Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 113,1871 (2012)	15-Jun-2012

Q(β^-)=−3.31×10^3 *4*; S(n)=7.66×10^3 *4*; S(p)=2.57×10^3 *4*; Q(α)=3.98×10^3 *4* 2012Wa38
Note: Current evaluation has used the following Q record −3316 34 *7661* 33 *2568* 39 *4004* 38 2011AuZZ.
Q(β^-), S(n), S(p), Q(α) from 2003Au03 are −3320 *30*, 7660 *30*, 2570 *40*, 4000 *40*, respectively.
Additional information 1.
See 1987Bi08, 1987Bo44, 1990Di09, 1992Me07 (supersedes 1989MeZV, 1989MeZZ) for hfs and isotope shift data.
^{192}Tl has two isomers. The low-spin isomer (g.s.) is obtained following ^{192}Pb ε decay; the high-spin isomer (7$^+$) is formed in (HI,xnγ) reactions. There is no evidence that either isomer decays by any mode other than $\varepsilon+\beta^+$.

^{192}Tl Levels

J(IJKLM) Values proposed in (^{37}Cl,5nγ) based on observed band structure and unreported DCO data (parentheses added by evaluator). Values are highly tentative, and, since adopted J values in the $\pi=-$ ΔJ=1 sequence are 1 unit higher here than proposed by 1996RiZZ, it seems possible that these values should have been increased by 1 unit also; note that such an increase may jeopardize the validity of the configuration proposed by 1996RiZZ (for the (7$^+$) band at least).

Cross Reference (XREF) Flags

A	^{192}Pb ε decay	E	^{196}Bi α decay: high spin
B	^{181}Ta(^{18}O,7nγ), (^{16}O,5nγ)	F	^{9}Be(^{238}U,Xγ)
C	^{160}Gd(^{37}Cl,5nγ):SD	G	^{160}Gd(^{37}Cl,5nγ)
D	^{196}Bi α decay: low spin		

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$	XREF	Comments
0.0	(2$^-$)[#]	9.6 min *4*	A D	%ε+%β^+=100 μ=+0.200 *3*; Q=−0.335 *11* Δ<r^2>(^{192}Tl−^{205}Tl)=−0.60 *7* (1992Me07). <r^2>$^{1/2}$(charge)=5.416 *7* (2004An14). μ: collinear fast-beam laser spectroscopy (1992Me07); value relative to μ=+1.63821461 *12* for ^{205}Tl. Q: collinear fast-beam laser spectroscopy; −0.328 *11* from 1992Me07, increased by evaluator by 2% (Sternheimer correction). T$_{1/2}$: weighted average of 9.4 min *2* (1979To06,1981So09) and 10.6 min *5* (1975Va20). Others: 1961An03, 1963Di10, 1968Pe13.
0.0+x[e]	(7$^+$)		G	E(level): since the 251γ from the (8$^-$) isomer is coincident with most transitions reported by 1996RiZZ in ^{160}Gd(^{37}Cl,5nγ), the 217+x isomer must have been strongly populated in that study even though no linking transition between it and the 237+x level fed by the 83γ (or the 0.0+x level) has been observed; thus, K is at least 6$\hbar$ to 8$\hbar$ for levels observed in (^{37}Cl,5nγ) above the 217+x level. If the E=491 *40* level fed in α decay: high spin is synonymous with the 320.4+x level from (^{37}Cl,5nγ) then x=171 *40*.
138 *45*	(7$^+$)[#]	10.8 min *2*	B G	%ε+%β^+=100 μ=+0.518 *4*; Q=+0.473 *20* Δ<r^2>(^{192}Tl−^{205}Tl)=−0.61 *7* (1992Me07). μ: collinear fast-beam laser spectroscopy (1989Ra17, from 1987Bo44); value relative to μ=+1.62225787 *12* for ^{203}Tl and μ=+1.63821461 *12* for ^{205}Tl. Other value: +0.502 *8* (collinear fast-beam laser spectroscopy, 1992Me07). Q: from collinear fast−beam laser spectroscopy; +0.464 *20* from 1992Me07, increased by evaluator by 2% (Sternheimer correction). E(level): from Eγ=250.6 from 217+x 20, assuming x=171 *40*.

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Adopted Levels, Gammas (continued)

^{192}Tl Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	$T_{1/2}$	XREF	Comments
				J$^{\pi}$: possible configuration: $(s_{1/2}i_{13/2})7^+$ (1991Va04); supported by μ (1992Me07).
				$T_{1/2}$: from 1975Va20 (10.8 min *2*), 1981So09 (10.8 min *3*). Others: 1961An03, 1963Di10, 1968Pe13.
167.49 *10*	$1^{(-)}$		A	J$^{\pi}$: M1,E2 168γ to (2^-) g.s.; log *ft*=5.7 *3* (log $f^{1u}t$<8.5) from 0^+.
178 *40*	(3^+)		D	E(level): from Q(α) and measured Eα in ^{196}Bi α decay: low spin.
				J$^{\pi}$: based on α hindrance (HF=1.6 *8*) from (3^+) parent in ^{196}Bi α decay: low spin. Possible α-parent configuration is $(\pi\ 1h_{9/2})(\nu\ 3p_{3/2})3^+$ (1991Va04); other members of this intruder multiplet have not yet been identified.
237.4+x *16*	(9^-)		B G	J$^{\pi}$: (M1) 83γ from (10^-) 320+x level. Level also proposed in (O,xnγ) study to allow for possible missed level(s) between the level deexcited by the 250.6γ and that deexcited by the 83γ; J=9 favored by analogy with neighboring higher-mass Tl isotopes (1988Hu03).
				Probably deexcited by an unobserved Eγ<40 transition, analogous to higher A isotopes of Tl (1980Kr02, 1988Hu03).
320.4+x[@] *16*	(10^-)[&]		B E G	E(level): 491 *40* from E(5112α) in ^{196}Bi α decay: high spin and Q(α), assuming E=271 *5* for the (10^-) isomer in ^{196}Bi. Thus, x=171 *40*, provided that this is indeed the level fed in α decay: high spin.
				J$^{\pi}$: α decay from (10^-) in ^{196}Bi α decay: high spin is probably allowed (HF=3.1 *14*). Possible α-parent configuration is $(\pi\ 1h_{9/2})(\nu\ 1i_{13/2})10^-$ (1991Va04).
371.05 *18*	$1^{(-)}$		A	J$^{\pi}$: M1(+E2) 371γ to (2^-) g.s.; log *ft*=6.0 *1* (log $f^{1u}t$<8.5) from 0^+.
388 *45*	(8^-)	296 ns *5*	B FG	%IT=100
				μ=+1.66 *4*; Q=0.44 *7*
				μ: differential perturbed angular distributions (1989Ra17, from 1982Da17); value relative to μ=3.607 *8* for ^{19}F(197 level).
				Q: estimate from differential perturbed angular distributions (1989Ra17, from 1982Sc27); other estimate: 0.42 *7* (differential perturbed angular distributions, 1983Ma79).
				E(level): (237+x−z)=217+x 20, where 0≤z≤40 keV (1991Va04) and x=171 *40*; z represents the energy of an unobserved transition from an expected level lying between the level deexcited by the 250.6γ and the one deexcited by the 83γ.
				J$^{\pi}$: (E1) 251γ to (7^+) 138; J expected to increase with energy in (HI,xnγ) reactions. Analogous to 8^- isomers known in higher A Tl isotopes.
				$T_{1/2}$: from $\gamma\gamma$(t) in (O,xnγ) (1982Da17). Other values: 272 ns *10* ($\gamma\gamma$(t), 1980Kr02) in (O,xnγ); 313 ns *44* (2004Gl04, 2003Gl05) from fragment-γ(t) in ^{9}Be(^{238}U,Xγ).
413.98 *23*	$(1^-,2^-)$		A	J$^{\pi}$: M1(+E2) 414γ to (2^-) g.s.; 782γ from 1^+ 1195 level.
445.0+x[e] *8*	(8^+)		G	
596.4+x[@] *16*	(11^-)[&]		B G	J$^{\pi}$: D+Q 276γ to (9^-) 321+x; band assignment.
674.0+x *18*	(8^+)		G	
775.67 *14*	$(0^-,1^-)$		A	J$^{\pi}$: M1+E2 608γ to $1^{(-)}$ 167; log *ft*=5.3 from 0^+.
794.0+x[e] *8*	(9^+)		G	
858.4+x[@] *16*	(12^-)[&]		B G	J$^{\pi}$: D+Q intraband 262γ to (10^-) 596+x; band assignment.
1168.0+x[e] *10*	(10^+)		G	
1195.46 *18*	1^+		A	J$^{\pi}$: log *ft*=4.7 from 0^+; (E1) 1195γ to (2^-) g.s.
1254.7+x[@] *16*	(13^-)[&]		B G	J$^{\pi}$: D+Q 396γ to (11^-) 858+x; band assignment.
1303.0+x *15*	(10^+)		G	
1432.2+x *16*	(11^+)		G	
1563.4+x[@] *16*	(14^-)[&]		B G	J$^{\pi}$: D+Q 309γ to (12^-) 1255+x; Q 705γ to (11^-) 858+x; band assignment.
1683.3+x[e] *18*	(12^+)		G	
1729.3+x[f] *17*	(12^+)		G	

