^{208}Rn ε decay

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. J. Martin	NDS 108,1583 (2007)	1-Jun-2007

Parent: ^{208}Rn: E=0.0; $J^\pi=0^+$; $T_{1/2}$=24.35 min *14*; Q(ε)=2843 *28*; %ε+%β^+ decay=38 *7*

The decay scheme is that proposed by 1979Va22 on the basis of $\gamma\gamma$ and levels At 23.5 and 63.6 seen In ^{212}Fr α decay. The 237 level, also observed In α decay, has been added by the evaluator on the basis of energy fits. The introduction of the 237 level allows placement of the 187.52γ, unplaced by the authors, between the 424 and 237 levels. Since the unplaced (γ+ce) radiation is≈71%, No ε feedings or log *ft* values are calculated.

^{208}At Levels

E(level)†‡	J^π#	Comments
0	6^+	
23.530 *20*	$(5)^+$	
63.699 *23*	$(4)^+$	
113.788 *25*	$(3)^+$	
173.75 *3*	$(2)^+$	
208.13 *3*	$(4,5)^+$	E(level): added by the evaluator on the basis of data In ^{212}Fr α decay.
237.22 *4*	$(4)^+$	
424.78 *4*	$(3)^+$	
600.55 *3*	$(2,3)^+$	
734.21 *3*	$(2,3)^+$	
853.41? *4*	$(2,3,4)^+$	
904.43 *5*		
1539.85 *5*		
1826.63 *5*		
1979.50? *6*		
2270.11 *6*		
2576.7? *2*		E(level): the two deexciting transitions do not give consistent E(level) values. The 306γ gives E(level)=2576.92 *4* and the 2152 level gives E(level)=2576.48 *9*. The evaluator adopts 2576.7 *2*.

† From a least-squares fit to the Eγ values.

‡ In α decay, a level At 588 is proposed with the strongest branch, Eγ=361.3 *3* deexciting to a level At 226 with the strongest branch, Eγ=227.2 *1*, deexciting to the g.s.. In ε decay, unplaced transitions with energies Eγ=361.30 *10* and 226.83 *8* are observed. These might correspond to the transitions seen In α decay; however, Ti(361γ)/Ti(227γ)=4.6 *8* which leads to a large intensity imbalance At the 226 level.

Spin and parity values are those given under Adopted Levels.

^{208}Rn ε decay (continued)

γ(^{208}At)

Iγ normalization: weighted average of sum I(γ+ce to 23 level)=100 and sum I(γ+ce to 63 level+213γ)=100. Although there are many unplaced transitions, there is probably very little additional feeding of the high spin 23 and 64 levels since the ^{208}Rn ε parent has J=0.

