Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 146, 1 (2017)	30-Sep-2017

Q(β^-)=2915 *10*; S(n)=5660 *3*; S(p)=10905 *9*; Q(α)=137 *4* 2017Wa10
S(2n)=9686 *3*, S(2p)=20125 *4*, Q(2β^+)=8289 *3* (2017Wa10).
First identification of ^{138}Xe nuclide by 1943Se02 (see 2013Ka01).
Other reactions:
2005Ga25: 2000Ga60: ^{232}Th,^{238}U(γ,F) E=25 MeV, measured yields.
2000JoZZ,2000YoZS: ^{235}U,^{238}U(n,F), measured yields.
1998Ph04: ^{238}U(n,F) E=1.5-3.5 MeV, measured σ.

^{138}Xe Levels

Cross Reference (XREF) Flags

A	^{138}I β^- decay	D	^{252}Cf SF decay
B	^{139}I β^-n decay	E	^{235}U(n,Fγ),^{238}U(n,Fγ)
C	^{248}Cm SF decay	F	Coulomb excitation

E(level)†	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0‡	0$^+$	14.14 min *7*	ABCDEF	%β^-=100 T$_{1/2}$: weighted average of 14.18 min *10* (2012Wa21), 14.08 min *8* (1972Mo33), 14.17 min *7* (1969Ca03), 14.0 min *2* (1964Cl01), 14.1 min *8* (1966Ar08), 14.5 min *5* (1965Pa14). Other: 1968To20. Additional information 1. Evaluated nuclear charge radius <r^2>$^{1/2}$=4.828 fm *8* (2013An02).
588.826‡ *18*	2$^+$	10.5 ps *+38−22*	ABCDEF	J$^\pi$: 588.825γ E2 to 0$^+$ g.s. T$_{1/2}$: from preliminary B(E2)↑=0.38 *10* (2007Kr19) in Coulomb excitation. Other: 15 ps *11* from $\gamma\gamma$(t) in (n,fγ).
1072.53‡ *3*	(4$^+$)		ABCDE	J$^\pi$: 484.700γ (E2) to 2$^+$, band structure.
1463.99 *7*	(2$^+$)		ABC E	J$^\pi$: 875.25γ (M1+E2) to 2$^+$, 1463.98γ to 0$^+$, systematics of N=84 nuclei.
1554.6‡ *4*	(6$^+$)		CDE	J$^\pi$: 482.1γ (E2) to (4$^+$), band structure.
1866.21 *8*	(1,2$^+$)		A	J$^\pi$: 1277.45γ to 2$^+$, 1866.20γ to 0$^+$.
1903.17 *6*	(2$^+$,3,4$^+$)		A C E	J$^\pi$: 439.04γ to (2$^+$), 830.69γ to (4$^+$), 1314.30γ to 2$^+$. (4$^+$) is proposed by 2000Ko15 in ^{248}Cm SF decay.
2015.48 *8*	(3$^-$)		A	J$^\pi$: 942.89γ to (4$^+$), 1426.76γ to 2$^+$; systematics of N=84 nuclei suggest a J^π value of 3$^-$ (1979Ho21) in ^{138}I β^- decay.
2114.67 *12*	(1,2$^+$)		A	J$^\pi$: 650.88γ to (2$^+$), 1525.83γ to 2$^+$, 2114.7γ to 0$^+$.
2115.5 *5*			C	
2117.22 *15*			A	
2212.54 *13*			A	
2262.14 *7*	(1,2$^+$)		A	J$^\pi$: 1673.28γ to 2$^+$, 2262.20γ to 0$^+$.
2284.2‡ *6*	(8$^+$)		CDE	J$^\pi$: 729.6γ (E2) to (6$^+$), band structure.
2293.2 *4*	(4$^+$,5,6$^+$)		C E	J$^\pi$: 738.6γ to (6$^+$), 1220.7γ to (4$^+$). (6$^+$) is proposed by 2000Ko15 in ^{248}Cm SF decay.
2331.92 *13*	(2$^+$,3,4$^+$)		A	J$^\pi$: 1259.1γ to (4$^+$), 1743.1γ to 2$^+$.
2334.07 *12*	(1$^-$,2,3)		A	J$^\pi$: 318.6γ to (3$^-$), 1745.0γ to 2$^+$.
2391.0 *7*			C E	
2398.15 *11*	(1,2$^+$)		A	J$^\pi$: 1809.28γ to 2$^+$, 2398.16γ to 0$^+$.
2543.71 *11*	(1,2$^+$)		A	J$^\pi$: 1954.8γ to 2$^+$, 2543.73γ to 0$^+$.
2572.42 *11*	(1,2$^+$)		A	J$^\pi$: 1108.29γ to (2$^+$), 2572.38γ to 0$^+$.
2644.8 *3*	(1,2$^+$)		A	J$^\pi$: 2644.9γ to 0$^+$.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{138}Xe Levels (continued)

