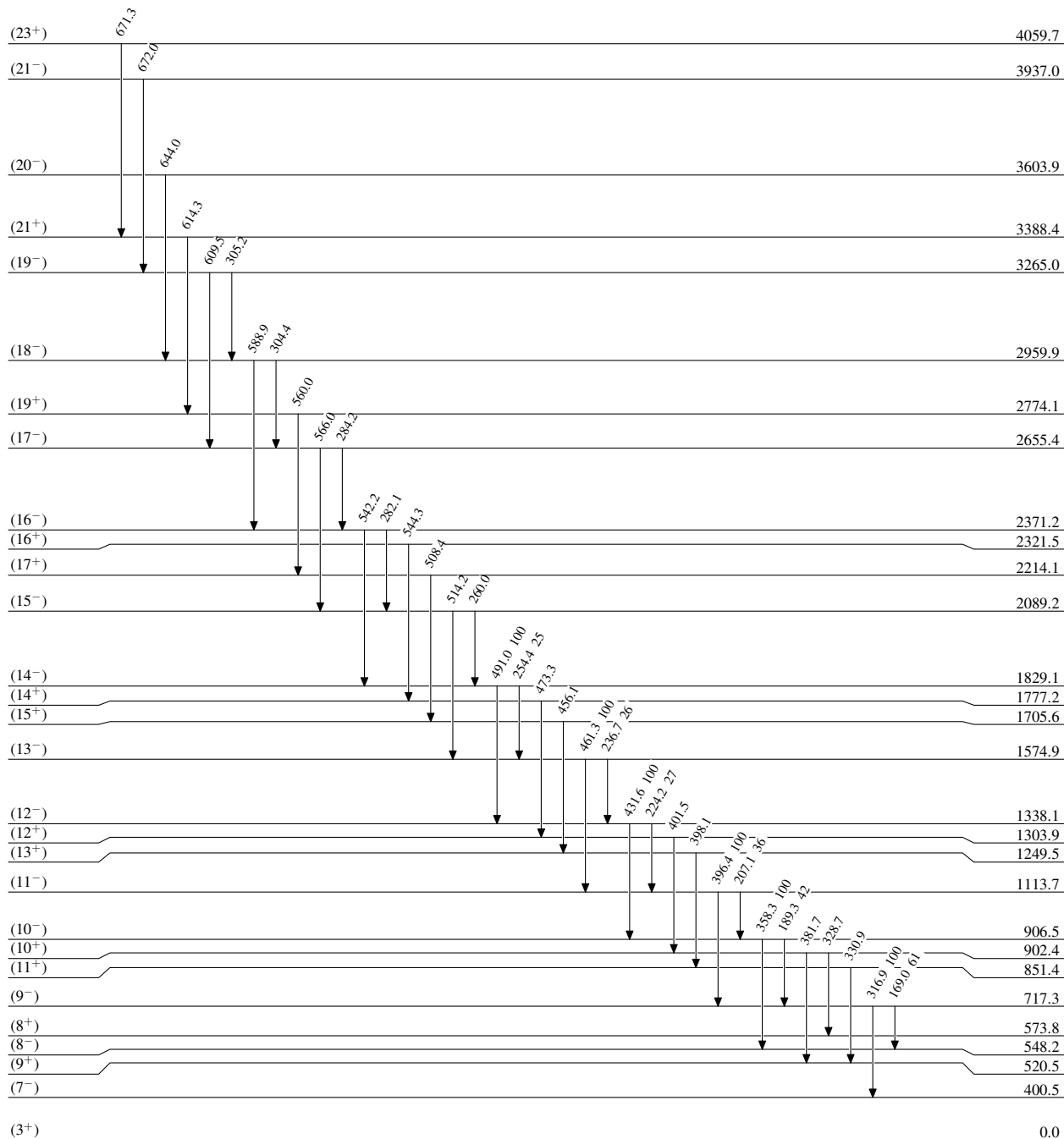
Level Scheme (continued)

Intensities: Relative photon branching from each level



Adopted Levels, GammasLevel Scheme (continued)

