Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 200,2 (2025)	22-Aug-2022

Q(β^-)=240 *50*; S(n)=6910 *50*; S(p)=4560 *50*; Q(α)=2210 *50* 2021Wa16
S(2n)=15580 *60*, S(2p)=11850 *50* (2021Wa16).

^{154}Tb Levels

Cross Reference (XREF) Flags

A ^{154}Tb IT decay (9.973 h)
B ^{154}Tb IT decay (22.7 h)
C ^{148}Nd(^{11}B,5nγ),^{124}Sn(^{36}S,p5nγ)

E(level)	J$^\pi$ †‡	$T_{1/2}$	XREF	Comments
0.0#	0	21.5 h *4*	AB	%ε+%β^+=100 J$^\pi$: J=0 from atomic-beam measurement (1970Ad09). π not determined. Additional information 1. $T_{1/2}$: Weighted average of 22.0 h *15* (1972Vy04), 21.4 h *5* (1973La20), 21.8 h *10* (1975So03) and 21.44 *64* (2022De08) from ε decay. Other: 22.2 h *11* (1976NeZT). In an evaluation of nuclear rms charge radii, 2004An14 report <r^2>$^{1/2}$=5.03 fm 15.
0+x@	3$^-$	9.973 h *44*	AB	%IT=21.8 *7*; %ε+%β^+=78.2 *7* μ=+1.6 *2* Q=+2.4 *13* E(level): ≤ 25 keV (1973Ba20) based on lack of Tb K x rays and lack of conversion lines above 18 keV. 2003Au02 list x=12 *7*. J$^\pi$: J=3 from atomic-beam measurement (1970Ad09). π and configuration confirmed by μ value (1983Be03) from $\gamma(\theta,t)$. $T_{1/2}$: Weighted average of 9.9 h *1* (1972Vy04), 9.0 h *5* (1973La20), 9.0 h *10* (1975So03), 9.8 h *3* (1983Be03) and 9.994 *39* (2009Gy01) from ε decay. Other: 9.9 h 4 (1976NeZT). %IT: From 1973La20, deduced from the relative intensity of the γ's in ^{154}Gd following the 9-h and 21.5-h activities. Other: 15% *5* (1973Ba20). μ: From 2019StZV and based on data of 1990Al36; other: 1.8 *4* from evaluation of 1989Ra17 and compilation of 2005St24 and based on $\gamma(\theta,t)$ data for oriented nuclei (1983Be03). Q: From 2021StZZ compilation based on $\gamma(\theta,t)$ data for oriented nuclei (1983Be03). From 1990Al36, Δ<r^2>(154-159)=0.258 fm^2 *17* and by subtraction of table entries Δ<r^2>(152-154)=0.606 fm^2 *19*. In an evaluation of nuclear rms charge radii, 2013An02 report <r^2>$^{1/2}$=5.03 fm *15*.
0+y&	7$^-$	22.7 h *5*	B	%IT=1.8 *6*; %ε+%β^+=98.2 *6* μ=0.9 *3* E(level): y>x (1973Ba20). From systematics, 2021Ko07 estimate y=200 *150*. J$^\pi$: J=7, π, and configuration consistent with μ value (1983Be03) from $\gamma(\theta,t)$. $T_{1/2}$: Weighted average of 23.1 h *9* (1972Vy04), 22.6 h *6* (1973La20), and 22.5 h *15* (1975So03) from ε decay. Other: 24.4 h (1976NeZT). %IT: From 1973La20, deduced from the relative intensity of the γ in ^{154}Gd following the 22.7-h and 9-h activities. μ: From 2019StZV and based on $\gamma(\theta,t)$ data for oriented nuclei (1983Be03). Value assumes J=7, but result also confirms that value rather than J=8.
0+z[a]	(9$^-$)		C	E(level): See in-beam data for discussion of γ's that may depopulate this level.
119.1+z[b]	(10$^-$)		C	
154.3+z[a]	(11$^-$)		C	