E_γ[†]	I_γ[†&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	α[a]	Comments
23.53 *2*	5.4 *10*	23.530	(5)$^+$	0	6$^+$	M1(+E2)[#]	≤0.032	167 *5*	α(L)=127 *4*; α(M)=30.2 *10*; α(N+..)=9.7 *3* α(N)=7.83 *24*; α(O)=1.67 *5*; α(P)=0.229 *6*
40.17 *1*	14.7 *10*	63.699	(4)$^+$	23.530	(5)$^+$	M1(+E2)[#]	≤0.015	33.5	α(L)=25.5 *4*; α(M)=6.06 *9*; α(N+..)=1.95 *3* α(N)=1.569 *23*; α(O)=0.336 *5*; α(P)=0.0463 *7*
50.09 *1*	28.0 *18*	113.788	(3)$^+$	63.699	(4)$^+$	M1(+E2)[#]	≤0.037	17.6 *3*	α(L)=13.40 *21*; α(M)=3.18 *6*; α(N+..)=1.024 *17* α(N)=0.824 *14*; α(O)=0.176 *3*; α(P)=0.0243 *4*
59.959 *6*	30.9 *20*	173.75	(2)$^+$	113.788	(3)$^+$	M1(+E2)[#]	≤0.060	10.45 *20*	α(L)=7.95 *15*; α(M)=1.89 *4*; α(N+..)=0.608 *12* α(N)=0.489 *10*; α(O)=0.1046 *20*; α(P)=0.01438 *24* Mult.: α(K)exp=20 *9*. α(K)=7.0(M1), 38.9(M2).
[x]114.6 *3*	1.9 *4*								
123.42 *3*	8.1 *12*	237.22	(4)$^+$	113.788	(3)$^+$	M1(+E2)	0.71 *+28−25*	5.5 *6*	α(K)=3.7 *8*; α(L)=1.34 *18*; α(M)=0.34 *6*; α(N+..)=0.108 *17* α(N)=0.088 *14*; α(O)=0.018 *3*; α(P)=0.00213 *19*
[x]134.18 *8*	4.2 *4*					M1(+E2)	≤0.56	4.9 *4*	α(K)=3.8 *5*; α(L)=0.84 *8*; α(M)=0.204 *24*; α(N+..)=0.065 *8* α(N)=0.053 *7*; α(O)=0.0111 *12*; α(P)=0.00145 *8*
144.44 *3*	10.0 *18*	208.13	(4,5)$^+$	63.699	(4)$^+$	M1(+E2)	≤0.92	3.7 *6*	α(K)=2.7 *8*; α(L)=0.71 *10*; α(M)=0.17 *3*; α(N+..)=0.056 *9* α(N)=0.045 *8*; α(O)=0.0094 *14*; α(P)=0.00119 *8* E_γ,I_γ: unplaced by the authors. Placed by the evaluator on the basis of data In ^{212}Fr α decay.
[x]160.5 *8*	2.7 *6*					M1(+E2)	≤0.77	2.8 *4*	α(K)=2.1 *5*; α(L)=0.49 *4*; α(M)=0.119 *12*; α(N+..)=0.038 *4* α(N)=0.031 *3*; α(O)=0.0065 *6*; α(P)=0.000839 *22*
[x]163.2 *4*	3.0 *8*					M1(+E2)	≤0.78	2.6 *4*	α(K)=2.0 *5*; α(L)=0.46 *3*; α(M)=0.113 *11*; α(N+..)=0.036 *4* α(N)=0.029 *3*; α(O)=0.0061 *5*; α(P)=0.000797 *16*
169.7[b] *5*	2.7 *7*	904.43		734.21	(2,3)$^+$	[M1]		2.69 *5*	α(K)=2.18 *4*; α(L)=0.389 *7*; α(M)=0.0921 *15*; α(N+..)=0.0297 *5* α(N)=0.0239 *4*; α(O)=0.00511 *9*; α(P)=0.000706 *12* Mult.: α(K)exp=5.9 *+23−17*. α(K)=2.18(M1), 0.100(E1), 9.74(M2). α(K)exp suggests mult=E1+M2, with δ=1.2 *+11−3*; however, if the placement In the level scheme is correct, $\Delta\pi$=No. Also, the deduced δ is very large for an M2 component.
173.50 *6*	16.6 *17*	237.22	(4)$^+$	63.699	(4)$^+$	M1(+E2)	≤0.57	2.32 *21*	α(K)=1.82 *23*; α(L)=0.376 *12*; α(M)=0.091 *5*; α(N+..)=0.0291 *13* α(N)=0.0235 *12*; α(O)=0.00496 *18*; α(P)=0.000660 *10*

^{208}Rn ε decay (continued)

$\gamma(^{208}At)$ (continued)