E(level)[†]	J^π	XREF	Comments
2655.1 *6*	$(6^+,7,8^+)$	C E	J^π: 370.9γ to (8^+), 1100.5γ to (6^+). (8^+) is proposed by 2000Ko15 in ^{248}Cm SF decay.
2674.26 *10*	$(1,2^+)$	A	J^π: 2085.43γ to 2^+, 2674.0γ to 0^+.
2710.1 *7*		C	
2794.37 *17*	$(1,2^+)$	A	J^π: 1331.2γ to (2^+), 2794.3γ to 0^+.
2835.63 *15*	(1,2)	A	J^π: 1371.57γ to (2^+), 2835.64γ to 0^+.
2890.61 *20*	$(1,2^+)$	A	J^π: 2890.7γ to 0^+.
2952.63 *15*		A	
2964.39 *12*	$(1,2^+)$	A	J^π: 2376.0γ to 2^+, 2964.4γ to 0^+.
2972.2[‡] *7*	(10^+)	CDE	J^π: 687.9γ (E2) to (8^+), band structure.
3224.7 *7*		C	
3276.5 *8*		C	
3354.7 *7*		C	
3412.7 *8*		C	
3474.79 *21*	(2^+)	A	J^π: 2402.24γ to (4^+), 3474.3γ to 0^+.
3496.59 *12*	$(1,2^+)$	A	J^π: 3496.3γ to 0^+.
3516.51? *15*	$(1,2^+)$	A	J^π: 3516.3γ to 0^+.
3571.3[‡] *8*	(12^+)	CDE	J^π: 599.0γ (E2) to (10^+), band structure.
3839.7 *8*		C	
3876.7 *9*		C	
3898.7 *7*		C	
3899.05 *11*	$(1,2^+)$	A	J^π: 3310.28γ to 2^+, 3898.4γ to 0^+.
3961.86 *11*	$(1^-,2,3)$	A	J^π: 1946.26γ to (3^-); direct feeding from (2^-) parent in ^{138}I β^- decay.
4084.6 *8*		C	
4167.56 *14*	(1,2,3)	A	J^π: direct feeding from (2^-) parent in ^{138}I β^- decay.
4182.01 *12*	$(1,2^+)$	A	J^π: 3593.0γ to 2^+, 4182.0γ to 0^+.
4318.96 *20*	$(1,2^+)$	A	J^π: 4318.9γ to 0^+.
4357.4 *8*		C	
4419.1[‡] *9*	(14^+)	C	J^π: 847.8γ to (12^+), band structure.
4490.3? *3*	(1,2,3)	A	J^π: direct feeding from (2^-) parent in ^{138}I β^- decay.
4511.8 *8*		C	
4526.3 *9*		C	
4689.9 *9*		C	
4965.0 *10*		C	
4989.7 *10*		C	
5042.0? *4*	(1,2,3)	A	J^π: direct feeding from (2^-) parent in ^{138}I β^- decay.
5142.0? *3*	(1,2,3)	A	J^π: direct feeding from (2^-) parent in ^{138}I β^- decay.
5341.66? *21*	$(1,2^+)$	A	J^π: 4752.7γ to 2^+, 5341.6γ to 0^+.
5520.0 *10*		C	
5814.0 *11*		C	

[†] From a least-squares fit to γ-ray energies, assuming $\Delta E\gamma$=0.5 keV if not given.
[‡] Band(A): Yrast band.