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Adopted Levels, Gammas (continued)

^{154}Tb Levels (continued)

E(level)	J^{π}[†‡]	$T_{1/2}$	XREF	Comments
353.3+z[b]	(12$^-$)		C	
469.4+z[a]	(13$^-$)		C	
714.0+z[b]	(14$^-$)		C	
918.7+z[a]	(15$^-$)		C	
1189.2+z[b]	(16$^-$)		C	
1473.6+z[a]	(17$^-$)		C	
1760.5+z[b]	(18$^-$)		C	
2118.3+z[a]	(19$^-$)		C	
2413.9+z[b]	(20$^-$)		C	
2841.7+z[a]	(21$^-$)		C	
3138+z[b]	(22$^-$)		C	
3630+z[a]	(23$^-$)		C	
3918+z[b]	(24$^-$)		C	
4453+z?[a]	(25$^-$)		C	
4742+z[b]	(26$^-$)		C	
5597+z?[b]	(28$^-$)		C	
0+u[c]	(7$^+$)		C	
97.2+u[d]	(8$^+$)		C	
183.9+u[c]	(9$^+$)		C	
338.5+u[d]	(10$^+$)		C	
479.1+u[c]	(11$^+$)		C	
676.8+u[d]	(12$^+$)		C	
870.5+u[c]	(13$^+$)		C	
1100.6+u[d]	(14$^+$)		C	
1342.5+u[c]	(15$^+$)		C	
1599.8+u[d]	(16$^+$)		C	
1885.1+u[c]	(17$^+$)		C	
2166.6+u[d]	(18$^+$)		C	
2490.0+u[c]	(19$^+$)		C	
2795+u[d]	(20$^+$)		C	
3151+u[c]	(21$^+$)		C	
3478+u[d]	(22$^+$)		C	
3858+u[c]	(23$^+$)		C	
4203+u[d]	(24$^+$)		C	
4597+u[c]	(25$^+$)		C	
4951+u[d]	(26$^+$)		C	
5368+u[c]	(27$^+$)		C	
5731+u[d]	(28$^+$)		C	
6203+u[c]	(29$^+$)		C	
6565+u[d]	(30$^+$)		C	
7097+u[c]	(31$^+$)		C	
7450+u[d]	(32$^+$)		C	
0+v		513 ns *42*	C	$T_{1/2}$: See the comment from the in-beam study.

[†] For the lowest members of the bands reported in the in-beam study (1982Be46), J^{π}=9$^-$ and 7$^+$ have been assumed (1982Be46),

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Adopted Levels, Gammas (continued)

^{154}Tb Levels (continued)

with the 9^- proposed in analogy to a 9^- band in ^{152}Eu and the 7^+ in analogy to the one in ^{156}Tb.

‡ Within the 9^- and 7^+ bands, the spins and parities are assigned from the apparent band structure and the stretched E2 character for some γ's.

Band(A): $J^\pi=0^-$ state, with the configuration (π 3/2[411])-(ν 3/2[521]), or $J^\pi=0^+$ state, with the configuration (π 3/2[411])-(ν 3/2[651]).

@ Band(B): J,K$^\pi$= 3,3$^-$ state, with the configuration (π 3/2[411])+(ν 3/2[521]).

& Band(C): J,K$^\pi$=7,7$^-$ state, with the configuration (π 3/2[411])+(ν 11/2[505]).

a Band(D): Signature=1 band, with the configuration (π $h_{11/2}$)(ν $i_{13/2}$).

b Band(E): Signature=0 band, with the configuration (π $h_{11/2}$)(ν $i_{13/2}$).

c Band(F): Signature=1 band, with the configuration (π 3/2[411])(ν $i_{13/2}$).

d Band(G): Signature=0 band, with the configuration (π 3/2[411])(ν $i_{13/2}$).