E_γ[†]	I_γ[†&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	δ[‡]	α[a]	Comments
184.56 5	8.4 13	208.13	$(4,5)^+$	23.530	$(5)^+$	M1(+E2)	≤0.89	1.8 4	α(K)=1.4 4; α(L)=0.315 10; α(M)=0.077 5; α(N+..)=0.0246 13 α(N)=0.0199 12; α(O)=0.00418 16; α(P)=0.000542 17 E_γ,I_γ: unplaced by the authors. Placed by the evaluator on the basis of data In ^{212}Fr α decay.
187.52 5	5.1 8	424.78	$(3)^+$	237.22	$(4)^+$	M1(+E2)	≤0.52	1.88 16	α(K)=1.49 16; α(L)=0.296 6; α(M)=0.0712 21; α(N+..)=0.0229 6 α(N)=0.0184 6; α(O)=0.00391 8; α(P)=0.000524 11
^{x}192.367 21	18.9 19					M1(+E2)	≤0.56	1.73 16	α(K)=1.37 17; α(L)=0.275 5; α(M)=0.0661 18; α(N+..)=0.0212 5 α(N)=0.0171 5; α(O)=0.00362 7; α(P)=0.000485 12
^{x}198.96 15	4.5 4					M1(+E2)	≤0.48	1.61 12	α(K)=1.28 12; α(L)=0.248 4; α(M)=0.0595 12; α(N+..)=0.0191 4 α(N)=0.0154 3; α(O)=0.00327 5; α(P)=0.000441 11
213.61 10	8.8 10	237.22	$(4)^+$	23.530	$(5)^+$	M1+E2	3.2 +20−7	0.48 6	α(K)=0.23 6; α(L)=0.187 3; α(M)=0.0491 7; α(N+..)=0.01551 22 α(N)=0.01270 18; α(O)=0.00254 4; α(P)=0.000276 7
^{x}226.83 8	3.4 5					M1+E2	2.2 +6−4	0.47 6	α(K)=0.27 6; α(L)=0.149 3; α(M)=0.0387 6; α(N+..)=0.01224 19 α(N)=0.01000 15; α(O)=0.00201 4; α(P)=0.000227 8
^{x}244.31 4	18.9 19					M1(+E2)	≤0.24	0.950 24	α(K)=0.768 22; α(L)=0.1387 22; α(M)=0.0329 5; α(N+..)=0.01059 16 α(N)=0.00852 13; α(O)=0.00182 3; α(P)=0.000250 5
^{x}245.8 10	6.4 10					M1(+E2)	≤0.43	0.90 6	α(K)=0.72 6; α(L)=0.135 4; α(M)=0.0321 7; α(N+..)=0.01032 24 α(N)=0.00831 19; α(O)=0.00177 5; α(P)=0.000241 9
251.05 3	100.0 24	424.78	$(3)^+$	173.75	$(2)^+$	M1(+E2)	≤0.43	0.85 6	α(K)=0.68 5; α(L)=0.127 4; α(M)=0.0302 6; α(N+..)=0.00971 21 α(N)=0.00782 16; α(O)=0.00167 4; α(P)=0.000227 8
^{x}259.65 4	10.0 11								
^{x}287.160 22	56.8 23					M1+E2	0.45 +19−21	0.54 6	α(K)=0.43 6; α(L)=0.084 5; α(M)=0.0200 9; α(N+..)=0.0064 3 α(N)=0.00518 22; α(O)=0.00110 6; α(P)=0.000148 10
^{x}295.933 22	13.7 5								
306.77[b] 4	18.3 18	2576.7?		2270.11		M1(+E2)	≤0.81	0.44 8	
^{x}316.46 8	22.1 22					M1(+E2)	≤0.74	0.41 7	α(K)=0.33 6; α(L)=0.063 6; α(M)=0.0151 11; α(N+..)=0.0048 4 α(N)=0.0039 3; α(O)=0.00083 7; α(P)=0.000112 12
^{x}325.293 16	42.5 17					M1(+E2)	≤0.70	0.39 6	α(K)=0.31 5; α(L)=0.059 5; α(M)=0.0140 10; α(N+..)=0.0045 4 α(N)=0.0036 3; α(O)=0.00077 6; α(P)=0.000104 11
^{x}350.026 21	66.6 23					M1(+E2)	≤0.46	0.337 25	α(K)=0.272 22; α(L)=0.0495 23; α(M)=0.0118 5; α(N+..)=0.00379 17 α(N)=0.00305 13; α(O)=0.00065 3; α(P)=8.9×10^{-5} 5

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^{208}Rn ε decay (continued)

γ(^{208}At) (continued)