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Adopted Levels, Gammas (continued)

^{192}Tl Levels (continued)

E(level)†	Jπ‡	XREF		Comments
1874.3+x[f] *18*	(13+)		G	
2021.6+x[@] *16*	(15−)[&]	B	G	Jπ: D+Q 458γ to (13−) 1564+x; band assignment.
2043.3+x[f] *20*	(14+)		G	
2202.3+x[f] *20*	(15+)		G	
2336.8+x[g] *17*	(15−)		G	
2493.3+x[f] *21*	(16+)		G	
2512.5+x[@] *17*	(16−)[&]		G	
2636.2+x[g] *17*	(16−)		G	
2717.0+x[g] *18*	(17−)		G	
2789.3+x[f] *21*	(17+)		G	
2848.6+x[@] *19*	(17−)[&]		G	
2977.1+x[g] *18*	(18−)		G	
3109.6+x[h] *18*	(16+)		G	
3139.8+x[i] *20*	(17−)		G	
3170.3+x[f] *22*	(18+)		G	
3198.1+x[g] *19*	(19−)		G	
3348.0+x[h] *20*	(17+)		G	
3495.2+x[h] *20*	(18+)		G	
3508.8+x[i] *21*	(18−)		G	
3537.3+x[f] *22*	(19+)		G	
3552.1+x[g] *20*	(20−)		G	
3753.8+x[i] *21*	(19−)		G	
3788.1+x[h] *20*	(19+)		G	
3894.1+x[g] *20*	(21−)		G	
3952.3+x[f] *23*	(20+)		G	
4020.2+x[h] *21*	(20+)		G	
4302.3+x[f] *23*	(21+)		G	
4306.1+x[g] *21*	(22−)		G	
4370.2+x[h] *21*	(21+)		G	
4702.2+x[h] *22*	(22+)		G	
4718.1+x[g] *21*	(23−)		G	
4772.3+x[f] *25*	(22+)		G	
5099.2+x[h] *23*	(23+)		G	
5156.1+x[g] *22*	(24−)		G	
u[a]	(15)	C		
283.0+u[a] *2*	(17)	C		
603.8+u[a] *3*	(19)	C		
962.8+u[a] *4*	(21)	C		
1360.6+u[a] *4*	(23)	C		
1797.7+u[a] *5*	(25)	C		
2273.8+u[a] *5*	(27)	C		
2789.0+u[a] *6*	(29)	C		
3343.4+u[a] *6*	(31)	C		
3936.4+u[a] *6*	(33)	C		
4568.4+u[a] *7*	(35)	C		
5238.8+u[a] *8*	(37)	C		
5946.7+u[a] *12*	(39)	C		

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Adopted Levels, Gammas (continued)

^{192}Tl Levels (continued)

E(level)†	Jπ‡	XREF	E(level)†	Jπ‡	XREF	E(level)†	Jπ‡	XREF
v[b]	(18)	C	820.2+w[c] 4	(16)	C	467.1+s[d] 4	(13)	C
337.5+v[b] 2	(20)	C	1171.8+w[c] 4	(18)	C	760.4+s[d] 5	(15)	C
712.4+v[b] 3	(22)	C	1562.2+w[c] 5	(20)	C	1092.6+s[d] 5	(17)	C
1125.8+v[b] 4	(24)	C	1990.1+w[c] 5	(22)	C	1463.6+s[d] 5	(19)	C
1576.9+v[b] 4	(26)	C	2455.5+w[c] 6	(24)	C	1872.9+s[d] 6	(21)	C
2066.5+v[b] 5	(28)	C	2957.3+w[c] 6	(26)	C	2319.3+s[d] 6	(23)	C
2593.9+v[b] 5	(30)	C	3495.1+w[c] 6	(28)	C	2802.9+s[d] 6	(25)	C
3159.4+v[b] 6	(32)	C	4068.1+w[c] 7	(30)	C	3322.8+s[d] 7	(27)	C
3762.5+v[b] 6	(34)	C	4675.3+w[c] 7	(32)	C	3878.2+s[d] 7	(29)	C
4403.4+v[b] 7	(36)	C	5317.9+w[c] 8	(34)	C	4469.4+s[d] 8	(31)	C
5081.1+v[b] 9	(38)	C	5994.7+w[c] 9	(36)	C	5094.6+s[d] 8	(33)	C
5796.1+v[b] 12	(40)	C	6707.2+w[c] 12	(38)	C	5754.3+s[d] 9	(35)	C
w[c]	(10)	C	7451.9+w[c] 15	(40)	C	6448.1+s[d] 10	(37)	C
233.4+w[c] 2	(12)	C	s[d]	(9)	C	7175.4+s[d] 13	(39)	C
507.2+w[c] 3	(14)	C	213.4+s[d] 3	(11)	C			

† From least-squares fit to Eγ, except as noted. The large uncertainties indicated here for some high spin levels arise from the large uncertainty in energy assumed for the (3+) level. See the relevant source datasets for more precise level energy differences for many high−spin levels. See also the comment on the energy of the 0.0+x level.

‡ Values given without comment are from ^{160}Gd(^{37}Cl,5nγ):SD. Those for bands SD-1 and SD-2 were deduced from observed signature splitting and comparison with the $i_{13/2}$ proton excitations in ^{193}Tl. Those for bands SD-3 and SD-4 were deduced from fits to the dynamic moments of inertia.

Assignments for both the (2−) and the (7+) isomers are based on J^π systematics for even-mass Tl isotopes and on measured μ values, interpreted via the additivity rule as arising from coupling of the $s_{1/2}$ proton hole (known in neighboring odd-A Tl) to an odd neutron; apparent configurations (1991Va04,1992Me07) are $((\pi\ 3s_{1/2})(\nu\ 3p_{3/2}))$ for (2−) ^{192}Tl, and $((\pi\ 3s_{1/2})(\nu\ 1i_{13/2}))$ for (7+) ^{192}Tl, and these are supported by measured Q (1992Me07). ε+β+ decay to ^{192}Hg from a mixed-isomer Tl source is compatible with these J^π.