γ(^{154}Tb)

E_i(level)	J_i^π	E_γ †	I_γ	E_f	J_f^π	Mult.
119.1+z	(10$^-$)	119.1	100	0+z	(9$^-$)	
154.3+z	(11$^-$)	154.3@	100@	0+z	(9$^-$)	
353.3+z	(12$^-$)	199.0	100 *10*	154.3+z	(11$^-$)	
		234.3	2.8 *8*	119.1+z	(10$^-$)	
469.4+z	(13$^-$)	116.1	44 *4*	353.3+z	(12$^-$)	
		315.1	100 *10*	154.3+z	(11$^-$)	E2
714.0+z	(14$^-$)	244.6	100 *10*	469.4+z	(13$^-$)	
		360.6	32 *7*	353.3+z	(12$^-$)	E2
918.7+z	(15$^-$)	204.7	25 *5*	714.0+z	(14$^-$)	
		449.3	100 *10*	469.4+z	(13$^-$)	E2
1189.2+z	(16$^-$)	270.5	100 *10*	918.7+z	(15$^-$)	
		475.2	95 *10*	714.0+z	(14$^-$)	E2
1473.6+z	(17$^-$)	284.3	13 *3*	1189.2+z	(16$^-$)	
		555.0	100 *10*	918.7+z	(15$^-$)	E2
1760.5+z	(18$^-$)	286.9	75 *16*	1473.6+z	(17$^-$)	
		571.4	100 *9*	1189.2+z	(16$^-$)	E2
2118.3+z	(19$^-$)	357.6	14 *4*	1760.5+z	(18$^-$)	
		644.8	100 *18*	1473.6+z	(17$^-$)	E2
2413.9+z	(20$^-$)	295.2@	≤272@	2118.3+z	(19$^-$)	
		653.4	100 *20*	1760.5+z	(18$^-$)	E2
2841.7+z	(21$^-$)	723.4	100	2118.3+z	(19$^-$)	E2
3138+z	(22$^-$)	724	100	2413.9+z	(20$^-$)	
3630+z	(23$^-$)	788		2841.7+z	(21$^-$)	
3918+z	(24$^-$)	780		3138+z	(22$^-$)	
4453+z?	(25$^-$)	823&		3630+z	(23$^-$)	
4742+z	(26$^-$)	824		3918+z	(24$^-$)	
5597+z?	(28$^-$)	855&		4742+z	(26$^-$)	
97.2+u	(8$^+$)	97.2	100	0+u	(7$^+$)	
183.9+u	(9$^+$)	86.7		97.2+u	(8$^+$)	
		184		0+u	(7$^+$)	
338.5+u	(10$^+$)	154.3@	≤575@	183.9+u	(9$^+$)	
		241.3	100 *20*	97.2+u	(8$^+$)	E2
479.1+u	(11$^+$)	141.0	100 *19*	338.5+u	(10$^+$)	
		295.2@	≤194@	183.9+u	(9$^+$)	E2
676.8+u	(12$^+$)	197	≤145#	479.1+u	(11$^+$)	
		338.3	100 *20*	338.5+u	(10$^+$)	E2
870.5+u	(13$^+$)	194.69	54 *12*	676.8+u	(12$^+$)	

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Adopted Levels, Gammas (continued)

γ(^{154}Tb) (continued)

