^{212}At IT decay (152 μs) 1999Ba30,1998By01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	K. Auranen and E. A. Mccutchan	NDS 168, 117 (2020)	1-Aug-2020

Parent: ^{212}At: E=4771.4 *15*; J$^{\pi}$=(25$^-$); T$_{1/2}$=152 μs *5*; %IT decay=100.0

1999Ba30: Target: ^{208}Pb. Projectile ^{7}Li, E=30-44 MeV. Measured Eγ, Iγ, $\gamma\gamma$ coin, $\gamma\gamma$(t), $\gamma(\theta)$ using the CAESAR array of six Compton-suppressed Ge detectors. Measured conversion electrons using a superconducting solenoid spectrometer. Deduced internal conversion coefficients and assigned γ-ray multipolarities.

1998By01: The nuclei of interest were produced using ^{208}Pb(^{7}Li,3n)^{212}At reaction with beam energies of 32-44 MeV on a 3-mg/cm^2 thick target at 14UD Accelerator of Australian National University. $\gamma\gamma$, γ(t) and $\gamma(\theta)$ were measured using the CAESAR array.

Others: 1994By01, 1979Sj01.

This dataset presents a measurement made in beam-off interval following decay of 152 μs isomer. For in-beam data measured in the same experiment see ^{208}Pb(^{7}Li,3nγ) dataset.

α: Additional information 1.

^{212}At Levels

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$[#]	Comments
222.9	(9$^-$)[@]	0.121 s *2*	%α=99.5 *5*; %IT=0.5 *5* E(level),T$_{1/2}$,%α: from the Adopted Levels. Energy is rounded value.
701.6	(10$^-$)[&]	≤1.4 ns	
885.4	(11$^+$)[c]	18.7 ns *7*	g-factor=0.541 *11*, corrected for diamagnetism and for Knight shift (1979Sj01,1994By01).
1262.4	(12$^+$)[a]	≤0.7 ns	
1317.0	(11$^-$)	≤2 ns	
1540.6	(13$^-$)[@]	≤1.4 ns	
1604.5	(15$^-$)[@]	35.4 ns *14*	g-factor=0.622 *10*, corrected for diamagnetism and for Knight shift (1979Sj01). g-factor=0.631 *5*, measured in ^{208}Pb(^{11}B,α3nγ) (1994By01). T$_{1/2}$: other: 37.4 ns *14* (1979Sj01).
1710.7	(14$^-$)[@]		
1763.9	(16$^-$)[b]		
1832.5	($^-$)		
1954.7	(16$^-$)[&]		
2193.1	(15)[c]		
2212.2	(16$^+$)[c]		
2250.0	(18$^+$)[c]	42 ns *2*	
2263.5	(19$^+$)[c]		
2797.3	(20$^+$)[d]	≤0.7 ns	
3034.3	(19$^+$)[d]		
3322.7	[f]		J$^{\pi}$: assigned as (21$^-$) in 1999Ba30.
3364.1	[h]		J$^{\pi}$: assigned as (20$^-$) in 1999Ba30.
3505.9	(22$^-$)[e]	2.8 ns *7*	
3682.4	[e]		J$^{\pi}$: assigned as (21$^-$) in 1999Ba30.
3882.6	[g]		J$^{\pi}$: assigned as (20$^-$) in 1999Ba30.
4440.2	(21$^+$)[i]		
4547.4	(22$^+$)[j]		
4771.4 *15*	(25$^-$)[k]	152 μs *5*	E(level): from the Adopted Levels.

[†] From a least-squares fit to Eγ, except where noted.
[‡] From the Adopted Levels.
[#] From 1999Ba30, except where noted.

Continued on next page (footnotes at end of table)

^{212}At IT decay (152 μs) 1999Ba30,1998By01 (continued)

^{212}At Levels (continued)

