Adopted Levels, Gammas

History

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

Q(β^-)=31 *4*; S(n)=5052 *3*; S(p)=3484.6 *22*; Q(α)=7817.1 *6* 2017Wa10
S(2n)=12799 *8*; S(2p)=8414.2 *20* (2017Wa10).
α: Additional information 1.

^{212}At Levels

Cross Reference (XREF) Flags

A	^{216}Fr α decay (0.70 μs)	D	^{216}Fr α decay (71 ns)
B	^{208}Pb(^{7}Li,3nγ)	E	^{212}At IT decay (152 μs)
C	^{209}Bi(α,nγ)	F	^{216}Fr α decay (850 ns)

E(level)†	J$^\pi$#	T$_{1/2}$‡	XREF	Comments
0.0	(1$^-$)&	0.314 s *3*	A CD	%α=100 J$^\pi$: analogy with ^{210}Bi; J^π=0$^-$ is excluded by the α group from ^{212}At(g.s.) to J^π=4$^+$ in ^{208}Bi. T$_{1/2}$: weighted average of 0.315 s *3* (1970Re02), 0.313 s *3* (1974Ba29), 0.306 s *15* (1999Ho28), and 0.31 s *3* (2007Ku30). Other: 0.305 s (1963Jo09). %β^-: from log *ft*>5.1 (minimum value expected for a first- forbidden transition), one obtains %$\beta^- < 2 \times 10^{-6}$. %$\varepsilon$+%$\beta^+$: from log *ft*>5.1 (minimum value expected for a first- forbidden transition) for decay to ^{212}Po g.s, one obtains %$\varepsilon+\beta^+ < 3 \times 10^{-2}$.
54.99 *20*	(1$^-$,2$^-$)	<1@ ns	CD	J$^\pi$: (M1) 55.0γ to (1$^-$), (M1+E2) 308.9γ from (2$^-$).
160.30 *10*	(2$^-$)		A CD	J$^\pi$: M1 160.3γ to (1$^-$) g.s., M1 45.0γ from (3$^-$).
205.30 *14*	(3$^-$)		A CD	J$^\pi$: allowed, unhindered α decay from ^{216}Fr (J^π=(3$^-$)).
222.9 *4*	(9$^-$)&	0.121 s *2*	BC EF	%α=99.5 *5*; %IT=0.5 *5* E(level): from 1976FrZO. J$^\pi$: HF=1.9 for alpha group from ^{216}Fr (J^π=(9$^-$)), analogy with ^{210}Bi. T$_{1/2}$: weighted average of 0.122 s *1* (1970Re02), 0.115 s *2* (1974Ba29), 0.125 s *17* (1999Ho28), and 0.125 s *25* (2007Ku30). Other: 0.120 s (1963Jo09). %α: based on nonobservation of ce in the range 100≤Eγ≤600 (1963Jo09), the IT branch is estimated as <1%.
275.2 *10*		32@ ns *1*	C	
328.0 *9*	(8$^-$)	<1@ ns	C	J$^\pi$: (M1+E2) 105.1γ to 9$^-$ level; not fed by cascading transitions from (15$^-$) 1604.5 keV level.
345.7 *10*	(−)		C	J$^\pi$: (M1(+E2)) 290.7γ to (1$^-$,2$^-$).
363.7 *7*	(2$^-$)		C	J$^\pi$: (M1) 363.6γ to (1$^-$) g.s.
622.6 *10*	(−)		C	J$^\pi$: (M1) 567.6γ to (1$^-$,2$^-$).
635.3 *10*			C	
701.4 *4*	(10$^-$)[a]	≤1.4 ns	BC E	J$^\pi$: M1 478.5γ to (9$^-$), (E1) 183.9γ from (11$^+$).
748.0 *10*	(1$^-$,2$^-$,3$^-$)		C	J$^\pi$: (M1) 587.7γ to (2$^-$).
768.9 *10*	(1$^-$,2$^-$,3$^-$)		C	J$^\pi$: (M1) 608.6γ to (2$^-$).
779.1 *10*			C	
783.5 *12*	(1$^-$,2$^-$,3$^-$)		C	J$^\pi$: (M1) 419.8γ to (2$^-$).
839.9 *10*	(1$^-$,2$^-$,3$^-$)		C	J$^\pi$: (M1+E2) 679.6γ to (2$^-$).
842.9 *9*	(7$^-$)		C	J$^\pi$: (M1) 514.8γ to (8$^-$); (E2) 620.0γ to (9$^-$).
845.7 *10*	(1$^-$,2$^-$,3$^-$)		C	J$^\pi$: (M1) 685.4γ to (2$^-$).
885.4 *4*	(11$^+$)[d]	18.7 ns *7*	BC E	μ=5.94 *11* J$^\pi$: M2 662.5γ to (9$^-$), configuration assignment. μ: from g-factor=0.54 *1* (1994By01, 2014StZZ). Other: g-factor=0.541 *11* (1979Sj01).