Adopted Levels, Gammas (continued)

γ(^{138}Xe)

E_i(level)	J_i^π	E_γ[‡]	I_γ[‡]	E_f	J_f^π	Mult.[@]	δ	α[†]	Comments
588.826	2^+	588.825 *18*	100	0.0	0^+	E2		0.00577	α(K)=0.00491 *7*; α(L)=0.000686 *10*; α(M)=0.0001398 *20* α(N)=2.87×10^{-5} *4*; α(O)=3.48×10^{-6} *5* B(E2)(W.u.)=18 *5* Mult.: from Coulomb excitation and γ(θ) in ^{248}Cm SF decay.
1072.53	(4^+)	483.700 *24*	100	588.826	2^+	(E2)		0.00985	α(K)=0.00833 *12*; α(L)=0.001218 *17*; α(M)=0.000249 *4* α(N)=5.10×10^{-5} *8*; α(O)=6.10×10^{-6} *9*
1463.99	(2^+)	875.25 *13*	100.0 *24*	588.826	2^+	(M1+E2)	−5.2 *+16−39*	0.00221 *4*	α(K)=0.00190 *4*; α(L)=0.000247 *5*; α(M)=5.01×10^{-5} *9* α(N)=1.033×10^{-5} *18*; α(O)=1.276×10^{-6} *23* Mult.,δ: D+Q from γγ(θ) (1992Co26) in ^{138}I β^- decay; positive parity for the 1464 level based on systematics of N=84 nuclei; mult=E1+M2 with such a large δ is highly unlikely.
		1463.98 *21*	7.5 *10*	0.0	0^+				
1554.6	(6^+)	482.1[#]	100	1072.53	(4^+)	(E2)		0.00995	α(K)=0.00841 *12*; α(L)=0.001231 *18*; α(M)=0.000252 *4* α(N)=5.15×10^{-5} *8*; α(O)=6.16×10^{-6} *9*
1866.21	$(1,2^+)$	1277.45 *11*	100 *3*	588.826	2^+				
		1866.20 *17*	15.3 *14*	0.0	0^+				
1903.17	$(2^+,3,4^+)$	439.04 *23*	11.5 *18*	1463.99	(2^+)				
		830.69 *8*	100 *3*	1072.53	(4^+)				
		1314.30 *10*	59 *4*	588.826	2^+				
2015.48	(3^-)	942.89 *8*	61 *3*	1072.53	(4^+)				
		1426.76 *21*	100 *4*	588.826	2^+				
2114.67	$(1,2^+)$	650.88[a] *22*	26 *3*	1463.99	(2^+)				
		1525.83 *13*	100 *5*	588.826	2^+				
		2114.7 *3*	21 *3*	0.0	0^+				
2115.5		1043.0[#]	100	1072.53	(4^+)				
2117.22		1528.38 *15*	100	588.826	2^+				
2212.54		1623.69 *13*	100	588.826	2^+				
2262.14	$(1,2^+)$	1673.28 *9*	31.5 *12*	588.826	2^+				
		2262.20 *11*	100 *3*	0.0	0^+				
2284.2	(8^+)	729.6	100	1554.6	(6^+)	(E2)		0.00335	α(K)=0.00287 *4*; α(L)=0.000385 *6*; α(M)=7.82×10^{-5} *11* α(N)=1.609×10^{-5} *23*; α(O)=1.97×10^{-6} *3*
2293.2	$(4^+,5,6^+)$	738.6[#]		1554.6	(6^+)				
		1220.7[#]		1072.53	(4^+)				
2331.92	$(2^+,3,4^+)$	1259.1 *3*	100 *18*	1072.53	(4^+)				
		1743.1 *3*	85 *9*	588.826	2^+				
2334.07	$(1^-,2,3)$	318.6 *4*	3.3 *12*	2015.48	(3^-)				

$^{138}_{54}Xe_{84}$-3

Adopted Levels, Gammas (continued)

γ(^{138}Xe) (continued)

