Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Shaofei Zhu and E. A. Mccutchan	NDS 175, 1 (2021)	1-May-2021

Q(β^-)=−3361 *12*; S(n)=6695 *10*; S(p)=5029 *10*; Q(α)=9208 *9* 2021Wa16
S(2n)=11803 *10*; S(2p)=8528 *9* (2021Wa16).
α: Additional information 1.

^{214}Rn Levels

Cross Reference (XREF) Flags

A ^{218}Ra α decay
B (HI,xnγ)

E(level)†	J$^\pi$#	T$_{1/2}$‡	XREF	Comments
0.0	0$^+$@	259 ns *3*	AB	%α=100 T$_{1/2}$: from 2019Pa45; other: 270 ns *20* (1970Va13).
694.7 *10*	2$^+$@	<1.4 ns	AB	J$^\pi$: E2 to 0$^+$.
1141.2 *15*	4$^+$@	<1.4 ns	B	J$^\pi$: E2 to 2$^+$.
1331.7 *15*			B	
1442.7 *18*	6$^+$@	0.69 ns *21*	B	%α>0; %IT<100 J$^\pi$: E2 to 4$^+$. %IT and %α: from (HI,xnγ) data.
1625.1 *20*	8$^+$@	6.5 ns *17*	B	%IT=95.9 *10*; %α=4.1 *10* J$^\pi$: E2 to 6$^+$. %IT and %α: from (HI,xnγ) data.
1800.5 *18*			B	
1928.0 *22*	10$^+$&	0.90 ns *21*	B	J$^\pi$: E2 to 8$^+$.
1944.9 *23*	(10)$^+$		B	J$^\pi$: (Q) to 8$^+$.
2028.2 *23*	(10)$^+$		B	J$^\pi$: (Q) to 8$^+$.
2099.7 *25*			B	
2208.6 *20*			B	
2320.5 *25*			B	
2377.1 *22*	(10$^+$)		B	J$^\pi$: γ to 10$^+$; (Q) to 8$^+$.
2394.7 *23*	11$^-$[a]	<1.4 ns	B	J$^\pi$: E1+M2 to 10$^+$; γ from 12$^+$.
2504.6 *23*			B	
2557.1 *24*	(12)$^+$		B	J$^\pi$: (Q) to 10$^+$.
2648.6 *24*	(11,12)$^-$		B	J$^\pi$: M1 to 11$^-$; γ from 12$^+$.
2668.2 *25*			B	
2676.1 *23*	13$^-$[b]	3.7 ns *3*	B	J$^\pi$: E2 to 11$^-$.
2682.2 *23*			B	
2689.1 *25*			B	
2878.2 *23*	12$^+$@	<1.4 ns	B	J$^\pi$: E2 to 10$^+$.
2917.1 *25*			B	
3148.0 *24*	14$^+$@	<1.4 ns	B	J$^\pi$: γ to 12$^+$; E1+M2 to 13$^-$.
3269 *3*	(14$^+$)&		B	J$^\pi$: γ to 14$^+$; γ from 16$^+$.
3328 *3*	16$^+$@	5.1 ns *3*	B	J$^\pi$: E2 to 14$^+$.
3465 *3*	(16$^+$)		B	J$^\pi$: (Q) to 14$^+$.
3490 *3*	18$^+$&	44 ns *3*	B	J$^\pi$: E2 to 16$^+$.
3540 *3*			B	
3579 *3*	(18$^-$)[a]		B	J$^\pi$: γ to 18$^+$; γ from 19$^-$.
3610.4 *24*	(16$^+$)&		B	J$^\pi$: γ to 14$^+$; γ to 13$^-$.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{214}Rn Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$[‡]	XREF	Comments
3746 *3*	19^{-}[*a*]	2.4 ns *3*	B	Jπ: E1 to 18^{+}.
3753 *3*			B	
3791 *3*			B	
3827 *3*	(20^{-})[*b*]		B	Jπ: (M1+E2) to 19^{-}.
3907 *3*			B	
3941 *3*			B	
4064 *3*	(20)		B	Jπ: (D) to 19^{-}.
4220 *3*			B	
4250 *4*	(21)		B	Jπ: (D) to (20^{-}).
4262 *3*			B	
4517 *4*			B	
4555 *3*			B	
4595 *4*	(22^{+})	260 ns *35*	B	Jπ: (M2) to $(20)^{-}$.
4751 *4*	(23^{+})		B	Jπ: (M1) to (22^{+}).
4859 *4*			B	
4977 *4*	(25^{+})	8.0 ns *3*	B	Jπ: (E2) to (23^{+}).
5051 *4*			B	