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Adopted Levels, Gammas (continued)

^{212}At Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$[‡]	XREF	Comments
				$T_{1/2}$: other: 20 ns *4* from 184γ(t) in ^{209}Bi(α,nγ).
890.4 *12*	(⁻)		C	Jπ: (M1) 526.7γ to (1⁻,2⁻).
920.8 *3*	(4⁻)		C	Jπ: (E2) 760.5γ to (2⁻).
1082.5 *14*			C	
1117.7 *10*			C	
1209.5 *14*			C	
1262.4 *5*	(12⁺)[b]	≤0.7 ns	BC E	Jπ: M1 377.0γ to (11⁺).
1283.0 *5*	(12⁺)	≤4 ns	BC	Jπ: (M1) 397.6γ to (11⁺).
1316.8 *8*	(11⁻)	≤2 ns	B E	Jπ: (E2) 1094.0γ to (9⁻), E2 223.7γ from (13⁻).
1321.4 *5*	(11⁺,12⁺)	<4 ns	BC	Jπ: (M1) 436.0γ to (11⁺) level.
1428.6 *11*	(11⁻)		BC	Jπ: (M1) 727.2γ to (10⁻).
1457.5 *10*	(5⁺)		C	Jπ: (E1) 536.7γ to (4⁻).
1540.5 *5*	(13⁻)[&]	≤1.4 ns	BC E	Jπ: E1 278.1γ to (12⁺).
1548.4 *13*			B	
1604.3 *9*	(15⁻)[&]	35.4 ns *14*	BC E	μ=9.46 *8* Jπ: (E2) 63.9γ to (13⁻), configuration assignment. μ: from g-factor=0.631 *5* (1994By01,2014StZZ). Othe: g-factor=0.622 *10*, μ=9.33 *15* (1979Sj01,2014StZZ).
1651.1 *11*	(13⁺)		C	Jπ: (E2) 765.7γ to (11⁺).
1710.6 *9*	(14⁻)[&]		B E	Jπ: 170.1γ to (13⁻), configuration assignment.
1763.9 *11*	(16⁻)[c]		B E	Jπ: M1 159.3γ to (15⁻).
1806.0 *16*			B	
1827.5 *11*	(12⁺)		C	Jπ: (M1+E2) 942.1γ to (11⁺); no γ rays to levels with J<12.
1832.4 *12*	(⁻)		B E	Jπ: M1 228.0γ to (15⁻).
1933.1 *11*	(13⁺)		C	Jπ: (M1+E2) 650.1γ to (12⁺).
1954.7 *12*	(16⁻)[a]		B E	Jπ: 350.3γ to (15⁻), configuration assignment.
2004.5 *14*			B	
2037.6 *16*			B	
2093.9 *14*			B	
2111.5 *11*			B	
2128.2 *12*			B	
2193.1 *10*	(15)[d]		B E	Jπ: 482.4γ to (14⁻), 19.2γ from (16⁺).
2212.5 *10*	(16⁺)[d]		B E	Jπ: E1 608.2γ to (15⁻).
2250.0 *11*	(18⁺)[d]	42 ns *2*	B E	Jπ: M2 295.4γ to (16⁻), E3 645.5γ to (15⁻).
2263.5 *13*	(19⁺)[d]		B E	Jπ: 2176.5γ from (21⁺), 13.5γ to (18⁺), configuration assignment.
2269.5 *15*			B	
2335.9 *15*			B	
2356.0 *13*			B	
2702.6 *13*			B	
2724.9 *16*			B	
2737.5 *15*			B	
2786.9 *15*			B	
2797.3 *13*	(20⁺)[e]	≤0.7 ns	B E	Jπ: M1 533.8γ to (19⁺).
3034.3 *13*	(19⁺)[d]		B E	Jπ: M1 237.0γ to (20⁺), 784.3γ to (18⁺), configuration assignment.
3322.7 *14*	[g]		B E	Jπ: from comparison to shell model calculations and configuration assignments, $J^{\pi}=(19^+)$ is assigned in ^{208}Pb(^{7}Li,3nγ).
3364.1 *14*	[i]		B E	Jπ: from comparison to shell model calculations and configuration assignments, $J^{\pi}=(21^-)$ is assigned in ^{208}Pb(^{7}Li,3nγ).
3506.0 *14*	(22⁻)[f]	2.8 ns *7*	B E	Jπ: (E3) 1242.5γ to (19⁺).
3519.6? *16*			B	
3682.4 *14*	[f]		B E	Jπ: from comparison to shell model calculations and configuration assignments, $J^{\pi}=(21^-)$ is assigned in ^{208}Pb(^{7}Li,3nγ).
3882.6 *13*	[h]		B E	Jπ: from comparison to shell model calculations and configuration assignments,

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Adopted Levels, Gammas (continued)

^{212}At Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$[‡]	XREF	Comments
				J^π=(20$^+$) is assigned in ^{208}Pb(^{7}Li,3nγ).
4440.2 *13*	(21$^+$)[j]		B E	J$^\pi$: M1 1643.0γ to (20$^+$).
4547.3 *15*	(22$^+$)[k]		B E	J$^\pi$: M1 107.2γ to (21$^+$).
4771.4 *15*	(25$^-$)[l]	152 μs *5*	B E	J$^\pi$: E3 224.2γ to (22$^+$).