E_i(level)	J_i^π	E_γ ‡	I_γ ‡	E_f	J_f^π
2334.07	(1⁻,2,3)	430.83 *21*	18.2 *21*	1903.17	(2⁺,3,4⁺)
		467.8 *3*	3.7 *9*	1866.21	(1,2⁺)
		870.05 *20*	100 *5*	1463.99	(2⁺)
		1745.0 *4*	37 *7*	588.826	2⁺
2391.0		836.4#	100	1554.6	(6⁺)
2398.15	(1,2⁺)	1809.28 *14*	100 *3*	588.826	2⁺
		2398.16 *15*	38 *4*	0.0	0⁺
2543.71	(1,2⁺)	212.4 *4*	76 *42*	2331.92	(2⁺,3,4⁺)
		640.0 *3*	9 *3*	1903.17	(2⁺,3,4⁺)
		1079.8 *3*	17 *4*	1463.99	(2⁺)
		1954.8 *3*	100 *8*	588.826	2⁺
		2543.73 *14*	98 *3*	0.0	0⁺
2572.42	(1,2⁺)	1108.29 *18*	33.5 *23*	1463.99	(2⁺)
		2572.38 *14*	100 *3*	0.0	0⁺
2644.8	(1,2⁺)	310.6 *3*	61 *19*	2334.07	(1⁻,2,3)
		2644.9 *4*	100 *13*	0.0	0⁺
2655.1	(6⁺,7,8⁺)	370.9#		2284.2	(8⁺)
		1100.5#		1554.6	(6⁺)
2674.26	(1,2⁺)	771.0 *4*	10 *3*	1903.17	(2⁺,3,4⁺)
		1210.2 *3*	22 *4*	1463.99	(2⁺)
		2085.43 *12*	100 *4*	588.826	2⁺
		2674.0 *3*	15.3 *22*	0.0	0⁺
2710.1		1155.5#	100	1554.6	(6⁺)
2794.37	(1,2⁺)	460.0 *3*	30 *10*	2334.07	(1⁻,2,3)
		778.90 *22*	100 *10*	2015.48	(3⁻)
		1331.2 *5*	28 *10*	1463.99	(2⁺)
		2794.3 *4*	62 *8*	0.0	0⁺
2835.63	(1,2)	1371.57 *23*	25.9 *23*	1463.99	(2⁺)
		2835.64 *19*	100 *4*	0.0	0⁺
2890.61	(1,2⁺)	678.0 *3*	56 *16*	2212.54	
		987.4 *3*	100 *20*	1903.17	(2⁺,3,4⁺)
		2890.7 *6*	48 *12*	0.0	0⁺
2952.63		621.1 *4*	21 *8*	2331.92	(2⁺,3,4⁺)
		837.80[a] *25*	56 *8*	2114.67	(1,2⁺)
		2363.74 *16*	100 *6*	588.826	2⁺
2964.39	(1,2⁺)	391.6 *4*	7 *3*	2572.42	(1,2⁺)
		849.79[a] *24*	15 *3*	2114.67	(1,2⁺)
		1061.2 *4*	12 *3*	1903.17	(2⁺,3,4⁺)
		1500.42 *11*	100 *4*	1463.99	(2⁺)
		2376.0[a] *2*	18.3 *25*	588.826	2⁺
		2964.4 *3*	17.1 *18*	0.0	0⁺

$^{138}_{54}Xe_{84}$-4

Adopted Levels, Gammas (continued)