[†] From a least squares fit to adopted Eγ's by evaluators.
[‡] Half-lives of all excited states are from (HI,xnγ).
[#] Assigned using γ multipolarity from (HI,xnγ), unless otherwise noted.
[@] Configuration=$(\pi\ h_{9/2})^{+4}(\nu\ g_{9/2})^{+2}$.
[&] Configuration=$(\pi\ h_{9/2})^{+4}(\nu\ g_{9/2})(\nu\ i_{11/2})$.
[*a*] Configuration=$(\pi\ h_{9/2})^{+3}(\pi\ i_{13/2})(\nu\ g_{9/2})^{+2}$.
[*b*] Configuration=$(\pi\ h_{9/2})^{+4}(\nu\ i_{11/2})(\nu\ j_{15/2})$.

Adopted Levels, Gammas (continued)

$\gamma(^{214}Rn)$

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	δ	α	Comments
694.7	2^+	694.7	100	0.0	0^+	E2		0.01688 *24*	α(K)=0.01246 *17*; α(L)=0.00333 *5*; α(M)=0.000825 *12*; α(N)=0.0002148 *30* α(O)=4.57×10^{-5} *6*; α(P)=6.12×10^{-6} *9* B(E2)(W.u.) > 0.032
1141.2	4^+	446.5	100	694.7	2^+	E2		0.0463 *6*	α(K)=0.0297 *4*; α(L)=0.01243 *17*; α(M)=0.00318 *4*; α(N)=0.000829 *12*; α(O)=0.0001732 *24* α(P)=2.190×10^{-5} *31* B(E2)(W.u.) > 0.28
1331.7		637.0	100	694.7	2^+				
1442.7	6^+	301.5	100	1141.2	4^+	E2		0.1360 *19*	α(K)=0.0682 *10*; α(L)=0.0503 *7*; α(M)=0.01322 *19*; α(N)=0.00344 *5*; α(O)=0.000709 *10* α(P)=8.51×10^{-5} *12* B(E2)(W.u.)<4
1625.1	8^+	182.4	100	1442.7	6^+	E2		0.731 *10*	α(K)=0.1981 *28*; α(L)=0.394 *6*; α(M)=0.1054 *15*; α(N)=0.0274 *4*; α(O)=0.00558 *8* α(P)=0.000637 *9* B(E2)(W.u.)=3.1 *9*
1800.5		468.8	100	1331.7					
1928.0	10^+	302.9	100	1625.1	8^+	E2		0.1341 *19*	α(K)=0.0675 *9*; α(L)=0.0495 *7*; α(M)=0.01299 *18*; α(N)=0.00338 *5*; α(O)=0.000696 *10* α(P)=8.36×10^{-5} *12* B(E2)(W.u.)=2.9 *7*
1944.9	$(10)^+$	319.8	100	1625.1	8^+	(Q)			
2028.2	$(10)^+$	403.1	100	1625.1	8^+	(Q)			
2099.7		154.8	100	1944.9	$(10)^+$				
2208.6		765.9	100	1442.7	6^+				
2320.5		292.3	100	2028.2	$(10)^+$				
2377.1	(10^+)	449.2	60 *10*	1928.0	10^+				
		752.0	100 *10*	1625.1	8^+	(Q)			
2394.7	11^-	466.7	100	1928.0	10^+	E1+M2	0.147 *+13−14*	0.0235 *20*	α(K)=0.0186 *15*; α(L)=0.00369 *35*; α(M)=0.00089 *9*; α(N)=0.000232 *23*; α(O)=5.0×10^{-5} *5* α(P)=7.2×10^{-6} *7* B(E1)(W.u.) > 1.1×10^{-6}; B(M2)(W.u.) > 0.40
2504.6		296.0	100	2208.6					
2557.1	$(12)^+$	629.1	100	1928.0	10^+	(Q)			
2648.6	$(11,12)^-$	254.0	100	2394.7	11^-	M1		0.945 *13*	α(K)=0.765 *11*; α(L)=0.1373 *19*; α(M)=0.0326 *5*; α(N)=0.00849 *12*; α(O)=0.001858 *26* α(P)=0.000271 *4*
2668.2		723.3	100	1944.9	$(10)^+$				
2676.1	13^-	281.5	100.0 *14*	2394.7	11^-	E2		0.1676 *23*	α(K)=0.0791 *11*; α(L)=0.0656 *9*; α(M)=0.01730 *24*; α(N)=0.00450 *6*; α(O)=0.000925 *13* α(P)=0.0001102 *15* B(E2)(W.u.)=0.93 *8*