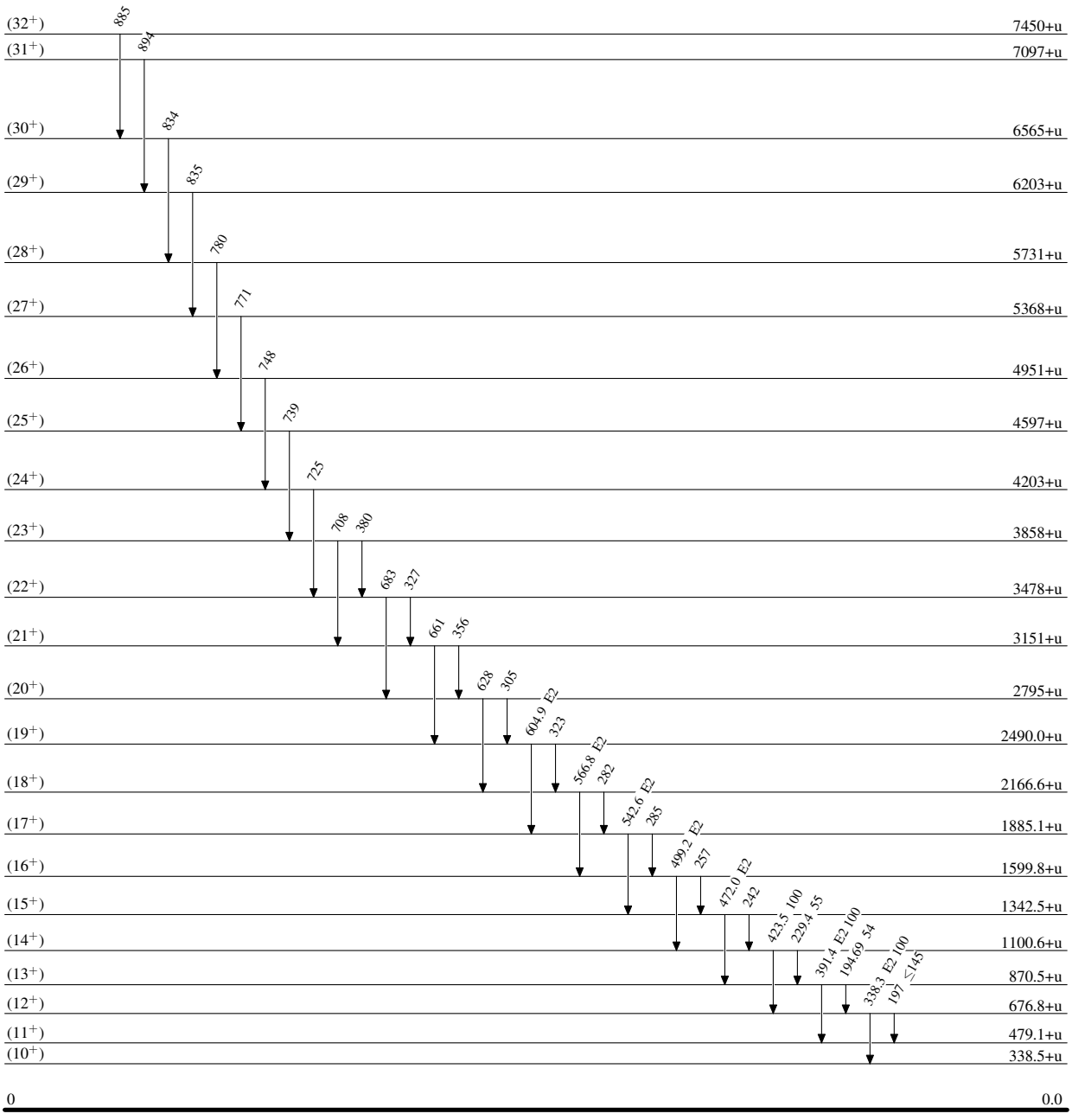
E_i(level)	J_i^π	E_γ †	I_γ	E_f	J_f^π	Mult.
870.5+u	(13$^+$)	391.4	100 *19*	479.1+u	(11$^+$)	E2
1100.6+u	(14$^+$)	229.4	55 *11*	870.5+u	(13$^+$)	
		423.5	100 *18*	676.8+u	(12$^+$)	
1342.5+u	(15$^+$)	242		1100.6+u	(14$^+$)	
		472.0	‡	870.5+u	(13$^+$)	E2
1599.8+u	(16$^+$)	257		1342.5+u	(15$^+$)	
		499.2		1100.6+u	(14$^+$)	E2
1885.1+u	(17$^+$)	285		1599.8+u	(16$^+$)	
		542.6	‡	1342.5+u	(15$^+$)	E2
2166.6+u	(18$^+$)	282		1885.1+u	(17$^+$)	
		566.8		1599.8+u	(16$^+$)	E2
2490.0+u	(19$^+$)	323		2166.6+u	(18$^+$)	
		604.9		1885.1+u	(17$^+$)	E2
2795+u	(20$^+$)	305		2490.0+u	(19$^+$)	
		628		2166.6+u	(18$^+$)	
3151+u	(21$^+$)	356		2795+u	(20$^+$)	
		661		2490.0+u	(19$^+$)	
3478+u	(22$^+$)	327		3151+u	(21$^+$)	
		683		2795+u	(20$^+$)	
3858+u	(23$^+$)	380		3478+u	(22$^+$)	
		708		3151+u	(21$^+$)	
4203+u	(24$^+$)	725		3478+u	(22$^+$)	
4597+u	(25$^+$)	739		3858+u	(23$^+$)	
4951+u	(26$^+$)	748		4203+u	(24$^+$)	
5368+u	(27$^+$)	771		4597+u	(25$^+$)	
5731+u	(28$^+$)	780		4951+u	(26$^+$)	
6203+u	(29$^+$)	835		5368+u	(27$^+$)	
6565+u	(30$^+$)	834		5731+u	(28$^+$)	
7097+u	(31$^+$)	894		6203+u	(29$^+$)	
7450+u	(32$^+$)	885		6565+u	(30$^+$)	