[†] From a least-squares fit to Eγ, by evaluators, except where noted. Evaluators assume 1 keV uncertainty for γ rays with no experimental uncertainty.
[‡] From ^{208}Pb(^{7}Li,3nγ), except where noted.
[#] Shell-model configuration assignments are from ^{208}Pb(^{7}Li,3nγ) (1999Ba30). Assignments are made under the general assumption that spin increases with increasing excitation energy in the fusion evaporation reactions.
[@] From ^{209}Bi(α,nγ) (1982Lo01).
[&] Possible configuration=$((\pi\ h_{9/2})^{+3}(\nu\ g_{9/2}))$.
[a] Possible configuration=$((\pi\ h_{9/2})^{+3}(\nu\ i_{11/2}))$.
[b] Possible configuration=$((\pi\ h_{9/2})^{+3}(\nu\ j_{15/2}))$.
[c] Possible configuration=$((\pi\ h_{9/2})^{+2}(\pi\ f_{7/2})(\nu\ g_{9/2}))$.
[d] Possible configuration=$((\pi\ h_{9/2})^{+2}(\pi\ i_{13/2})(\nu\ g_{9/2}))$.
[e] Possible configuration=$((\pi\ h_{9/2})^{+2}(\pi\ i_{13/2})(\nu\ i_{11/2}))$.
[f] Possible configuration=$((\pi\ h_{9/2})^{+2}(\pi\ i_{13/2})(\nu\ j_{15/2}))$.
[g] Possible configuration=$((\pi\ h_{9/2})(\pi\ i_{13/2})(\pi\ f_{7/2})(\nu\ g_{9/2}))$.
[h] Possible configuration=$((\pi\ h_{9/2})(\pi\ i_{13/2})(\pi\ f_{7/2})(\nu\ i_{11/2}))$.
[i] Possible configuration=$((\pi\ h_{9/2})(\pi\ i_{13/2})^{+2}(\nu\ g_{9/2}))$.
[j] Possible configuration=$((\pi\ h_{9/2})^{+3}(\nu\ g_{9/2})(\nu\ i_{11/2})(\nu\ p_{1/2})^{-1})$.
[k] Possible configuration=$((\pi\ h_{9/2})^{+2}(\pi\ f_{7/2})(\nu\ g_{9/2})(\nu\ i_{11/2})(\nu\ p_{1/2})^{-1})$.
[l] Possible configuration=$((\pi\ h_{9/2})^{+2}(\pi\ i_{13/2})(\nu\ g_{9/2})(\nu\ i_{11/2})(\nu\ p_{1/2})^{-1})$.

γ(^{212}At)

E$_i$(level)	J$_i^\pi$	E$_\gamma$[†]	I$_\gamma$[†]	E$_f$	J$_f^\pi$	Mult.[‡]	α	Comments
54.99	(1$^-$,2$^-$)	55.0 *2*	100	0.0	(1$^-$)	(M1)[@]	13.28 *24*	α(L)=10.12 *18*; α(M)=2.40 *5*; α(N)=0.621 *11*; α(O)=0.1330 *24*; α(P)=0.0184 *4* E$_\gamma$,I$_\gamma$: from ^{216}Fr α decay (71 ns).
160.30	(2$^-$)	160.3[#] *1*	100	0.0	(1$^-$)	M1[#]	3.16	α(K)=2.56 *4*; α(L)=0.457 *7*; α(M)=0.1083 *16*; α(N)=0.0281 *4*; α(O)=0.00601 *9* α(P)=0.000830 *12*
205.30	(3$^-$)	45.0[#] *1*	100	160.30	(2$^-$)	M1[#]	24.0	α(L)=18.2 *3*; α(M)=4.32 *7*; α(N)=1.120 *18*; α(O)=0.240 *4*; α(P)=0.0331 *6*
275.2		69.9[@]	100[@]	205.30	(3$^-$)			
328.0	(8$^-$)	105.1[@]	100[@]	222.9	(9$^-$)	(M1+E2)	8.4 *21*	α(K)=4.4 *41*; α(L)=2.9 *15*; α(M)=0.77 *41*; α(N)=0.20 *11*; α(O)=0.040 *20*; α(P)=0.0044 *16* Mult.: (D+Q) from $\gamma(\theta)$ in ^{209}Bi(α,nγ); even small M2 component is excluded by comparison to RUL.
345.7	(?)	290.7[@]	100[@]	54.99	(1$^-$,2$^-$)	(M1(+E2))[@]	0.37 *23*	α(K)=0.28 *21*; α(L)=0.070 *17*; α(M)=0.017 *4*; α(N)=0.0045 *9*; α(O)=0.00093 *21* α(P)=1.18×10^{-4} *39*
363.7	(2$^-$)	308.9[@]	27[@]	54.99	(1$^-$,2$^-$)	(M1+E2)[@]	0.31 *20*	α(K)=0.24 *18*; α(L)=0.058 *16*; α(M)=0.014

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Adopted Levels, Gammas (continued)