Intensities: Relative photon branching from each level



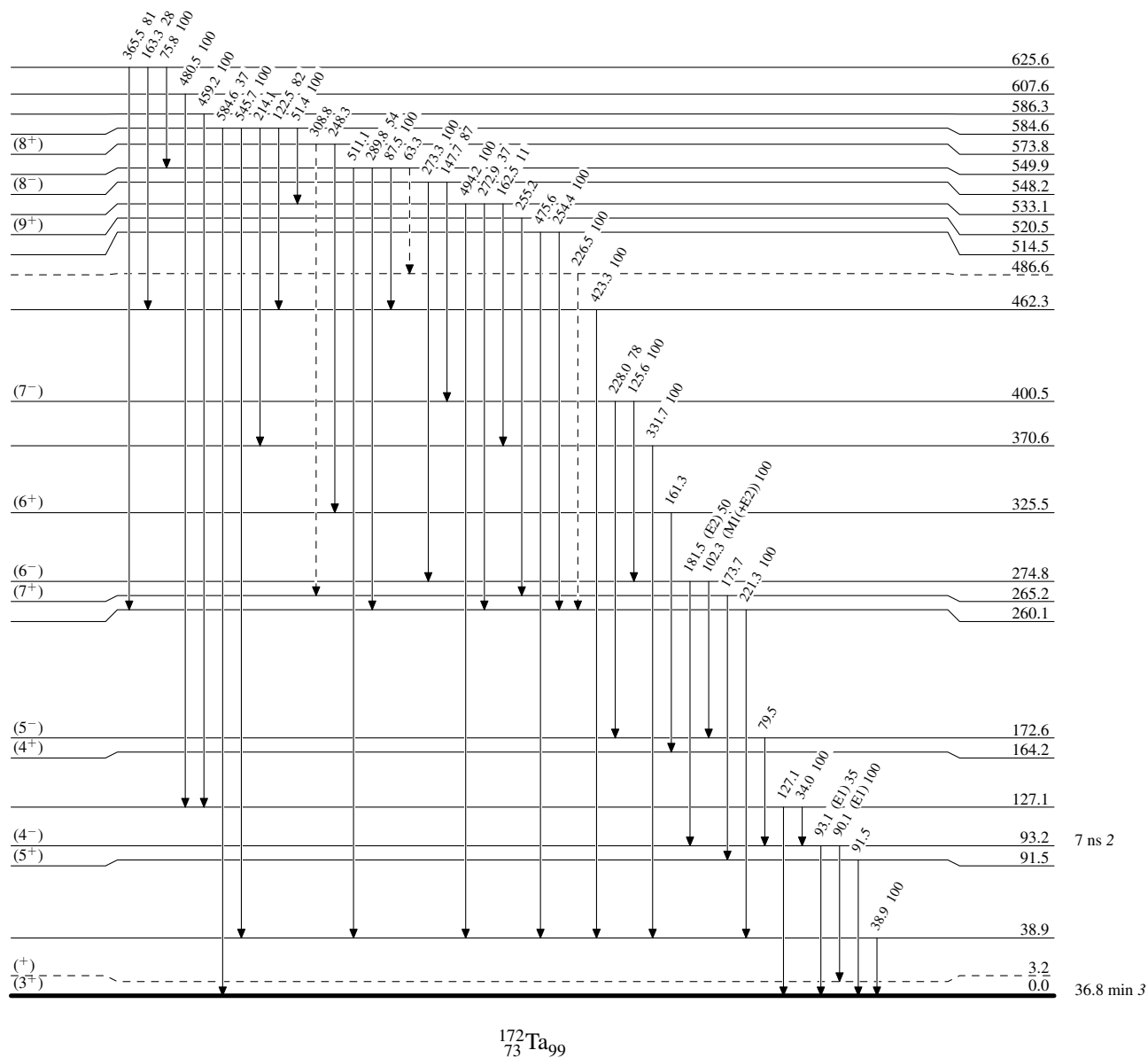
36.8 min 3

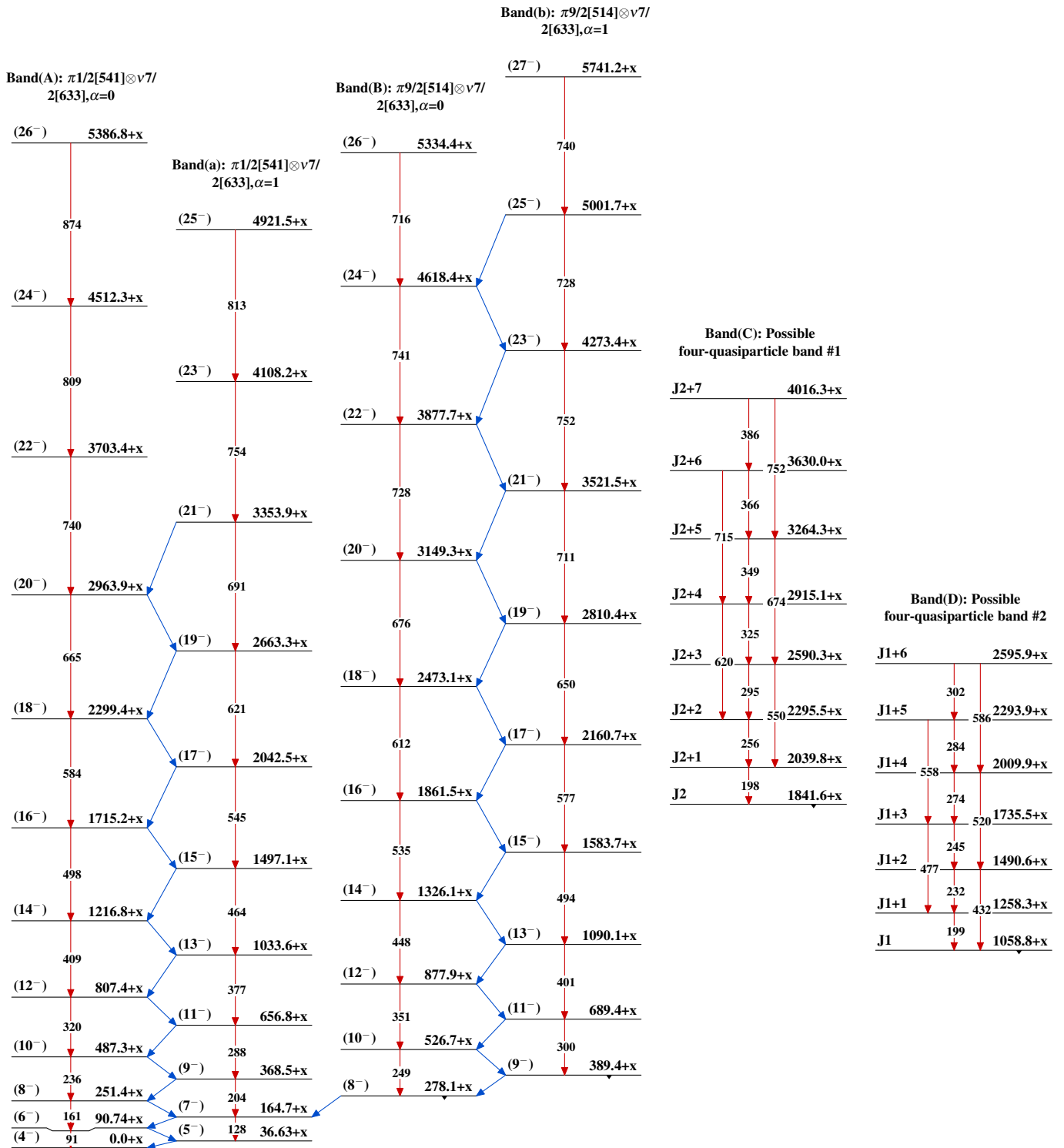
Adopted Levels, Gammas

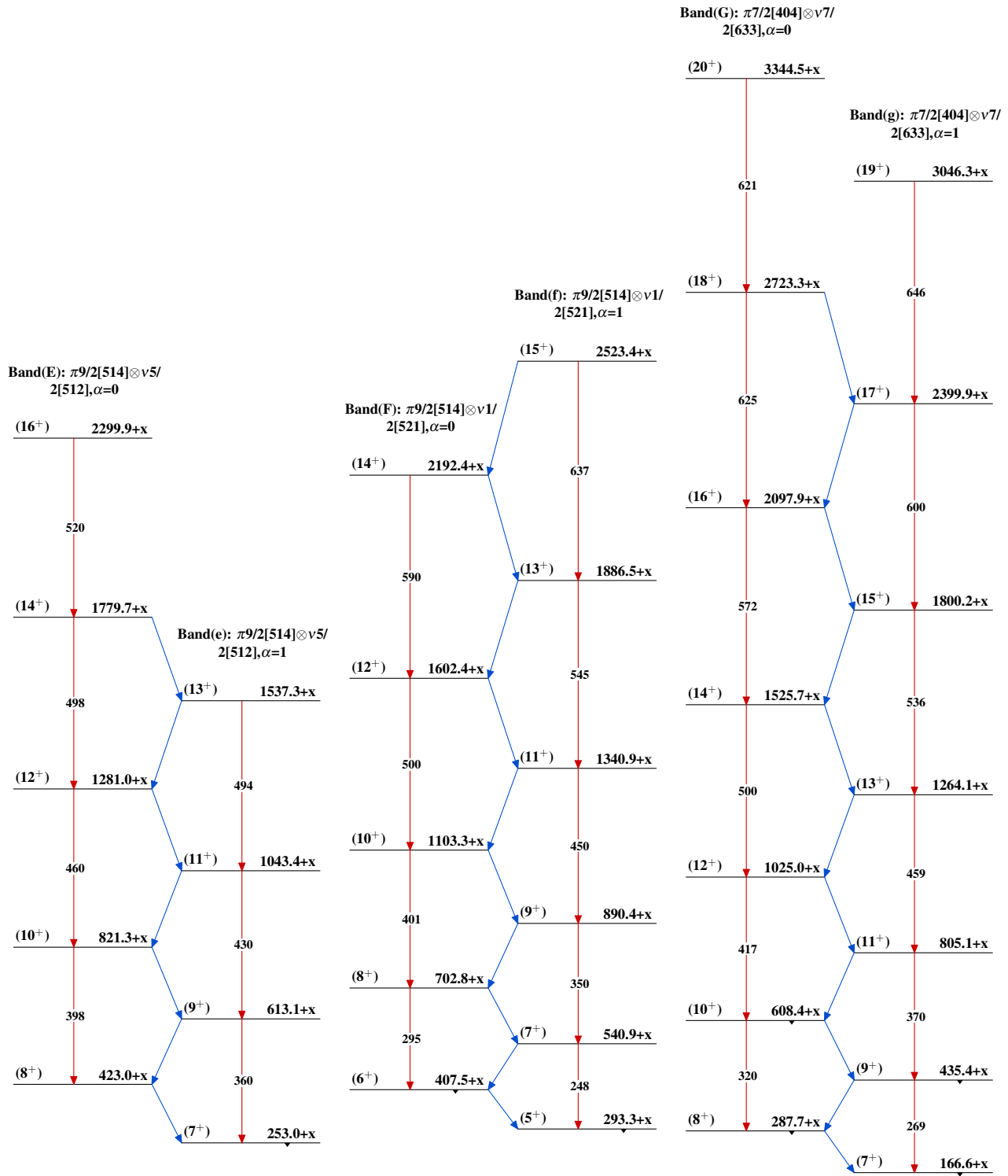
Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)


Adopted Levels, Gammas

Adopted Levels, Gammas (continued)

Adopted Levels, Gammas (continued)**Band(H): $\pi 5/2[402] \otimes v7/$
 $2[633], \alpha=0$**

(26 ⁺)	5350.3+x		
	728		
(24 ⁺)	4622.8+x		
	672		
(22 ⁺)	3951.1+x		
	664		
(20 ⁺)	3286.7+x		
	664		
(18 ⁺)	2622.5+x		
	617		
(16 ⁺)	2005.8+x		
	556		
(14 ⁺)	1450.3+x		
	483		
(12 ⁺)	966.7+x		
	399		
(10 ⁺)	567.7+x		
	303		
(8 ⁺)	265.0+x		