† For unplaced γ's, see the in-beam data.
‡ Unresolved from ^{155}Tb contaminant line in the in-beam study.
# Unresolved from a ^{19}F contaminant line in the in-beam study.
@ Multiply placed with undivided intensity.
& Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{154}_{65}Tb_{89}$

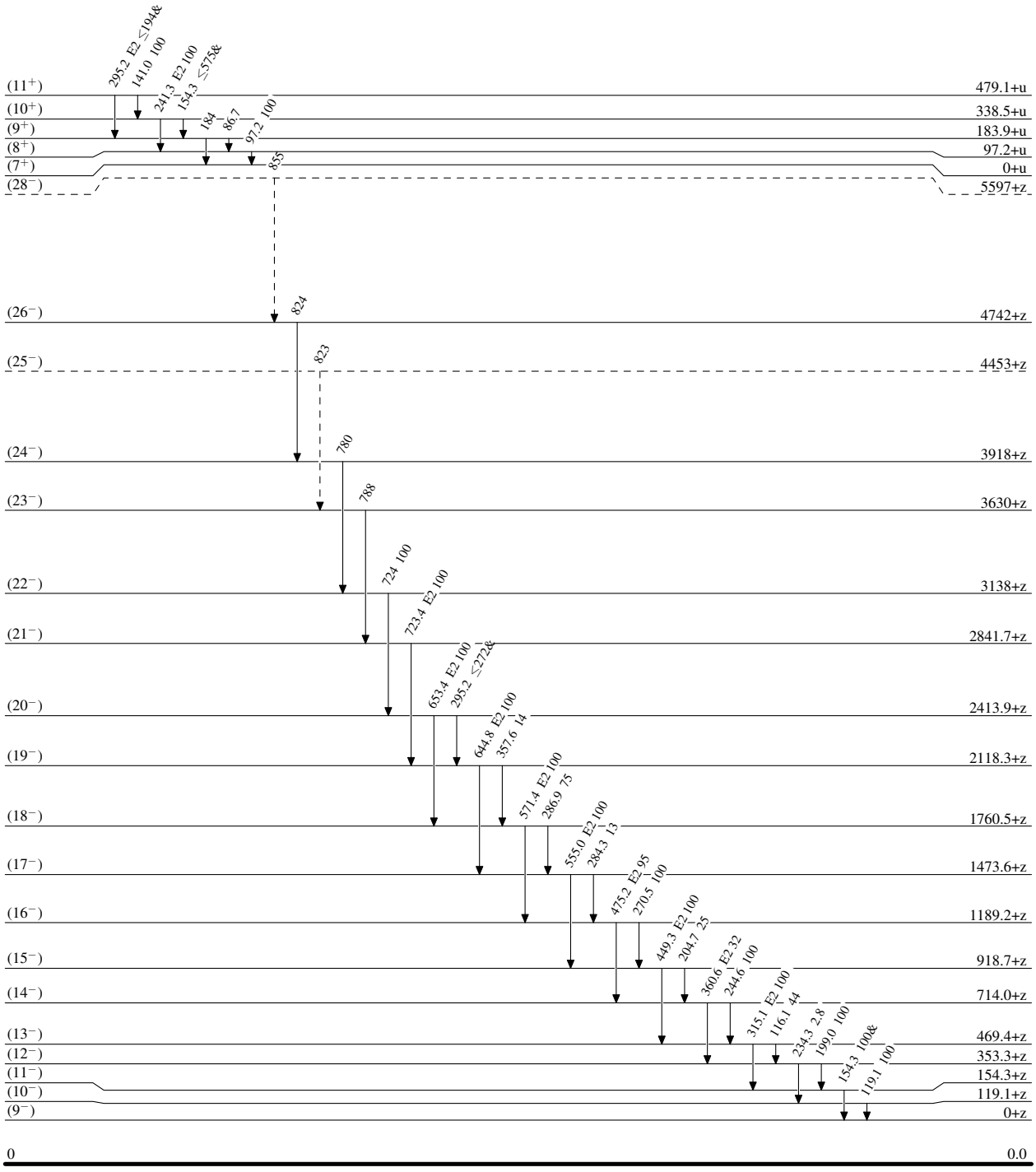
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