@ Band(A): π=− ΔJ=1 sequence (1996RiZZ). A $K^\pi=7^-$ π 9/2[505]+ν 5/2[642] configuration was proposed in (^{37}Cl,5nγ) (1996RiZZ) but J=7, 8, 9 members not identified. Involvement of π $h_{9/2}$ is suggested by analogy to states in neighboring odd-a Tl nuclei above the 9/2− isomer. J values shown here are based on the presumption that the level fed by α decay: high spin is a member of this band. This implies J values 1 unit higher than proposed by 1996RiZZ and 1 unit lower than proposed by 1980Kr02 in (^{18}O,7nγ).

& based on cascade of ΔJ=1 in−band gammas feeding 320+x level and sequence of crossover transitions feeding 320+x and 237+x levels, assuming J(320+x)=(10−) as implied if that is the level fed in α decay from (10−) ^{196}Bi. Note that J^π proposed by 1996RiZZ in (^{37}Cl,5nγ) is 1 unit lower and J^π favored by 1980Kr02 in (^{18}O,7nγ) is 1 unit higher than adopted here.

[a] Band(B): SD-1 band (1996Fi02,1992Li21). Configuration=$((\nu\ j_{15/2})(\pi\ i_{13/2}))$, α=1 (coupling of favored (α=−1/2) $j_{15/2}$ neutron and unfavored (α=−1/2) $i_{13/2}$ proton) (1996Fi02). Percent population=0.9 (1992Li21) in (^{37}Cl,5nγ):SD.

[b] Band(C): SD-2 band (1996Fi02,1992Li21). Configuration=$((\nu\ j_{15/2})(\pi\ i_{13/2}))$, α=0 (coupling of favored (α=−1/2) $j_{15/2}$ neutron and favored (α=+1/2) $i_{13/2}$ proton) (1996Fi02). SD-1 and SD-2 bands are proposed (1996Fi02) as signature partners on the basis of transition energies. There is also weak evidence (from γγ data) of crosstalk between SD-1 and SD-2 bands. However, the population intensity of this band is ≈1/2 of that for SD-1, which is not expected for signature partner bands. This band seems to display ΔJ=2 staggering for seven transitions in J=24 to 36 range. From γγ coin data, 1996Fi02 deduce limits on B(M1)/B(E2), with B(M1)≈1 μ_n^2. Percent population=1.1 (1992Li21) in (^{37}Cl,5nγ):SD; however, 1996Fi02 report that intensity of this band is ≈1/2 that of SD-1 band (i.e., ≈0.45%).

[c] Band(D): SD-3 band (1996Fi02,1992Li21). Configuration=$((\nu\ 5/2[512])(\pi\ 5/2[642]))$, α=0 (1996Fi02). The neutron and proton orbitals arise from $h_{9/2}$ and $i_{13/2}$, respectively. Percent population=0.5 (1992Li21) in (^{37}Cl,5nγ):SD.

[d] Band(E): SD-4 band (1996Fi02). Configuration=$((\nu\ 5/2[512])(\pi\ 5/2[642]))$, α=1 (1996Fi02). The neutron and proton orbitals

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Adopted Levels, Gammas (continued)

^{192}Tl Levels (continued)

arise from $h_{9/2}$ and $i_{13/2}$, respectively. SD-3 and SD-4 bands are proposed as signature partners, with no evidence of crosstalk (1996Fi02). The two bands remain strongly coupled (no evidence of signature splitting) over the whole range.

[e] Band(F): $K^{\pi}=7+?$, π 9/2[505] $\otimes$ ν 5/2[503] band. Band interacts with π 9/2[505]+ν 5/2[642] band, so must be a high-K band also. $K^{\pi}=7^{+}$ favored by Gallagher-Moszkowski rule. Similarity of Routhian plot to that for a ^{192}Hg band excludes excitation of a single $i_{13/2}$ neutron (1996RiZZ).

[f] Band(G): π=(+) band−1. High−K band (see comment on 9/2[505] $\otimes$ 5/2[503] band also); interacts with $K^{\pi}=7^{-}$ band.

[g] Band(H): π 9/2[505]$\otimes\nu$ 5/2[642]$\otimes i^{2}_{13/2}$ band. Crosses π 9/2[505] $\otimes$ ν 5/2[642] band at J≈15 ($\hbar\omega$≈0.26 MeV, alignment gain ≈9$\hbar$) (1996RiZZ). High-K band (see comment on 9/2[505] $\otimes$ 5/2[503] band also).

[h] Band(I): π=(+) band−2. Feeds into $K^{\pi}=7^{-}$ band at J=(15).

[i] Band(J): band fragment.

Adopted Levels, Gammas (continued)

γ(^{192}Tl)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[†]	δ[†]	α[c]	Comments
167.49	$1^{(-)}$	167.5 *1*	100	0.0	(2^-)	M1,E2		1.4 *6*	
178	(3^+)	(178 *40*)	100	0.0	(2^-)	[E1]		0.10 *9*	E_γ: from level-energy difference. Consistent with Eγ=200 *50* based on systematics of Eγ for low-lying 3^+ level to 2^- g.s. transition in lower-mass Tl isotopes (1991Va04). γ has not been observed.
320.4+x	(10^-)	83[#] *1*	100	237.4+x	(9^-)	(M1)[#]		2.710	Placement from level fed in ^{196}Bi α decay: high spin is indicated in level scheme in fig. 2 of 1991Va04. Mult.: not E1 based on α(exp)≥1.0 *7* (from intensity balance at parent level in ^{181}Ta(^{18}O,7nγ), (^{16}O,5nγ)). M1 assignment supported by similarity with structure in higher-mass even-A Tl.
371.05	$1^{(-)}$	371.0 *2*	100	0.0	(2^-)	M1(+E2)	0.6 *+5–6*	0.18 *5*	
388	(8^-)	250.6[#] *2*	100	138	(7^+)	(E1)[#]		0.0439	B(E1)(W.u.)=4.18×10^{-8} *8* Mult.: D from γ(θ) in (O,xnγ); hindrance favors E1 (B(E1)(W.u.)=4×10^{-8} cf. B(M1)(W.u.)=3×10^{-6}).
413.98	$(1^-,2^-)$	414.1 *3*	100	0.0	(2^-)	M1(+E2)	≤2.2	0.11 *5*	
445.0+x	(8^+)	445[&]	100	0.0+x	(7^+)				
596.4+x	(11^-)	275.8[#] *2*	100 *15*	320.4+x	(10^-)	(M1+E2)[#]		0.32 *18*	
		359.0 *2*	20 *3*	237.4+x	(9^-)				
775.67	$(0^-,1^-)$	404.5 *3*	17.1[@] *24*	371.05	$1^{(-)}$	[M1,E2]		0.11 *7*	
		608.2 *1*	100[@] *8*	167.49	$1^{(-)}$	M1+E2	1.7 *+7–4*	0.029 *5*	
794.0+x	(9^+)	349[&]		445.0+x	(8^+)				
		794[&]		0.0+x	(7^+)				
858.4+x	(12^-)	261.8[#] *2*	100 *16*	596.4+x	(11^-)	(M1+E2)[#]		0.37 *20*	
		538.2[#] *2*	46 *7*	320.4+x	(10^-)				
1168.0+x	(10^+)	374[&]		794.0+x	(9^+)				
		723[&]		445.0+x	(8^+)				
1195.46	1^+	781.6 *3*	18[@] *2*	413.98	$(1^-,2^-)$	[E1]			
		1195.4 *2*	100[@] *6*	0.0	(2^-)	(E1)			Mult.: E1,E2 from α(K)exp; Δπ=yes from level scheme.
1254.7+x	(13^-)	396.4[#] *2*	100 *15*	858.4+x	(12^-)	(M1(+E2))[#]		0.12 *7*	
		658.3[#] *2*	71 *10*	596.4+x	(11^-)				
1303.0+x	(10^+)	135[&]		1168.0+x	(10^+)				Tentatively assigned by 1996RiZZ as a ΔJ=0 transition.
		629[&]		674.0+x	(8^+)				
		707[&]		596.4+x	(11^-)				
		982[&]		320.4+x	(10^-)				