**Band(h): $\pi 5/2[402] \otimes v7/$
 $2[633], \alpha=1$**

(25 ⁺)	4978.9+x		
	696		
(23 ⁺)	4282.6+x		
	659		
(21 ⁺)	3623.9+x		
	673		
(19 ⁺)	2951.2+x		
	643		
(17 ⁺)	2307.1+x		
	588		
(15 ⁺)	1719.0+x		
	521		
(13 ⁺)	1198.2+x		
	442		
(11 ⁺)	755.9+x		
	352		
(9 ⁺)	404.1+x		
	253		
(7 ⁺)	151.1+x		

**Band(J): $\pi 1/2[541] \otimes v1/$
 $2[521], \alpha=1$**

(31 ⁺)	7304.8		
	890		
(29 ⁺)	6414.8		
	840		
(27 ⁺)	5574.8		
	786		
(25 ⁺)	4788.8		
	729		
(23 ⁺)	4059.7		
	671		
(21 ⁺)	3388.4		
	614		
(19 ⁺)	2774.1		
	560		
(17 ⁺)	2214.1		
	508		
(15 ⁺)	1705.6		
	456		
(13 ⁺)	1249.5		
	398		
(11 ⁺)	851.4		
	331		
(9 ⁺)	520.5		
	255		
(7 ⁺)	265.2		
	174		
(5 ⁺)	91.5		
	92		
(3 ⁺)	0.0		

**Band(I): (4^-) band,
 $\alpha=0$**

(20 ⁻)	3603.9		
	644		
(18 ⁻)	2959.9		
	589		
(16 ⁻)	2371.2		
	542		
(14 ⁻)	1829.1		
	491		
(12 ⁻)	1338.1		
	432		
(10 ⁻)	906.5		
	358		
(8 ⁻)	548.2		
	273		
(6 ⁻)	274.8		
	182		
(4 ⁻)	93.2		

Band(i): (4^-) band, $\alpha=1$

(21 ⁻)	3937.0		
	672		
(19 ⁻)	3265.0		
	610		
(17 ⁻)	2655.4		
	566		
(15 ⁻)	2089.2		
	514		
(13 ⁻)	1574.9		
	461		
(11 ⁻)	1113.7		
	396		
(9 ⁻)	717.3		
	317		
(7 ⁻)	400.5		
	228		
(5 ⁻)	172.6		

**Band(j): $\pi 1/2[541] \otimes v1/$
 $2[521], \alpha=0$**

(16 ⁺)	2321.5		
	544		
(14 ⁺)	1777.2		
	473		
(12 ⁺)	1303.9		
	402		
(10 ⁺)	902.4		
	329		
(8 ⁺)	573.8		
	248		
(6 ⁺)	325.5		
	161		
(4 ⁺)	164.2		

Adopted Levels, Gammas (continued)Band(K): Possible negative-parity
band

J3+19		4369.7+y
		↓
J3+18	656	4037.5+y
		↓
J3+17	628	3713.5+y
		↓
J3+16	606	3410.0+y
		↓
J3+15	588	3107.6+y
		↓
J3+14	566	2822.5+y
		↓
J3+13	548	2542.0+y
	268	↓
J3+12	526	2274.5+y
	259	↓
J3+11	506	2015.6+y
	247	↓
J3+10	482	1768.9+y
	236	↓
J3+9	458	1533.4+y
	222	↓
J3+8	434	1311.3+y
	212	↓
J3+7	414	1098.9+y
	202	↓
J3+6	384	897.4+y
	182	↓
J3+5	357	715.3+y
	175	↓
J3+4	335	540.3+y
	160	↓
J3+3	302	380.5+y
	142	↓
J3+2	272	238.16+y
	130	↓
J3+1	238	108.45+y
	109	↓
J3		0.0+y

 $^{172}_{73}\text{Ta}_{99}$