γ Decay (Uncertain)



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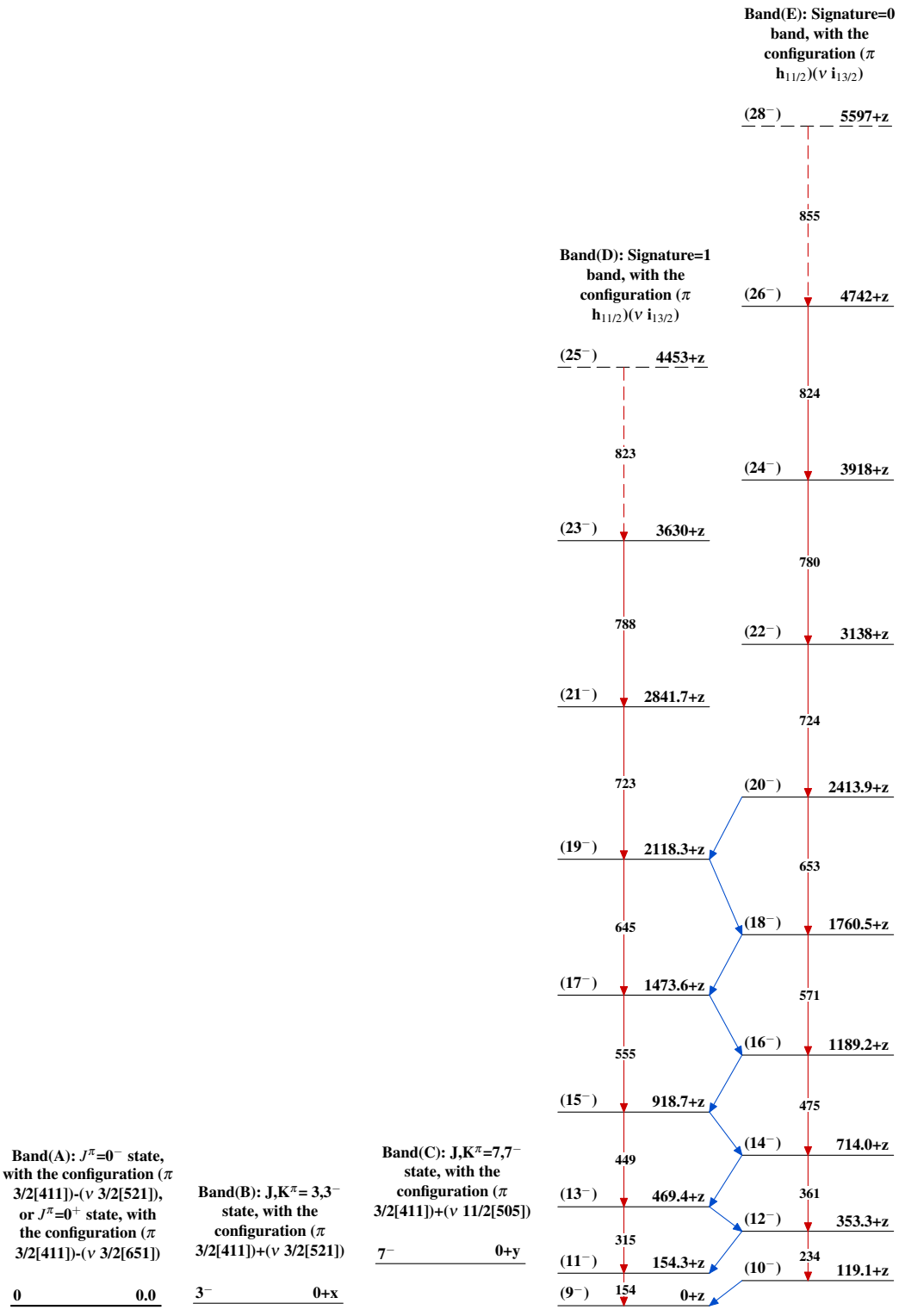
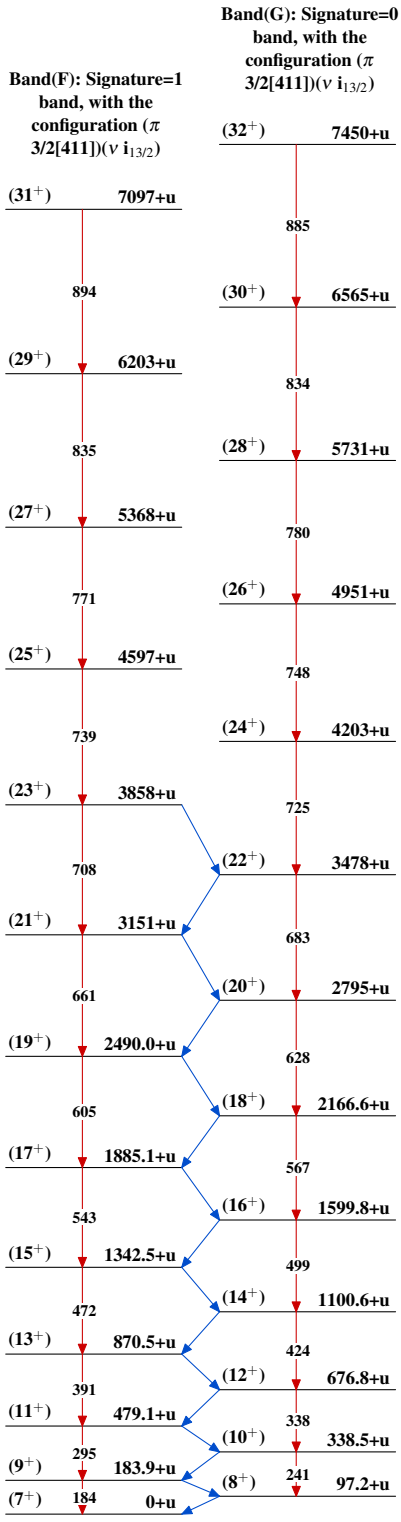
Adopted Levels, Gammas



Adopted Levels, Gammas (continued)



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