E_γ[†]	I_γ[†&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	δ[‡]	α[a]	Comments
[x]361.30 *10*	17.5 *12*					M1(+E2)	≤0.46	0.309 *23*	α(K)=0.250 *20*; α(L)=0.0454 *22*; α(M)=0.0108 *5*; α(N+..)=0.00347 *16* α(N)=0.00279 *12*; α(O)=0.00060 *3*; α(P)=8.2×10^{-5} *5*
[x]365.337 *24*	46.1 *21*					M1(+E2)	≤0.33	0.310 *13*	α(K)=0.251 *12*; α(L)=0.0449 *13*; α(M)=0.0106 *3*; α(N+..)=0.00342 *10* α(N)=0.00275 *8*; α(O)=0.000589 *17*; α(P)=8.1×10^{-5} *3*
[x]379.847 *15*	36.9 *12*					M1(+E2)	≤0.38	0.275 *15*	α(K)=0.223 *13*; α(L)=0.0400 *15*; α(M)=0.0095 *4*; α(N+..)=0.00305 *11* α(N)=0.00246 *9*; α(O)=0.000525 *19*; α(P)=7.2×10^{-5} *3*
[x]390.57 *4*	24.9 *20*					M1(+E2)	≤0.43	0.252 *17*	α(K)=0.204 *15*; α(L)=0.0368 *17*; α(M)=0.0087 *4*; α(N+..)=0.00281 *12* α(N)=0.00226 *10*; α(O)=0.000482 *22*; α(P)=6.6×10^{-5} *4*
[x]399.87 *8*	10.1 *12*								
[x]413.96 *6*	18.6 *13*					M1+E2	0.75 *+28−25*	0.17 *3*	α(K)=0.132 *25*; α(L)=0.026 *3*; α(M)=0.0063 *7*; α(N+..)=0.00203 *21* α(N)=0.00164 *17*; α(O)=0.00035 *4*; α(P)=4.6×10^{-5} *6*
[x]421.21 *10*	7.0 *10*					M1(+E2)	≤0.77	0.19 *4*	α(K)=0.15 *3*; α(L)=0.028 *4*; α(M)=0.0067 *8*; α(N+..)=0.00215 *24* α(N)=0.00173 *19*; α(O)=0.00037 *5*; α(P)=5.0×10^{-5} *7*
426.780 *21*	141 *4*	600.55	(2,3)$^+$	173.75	(2)$^+$	M1(+E2)	≤0.31	0.204 *8*	α(K)=0.166 *7*; α(L)=0.0294 *9*; α(M)=0.00696 *19*; α(N+..)=0.00224 *7* α(N)=0.00180 *5*; α(O)=0.000386 *11*; α(P)=5.31×10^{-5} *17*
[x]435.55 *6*	6.5 *11*					M1(+E2)	≤0.53	0.183 *17*	α(K)=0.148 *15*; α(L)=0.0268 *18*; α(M)=0.0064 *4*; α(N+..)=0.00204 *13* α(N)=0.00165 *11*; α(O)=0.000351 *23*; α(P)=4.8×10^{-5} *4*
[x]471.956 *25*	39.4 *20*								Mult.: α(K)exp for the 471 + 473γ′s requires both transitions to Be mainly M1.
[x]473.440 *22*	48.3 *24*								Mult.: see comment on 471.956γ.
479.651 *20*	46.3 *13*	904.43		424.78	(3)$^+$	M1+E2	0.68 *+23−21*	0.118 *17*	α(K)=0.094 *14*; α(L)=0.0179 *18*; α(M)=0.0043 *4*; α(N+..)=0.00138 *13* α(N)=0.00111 *11*; α(O)=0.000236 *23*; α(P)=3.2×10^{-5} *4*
486.79 *3*	31.2 *13*	600.55	(2,3)$^+$	113.788	(3)$^+$	M1+E2	1.14 *+19−15*	0.085 *9*	α(K)=0.066 *8*; α(L)=0.0141 *10*; α(M)=0.00342 *21*; α(N+..)=0.00110 *7* α(N)=0.00089 *6*; α(O)=0.000187 *12*; α(P)=2.45×10^{-5} *19*
[x]531.97 *3*	15.7 *14*					E2		0.0290	α(K)=0.0202 *3*; α(L)=0.00665 *10*; α(M)=0.001672 *24*; α(N+..)=0.000532 *8* α(N)=0.000432 *6*; α(O)=8.88×10^{-5} *13*; α(P)=1.072×10^{-5} *15* Mult.: α(K)exp gives δ>5.9.
[x]537.69 *5*	23.6 *15*					M1(+E2)	≤0.46	0.107 *8*	α(K)=0.087 *7*; α(L)=0.0153 *9*; α(M)=0.00363 *20*; α(N+..)=0.00117 *7* α(N)=0.00094 *6*; α(O)=0.000201 *12*; α(P)=2.77×10^{-5} *17*
560.425 *17*	37.1 *14*	734.21	(2,3)$^+$	173.75	(2)$^+$	M1+E2	≤0.46	0.096 *7*	α(K)=0.078 *6*; α(L)=0.0137 *8*; α(M)=0.00325 *18*;