[@] Possible configuration=((π $h_{9/2}$)$^{+3}$(ν $g_{9/2}$)).
[&] Possible configuration=((π $h_{9/2}$)$^{+3}$(ν $i_{11/2}$)).
[a] Possible configuration=((π $h_{9/2}$)$^{+3}$(ν $j_{15/2}$)).
[b] Possible configuration=((π $h_{9/2}$)$^{+2}$(π $f_{7/2}$)(ν $g_{9/2}$)).
[c] Possible configuration=((π $h_{9/2}$)$^{+2}$(π $i_{13/2}$)(ν $g_{9/2}$)).
[d] Possible configuration=((π $h_{9/2}$)$^{+2}$(π $i_{13/2}$)(ν $i_{11/2}$)).
[e] Possible configuration=((π $h_{9/2}$)$^{+2}$(π $i_{13/2}$)(ν $j_{15/2}$)).
[f] Possible configuration=((π $h_{9/2}$)(π $i_{13/2}$)(π $f_{7/2}$)(ν $g_{9/2}$)).
[g] Possible configuration=((π $h_{9/2}$)(π $i_{13/2}$)(π $f_{7/2}$)(ν $i_{11/2}$)).
[h] Possible configuration=((π $h_{9/2}$)(π $i_{13/2}$)$^{+2}$(ν $g_{9/2}$)).
[i] Possible configuration=((π $h_{9/2}$)$^{+3}$(ν $g_{9/2}$)(ν $i_{11/2}$)(ν $p_{1/2}$)$^{-1}$).
[j] Possible configuration=((π $h_{9/2}$)$^{+2}$(π $f_{7/2}$)(ν $g_{9/2}$)(ν $i_{11/2}$)(ν $p_{1/2}$)$^{-1}$).
[k] Possible configuration=((π $h_{9/2}$)$^{+2}$(π $i_{13/2}$)(ν $g_{9/2}$)(ν $i_{11/2}$)(ν $p_{1/2}$)$^{-1}$).

γ(^{212}At)

Iγ normalization: From ΣI(γ+ce) (to 222.9)=100.

E_γ[†]	I_γ[‡&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α	Comments
(13.5)		2263.5	(19$^+$)	2250.0	(18$^+$)			
(19.2)		2212.2	(16$^+$)	2193.1	(15)			
(37.7)	≤15	2250.0	(18$^+$)	2212.2	(16$^+$)	(E2)[@]	814	α(L)=603 *9*; α(M)=160.5 *23*; α(N)=41.3 *6*; α(O)=8.06 *12*; α(P)=0.795 *12* Mult.: from α(exp)>55.
63.9	19 *2*	1604.5	(15$^-$)	1540.6	(13$^-$)	E2[@]	62.4	α(L)=46.2 *7*; α(M)=12.37 *18*; α(N)=3.19 *5*; α(O)=0.623 *9*; α(P)=0.0620 *9* Mult.: from α(exp)=58 *9*.
106.3	≤5	1710.7	(14$^-$)	1604.5	(15$^-$)			
107.2	91 *4*	4547.4	(22$^+$)	4440.2	(21$^+$)	M1[@]	9.92	α(K)=8.02 *12*; α(L)=1.449 *21*; α(M)=0.343 *5*; α(N)=0.0889 *13*; α(O)=0.0190 *3* α(P)=0.00263 *4* Mult.: from α(exp)=11.6 *6*.
159.3	25 *5*	1763.9	(16$^-$)	1604.5	(15$^-$)	M1[@]	3.22	α(K)=2.60 *4*; α(L)=0.466 *7*; α(M)=0.1102 *16*; α(N)=0.0286 *4*; α(O)=0.00611 *9* α(P)=0.000844 *12* Mult.: from α(exp)=3.7 *10*.
170.1	≤5	1710.7	(14$^-$)	1540.6	(13$^-$)			
176.5	7 *3*	3682.4		3505.9	(22$^-$)			
183.7	297 *9*	885.4	(11$^+$)	701.6	(10$^-$)	E1[@]	0.1033	α(K)=0.0829 *12*; α(L)=0.01553 *22*; α(M)=0.00368 *6*; α(N)=0.000943 *14*; α(O)=0.000195 *3* α(P)=2.46×10^{-5} *4* Mult.: from α(exp)=0.25 *8*; A_2=0.14 *5* in γ(θ).
223.7	80 *8*	1540.6	(13$^-$)	1317.0	(11$^-$)	E2[@]	0.337	α(K)=0.1301 *19*; α(L)=0.1532 *22*; α(M)=0.0405 *6*; α(N)=0.01048 *15*; α(O)=0.00208 *3* α(P)=0.000222 *4* Mult.: from α(exp)=0.26 *12*; A_2=0.28 *5* in γ(θ).
224.2	291 *15*	4771.4	(25$^-$)	4547.4	(22$^+$)	E3	2.86	α(K)=0.330 *5*; α(L)=1.85 *3*; α(M)=0.514 *8*; α(N)=0.1342 *19*; α(O)=0.0266 *4*; α(P)=0.00278 *4* Mult.: from α(exp)=3.0 *2*, α(K)exp=0.3 *1*, α(L)exp=1.5 *2*, α(M)exp=0.5 *1*.
228.0	6 *2*	1832.5	($^-$)	1604.5	(15$^-$)	M1[@]	1.175	α(K)=0.952 *14*; α(L)=0.1693 *24*; α(M)=0.0401 *6*;