γ(^{138}Xe) (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[‡]	E_f	J_f^π	Mult.[@]	α[†]	Comments
2972.2	(10$^+$)	687.9[#]	100	2284.2	(8$^+$)	(E2)	0.00387	α(K)=0.00331 *5*; α(L)=0.000449 *7*; α(M)=9.13×10^{-5} *13* α(N)=1.88×10^{-5} *3*; α(O)=2.29×10^{-6} *4*
3224.7		940.5[#]	100	2284.2	(8$^+$)			
3276.5		992.3[#]	100	2284.2	(8$^+$)			
3354.7		382.6[#a]		2972.2	(10$^+$)			
		699.5[#]		2655.1	(6$^+$,7,8$^+$)			
		1070.5[#]		2284.2	(8$^+$)			
3412.7		1128.5[#]	100	2284.2	(8$^+$)			
3474.79	(2$^+$)	2402.24 *22*	100 *5*	1072.53	(4$^+$)			
		3474.3 *7*	26 *5*	0.0	0$^+$			
3496.59	(1,2$^+$)	1379.3 *5*	11 *4*	2117.22				
		2032.79[&] *15*	≤117[&]	1463.99	(2$^+$)			
		3496.3 *2*	100 *6*	0.0	0$^+$			
3516.51?	(1,2$^+$)	2927.82 *20*	75 *4*	588.826	2$^+$			
		3516.3 *2*	100 *11*	0.0	0$^+$			
3571.3	(12$^+$)	599.0[#]	100	2972.2	(10$^+$)	(E2)	0.00551	α(K)=0.00469 *7*; α(L)=0.000653 *10*; α(M)=0.0001332 *19* α(N)=2.73×10^{-5} *4*; α(O)=3.32×10^{-6} *5*
3839.7		615.0[#]		3224.7				
		867.5[#]		2972.2	(10$^+$)			
3876.7		904.5[#]	100	2972.2	(10$^+$)			
3898.7		327.4[#]		3571.3	(12$^+$)			
		544.0[#]		3354.7				
		926.5[#]		2972.2	(10$^+$)			
3899.05	(1,2$^+$)	1326.3 *3*	10 *3*	2572.42	(1,2$^+$)			
		1355.80[a] *11*	33 *4*	2543.71	(1,2$^+$)			
		1567.20[a] *25*	27 *4*	2331.92	(2$^+$,3,4$^+$)			
		2032.79[&] *15*	≤79[&]	1866.21	(1,2$^+$)			
		2826.1 *6*	6.7 *16*	1072.53	(4$^+$)			
		3310.28 *15*	100 *4*	588.826	2$^+$			
		3898.4 *6*	4.1 *10*	0.0	0$^+$			
3961.86	(1$^-$,2,3)	1629.7 *3*	22 *4*	2331.92	(2$^+$,3,4$^+$)			
		1946.26 *13*	56.3 *24*	2015.48	(3$^-$)			
		2058.84 *14*	100 *12*	1903.17	(2$^+$,3,4$^+$)			
4084.6		1112.5[#]	100	2972.2	(10$^+$)			
4167.56	(1,2,3)	1594.7 *5*	8 *3*	2572.42	(1,2$^+$)			
		1835.44 *17*	22 *4*	2331.92	(2$^+$,3,4$^+$)			
		2301.57 *16*	100 *5*	1866.21	(1,2$^+$)			
4182.01	(1,2$^+$)	1609.3 *5*	13 *5*	2572.42	(1,2$^+$)			
		1919.94 *18*	22.3 *18*	2262.14	(1,2$^+$)			

$^{138}_{54}Xe_{84}$-5

Adopted Levels, Gammas (continued)

$\gamma(^{138}Xe)$ (continued)

E_i(level)	J_i^π	E_γ ‡	I_γ ‡	E_f	J_f^π
4182.01	(1,2$^+$)	3593.0 *2*	39.3 *18*	588.826	2$^+$
		4182.0 *2*	100 *6*	0.0	0$^+$
4318.96	(1,2$^+$)	2452.5 *9*	11 *6*	1866.21	(1,2$^+$)
		4318.9 *2*	100 *7*	0.0	0$^+$
4357.4		272.9#		4084.6	
		458.9#		3898.7	
		786#		3571.3	(12$^+$)
4419.1	(14$^+$)	847.8	100	3571.3	(12$^+$)
4490.3?	(1,2,3)	994.0 *3*	100 *17*	3496.59	(1,2$^+$)
		1815.6 *4*	97 *21*	2674.26	(1,2$^+$)
		3026.1&*a* *6*	≤90&	1463.99	(2$^+$)
4511.8		613.1#		3898.7	
		940.6#		3571.3	(12$^+$)
4526.3		955.0#	100	3571.3	(12$^+$)
4689.9		1118.6#	100	3571.3	(12$^+$)
4965.0		545.9#	100	4419.1	(14$^+$)
4989.7		570.6#	100	4419.1	(14$^+$)
5042.0?	(1,2,3)	1545.6 *5*	100 *27*	3496.59	(1,2$^+$)
		2151.3 *4*	95 *21*	2890.61	(1,2$^+$)
		3026.1&*a* *5*	≤143&	2015.48	(3$^-$)
5142.0?	(1,2,3)	974.5 *3*	100 *25*	4167.56	(1,2,3)
		1666.7 *7*	69 *32*	3474.79	(2$^+$)
		3026.1&*a* *5*	≤162&	2114.67	(1,2$^+$)
5341.66?	(1,2$^+$)	1845.0 *3*	100 *14*	3496.59	(1,2$^+$)
		2389.2 *5*	74 *14*	2952.63	
		4752.7 *4*	43 *3*	588.826	2$^+$
		5341.6 *5*	63 *9*	0.0	0$^+$
5520.0		530.3#		4989.7	
		555.0#		4965.0	
5814.0		824.3#	100	4989.7	

† Additional information 2.
‡ From ^{138}I β^- decay, unless otherwise noted.
# From ^{248}Cm SF decay.
@ From $\gamma(\theta)$ in ^{248}Cm SF decay, unless otherwise noted. Brackets are added if no strong experimental evidence is available.
& Multiply placed with undivided intensity.
a Placement of transition in the level scheme is uncertain.