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^{208}Rn ε decay (continued)

γ(^{208}At) (continued)

E_γ[†]	I_γ[†&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	δ[‡]	α[a]	Comments
									α(N+..)=0.00105 *6* α(N)=0.00084 *5*; α(O)=0.000180 *11*; α(P)=2.48×10^{-5} *16*
[x]580.399 *25*	20.0 *16*					M1(+E2)	≤0.56	0.085 *9*	α(K)=0.069 *8*; α(L)=0.0122 *10*; α(M)=0.00290 *23*; α(N+..)=0.00093 *8* α(N)=0.00075 *6*; α(O)=0.000160 *13*; α(P)=2.20×10^{-5} *19*
620.472 *23*	36.9 *22*	734.21	(2,3)$^+$	113.788	(3)$^+$	M1+E2	≤0.43	0.074 *5*	α(K)=0.060 *4*; α(L)=0.0105 *6*; α(M)=0.00249 *13*; α(N+..)=0.00080 *4* α(N)=0.00064 *4*; α(O)=0.000138 *8*; α(P)=1.90×10^{-5} *11*
[x]643.5 *20*	3.8 *8*					M1		0.0710 *12*	α(K)=0.0579 *10*; α(L)=0.01004 *17*; α(M)=0.00237 *4*; α(N+..)=0.000762 *13* α(N)=0.000613 *10*; α(O)=0.0001313 *22*; α(P)=1.82×10^{-5} *3*
[x]655.08 *9*	13.9 *19*					M1(+E2)	≤0.56	0.062 *6*	α(K)=0.050 *5*; α(L)=0.0089 *8*; α(M)=0.00210 *17*; α(N+..)=0.00067 *6* α(N)=0.00054 *5*; α(O)=0.000116 *10*; α(P)=1.60×10^{-5} *14*
[x]701.69 *9*	9.9 *12*								
[x]713.9 *10*	2.2 *4*								
[x]730.76 *7*	6.6 *10*								
731.7 *10*	3.3 *6*	904.43		173.75	(2)$^+$				
739.62[b] *3*	27.2 *16*	853.41?	(2,3,4)$^+$	113.788	(3)$^+$	M1(+E2)	≤1.4	0.038 *12*	α(K)=0.030 *10*; α(L)=0.0055 *15*; α(M)=0.0013 *4*; α(N+..)=0.00042 *11* α(N)=0.00034 *9*; α(O)=7.2×10^{-5} *19*; α(P)=1.0×10^{-5} *3*
[x]767.17 *12*	15.7 *16*								
[x]778.58 *6*	5.7 *4*								
[x]786.608 *23*	15.7 *16*					E2		0.01244	α(K)=0.00947 *14*; α(L)=0.00225 *4*; α(M)=0.000550 *8*; α(N+..)=0.0001756 *25* α(N)=0.0001421 *20*; α(O)=2.97×10^{-5} *5*; α(P)=3.79×10^{-6} *6* Mult.: α(K)exp gives δ>3.0.
805.24[@b] *3*	32.8 *12*	1539.85		734.21	(2,3)$^+$	[@]		0.012	
[x]820.06 *3*	24.0 *16*					M1(+E2)	≤0.52	0.035 *3*	α(K)=0.0284 *24*; α(L)=0.0049 *4*; α(M)=0.00117 *9*; α(N+..)=0.00038 *3* α(N)=0.000302 *22*; α(O)=6.5×10^{-5} *5*; α(P)=8.9×10^{-6} *7*
[x]826.67 *7*	5.3 *9*					M1+E2	1.3 *+18−6*	0.021 *8*	α(K)=0.017 *7*; α(L)=0.0032 *10*; α(M)=0.00076 *23*; α(N+..)=0.00024 *8* α(N)=0.00020 *6*; α(O)=4.2×10^{-5} *13*; α(P)=5.6×10^{-6} *18*
[x]833.79 *22*	3.6 *7*					M1(+E2)	≤1.7	0.027 *10*	α(K)=0.022 *8*; α(L)=0.0039 *12*; α(M)=0.0009 *3*; α(N+..)=0.00030 *9* α(N)=0.00024 *7*; α(O)=5.1×10^{-5} *16*; α(P)=7.0×10^{-6} *22*
[x]841.53 *3*	19.6 *16*					E2		0.01086	α(K)=0.00835 *12*; α(L)=0.00190 *3*; α(M)=0.000462 *7*; α(N+..)=0.0001478 *21* α(N)=0.0001196 *17*; α(O)=2.50×10^{-5} *4*; α(P)=3.22×10^{-6} *5* Mult.: α(K)exp gives δ>2.6.
[x]852.96 *8*	11.9 *9*					E2		0.01057	α(K)=0.00814 *12*; α(L)=0.00184 *3*; α(M)=0.000447 *7*; α(N+..)=0.0001429 *20*