Continued on next page (footnotes at end of table)

^{212}At IT decay (152 μs) 1999Ba30,1998By01 (continued)

γ(^{212}At) (continued)

E_γ [†]	I_γ [‡&]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [#]	α	Comments
								α(N)=0.01038 *15*; α(O)=0.00222 *4* α(P)=0.000307 *5* Mult.: from α(exp)=1.4 *10*.
237.0	9 *2*	3034.3	(19⁺)	2797.3	(20⁺)	M1 [@]	1.055	α(K)=0.855 *12*; α(L)=0.1520 *22*; α(M)=0.0360 *5*; α(N)=0.00931 *13*; α(O)=0.00199 *3* α(P)=0.000275 *4* Mult.: from α(exp)=1.4 *10*.
278.1	1000 *20*	1540.6	(13⁻)	1262.4	(12⁺)	E1 [@]	0.0384	α(K)=0.0312 *5*; α(L)=0.00553 *8*; α(M)=0.001305 *19*; α(N)=0.000335 *5*; α(O)=7.00×10⁻⁵ *10* α(P)=9.05×10⁻⁶ *13* Mult.: from α(exp)=0.07 *2*; A_2≈0 in γ(θ).
295.4	15 *3*	2250.0	(18⁺)	1954.7	(16⁻)	M2 [@]	2.10	α(K)=1.555 *22*; α(L)=0.408 *6*; α(M)=0.1019 *15*; α(N)=0.0267 *4*; α(O)=0.00567 *8* α(P)=0.000762 *11* Mult.: from α(exp)=2.5 *7*.
318.3	7 *3*	3682.4		3364.1				
350.3	38 *4*	1954.7	(16⁻)	1604.5	(15⁻)			
360.6	14 *3*	2193.1	(15)	1832.5	(⁻)			
377.0	815 *13*	1262.4	(12⁺)	885.4	(11⁺)	M1	0.295	α(K)=0.240 *4*; α(L)=0.0422 *6*; α(M)=0.00998 *14*; α(N)=0.00258 *4*; α(O)=0.000553 *8* α(P)=7.65×10⁻⁵ *11* Mult.: from α(K)exp=0.28 *1*, α(L)exp=0.046 *5*; A_2≈0 in γ(θ).
448.1	59 *4*	2212.2	(16⁺)	1763.9	(16⁻)			
478.5	317 *20*	701.6	(10⁻)	222.9	(9⁻)	M1	0.1557	α(K)=0.1266 *18*; α(L)=0.0221 *4*; α(M)=0.00523 *8*; α(N)=0.001354 *19*; α(O)=0.000290 *4* α(P)=4.01×10⁻⁵ *6* Mult.: from α(K)exp=0.10 *4*; A_2≈0 in γ(θ).
482.4	32 *6*	2193.1	(15)	1710.7	(14⁻)			
486.0	39 *6*	2250.0	(18⁺)	1763.9	(16⁻)			
525.5	≤5	3322.7		2797.3	(20⁺)			
533.8	856 *17*	2797.3	(20⁺)	2263.5	(19⁺)	M1	0.1164	α(K)=0.0947 *14*; α(L)=0.01651 *24*; α(M)=0.00390 *6*; α(N)=0.001009 *15*; α(O)=0.000216 *3* α(P)=2.99×10⁻⁵ *5* Mult.: from α(K)exp=0.096 *6*, α(L)exp=0.015 *2*; A_2=−0.86 *3* in γ(θ).
547.3	18 *4*	2797.3	(20⁺)	2250.0	(18⁺)	[E2]		
557.5	115 *10*	4440.2	(21⁺)	3882.6				
560.0	24 *5*	3882.6		3322.7				
566.8	104 *10*	3364.1		2797.3	(20⁺)			
588.8	9 *3*	2193.1	(15)	1604.5	(15⁻)			
607.8	790 *11*	2212.2	(16⁺)	1604.5	(15⁻)	E1	0.00718	α(K)=0.00592 *9*; α(L)=0.000965 *14*; α(M)=0.000226 *4*; α(N)=5.81×10⁻⁵ *9*; α(O)=1.232×10⁻⁵ *18* α(P)=1.654×10⁻⁶ *24* Mult.: from α(K)exp<0.01; A_2=−0.52 *4* in γ(θ).
645.5	120 *10*	2250.0	(18⁺)	1604.5	(15⁻)	E3	0.0547	α(K)=0.0328 *5*; α(L)=0.01631 *23*; α(M)=0.00423 *6*; α(N)=0.001099 *16*; α(O)=0.000225 *4* α(P)=2.67×10⁻⁵ *4* Mult.: from α(K)exp<0.05; A_2=0.27 *8* in γ(θ).
662.4	594 *11*	885.4	(11⁺)	222.9	(9⁻)	M2	0.1715	α(K)=0.1344 *19*; α(L)=0.0281 *4*; α(M)=0.00681 *10*; α(N)=0.001773 *25*; α(O)=0.000378 *6* α(P)=5.17×10⁻⁵ *8* Mult.: from α(K)exp=0.133 *1*, α(L)exp=0.024 *3*; A_2=0.10 *4* in γ(θ).
708.7	≤5	3505.9	(22⁻)	2797.3	(20⁺)	[M2]		