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$^{214}_{86}Rn_{128}$-3

Adopted Levels, Gammas (continued)

γ(^{214}Rn) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	δ	α	Comments
2676.1	13^-	748.2	5.2 *6*	1928.0	10^+	(E3)		0.0391 *5*	α(K)=0.02498 *35*; α(L)=0.01049 *15*; α(M)=0.00270 *4*; α(N)=0.000707 *10* α(O)=0.0001490 *21*; α(P)=1.942×10^{-5} *27* B(E3)(W.u.)=39 *6*
2682.2		305.1	75 *17*	2377.1	(10^+)				
		754.2	100 *17*	1928.0	10^+				
2689.1		744.2	100	1944.9	$(10)^+$				
2878.2	12^+	202.2	3.3 *3*	2676.1	13^-	[E1]		0.0838 *12*	α(K)=0.0673 *9*; α(L)=0.01261 *18*; α(M)=0.00300 *4*; α(N)=0.000773 *11*; α(O)=0.0001642 *23* α(P)=2.212×10^{-5} *31* B(E1)(W.u.) > 5.0×10^{-7}
		229.6	1.8 *4*	2648.6	$(11,12)^-$	[E1]		0.0619 *9*	α(K)=0.0498 *7*; α(L)=0.00917 *13*; α(M)=0.002177 *30*; α(N)=0.000562 *8* α(O)=0.0001197 *17*; α(P)=1.626×10^{-5} *23* B(E1)(W.u.) > 1.8×10^{-7}
		483.4	0.78 *21*	2394.7	11^-	[E1]		0.01180 *17*	α(K)=0.00966 *14*; α(L)=0.001629 *23*; α(M)=0.000383 *5*; α(N)=9.93×10^{-5} *14* α(O)=2.143×10^{-5} *30*; α(P)=3.02×10^{-6} *4* B(E1)(W.u.) > 8.6×10^{-9}
		950.1	100 *4*	1928.0	10^+	E2		0.00897 *13*	α(K)=0.00697 *10*; α(L)=0.001516 *21*; α(M)=0.000368 *5*; α(N)=9.58×10^{-5} *13* α(O)=2.059×10^{-5} *29*; α(P)=2.85×10^{-6} *4* B(E2)(W.u.) > 0.0064
2917.1		522.4	100	2394.7	11^-				
3148.0	14^+	269.9	29.3 *12*	2878.2	12^+	[E2]		0.1911 *27*	α(K)=0.0867 *12*; α(L)=0.0774 *11*; α(M)=0.02044 *29*; α(N)=0.00532 *7*; α(O)=0.001092 *15* α(P)=0.0001294 *18* B(E2)(W.u.) > 0.78
		471.9	100.0 *18*	2676.1	13^-	E1+M2	0.13 *+2−3*	0.0206 *33*	α(K)=0.0164 *25*; α(L)=0.0032 *6*; α(M)=0.00076 *15*; α(N)=0.00020 *4*; α(O)=4.3×10^{-5} *8* α(P)=6.1×10^{-6} *12* B(E1)(W.u.) > 9.1×10^{-7}; B(M2)(W.u.) > 0.22
3269	(14^+)	120.6	100	3148.0	14^+				
3328	16^+	59[‡]		3269	(14^+)				
		179.8	100.0 *18*	3148.0	14^+	E2		0.771 *11*	α(K)=0.2037 *29*; α(L)=0.419 *6*; α(M)=0.1122 *16*; α(N)=0.0292 *4*; α(O)=0.00594 *8* α(P)=0.000678 *9* B(E2)(W.u.)<4.7 The limit given for B(E2)(W.u.) is due to unknown branching of 59γ.
3465	(16^+)	317.3	100	3148.0	14^+	(Q)			
3490	18^+	162.2	100	3328	16^+	E2		1.137 *16*	α(K)=0.2467 *35*; α(L)=0.658 *9*; α(M)=0.1765 *25*; α(N)=0.0460 *6*;