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^{208}Rn ε decay (continued)

$\gamma(^{208}At)$ (continued)

E_γ[†]	I_γ[†&]	E_i(level)	E_f	J^π_f	Mult.[‡]	δ[‡]	α[a]	Comments
								α(N)=0.0001156 17; α(O)=2.42×10^{-5} 4; α(P)=3.12×10^{-6} 5 Mult.: α(K)exp gives δ>2.0.
[x]865.91 4	10.7 6				E1		0.00367	α(K)=0.00304 5; α(L)=0.000482 7; α(M)=0.0001123 16; α(N+..)=3.59×10^{-5} 5 α(N)=2.89×10^{-5} 4; α(O)=6.15×10^{-6} 9; α(P)=8.36×10^{-7} 12
[x]879.7 2	5.2 7				E2		0.00994	α(K)=0.00769 11; α(L)=0.001703 24; α(M)=0.000414 6; α(N+..)=0.0001323 19 α(N)=0.0001070 15; α(O)=2.24×10^{-5} 4; α(P)=2.90×10^{-6} 4
[x]920.26 4	10.9 6				E2		0.00909	α(K)=0.00707 10; α(L)=0.001529 22; α(M)=0.000371 6; α(N+..)=0.0001185 17 α(N)=9.58×10^{-5} 14; α(O)=2.01×10^{-5} 3; α(P)=2.61×10^{-6} 4
[x]930.0 5	1.66 24							
939.30[@] 3	35.0 8	1539.85	600.55	$(2,3)^+$	[@]			
[x]943.36 19	4.4 6				M1+E2	1.2 +12−5	0.016 5	α(K)=0.013 4; α(L)=0.0024 6; α(M)=0.00056 14; α(N+..)=0.00018 5 α(N)=0.00014 4; α(O)=3.1×10^{-5} 8; α(P)=4.2×10^{-6} 11
[x]951.91 4	54.3 17				E2		0.00851	α(K)=0.00665 10; α(L)=0.001412 20; α(M)=0.000341 5; α(N+..)=0.0001092 16 α(N)=8.83×10^{-5} 13; α(O)=1.85×10^{-5} 3; α(P)=2.42×10^{-6} 4
[x]964.01 6	18.5 8				M1(+E2)	≤0.59	0.0226 22	α(K)=0.0184 18; α(L)=0.0032 3; α(M)=0.00075 7; α(N+..)=0.000242 21 α(N)=0.000195 17; α(O)=4.2×10^{-5} 4; α(P)=5.8×10^{-6} 6
[x]994.41 18	3.7 6							
[x]1011.42 8	6.8 6				E2(+M1)	≥1.5	0.0098 22	α(K)=0.0078 19; α(L)=0.0015 3; α(M)=0.00036 7; α(N+..)=0.000116 22 α(N)=9.3×10^{-5} 17; α(O)=2.0×10^{-5} 4; α(P)=2.6×10^{-6} 6
[x]1051.0 10	1.9 3							
[x]1081.0 4	1.6 4							
[x]1088.21 15	2.6 5							
[x]1120.4 6	2.1 4							
1125.1[b] 20	1.1 2	1979.50?	853.41?	$(2,3,4)^+$				
[x]1129.32 9	1.5 3							
[x]1140.60 9	3.5 4							
[x]1145.34 6	4.8 6							
[x]1156.54 7	6.3 5							
[x]1177.14 4	32.2 18				E1(+M2)	≤0.17	0.0026 5	α(K)=0.0021 4; α(L)=0.00034 7; α(M)=8.1×10^{-5} 17; α(N+..)=3.4×10^{-5} 6 α(N)=2.1×10^{-5} 5; α(O)=4.4×10^{-6} 10; α(P)=6.1×10^{-7} 13; α(IPF)=8.47×10^{-6} 16
[x]1201.24 4	6.1 4							
[x]1206.48 15	2.0 3							
[x]1219.62 7	3.3 4							

