^{203}Tl(^{13}C,5nγ),^{205}Tl(^{12}C,6nγ) 1986By01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	A. Sonzogni, G. Mukherjee, H. Huang, A. Tarazaga, J. Wang	NDS 114, 661 (2013)	28-Feb-2013

The level scheme proposed is based on the following experiments:

	Reaction	E(C)
Excitation function	^{205}Tl(^{12}C,6nγ)	77-96 MeV
(γ)(γ)	^{203}Tl(^{13}C,5nγ)	89 MeV
	^{205}Tl(^{12}C,6nγ)	96 MeV
(n)(γ)	^{205}Tl(^{12}C,6nγ)	96 MeV
$\gamma(\theta)$	^{203}Tl(^{13}C,5nγ)	89 MeV
ce (pulsed beam)	^{203}Tl(^{13}C,5nγ)	89 MeV
γ(beam) (pulsed beam)	^{205}Tl(^{12}C,6nγ)	87 MeV
	Tl(^{12}C,xnγ)	87 MeV
g-factors (pulsed beam)	Tl(^{12}C,xnγ)	87 MeV

^{211}Fr Levels

E(level)	J$^{\pi}$†	$T_{1/2}$	Comments
0.0	9/2$^-$	3.10 min *2*	J$^{\pi}$,$T_{1/2}$: from Adopted Levels.
583.24 *17*	(11/2$^-$)		
652.62 *10*	(13/2$^-$)	<1 ns	
1026.6 *4*			
1452.92 *14*	(17/2$^-$)	<2 ns	
1686.32 *17*	(21/2$^-$)	2.1 ns *2*	
1860.02 *20*	(23/2$^-$)	<2 ns	
2242.4 *4*			
2310.24 *22*	(25/2$^+$)	<2 ns	
2423.15 *24*	(29/2$^+$)	146 ns *14*	%IT=100 g=1.06 *1* Configuration=((π $h_{9/2}$)$^{+4}$(π $i_{13/2}$)(ν $p_{1/2}$)$_0^{-2}$).
2980.0 *3*	(31/2$^+$)	<2 ns	
3244.0 *3*	(33/2$^+$)	<2 ns	
3601.6 *3*	(37/2$^+$)	<2 ns	
3928.9 *3*	(39/2$^+$)	<2 ns	
4369.0 *4*			
4657.3 *4*	(45/2$^-$)	123 ns *14*	%IT=100 g=1.08 *1* Configuration=((π $h_{9/2}$)$^{+3}$(π $i_{13/2}$)$^{+2}$(ν $p_{1/2}$)$_0^{-2}$).
5196.0 *5*			
5303.3 *6*			
5556.4 *5*	(47/2$^-$)	<7 ns	
5785.9 *4*	($^-$)		J$^{\pi}$: possibly (47/2$^-$).
6023.8 *4*			J$^{\pi}$: possibly (49/2$^-$).
6182.5 *5*	(49/2$^-$)	<7 ns	
6259.4 *5*	(49/2$^-$)	<7 ns	J$^{\pi}$: possibly (49/2$^-$).
6560.1 *5*	($^-$)	<7 ns	J$^{\pi}$: possibly (51/2$^-$).
7031.1? *6*			
7822.1? *6*			
8230.0? *7*			

† Spin and parity assignments are based on γ-ray angular distributions, conversion coefficients and transition strengths.

^{203}Tl(^{13}C,5nγ),^{205}Tl(^{12}C,6nγ) 1986By01 (continued)

γ(^{211}Fr)