$\gamma(^{212}At)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α	Comments
								3; α(N)=0.0037 *8*; α(O)=0.00077 *19* α(P)=9.8×10^{-5} *35*
363.7	(2$^-$)	363.6[@]	100[@]	0.0	(1$^-$)	(M1)[@]	0.326	α(K)=0.265 *4*; α(L)=0.0466 *7*; α(M)=0.01102 *16*; α(N)=0.00285 *4*; α(O)=0.000611 *9* α(P)=8.44×10^{-5} *12*
622.6	(−)	567.6[@]	100[@]	54.99	(1$^-$,2$^-$)	(M1)[@]	0.0989	α(K)=0.0805 *12*; α(L)=0.01401 *20*; α(M)=0.00331 *5*; α(N)=0.000856 *12*; α(O)=0.000183 *3* α(P)=2.54×10^{-5} *4*
635.3		580.3[@]	100[@]	54.99	(1$^-$,2$^-$)			
701.4	(10$^-$)	478.5 *2*	100	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*
748.0	(1$^-$,2$^-$,3$^-$)	587.7[@]	100[@]	160.30	(2$^-$)	(M1)[@]	0.0902	α(K)=0.0735 *11*; α(L)=0.01277 *18*; α(M)=0.00301 *5*; α(N)=0.000780 *11* α(O)=0.0001671 *24*; α(P)=2.31×10^{-5} *4*
768.9	(1$^-$,2$^-$,3$^-$)	608.6[@]	100[@]	160.30	(2$^-$)	(M1)[@]	0.0823	α(K)=0.0670 *10*; α(L)=0.01164 *17*; α(M)=0.00275 *4*; α(N)=0.000711 *10* α(O)=0.0001523 *22*; α(P)=2.11×10^{-5} *3*
779.1		618.8[@]	100[@]	160.30	(2$^-$)			
783.5	(1$^-$,2$^-$,3$^-$)	419.8[@]	100[@]	363.7	(2$^-$)	(M1)[@]	0.221	α(K)=0.180 *3*; α(L)=0.0315 *5*; α(M)=0.00745 *11*; α(N)=0.00193 *3*; α(O)=0.000413 *6* α(P)=5.71×10^{-5} *8*
839.9	(1$^-$,2$^-$,3$^-$)	679.6[@]	100[@]	160.30	(2$^-$)	(M1+E2)[@]	0.039 *23*	α(K)=0.031 *19*; α(L)=0.0060 *27*; α(M)=0.00143 *62*; α(N)=3.7×10^{-4} *16*; α(O)=7.9×10^{-5} *35* α(P)=1.06×10^{-5} *52*
842.9	(7$^-$)	514.8[@]	100[@]	328.0	(8$^-$)	(M1)[@]	0.1281	α(K)=0.1043 *15*; α(L)=0.0182 *3*; α(M)=0.00430 *6*; α(N)=0.001112 *16*; α(O)=0.000238 *4* α(P)=3.29×10^{-5} *5*
		620.0[@]	≤82[@]	222.9	(9$^-$)	(E2)[@]	0.0206	α(K)=0.01492 *21*; α(L)=0.00425 *6*; α(M)=0.001056 *15*; α(N)=0.000273 *4*; α(O)=5.65×10^{-5} *8* α(P)=6.98×10^{-6} *10*
845.7	(1$^-$,2$^-$,3$^-$)	685.4[@]	100[@]	160.30	(2$^-$)	(M1)[@]	0.0602	α(K)=0.0491 *7*; α(L)=0.00849 *12*; α(M)=0.00200 *3*; α(N)=0.000518 *8*; α(O)=0.0001111 *16* α(P)=1.537×10^{-5} *22*
885.4	(11$^+$)	183.9 *2*	49.6 *15*	701.4	(10$^-$)	(E1)	0.1030	α(K)=0.0827 *12*; α(L)=0.01549 *23*; α(M)=0.00367 *6*; α(N)=0.000940 *14*; α(O)=0.000195 *3* α(P)=2.45×10^{-5} *4* B(E1)(W.u.)=4.72×10^{-7} *+22−20* I_γ: weighted average of 49.1 *15* from ^{208}Pb(^{7}Li,3nγ) and 50.0 *15* from ^{212}At IT decay (152 μs).
		662.5 *2*	100.0 *18*	222.9	(9$^-$)	M2	0.1714	α(K)=0.1343 *19*; α(L)=0.0281 *4*; α(M)=0.00681 *10*; α(N)=0.001772 *25*;

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Adopted Levels, Gammas (continued)

γ(^{212}At) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α	Comments
								α(O)=0.000378 *6* α(P)=5.17×10^{-5} *8* B(M2)(W.u.)=0.213 *8*
890.4	(⁻)	526.7[@]	100[@]	363.7	(2⁻)	(M1)[@]	0.1206	α(K)=0.0981 *14*; α(L)=0.01712 *24*; α(M)=0.00404 *6*; α(N)=0.001046 *15*; α(O)=0.000224 *4* α(P)=3.10×10^{-5} *5*
920.8	(4⁻)	715.1[@]	100[@]	205.30	(3⁻)	(E2)[@]	0.01515	α(K)=0.01134 *16*; α(L)=0.00287 *4*; α(M)=0.000708 *10*; α(N)=0.000183 *3*; α(O)=3.81×10^{-5} *6* α(P)=4.80×10^{-6} *7*
		760.5[@] *3*	72[@]	160.30	(2⁻)	(E2)[@]	0.01333	α(K)=0.01009 *15*; α(L)=0.00245 *4*; α(M)=0.000601 *9*; α(N)=0.0001553 *22*; α(O)=3.24×10^{-5} *5* α(P)=4.11×10^{-6} *6*
1082.5		239.6[@]	100[@]	842.9	(7⁻)			
1117.7		196.9[@]	100[@]	920.8	(4⁻)			
1209.5		366.6[@]	100[@]	842.9	(7⁻)	(M1+E2)[@]	0.20 *13*	α(K)=0.15 *11*; α(L)=0.034 *12*; α(M)=0.0083 *25*; α(N)=0.00215 *64*; α(O)=4.5×10^{-4} *15* α(P)=5.9×10^{-5} *24*
1262.4	(12⁺)	377.0 *2*	100	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*
1283.0	(12⁺)	397.6 *2*	100	885.4	(11⁺)	(M1)[@]	0.256	α(K)=0.208 *3*; α(L)=0.0365 *6*; α(M)=0.00863 *13*; α(N)=0.00224 *4*; α(O)=0.000479 *7* α(P)=6.62×10^{-5} *10*
1316.8	(11⁻)	1094.0	100	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*
1321.4	(11⁺,12⁺)	436.0 *2*	100	885.4	(11⁺)	(M1)[@]	0.200	α(K)=0.1624 *23*; α(L)=0.0285 *4*; α(M)=0.00672 *10*; α(N)=0.001741 *25*; α(O)=0.000373 *6* α(P)=5.15×10^{-5} *8*
1428.6	(11⁻)	727.2	100	701.4	(10⁻)	(M1)[@]	0.0516	α(K)=0.0420 *6*; α(L)=0.00726 *11*; α(M)=0.001712 *24*; α(N)=0.000443 *7*; α(O)=9.50×10^{-5} *14* α(P)=1.314×10^{-5} *19*
1457.5	(5⁺)	536.7[@]	100[@]	920.8	(4⁻)	(E1)[@]	0.00920	α(K)=0.00757 *11*; α(L)=0.001249 *18*; α(M)=0.000293 *4*; α(N)=7.53×10^{-5} *11* α(O)=1.593×10^{-5} *23*; α(P)=2.13×10^{-6} *3*
1540.5	(13⁻)	223.7	7.9 *8*	1316.8	(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* I_γ: weighted average of 7.7 *10* from ^{208}Pb(^{7}Li,3nγ) and 8.0 *8* from ^{212}At IT decay (152 μs).