$^{192}_{81}Tl_{111}$-6

Adopted Levels, Gammas (continued)

γ(^{192}Tl) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[†]	α[c]
1432.2+x	(11$^+$)	129[&]		1303.0+x	(10$^+$)		
		836[&]		596.4+x	(11$^-$)		
1563.4+x	(14$^-$)	308.7[#] *2*	37 *5*	1254.7+x	(13$^-$)	(M1+E2)[#]	0.23 *13*
		705.0[#] *2*	100 *17*	858.4+x	(12$^-$)	(E2)[#]	0.01292
1683.3+x	(12$^+$)	251		1432.2+x	(11$^+$)		
1729.3+x	(12$^+$)	297[&]		1432.2+x	(11$^+$)		
		871[&]		858.4+x	(12$^-$)		
1874.3+x	(13$^+$)	145[&]		1729.3+x	(12$^+$)		
		191[&]		1683.3+x	(12$^+$)		
2021.6+x	(15$^-$)	458.2[#] *2*		1563.4+x	(14$^-$)	(M1+E2)[#]	0.08 *5*
		767.6[#]		1254.7+x	(13$^-$)		
2043.3+x	(14$^+$)	169[&]		1874.3+x	(13$^+$)		
2202.3+x	(15$^+$)	159[&]		2043.3+x	(14$^+$)		
		328[&]		1874.3+x	(13$^+$)		
2336.8+x	(15$^-$)	315[&]		2021.6+x	(15$^-$)		
		773[&]		1563.4+x	(14$^-$)		
2493.3+x	(16$^+$)	291[&]		2202.3+x	(15$^+$)		
		450[&]		2043.3+x	(14$^+$)		
2512.5+x	(16$^-$)	491[&]		2021.6+x	(15$^-$)		
		949[&]		1563.4+x	(14$^-$)		
2636.2+x	(16$^-$)	124[&]		2512.5+x	(16$^-$)		
		299[&]		2336.8+x	(15$^-$)		
		615[&]		2021.6+x	(15$^-$)		
2717.0+x	(17$^-$)	81[&]		2636.2+x	(16$^-$)		
		380[&]		2336.8+x	(15$^-$)		
2789.3+x	(17$^+$)	296[&]		2493.3+x	(16$^+$)		
		587[&]		2202.3+x	(15$^+$)		
2848.6+x	(17$^-$)	827[&]		2021.6+x	(15$^-$)		
2977.1+x	(18$^-$)	260[&]		2717.0+x	(17$^-$)		
		341[&]		2636.2+x	(16$^-$)		
3109.6+x	(16$^+$)	597[&]		2512.5+x	(16$^-$)		
		773[&]		2336.8+x	(15$^-$)		
3139.8+x	(17$^-$)	803[&]		2336.8+x	(15$^-$)		

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Adopted Levels, Gammas (continued)

γ(^{192}Tl) (continued)

E_i(level)	J_i^π	E_γ †	E_f	J_f^π
3170.3+x	(18$^+$)	381&	2789.3+x	(17$^+$)
		677&	2493.3+x	(16$^+$)
3198.1+x	(19$^-$)	221&*b*	2977.1+x	(18$^-$)
		481&	2717.0+x	(17$^-$)
3348.0+x	(17$^+$)	238&	3109.6+x	(16$^+$)
3495.2+x	(18$^+$)	147&	3348.0+x	(17$^+$)
		386&	3109.6+x	(16$^+$)
3508.8+x	(18$^-$)	369&	3139.8+x	(17$^-$)
3537.3+x	(19$^+$)	367&	3170.3+x	(18$^+$)
		748&	2789.3+x	(17$^+$)
3552.1+x	(20$^-$)	354&	3198.1+x	(19$^-$)
		575&	2977.1+x	(18$^-$)
3753.8+x	(19$^-$)	245&	3508.8+x	(18$^-$)
		614&	3139.8+x	(17$^-$)
3788.1+x	(19$^+$)	293&	3495.2+x	(18$^+$)
		440&	3348.0+x	(17$^+$)
3894.1+x	(21$^-$)	342&	3552.1+x	(20$^-$)
		696&	3198.1+x	(19$^-$)
3952.3+x	(20$^+$)	415&	3537.3+x	(19$^+$)
		782&	3170.3+x	(18$^+$)
4020.2+x	(20$^+$)	232&	3788.1+x	(19$^+$)
		525&	3495.2+x	(18$^+$)
4302.3+x	(21$^+$)	350&	3952.3+x	(20$^+$)
		765&	3537.3+x	(19$^+$)
4306.1+x	(22$^-$)	412&	3894.1+x	(21$^-$)
		754&	3552.1+x	(20$^-$)
4370.2+x	(21$^+$)	350&	4020.2+x	(20$^+$)
		582&	3788.1+x	(19$^+$)
4702.2+x	(22$^+$)	332&	4370.2+x	(21$^+$)
		682&	4020.2+x	(20$^+$)
4718.1+x	(23$^-$)	412&	4306.1+x	(22$^-$)
		824&	3894.1+x	(21$^-$)
4772.3+x	(22$^+$)	820&	3952.3+x	(20$^+$)
5099.2+x	(23$^+$)	397&	4702.2+x	(22$^+$)
		729&	4370.2+x	(21$^+$)
5156.1+x	(24$^-$)	438&	4718.1+x	(23$^-$)
		850&	4306.1+x	(22$^-$)
283.0+u	(17)	283.0[a] *2*	u	(15)
603.8+u	(19)	320.8[a] *2*	283.0+u	(17)
962.8+u	(21)	359.0[a] *2*	603.8+u	(19)
1360.6+u	(23)	397.8[a] *2*	962.8+u	(21)
1797.7+u	(25)	437.1[a] *2*	1360.6+u	(23)
2273.8+u	(27)	476.1[a] *2*	1797.7+u	(25)
2789.0+u	(29)	515.2[a] *2*	2273.8+u	(27)
3343.4+u	(31)	554.4[a] *2*	2789.0+u	(29)
3936.4+u	(33)	593.0[a] *2*	3343.4+u	(31)
4568.4+u	(35)	632.0[a] *3*	3936.4+u	(33)
5238.8+u	(37)	670.4[a] *4*	4568.4+u	(35)
5946.7+u	(39)	707.9[a] *8*	5238.8+u	(37)
337.5+v	(20)	337.5[a] *2*	v	(18)
712.4+v	(22)	374.9[a] *2*	337.5+v	(20)
1125.8+v	(24)	413.4[a] *2*	712.4+v	(22)
1576.9+v	(26)	451.1[a] *2*	1125.8+v	(24)
2066.5+v	(28)	489.6[a] *2*	1576.9+v	(26)
2593.9+v	(30)	527.4[a] *2*	2066.5+v	(28)
3159.4+v	(32)	565.5[a] *2*	2593.9+v	(30)
3762.5+v	(34)	603.1[a] *3*	3159.4+v	(32)
4403.4+v	(36)	640.9[a] *3*	3762.5+v	(34)
5081.1+v	(38)	677.7[a] *5*	4403.4+v	(36)
5796.1+v	(40)	715.0[a] *8*	5081.1+v	(38)
233.4+w	(12)	233.4[a] *2*	w	(10)
507.2+w	(14)	273.8[a] *2*	233.4+w	(12)
820.2+w	(16)	313.0[a] *2*	507.2+w	(14)
1171.8+w	(18)	351.6[a] *2*	820.2+w	(16)

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Adopted Levels, Gammas (continued)

$\gamma(^{192}Tl)$ (continued)