E_γ	I_γ[#]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[@]	δ[‡]	α[†]	Comments
69.5 3		652.62	(13/2⁻)	583.24	(11/2⁻)	(M1)		8.12 16	α(L)=6.16 12; α(M)=1.47 3 α(N)=0.385 8; α(O)=0.0862 17; α(P)=0.0138 3; α(Q)=0.000773 15 Mult.: from α(exp)=7 4 (from intensity ratios in γγ data).
76.9 5		6259.4	(49/2⁻)	6182.5	(49/2⁻)				
112.9[&] 1	113 15	2423.15	(29/2⁺)	2310.24	(25/2⁺)	(E2)		5.32	α(K)=0.332 5; α(L)=3.67 6; α(M)=0.995 15 α(N)=0.261 4; α(O)=0.0541 8; α(P)=0.00700 11; α(Q)=2.14×10^{-5} 3 Mult.: from α(exp)=5.8 10 (from delayed intensities).
173.7 1	275 4	1860.02	(23/2⁻)	1686.32	(21/2⁻)	M1		2.98	α(K)=2.40 4; α(L)=0.440 7; α(M)=0.1048 15 α(N)=0.0275 4; α(O)=0.00614 9; α(P)=0.000985 14; α(Q)=5.50×10^{-5} 8 Mult.: from α(exp)=2.9 3 (from delayed intensities); α(L)exp=0.15 20.
233.4 1	794 9	1686.32	(21/2⁻)	1452.92	(17/2⁻)	E2		0.323	α(K)=0.1189 17; α(L)=0.1506 22; α(M)=0.0402 6 α(N)=0.01055 15; α(O)=0.00221 4; α(P)=0.000296 5; α(Q)=3.04×10^{-6} 5 Mult.: from α(exp)=0.27 6 (from delayed intensities); α(L)exp=0.09 3.
237.9 2	8 3	6023.8		5785.9	(⁻)				
264.0 2	130 5	3244.0	(33/2⁺)	2980.0	(31/2⁺)	(M1+E2)	1 1	0.6 4	α(K)=0.4 4; α(L)=0.114 23; α(M)=0.028 4 α(N)=0.0074 11; α(O)=0.0016 3; α(P)=0.00024 7; α(Q)=1.0×10^{-5} 8 Mult.: ce-data indicates M1+E2 or E3; γ(θ) indicates D+Q α(K)exp=0.32 10; α(exp)=1.13 34 (from delayed intensities).
300.7 5	5 10	6560.1	(⁻)	6259.4	(49/2⁻)				I_γ: obtained after subtraction of Iγ of 300.6-keV line from ^{207}Po using the 814-keV ^{207}Po line for normalization.
327.3[&] 1	400 16	3928.9	(39/2⁺)	3601.6	(37/2⁺)	M1(+E2)	0.6 6	0.41 13	α(K)=0.32 12; α(L)=0.066 12; α(M)=0.0159 24 α(N)=0.0042 7; α(O)=0.00092 15; α(P)=0.00014 3; α(Q)=7.E−6 3 Mult.: M1+E2 from ce data; D+Q from γ(θ). δ: from α(K)exp=0.38 19; α(L)exp=0.063 23; α(M)exp=0.03 1.
357.6 1	647 16	3601.6	(37/2⁺)	3244.0	(33/2⁺)	(E2)		0.0871	α(K)=0.0483 7; α(L)=0.0289 4;

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$^{203}Tl(^{13}C,5n\gamma),^{205}Tl(^{12}C,6n\gamma)$ 1986By01 (continued)

$\gamma(^{211}Fr)$ (continued)