$^{138}_{54}Xe_{84}$-6

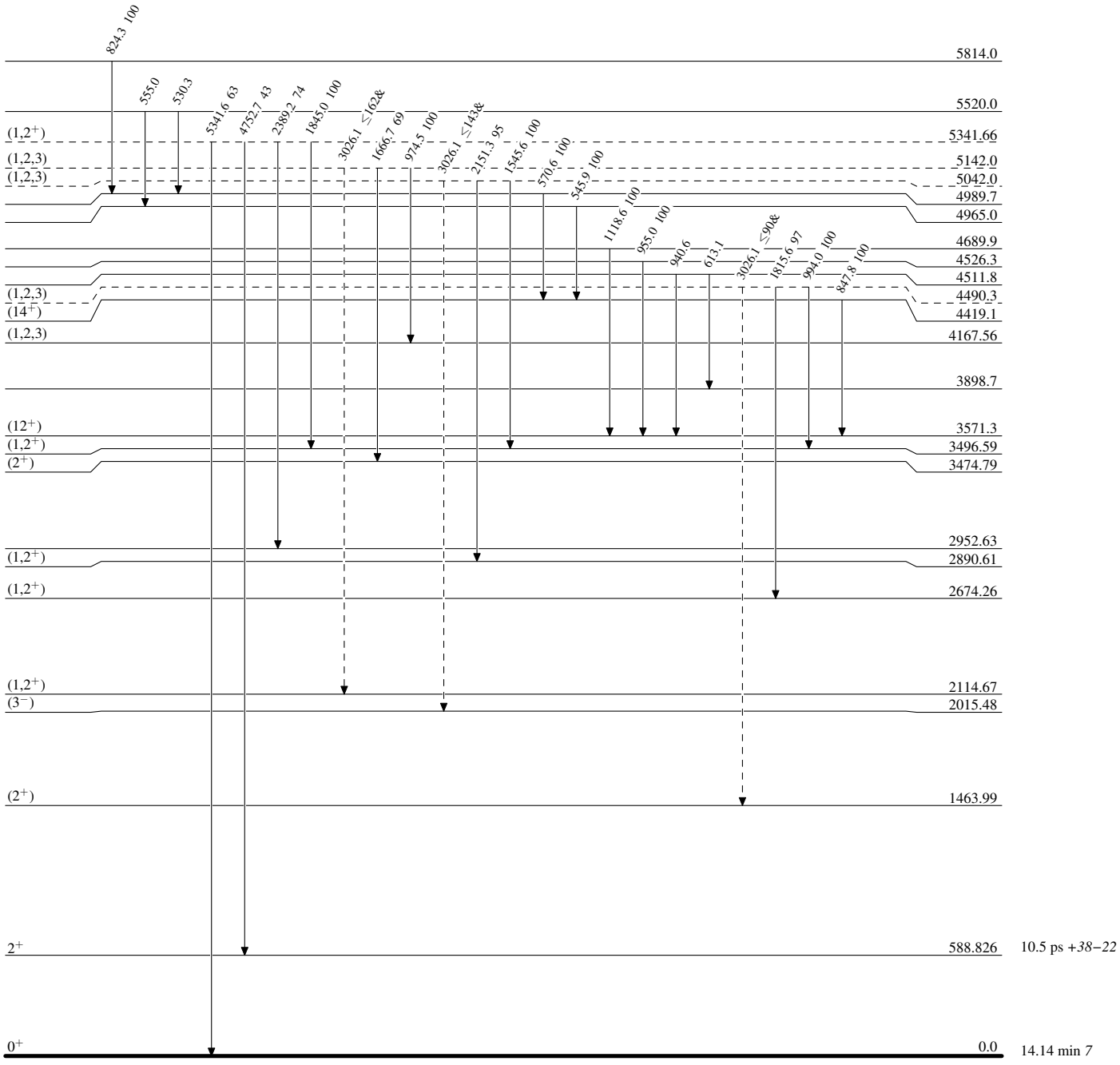
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