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Adopted Levels, Gammas (continued)

γ(^{212}At) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α	Comments
1540.5	(13$^-$)	278.1 *2*	100.0 *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*
1548.4		231.6	100	1316.8	(11$^-$)			
1604.3	(15$^-$)	63.9	100	1540.5	(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* B(E2)(W.u.)=3.15 *+19−17*
1651.1	(13$^+$)	765.7[@]	100[@]	885.4	(11$^+$)	(E2)[@]	0.01315	α(K)=0.00996 *14*; α(L)=0.00241 *4*; α(M)=0.000590 *9*; α(N)=0.0001525 *22*; α(O)=3.18×10^{-5} *5* α(P)=4.05×10^{-6} *6*
1710.6	(14$^-$)	106.3	100 *9*	1604.3	(15$^-$)			
		170.1	82 *9*	1540.5	(13$^-$)			
1763.9	(16$^-$)	159.3	100	1604.3	(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*
1806.0		257.6	100	1548.4				
1827.5	(12$^+$)	942.1[@]	100[@]	885.4	(11$^+$)	(M1+E2)[@]	0.0175 *88*	α(K)=0.0141 *74*; α(L)=0.0026 *12*; α(M)=6.1×10^{-4} *26*; α(N)=1.57×10^{-4} *67*; α(O)=3.4×10^{-5} *15* α(P)=4.6×10^{-6} *21*
1832.4	(−)	228.0	100	1604.3	(15$^-$)	M1	1.175	α(K)=0.952 *14*; α(L)=0.1693 *24*; α(M)=0.0401 *6*; α(N)=0.01038 *15*; α(O)=0.00222 *4* α(P)=0.000307 *5*
1933.1	(13$^+$)	650.1[@]	100[@]	1283.0	(12$^+$)	(M1+E2)[@]	0.044 *26*	α(K)=0.035 *22*; α(L)=0.0067 *31*; α(M)=0.00161 *70*; α(N)=4.2×10^{-4} *18*; α(O)=8.9×10^{-5} *40* α(P)=1.19×10^{-5} *58*
1954.7	(16$^-$)	350.3	100	1604.3	(15$^-$)			
2004.5		400.2	100	1604.3	(15$^-$)			
2037.6		489.2	100	1548.4				
2093.9		489.6	100	1604.3	(15$^-$)			
2111.5		571.0	100	1540.5	(13$^-$)			
2128.2		364.4	63 *25*	1763.9	(16$^-$)			
		523.7	100 *25*	1604.3	(15$^-$)			
2193.1	(15)	360.6	59 *5*	1832.4	(−)			
		482.4	100 *9*	1710.6	(14$^-$)			
		588.8	18 *5*	1604.3	(15$^-$)			
2212.5	(16$^+$)	(19.2)		2193.1	(15)			
		448.1	7.4 *5*	1763.9	(16$^-$)			I_γ: weighted average of 7.3 *5* from ^{208}Pb(^{7}Li,3nγ) and 7.5 *5* from ^{212}At IT decay (152 μs).
		608.2 *2*	100.0 *14*	1604.3	(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* I_γ: from ^{212}At IT decay (152 μs).
2250.0	(18$^+$)	(37.7)	≤12.5	2212.5	(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* B(E2)(W.u.)=2.8 *+4−27* I_γ: from ^{212}At IT decay (152 μs).
		295.4	13.3 *17*	1954.7	(16$^-$)	M2	2.10	α(K)=1.555 *22*; α(L)=0.408 *6*;