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γ(^{208}At) (continued)

E_γ[†]	I_γ[†&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	δ[‡]	α[a]	Comments
1226.08 *4*	40.2 *20*	1826.63		600.55	(2,3)$^+$	E1(+M2)	≤0.18	0.0025 *5*	α(K)=0.0020 *4*; α(L)=0.00032 *7*; α(M)=7.6×10^{-5} *17*; α(N+..)=4.6×10^{-5} *6* α(N)=2.0×10^{-5} *5*; α(O)=4.2×10^{-6} *10*; α(P)=5.7×10^{-7} *13*; α(IPF)=2.19×10^{-5} *5*
[x]1268.8 *15*	1.3 *4*								
[x]1284.95 *6*	8.5 *9*								
[x]1287.17 *12*	5.7 *9*								
[x]1306.04 *4*	5.5 *4*								
[x]1317.81 *9*	4.1 *3*								
[x]1324.21 *6*	6.5 *3*								
[x]1357.46 *5*	4.1 *3*								
1365.69 *7*	11.5 *4*	2270.11		904.43		E2		0.00432	α(K)=0.00346 *5*; α(L)=0.000636 *9*; α(M)=0.0001512 *22*; α(N+..)=7.53×10^{-5} *11* α(N)=3.91×10^{-5} *6*; α(O)=8.29×10^{-6} *12*; α(P)=1.112×10^{-6} *16*; α(IPF)=2.68×10^{-5} *4*
1378.95[b] *5*	14.6 *7*	1979.50?		600.55	(2,3)$^+$	E1(+M2)	≤0.21	0.0022 *5*	α(K)=0.0017 *4*; α(L)=0.00028 *7*; α(M)=6.4×10^{-5} *17*; α(N+..)=0.000109 *4* α(N)=1.7×10^{-5} *5*; α(O)=3.6×10^{-6} *9*; α(P)=4.9×10^{-7} *13*; α(IPF)=8.79×10^{-5} *20*
[x]1424.0 *10*	1.9 *6*								
[x]1429.48 *6*	13.4 *9*								
[x]1431.73 *6*	10.0 *7*								
[x]1465.3 *15*	2.7 *5*								
[x]1507.50 *23*	1.51 *18*								
[x]1560.6 *4*	2.5 *3*								
1669.86[b] *7*	3.1 *4*	2270.11		600.55	(2,3)$^+$				E_γ: the energy fit is poor. Not included In the least-squares adjustment. The adjustment yields Eγ=1669.62 *6*.
[x]1674.46 *15*	2.25 *21*								
[x]1771.6 *7*	2.7 *4*								
1845.30 *6*	14.5 *5*	2270.11		424.78	(3)$^+$				
[x]1850.52 *16*	1.5 *4*								
2151.65[b] *8*	4.0 *4*	2576.7?		424.78	(3)$^+$				

[†] From 1979Va22.

[‡] From relative I(γ) and I(ce) of 1979Va22 for Eγ<500. For Eγ>500 and for the 435.55γ, I(ce(K)) data of 1980PrZX are used. The I(ce(K)) of 1980PrZX are normalized to those of 1979Va22 At the 426.78γ. An average normalization factor for the relative I(γ) and I(ce) of 1979Va22 is obtained from ce(L1) for the 40.2, 50.1 and 60.0 γ′s whose multipolarities are independently obtained As indicated.

[#] From subshell ratio data of 1973AfZW.

[@] The 939γ is placed from the 1539 level. The 805γ is also placed from this level, but tentatively. α(K)exp(939γ)=0.0100 *13*, which for mult=E1+M2 gives δ=0.42 *+5−4*, with α=0.0123 *+19−14*, and for mult=M1+E2 gives δ=1.9 *+7−5* and α=0.0126 *+21−16*. The 805γ has α(K)exp=0.0059 *17* which, compared with α(K)=0.00347 for E1, and 0.00906 for E2, seems to require mult=E1+M2, with δ=0.18 *+6−8* and α=0.0072 *21*. If the placements are correct, the two transitions

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γ(^{208}At) (continued)

must have the same parity change. Note, however, that the two transitions do not give consistent E(level) values. The 939γ gives E(level)=1539.85 *3* whereas the 805γ gives 1539.45 *4*.