Continued on next page (footnotes at end of table)

^{212}At IT decay (152 μs) 1999Ba30,1998By01 (continued)

γ(^{212}At) (continued)

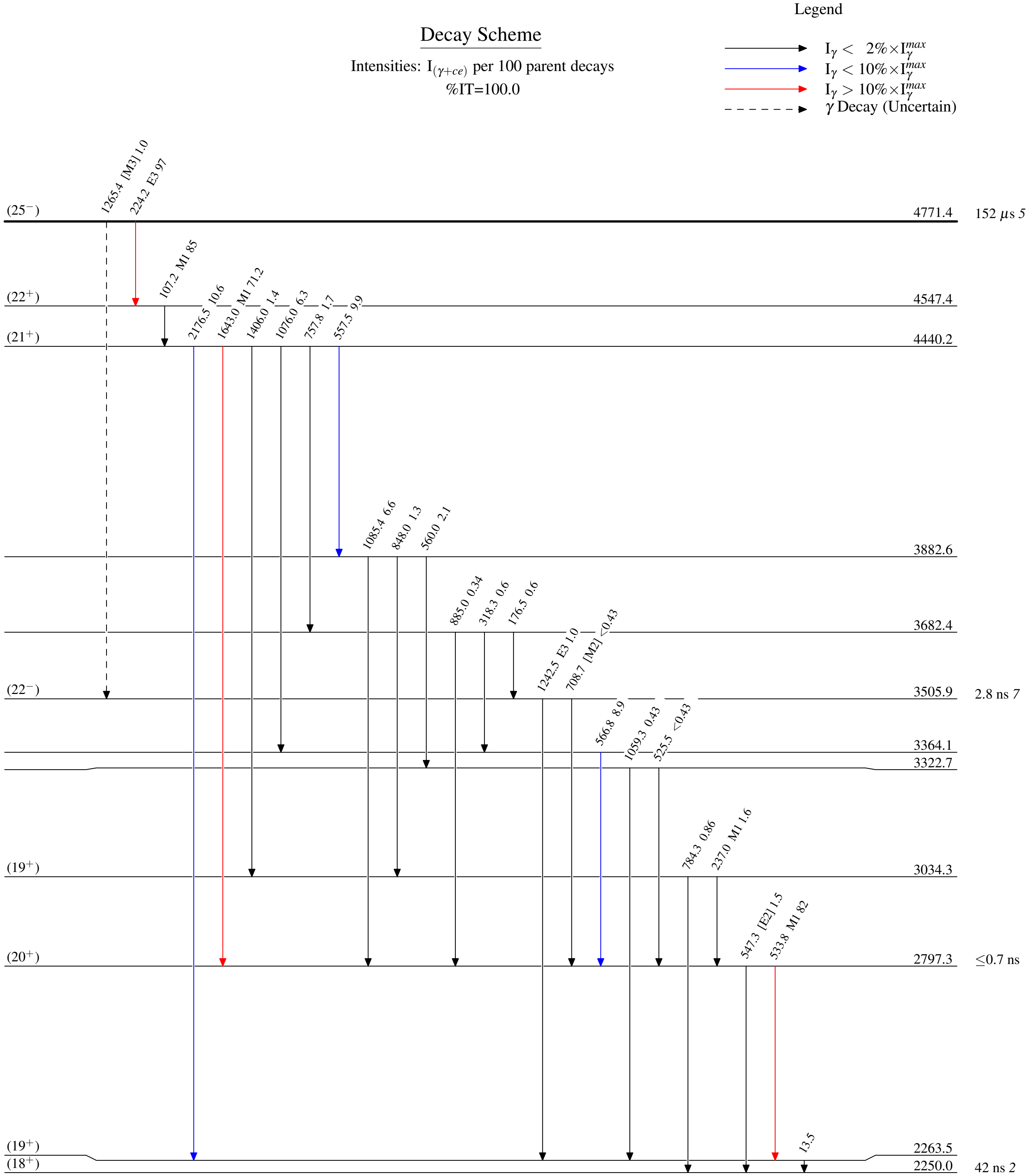
E_γ [†]	I_γ [‡&]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [#]	α	Comments
757.8	20 *4*	4440.2	(21$^+$)	3682.4				
784.3	9 *2*	3034.3	(19$^+$)	2250.0	(18$^+$)			
848.0	15 *4*	3882.6		3034.3	(19$^+$)			
885.0	3 *2*	3682.4		2797.3	(20$^+$)			
1059.3	4 *2*	3322.7		2263.5	(19$^+$)			
1076.0	73 *7*	4440.2	(21$^+$)	3364.1				
1085.4	77 *7*	3882.6		2797.3	(20$^+$)			
1094.0	100 *10*	1317.0	(11$^-$)	222.9	(9$^-$)	E2	0.00651	α(K)=0.00516 *8*; α(L)=0.001027 *15*; α(M)=0.000247 *4*; α(N)=6.37×10^{-5} *9*; α(O)=1.344×10^{-5} *19* α(P)=1.775×10^{-6} *25* Mult.: Q from A_2=0.15 *10* in γ(θ), M2 excluded by comparison to RUL.
1242.5	12 *3*	3505.9	(22$^-$)	2263.5	(19$^+$)	E3	0.01129	α(K)=0.00851 *12*; α(L)=0.00209 *3*; α(M)=0.000515 *8*; α(N)=0.0001336 *19*; α(O)=2.80×10^{-5} *4* α(P)=3.63×10^{-6} *5* Mult.: O from A_2=0.43 *11* in γ(θ), M3 excluded by comparison to RUL.