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$^{214}_{86}Rn_{128}$-4

Adopted Levels, Gammas (continued)

γ(^{214}Rn) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α	Comments
								α(O)=0.00932 *13* α(P)=0.001057 *15* B(E2)(W.u.)=0.70 *6*
3540		212.2	100	3328	16^+			
3579	(18^-)	88.6	100	3490	18^+			
3610.4	(16^+)	462.4	100 *18*	3148.0	14^+			
		934.3	27 *9*	2676.1	13^-			
3746	19^-	167.1	6.8 *7*	3579	(18^-)	[M1+E2]	2.0 *10*	α(K)=1.3 *11*; α(L)=0.51 *7*; α(M)=0.130 *24*; α(N)=0.034 *6*; α(O)=0.0071 *11*; α(P)=0.000905 *27*
		255.8	100.0 *21*	3490	18^+	E1	0.0480 *7*	α(K)=0.0388 *5*; α(L)=0.00703 *10*; α(M)=0.001667 *23*; α(N)=0.000431 *6*; α(O)=9.20×10^{-5} *13* α(P)=1.257×10^{-5} *18* B(E1)(W.u.)=3.8×10^{-6} *6*
3753		425.4	100	3328	16^+			
3791		45.3	100	3746	19^-			
3827	(20^-)	81.7	100	3746	19^-	(M1+E2)	13 *8*	α(L)=9 *6*; α(M)=2.5 *17*; α(N)=0.6 *4*; α(O)=0.13 *9*; α(P)=0.015 *9*
3907		417.1	100	3490	18^+			
3941		475.5	100	3465	(16^+)			
4064	(20)	318.3	100	3746	19^-	(D)		
4220		474.6	100	3746	19^-			
4250	(21)	422.6	100	3827	(20^-)	(D)		
4262		355.0	100	3907				
4517		726.3	100	3791		(D)		
4555		808.9	100	3746	19^-			
4595	(22^+)	767.7	100	3827	(20^-)	(M2)	0.1209 *17*	α(K)=0.0950 *13*; α(L)=0.01960 *27*; α(M)=0.00475 *7*; α(N)=0.001242 *17*; α(O)=0.000271 *4* α(P)=3.93×10^{-5} *6* B(M2)(W.u.)=0.0112 *15*
4751	(23^+)	155.4	100	4595	(22^+)	(M1)	3.75 *5*	α(K)=3.03 *4*; α(L)=0.548 *8*; α(M)=0.1302 *18*; α(N)=0.0339 *5*; α(O)=0.00743 *10* α(P)=0.001084 *15*
4859		341.3	100	4517				
4977	(25^+)	226.8	100	4751	(23^+)	(E2)	0.338 *5*	α(K)=0.1263 *18*; α(L)=0.1565 *22*; α(M)=0.0416 *6*; α(N)=0.01084 *15*; α(O)=0.002213 *31* α(P)=0.000258 *4* B(E2)(W.u.)=1.16 *5*
5051		300.2	100	4751	(23^+)			

[†] From (HI,xnγ).
[‡] Placement of transition in the level scheme is uncertain.