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{212}At) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α	Comments
								α(M)=0.1019 *15*; α(N)=0.0267 *4*; α(O)=0.00567 *8* α(P)=0.000762 *11* B(M2)(W.u.)=0.023 *+26−12* I_γ: weighted average of 13.6 *17* from ^{208}Pb(^{7}Li,3nγ) and 12.5 *25* from ^{212}At IT decay (152 μs).
2250.0	(18$^+$)	486.0	32 *5*	1763.9	(16$^-$)	[M2]	0.431	α(K)=0.332 *5*; α(L)=0.0747 *11*; α(M)=0.0183 *3*; α(N)=0.00477 *7*; α(O)=0.001017 *15* α(P)=0.0001381 *20* B(M2)(W.u.)=0.0046 *+52−24* I_γ: weighted average of 29 *7* from ^{208}Pb(^{7}Li,3nγ) and 33 *5* from ^{212}At IT decay (152 μs).
		645.5	100 *5*	1604.3	(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* B(E3)(W.u.)=4.4 *+48−23*
2263.5	(19$^+$)	(13.5)		2250.0	(18$^+$)			
2269.5		505.6	100	1763.9	(16$^-$)			
2335.9		572.0	100	1763.9	(16$^-$)			
2356.0		401.2	67 *13*	1954.7	(16$^-$)			
		592.2	100 *13*	1763.9	(16$^-$)			
2702.6		439.1	100 *14*	2263.5	(19$^+$)			
		452.6	52 *10*	2250.0	(18$^+$)			
2724.9		461.4	100	2263.5	(19$^+$)			
2737.5		782.8	100	1954.7	(16$^-$)			
2786.9		1023.0	100	1763.9	(16$^-$)			
2797.3	(20$^+$)	533.8	100 *2*	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* I_γ: from ^{212}At IT decay (152 μs). Other: 100 *4* in ^{208}Pb(^{7}Li,3nγ).
		547.3	2.1 *5*	2250.0	(18$^+$)	[E2]		I_γ: from ^{212}At IT decay (152 μs). Other: ≤4 in ^{208}Pb(^{7}Li,3nγ).
3034.3	(19$^+$)	237.0	100 *14*	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*
		784.3	86 *43*	2250.0	(18$^+$)			I_γ: other: 100 *22* in ^{212}At IT decay (152 μs).
3322.7		525.5	55 *18*	2797.3	(20$^+$)			
		1059.3	100 *27*	2263.5	(19$^+$)			
3364.1		566.8	100	2797.3	(20$^+$)			
3506.0	(22$^-$)	708.7	22 *7*	2797.3	(20$^+$)	[M2]		B(M2)(W.u.)=0.31 *+14−11*
		1242.5	100 *11*	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* B(E3)(W.u.)=29 *+10−6*
3519.6?		722.3[&]	100	2797.3	(20$^+$)			
3682.4		176.5	≤100	3506.0	(22$^-$)			
		318.3	100 *20*	3364.1				
		885.0	100 *40*	2797.3	(20$^+$)			
3882.6		560.0	31 *6*	3322.7				I_γ: from ^{212}At IT decay (152 μs). Other: 50 *30* in ^{208}Pb(^{7}Li,3nγ).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{212}At) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α	Comments
3882.6		848.0	19 *5*	3034.3	(19$^+$)			I_γ: from ^{212}At IT decay (152 μs). Other: 36 *9* in ^{208}Pb(^{7}Li,3nγ).
		1085.4	100 *9*	2797.3	(20$^+$)			I_γ: from ^{212}At IT decay (152 μs). Other: 100 *18* in ^{208}Pb(^{7}Li,3nγ).
4440.2	(21$^+$)	557.5	14.0 *12*	3882.6				I_γ: from ^{212}At IT decay (152 μs). Other: 17 *10* in ^{208}Pb(^{7}Li,3nγ).
		757.8	2.4 *5*	3682.4				I_γ: from ^{212}At IT decay (152 μs). Other: ≤17 in ^{208}Pb(^{7}Li,3nγ).
		1076.0	8.9 *9*	3364.1				I_γ: from ^{212}At IT decay (152 μs). Other: 13 *3* in ^{208}Pb(^{7}Li,3nγ).
		1406.0	1.9 *9*	3034.3	(19$^+$)			I_γ: from ^{212}At IT decay (152 μs). Other: ≤ 17 in ^{208}Pb(^{7}Li,3nγ).
		1643.0	100.0 *22*	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* I_γ: from ^{212}At IT decay (152 μs). Other: 100 *10* in ^{208}Pb(^{7}Li,3nγ).
		2176.5	14.9 *4*	2263.5	(19$^+$)			I_γ: from ^{212}At IT decay (152 μs).
4547.3	(22$^+$)	107.2	100	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*
4771.4	(25$^-$)	224.2	100 *5*	4547.3	(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* B(E3)(W.u.)=27.0 *10*
		1265.4[&]	4.10 *10*	3506.0	(22$^-$)	[M3]		B(M3)(W.u.)=7.01×10^{-4} *+47−44* I_γ: from ^{212}At IT decay (152 μs). Other: ≤50 in ^{208}Pb(^{7}Li,3nγ).

[†] From ^{208}Pb(^{7}Li,3nγ), except where noted.
[‡] From ^{208}Pb(^{7}Li,3nγ), except where noted.
[#] From ^{216}Fr α decay (0.70 μs).
[@] From ^{209}Bi(α,nγ).
[&] Placement of transition in the level scheme is uncertain.