E_i(level)	J_i^π	E_γ †	E_f	J_f^π	E_i(level)	J_i^π	E_γ †	E_f	J_f^π	E_i(level)	J_i^π	E_γ †	E_f	J_f^π
1562.2+w	(20)	390.4[a] *2*	1171.8+w	(18)	6707.2+w	(38)	712.5[a] *8*	5994.7+w	(36)	2802.9+s	(25)	483.6[a] *2*	2319.3+s	(23)
1990.1+w	(22)	427.9[a] *2*	1562.2+w	(20)	7451.9+w	(40)	744.7[a] *8*	6707.2+w	(38)	3322.8+s	(27)	519.9[a] *2*	2802.9+s	(25)
2455.5+w	(24)	465.4[a] *2*	1990.1+w	(22)	213.4+s	(11)	213.4[a] *3*	s	(9)	3878.2+s	(29)	555.4[a] *2*	3322.8+s	(27)
2957.3+w	(26)	501.8[a] *2*	2455.5+w	(24)	467.1+s	(13)	253.7[a] *2*	213.4+s	(11)	4469.4+s	(31)	591.2[a] *3*	3878.2+s	(29)
3495.1+w	(28)	537.8[a] *2*	2957.3+w	(26)	760.4+s	(15)	293.3[a] *2*	467.1+s	(13)	5094.6+s	(33)	625.2[a] *3*	4469.4+s	(31)
4068.1+w	(30)	573.0[a] *2*	3495.1+w	(28)	1092.6+s	(17)	332.2[a] *2*	760.4+s	(15)	5754.3+s	(35)	659.7[a] *3*	5094.6+s	(33)
4675.3+w	(32)	607.2[a] *3*	4068.1+w	(30)	1463.6+s	(19)	371.0[a] *2*	1092.6+s	(17)	6448.1+s	(37)	693.8[a] *4*	5754.3+s	(35)
5317.9+w	(34)	642.6[a] *4*	4675.3+w	(32)	1872.9+s	(21)	409.3[a] *2*	1463.6+s	(19)	7175.4+s	(39)	727.3[a] *8*	6448.1+s	(37)
5994.7+w	(36)	676.8[a] *3*	5317.9+w	(34)	2319.3+s	(23)	446.4[a] *2*	1872.9+s	(21)					

† From ^{192}Pb ε decay, except where noted.
‡ Relative photon branching from each level; values are from ^{181}Ta(^{18}O,7nγ), (^{16}O,5nγ), unless noted to the contrary.
# From ^{181}Ta(^{18}O,7nγ), (^{16}O,5nγ). $\Delta\pi$=(no) assigned for intraband transitions.
@ From ^{192}Pb ε decay.
& From ^{160}Gd(^{37}Cl,5nγ).
[a] From ^{160}Gd(^{37}Cl,5nγ):SD.
[b] Presumed to differ from a questionable Eγ=220.9 *2* D+Q line reported in (O,xnγ) and tentatively placed from a lower-energy level that is not adopted here.
[c] 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.

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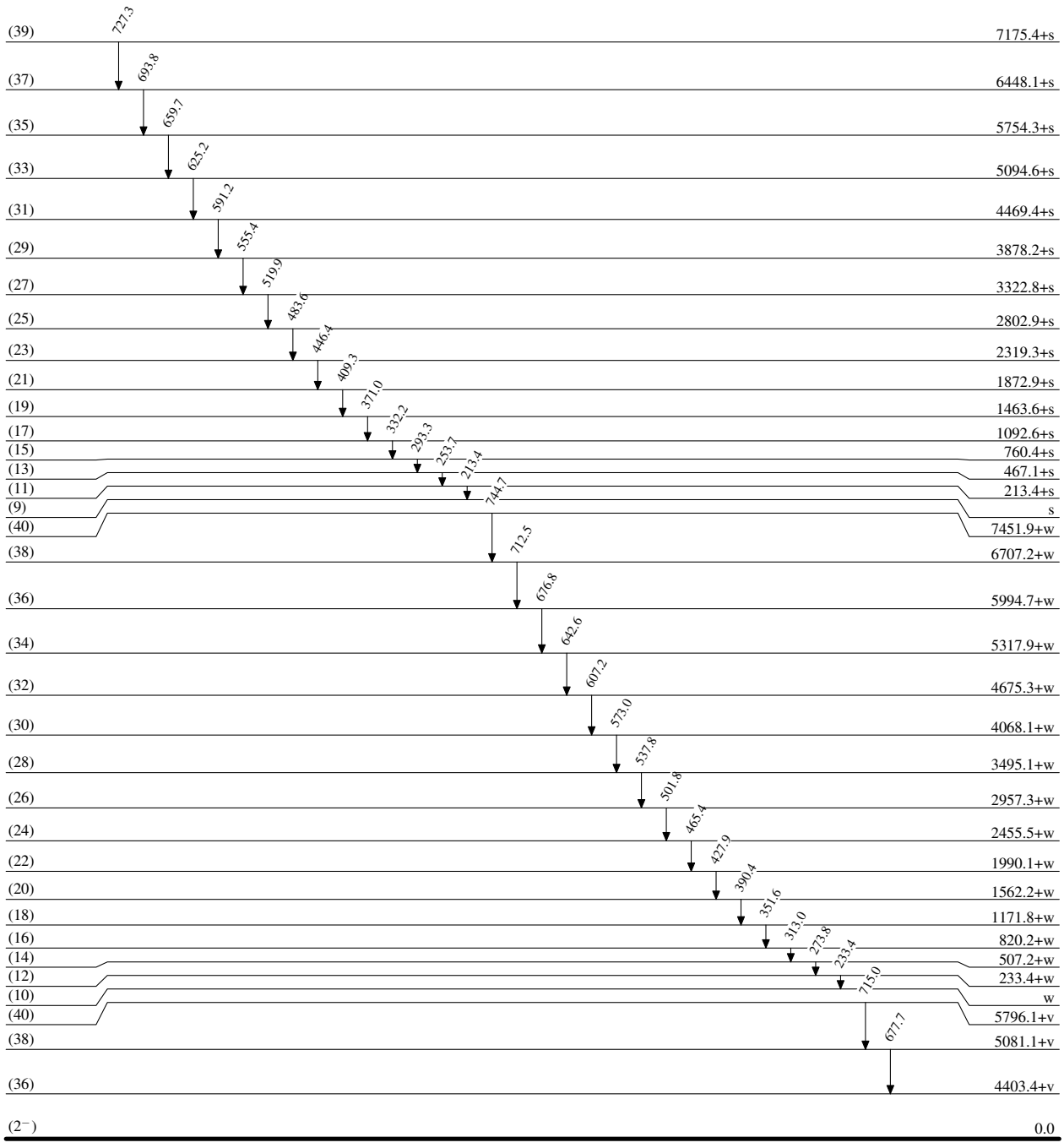
Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