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$^{214}_{86}Rn_{128}$-5

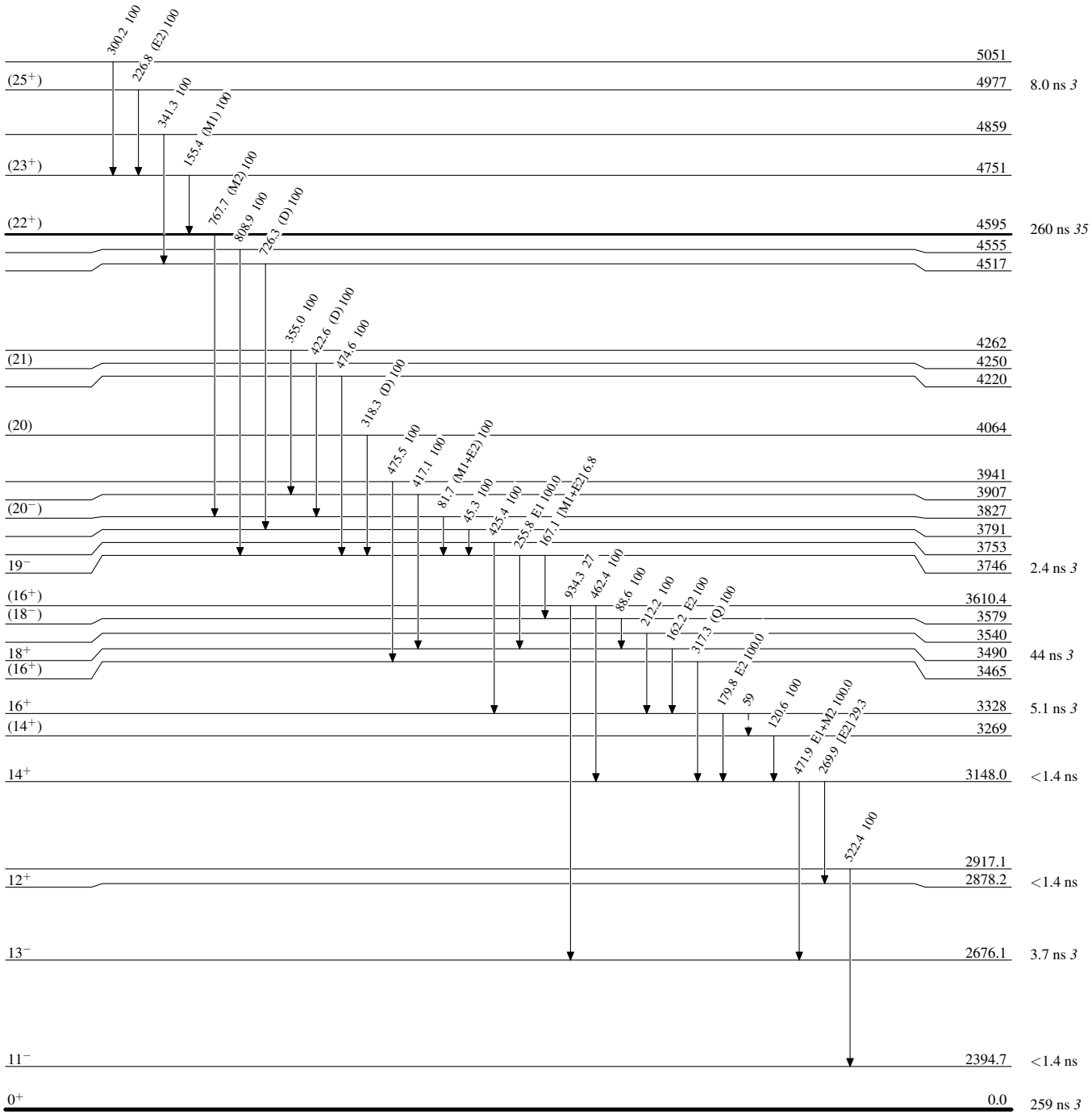
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)