1265.4[a]	12 *3*	4771.4	(25$^-$)	3505.9	(22$^-$)	[M3]		
1406.0	16 *7*	4440.2	(21$^+$)	3034.3	(19$^+$)			
1643.0	823 *18*	4440.2	(21$^+$)	2797.3	(20$^+$)	M1	0.00646	α(K)=0.00512 *8*; α(L)=0.000865 *13*; α(M)=0.000203 *3*; α(N)=5.26×10^{-5} *8*; α(O)=1.129×10^{-5} *16* α(P)=1.566×10^{-6} *22* Mult.: from α(K)exp=0.0061 *4*; A_2≈0 in γ(θ).
2176.5	123 *3*	4440.2	(21$^+$)	2263.5	(19$^+$)			

† From 1999Ba30. ΔE_γ not explicity given.
‡ Delayed relative Iγ. Incident beam energy for populating states was E=40 MeV (1999Ba30).
# Based on γ(θ) and conversion electron measurements (1999Ba30), except where noted.
@ From total conversion coefficients deduced from γ-ray transition intensity balance (1999Ba30).
& For absolute intensity per 100 decays, multiply by 0.0860 *21*.
a Placement of transition in the level scheme is uncertain.

^{212}At IT decay (152 μs) 1999Ba30,1998By01

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
%IT=100.0



$^{212}_{85}At_{127}$

^{212}At IT decay (152 μs) 1999Ba30,1998By01

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

%IT=100.0