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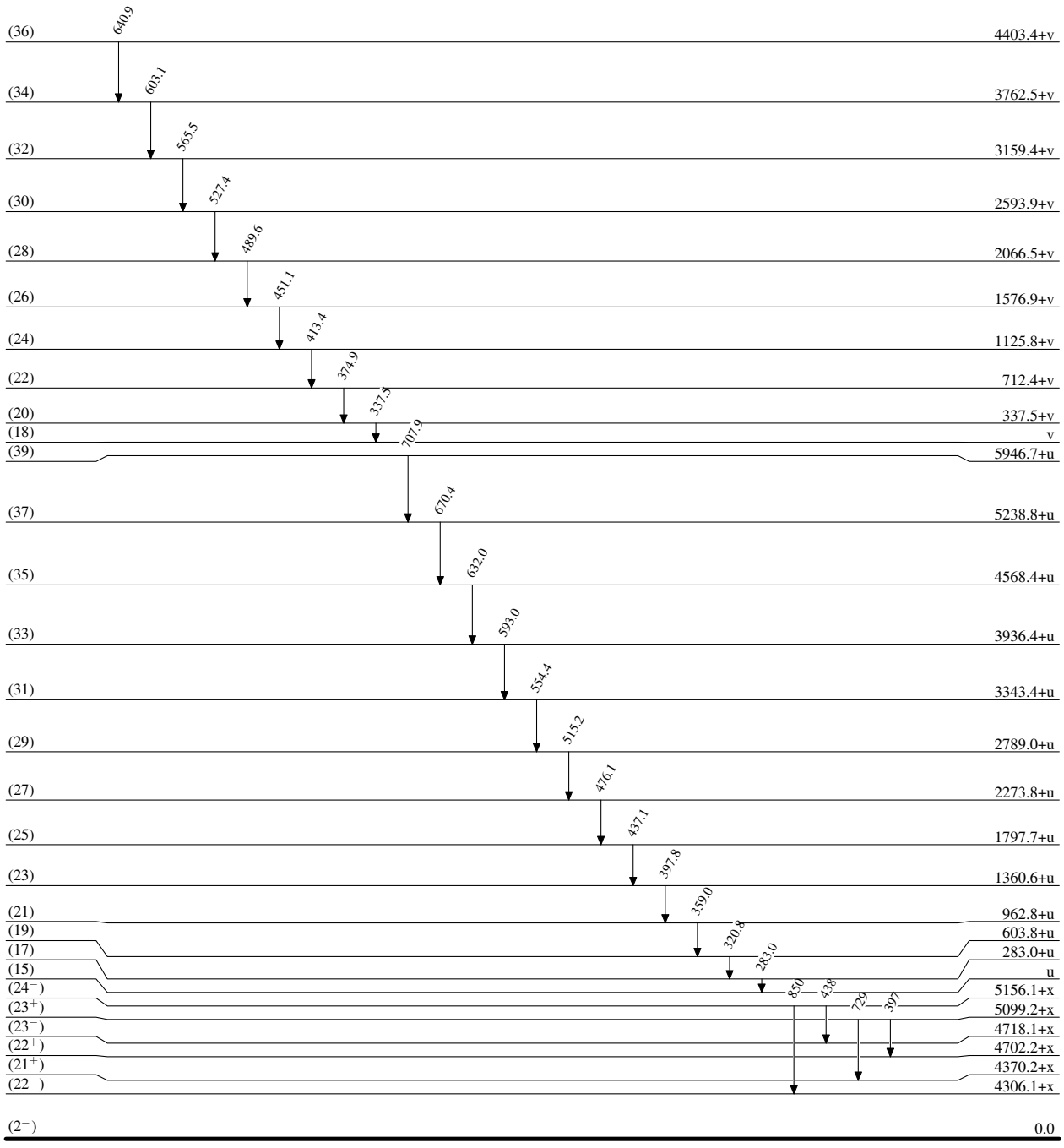
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