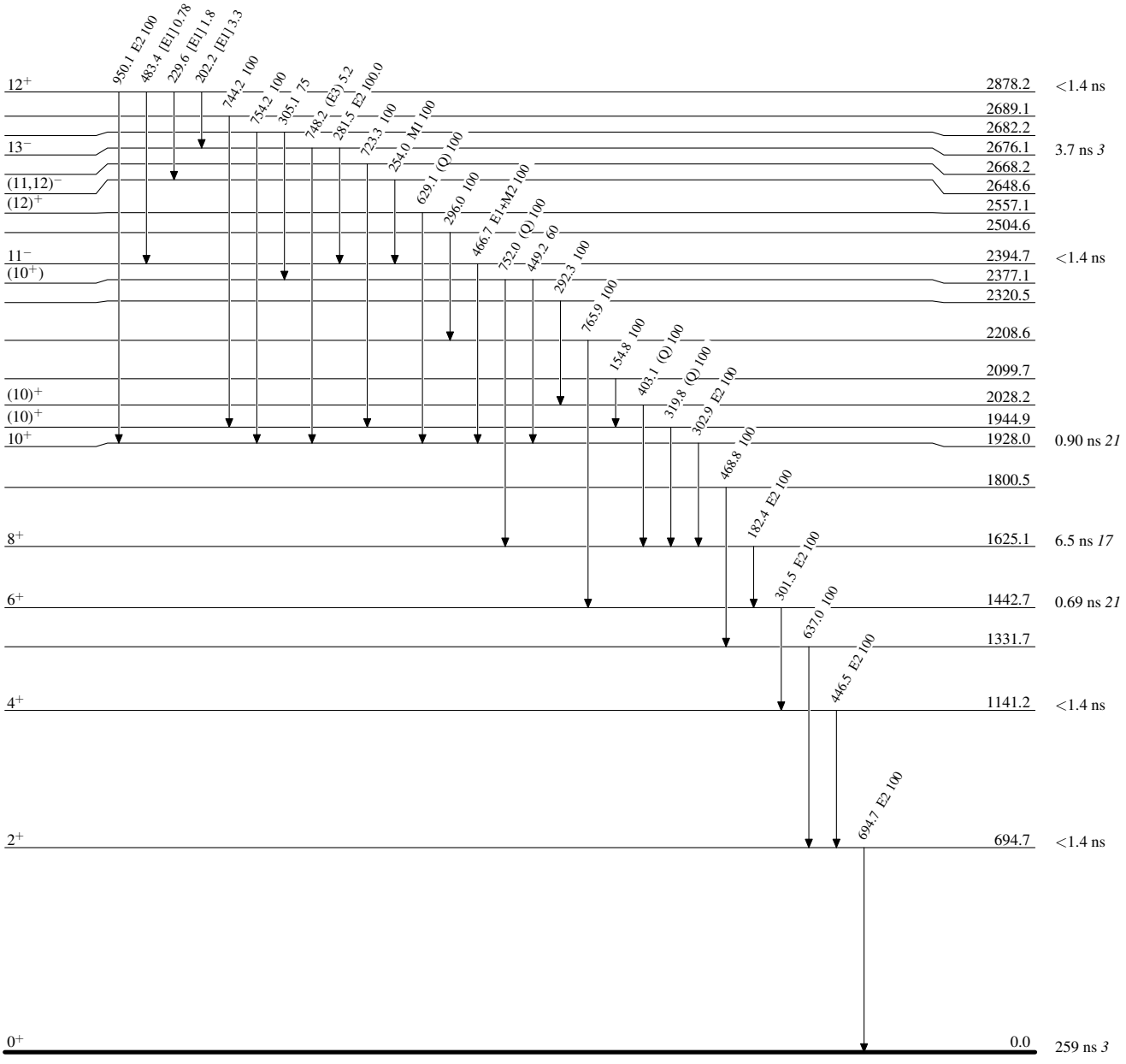


$^{214}_{86}Rn_{128}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



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