E_γ	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	δ[‡]	α[†]	Comments
									α(M)=0.00754 *11* α(N)=0.00198 *3*; α(O)=0.000420 *6*; α(P)=5.85×10^{-5} *9*; α(Q)=1.139×10^{-6} *16* Mult.: (Q, J to J-2) from γ(θ); α(K)exp=0.045 *11*.
374.0[&] *4*	≤91	1026.6		652.62	(13/2$^-$)				
377.6[&] *3*	17 *3*	6560.1	($^-$)	6182.5	(49/2$^-$)	(M1)		0.347	α(K)=0.281 *4*; α(L)=0.0506 *8*; α(M)=0.01204 *17* α(N)=0.00316 *5*; α(O)=0.000705 *10*; α(P)=0.0001132 *16*; α(Q)=6.32×10^{-6} *9* Mult.: from α(K)exp=0.42 *27*.
382.4 *4*	43 *3*	2242.4		1860.02	(23/2$^-$)				
407.9 *3*	16 *3*	8230.0?		7822.1?					
^{x}429.4 *3*	16 *3*								
440.1 *2*	124 *4*	4369.0		3928.9	(39/2$^+$)				I_γ: from angular distribution spectrum. Line contaminated by impurity in singles spectrum.
450.2 *1*	753 *14*	2310.24	(25/2$^+$)	1860.02	(23/2$^-$)	(E1)		0.01414	α(K)=0.01154 *17*; α(L)=0.00198 *3*; α(M)=0.000469 *7* α(N)=0.0001220 *17*; α(O)=2.69×10^{-5} *4*; α(P)=4.18×10^{-6} *6*; α(Q)=2.08×10^{-7} *3* Mult.: from α(K)exp=0.010 *3*.
471.0[&] *2*	17 *10*	7031.1?		6560.1	($^-$)				
556.8 *2*	289 *7*	2980.0	(31/2$^+$)	2423.15	(29/2$^+$)	M1(+E2)	−0.1 *+1−6*	0.12 *3*	α(K)=0.10 *3*; α(L)=0.018 *4*; α(M)=0.0042 *8* α(N)=0.00110 *21*; α(O)=0.00024 *5*; α(P)=3.9×10^{-5} *9*; α(Q)=2.2×10^{-6} *6* Mult.: from α(K)exp=0.103 *26*, α(L)exp=0.019 *5*. δ: from ce data; γ(θ) indicates negative δ.
563.3[&] *3*	121 *12*	2423.15	(29/2$^+$)	1860.02	(23/2$^-$)	(E3)		0.0907	α(K)=0.0473 *7*; α(L)=0.0321 *5*; α(M)=0.00852 *12* α(N)=0.00225 *4*; α(O)=0.000480 *7*; α(P)=6.83×10^{-5} *10*; α(Q)=1.518×10^{-6} *22* Mult.: α(K)exp=0.045 *11*, α(L)exp=0.020 *11*.
^{x}568.9 *3*									
583.3[&] *2*	157 *5*	583.24	(11/2$^-$)	0.0	9/2$^-$	M1+E2	0.84 *32*	0.074 *17*	α(K)=0.059 *14*; α(L)=0.0116 *20*; α(M)=0.0028 *5* α(N)=0.00073 *12*; α(O)=0.00016 *3*;

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^{203}Tl(^{13}C,5nγ),^{205}Tl(^{12}C,6nγ) 1986By01 (continued)

γ(^{211}Fr) (continued)

E_γ	I_γ[#]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[@]	δ[‡]	α[†]	Comments
									α(P)=2.6×10^{-5} *5*; α(Q)=1.3×10^{-6} *4* Mult.: from α(K)exp=0.062 *12*, α(L)exp=0.010 *3*. δ: from α(K)exp.
626.1[&] *2*	54 *6*	6182.5	(49/2$^-$)	5556.4	(47/2$^-$)	M1+E2	1.4 *+7−4*	0.045 *11*	α(K)=0.035 *10*; α(L)=0.0075 *14*; α(M)=0.0018 *3* α(N)=0.00048 *8*; α(O)=0.000106 *19*; α(P)=1.6×10^{-5} *3*; α(Q)=7.8×10^{-7} *21* Mult.,δ: from α(K)exp=0.037 *10*.
652.6 *1*	1000	652.62	(13/2$^-$)	0.0	9/2$^-$	E2		0.0202	α(K)=0.01459 *21*; α(L)=0.00424 *6*; α(M)=0.001061 *15* α(N)=0.000278 *4*; α(O)=6.03×10^{-5} *9*; α(P)=8.96×10^{-6} *13*; α(Q)=3.23×10^{-7} *5* Mult.: from α(K)exp=0.016 *2*, α(L)exp=0.003 *1*.
703.0[&] *3*	24 *6*	6259.4	(49/2$^-$)	5556.4	(47/2$^-$)	(M1)		0.0661	α(K)=0.0536 *8*; α(L)=0.00951 *14*; α(M)=0.00226 *4* α(N)=0.000591 *9*; α(O)=0.0001322 *19*; α(P)=2.12×10^{-5} *3*; α(Q)=1.191×10^{-6} *17* Mult.: from α(K)exp=0.068 *20*.
728.4 *2*	319 *5*	4657.3	(45/2$^-$)	3928.9	(39/2$^+$)	E3		0.0444	α(K)=0.0276 *4*; α(L)=0.01248 *18*; α(M)=0.00324 *5* α(N)=0.000853 *12*; α(O)=0.000184 *3*; α(P)=2.68×10^{-5} *4*; α(Q)=7.84×10^{-7} *11* Mult.: α(K)exp=0.034 *5*; α(L)exp=0.018 *3*; α(M)exp=0.006 *1*.
791.0[&] *3*	67 *5*	7822.1?		7031.1?					
800.3 *1*	993 *14*	1452.92	(17/2$^-$)	652.62	(13/2$^-$)	E2		0.01325	α(K)=0.00997 *14*; α(L)=0.00247 *4*; α(M)=0.000609 *9* α(N)=0.0001595 *23*; α(O)=3.49×10^{-5} *5*; α(P)=5.28×10^{-6} *8*; α(Q)=2.16×10^{-7} *3* Mult.: from α(K)exp=0.012 *2*, α(L)exp=0.0025 *3*.
820.9 *2*	373 *7*	3244.0	(33/2$^+$)	2423.15	(29/2$^+$)	E2		0.01259	α(K)=0.00952 *14*; α(L)=0.00231 *4*; α(M)=0.000570 *8* α(N)=0.0001494 *21*; α(O)=3.27×10^{-5} *5*;