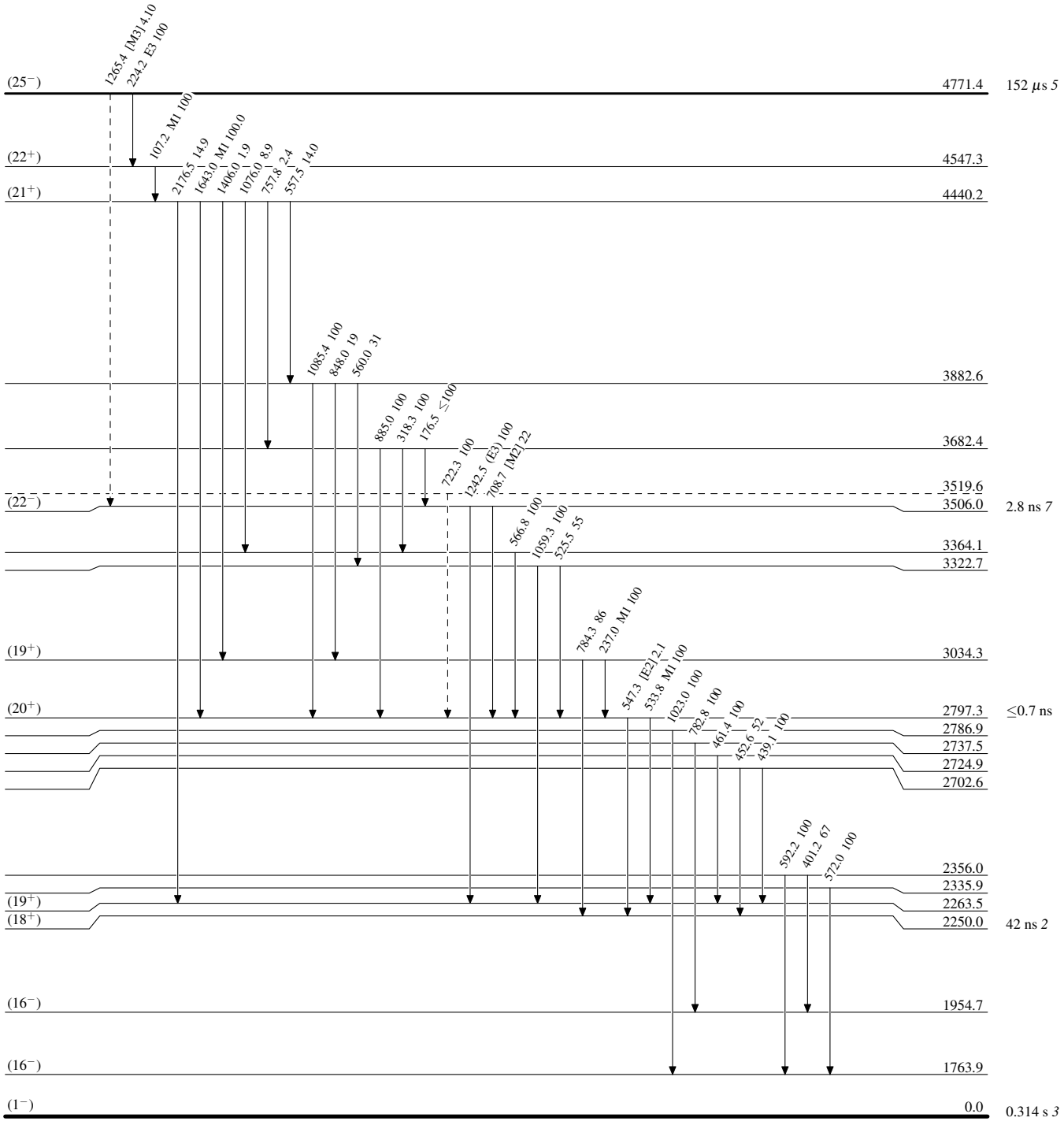
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



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

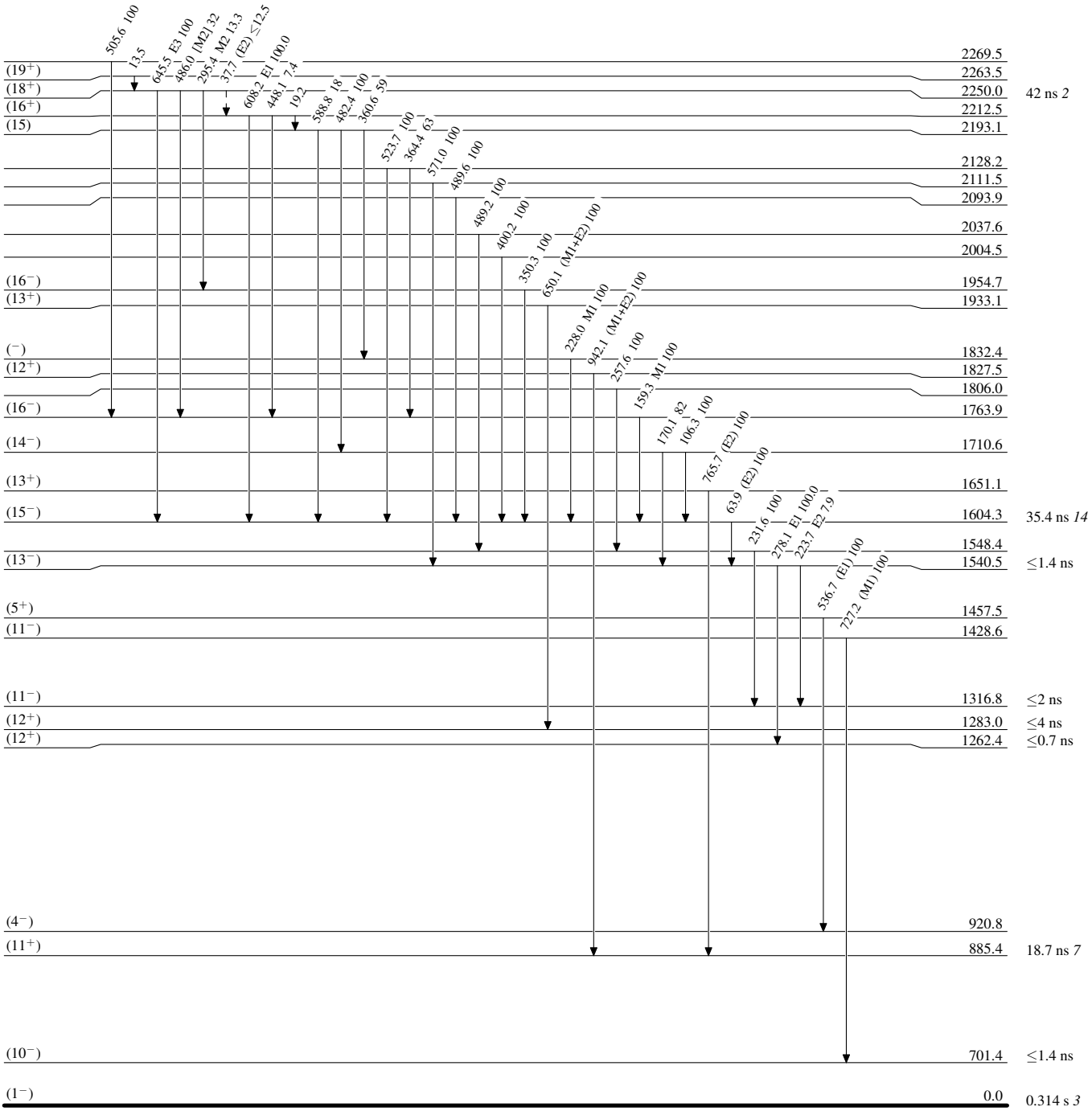
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)