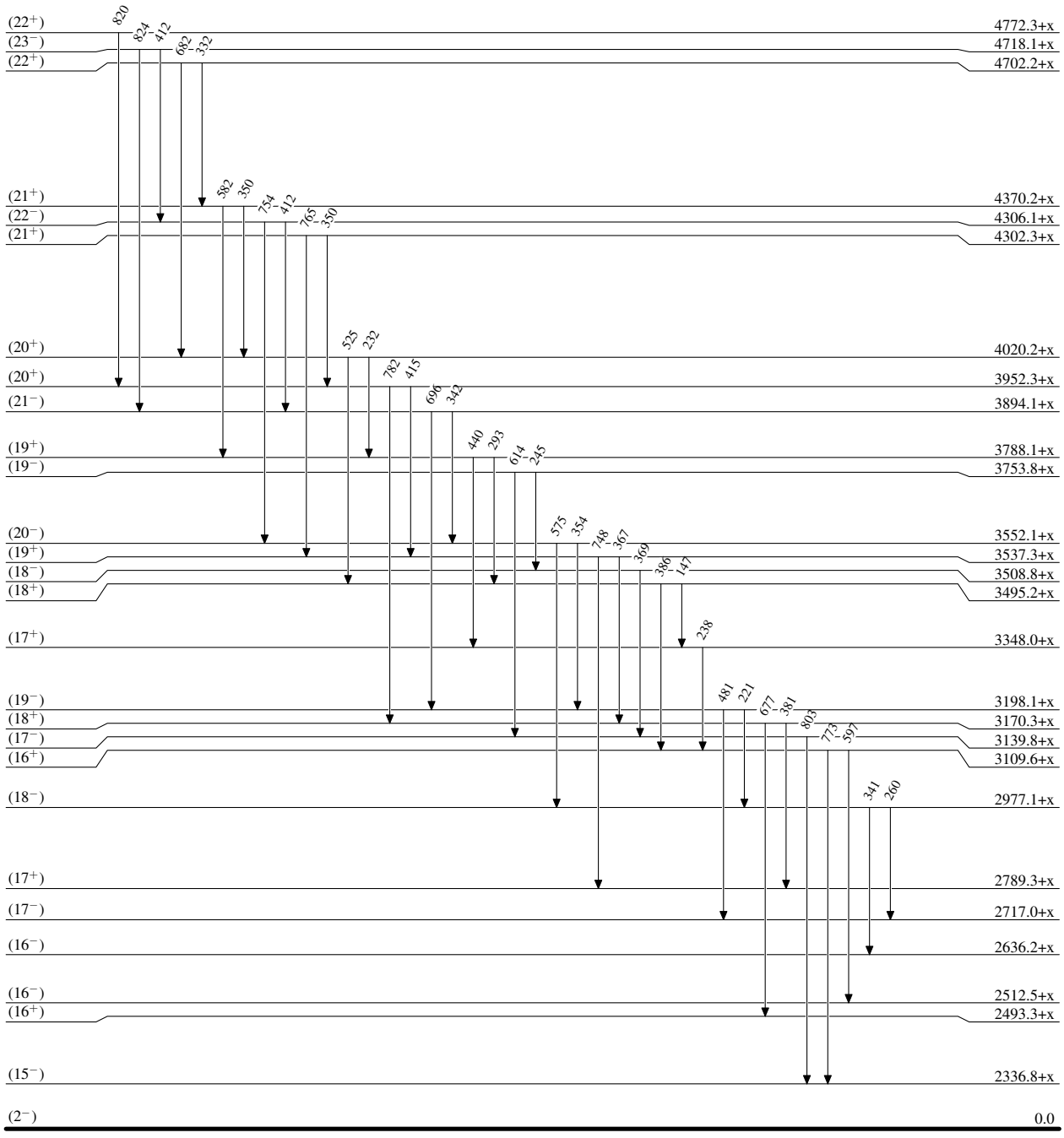


$^{192}_{81}Tl_{111}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



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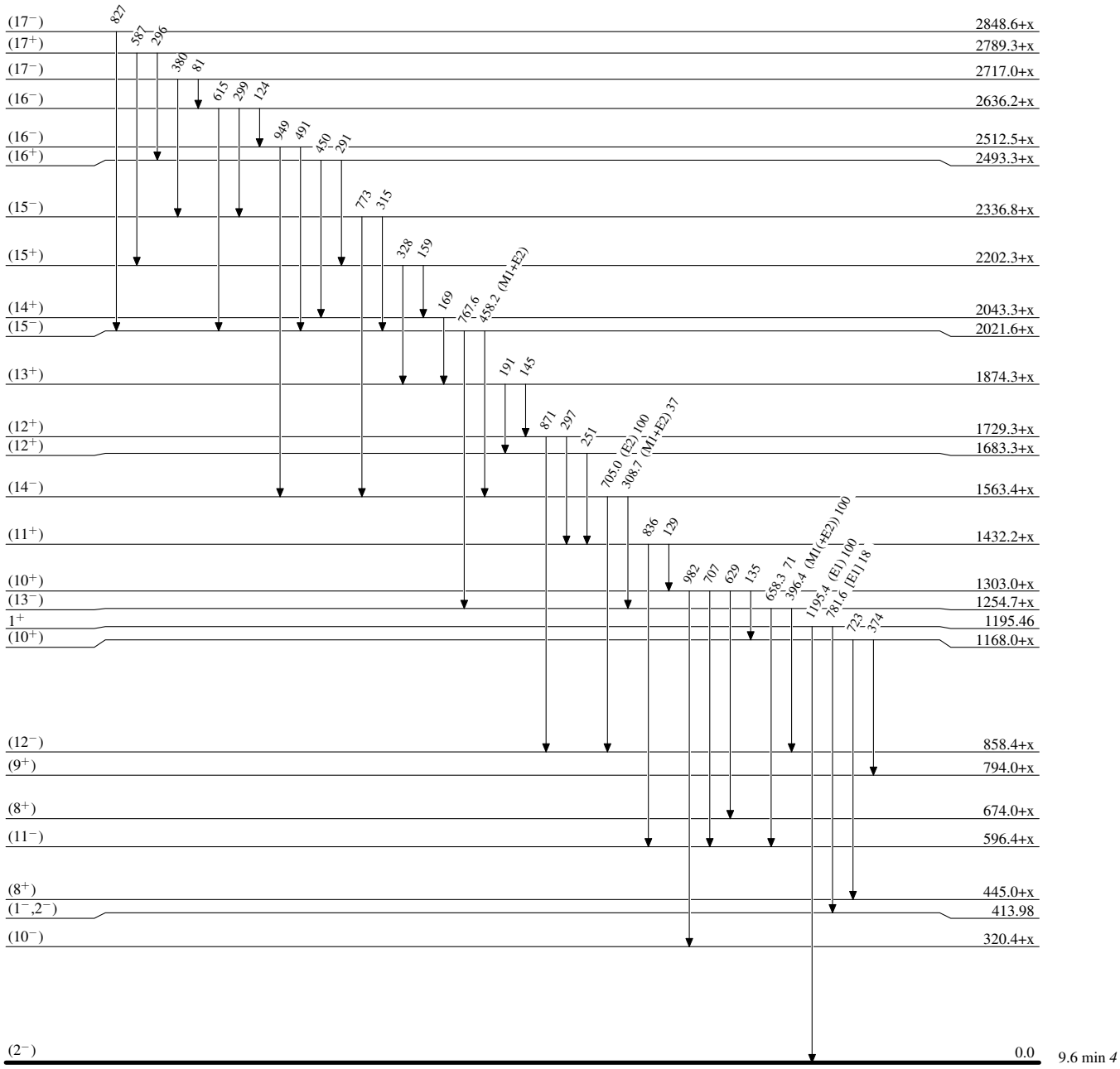
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



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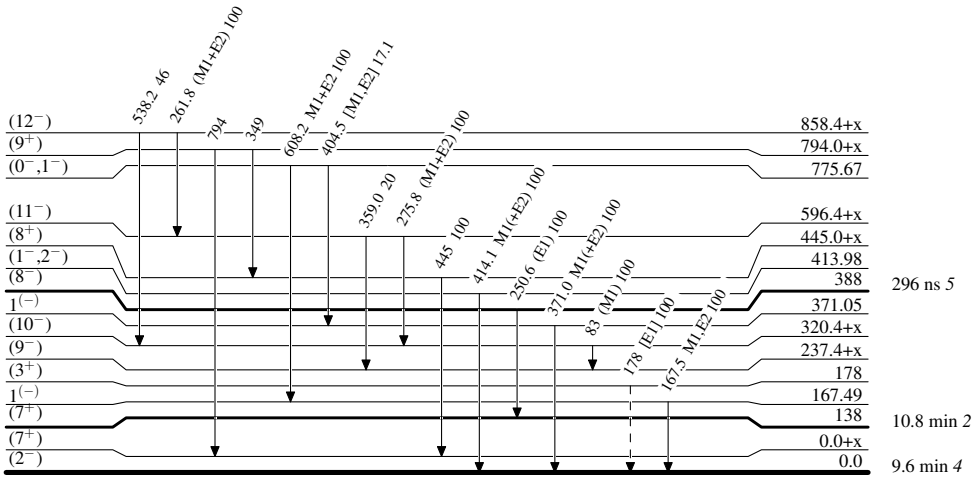
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



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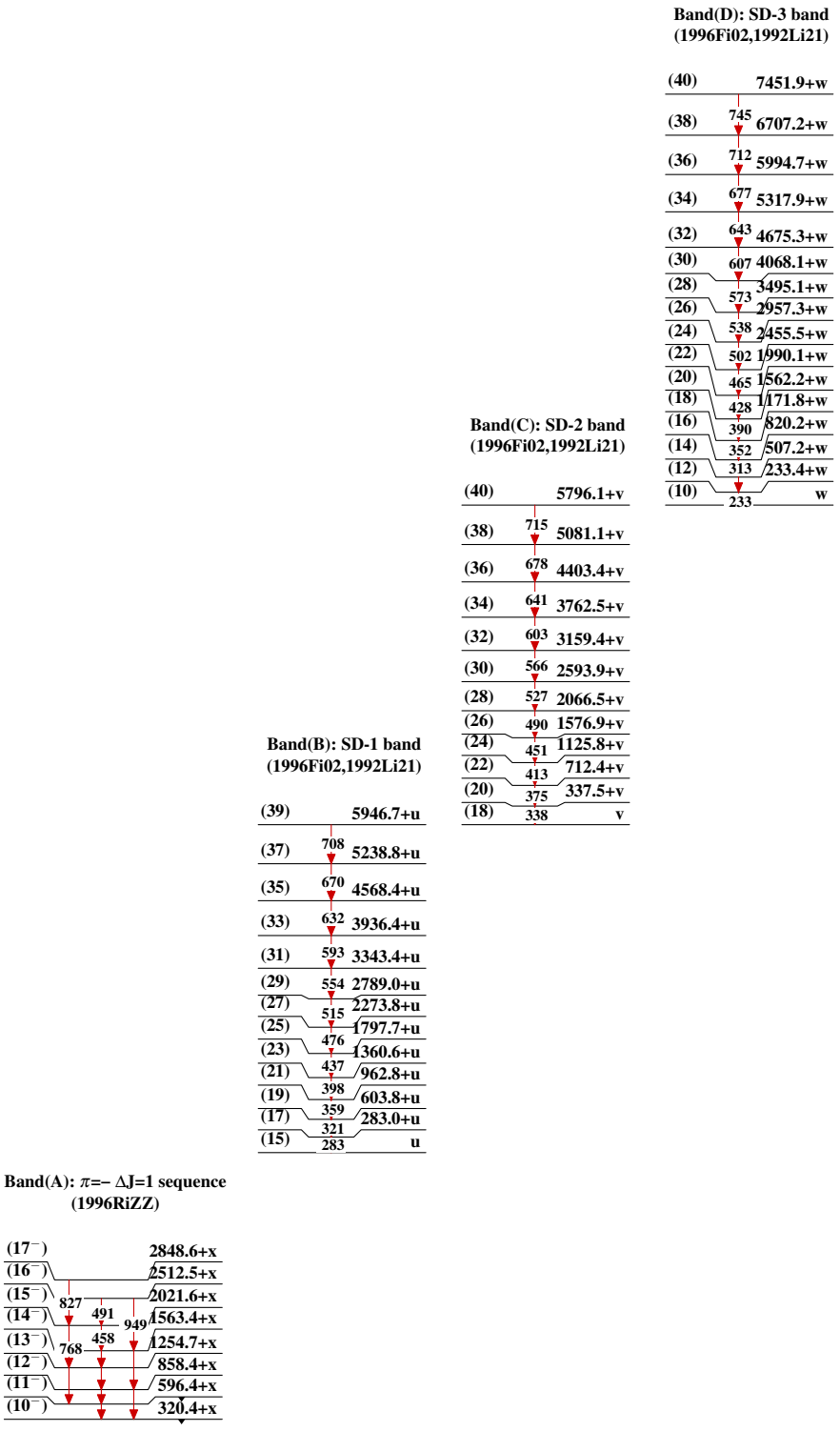
Adopted Levels, Gammas