[&] For absolute intensity per 100 decays, multiply by 0.052 *10*.

[a] 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.

[b] Placement of transition in the level scheme is uncertain.

[x] γ ray not placed in level scheme.

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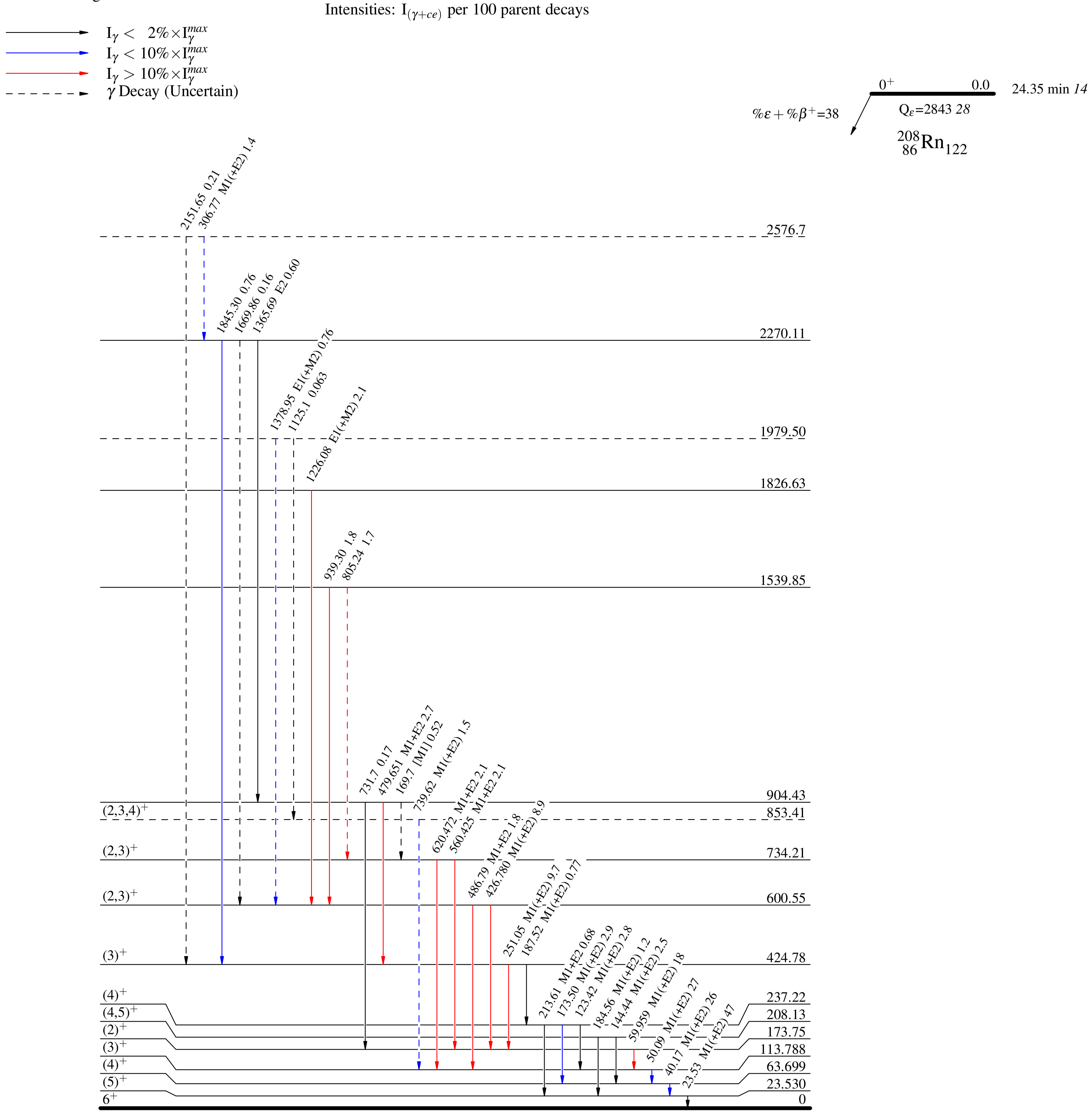
^{208}**Rn ε decay**

Decay Scheme

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

Legend



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