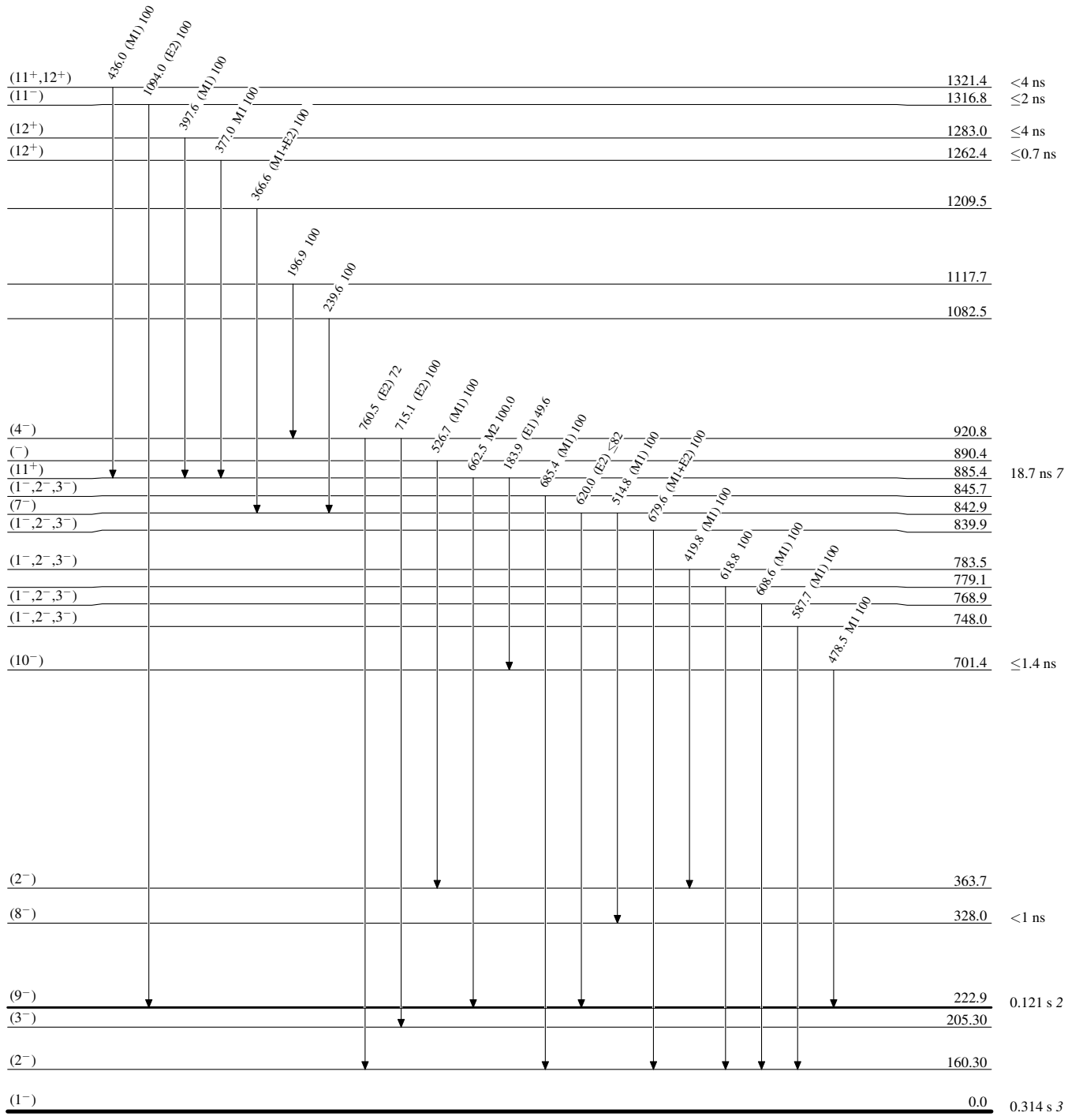


$^{212}_{85}At_{127}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



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

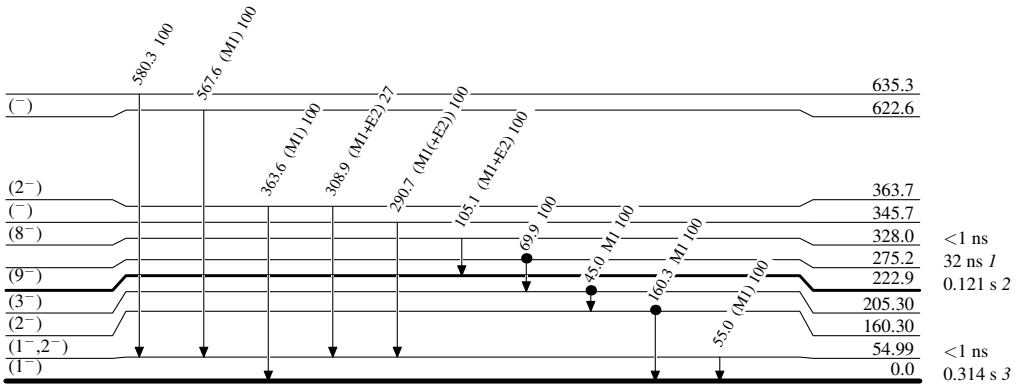
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

● Coincidence



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