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^{203}Tl(^{13}C,5nγ),^{205}Tl(^{12}C,6nγ) 1986By01 (continued)

γ(^{211}Fr) (continued)

E_γ	I_γ[#]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[@]	δ[‡]	α[†]	Comments
									α(P)=4.96×10^{-6} 7; α(Q)=2.06×10^{-7} 3 Mult.: Q from γ(θ); α(K)exp=0.010 3; α(L)exp=0.004 1.
827.0[&] 4	28 3	5196.0		4369.0					
899.0[&] 3	200 6	5556.4	(47/2$^-$)	4657.3	(45/2$^-$)	M1+E2	0.8 4	0.025 7	α(K)=0.020 5; α(L)=0.0037 8; α(M)=0.00089 19 α(N)=0.00023 5; α(O)=5.2×10^{-5} 11; α(P)=8.3×10^{-6} 18; α(Q)=4.5×10^{-7} 12 Mult.: from ce data. δ: from α(K)exp=0.019 6; α(L)exp=0.004 2.
934.3[&] 5	48 3	5303.3		4369.0					
[x]959.5 5	11 6								
[x]1044.0[&] 4	≈87								
[x]1125.4[&] 4	18 4								
1128.4[&] 3	19 3	5785.9	($^-$)	4657.3	(45/2$^-$)	(M1)		0.0192	α(K)=0.01559 22; α(L)=0.00273 4; α(M)=0.000647 9 α(N)=0.0001694 24; α(O)=3.79×10^{-5} 6; α(P)=6.09×10^{-6} 9; α(Q)=3.43×10^{-7} 5; α(IPF)=8.75×10^{-7} 16 Mult.: from α(K)exp=0.025 17.
1366.6[&] 3	32 3	6023.8		4657.3	(45/2$^-$)				α(K)exp=0.010 2 Mult.: α(K)(E2)=0.00383, α(K)(E3)=0.00792, α(K)(M1)=0.0101.
1525.2 4	17 3	6182.5	(49/2$^-$)	4657.3	(45/2$^-$)				

† Additional information 1.
‡ If no value given it was assumed δ=1.00 for E2/M1, δ=1.00 for E3/M2 and δ=0.10 for the other multipolarities.
# The intensity given is the singles intensity at 55° to the beam direction.
@ Based on conversion coefficient and angular distribution measurements.
& Spectral areas extracted by fits to the data where neighboring peaks in the fitting region constitute a significant fraction of the total area.
x γ ray not placed in level scheme.