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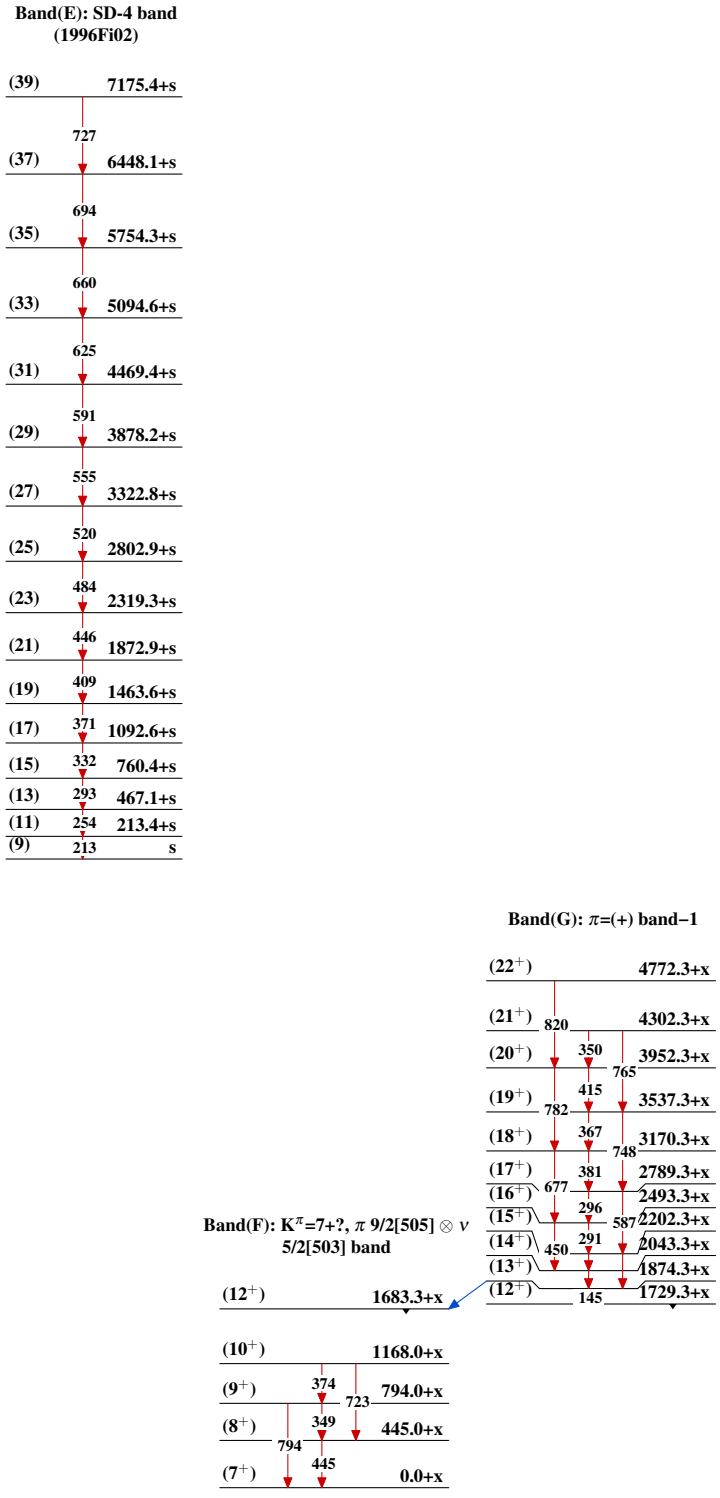
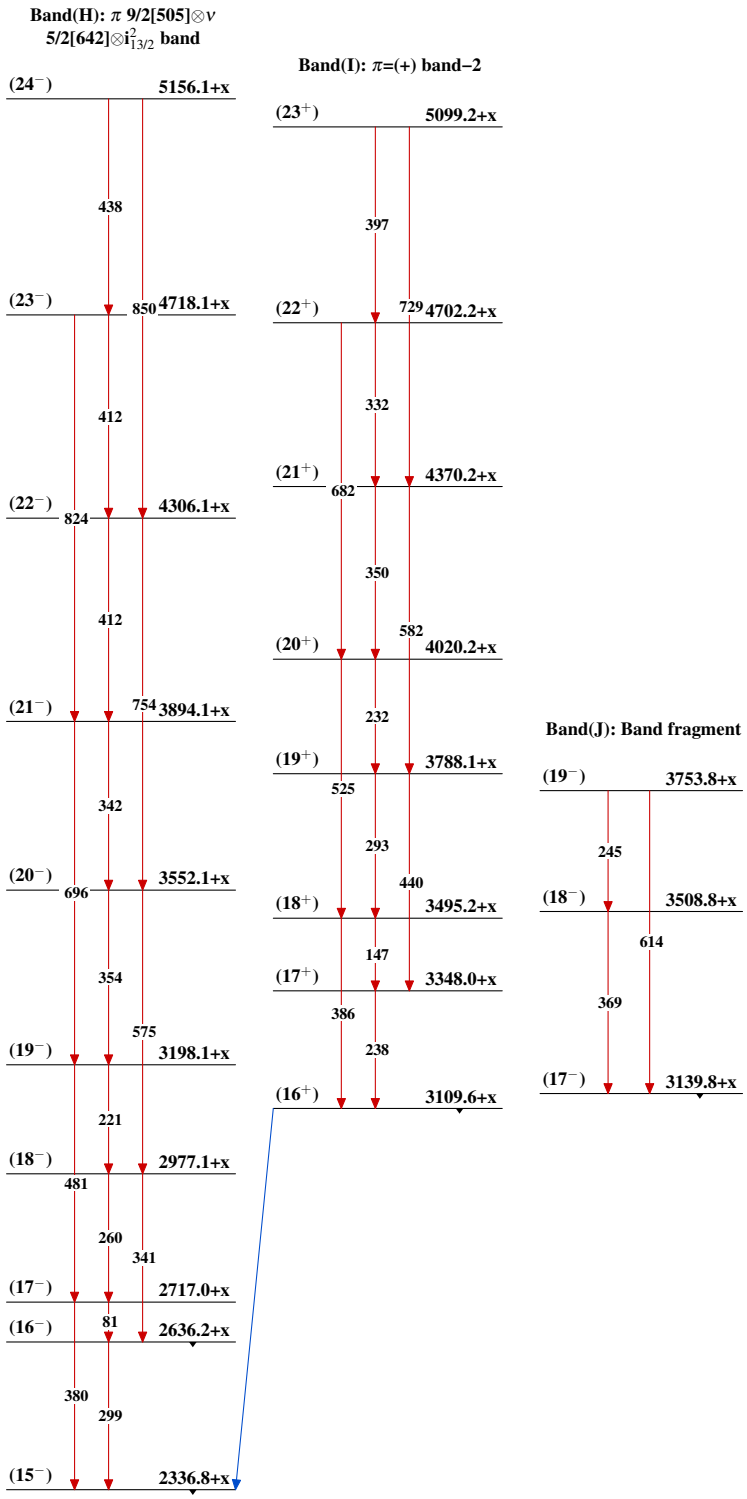
Adopted Levels, Gammas (continued)



$^{192}_{81}Tl_{111}$

Adopted Levels, Gammas (continued)



$^{192}_{81}Tl_{111}$