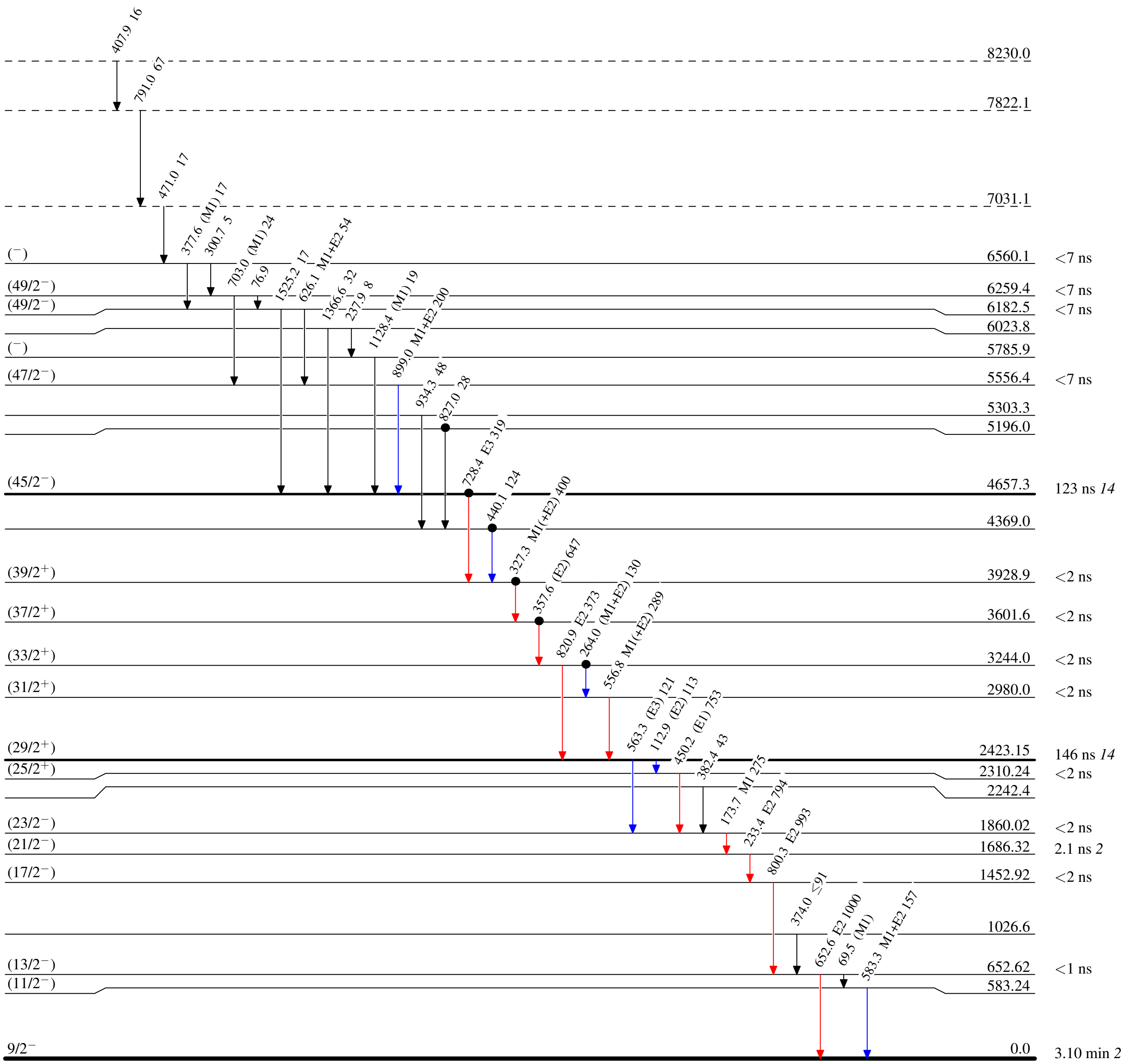
^{203}Tl(^{13}C,5nγ),^{205}Tl(^{12}C,6nγ) 1986By01

Level Scheme

Intensities: Relative I_γ

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- Coincidence



$^{211}_{87}Fr_{124}$