γ Decay (Uncertain)



$^{138}_{54}Xe_{84}$

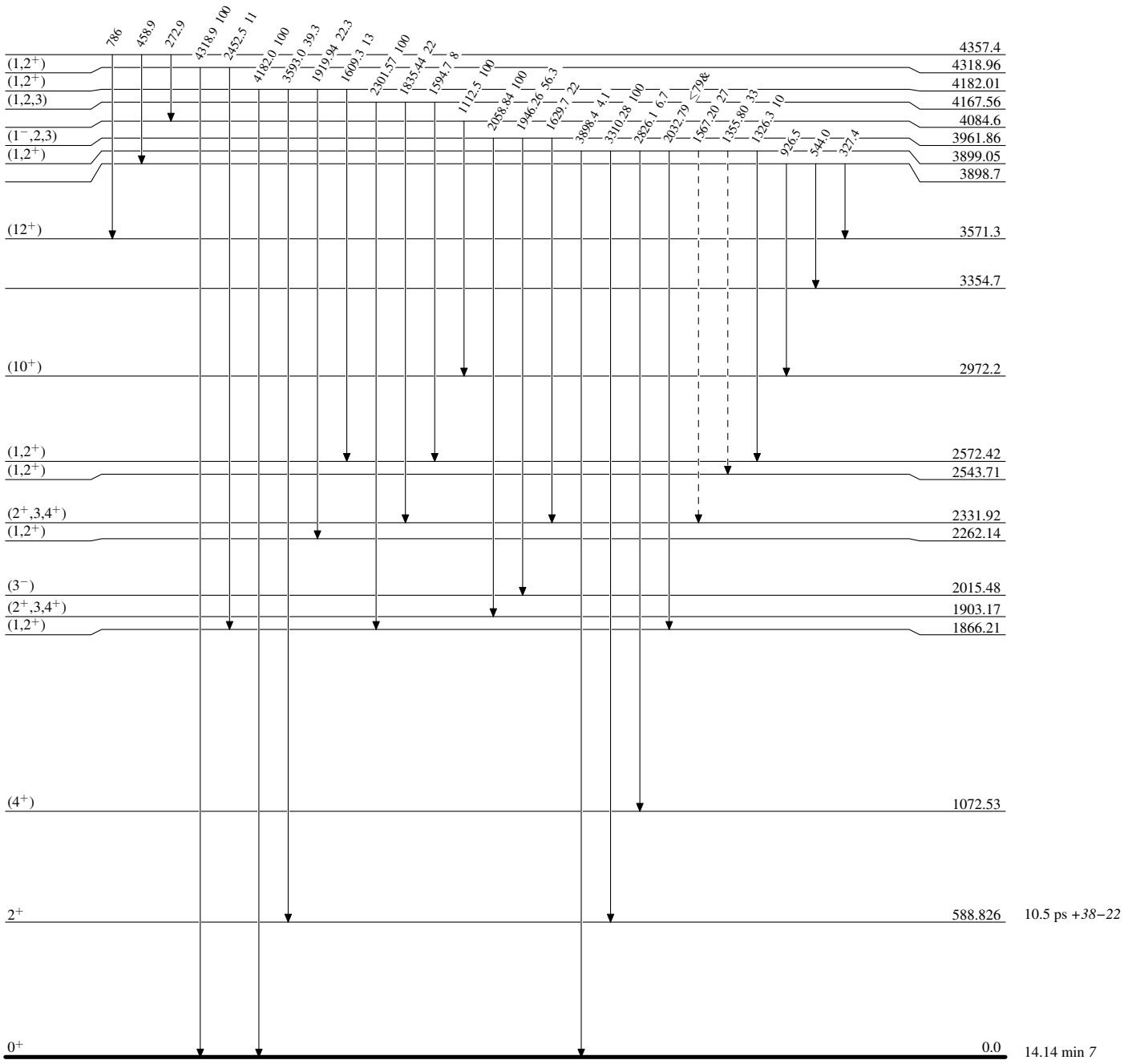
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

– – – – – – ► γ Decay (Uncertain)



$^{138}_{54}Xe_{84}$

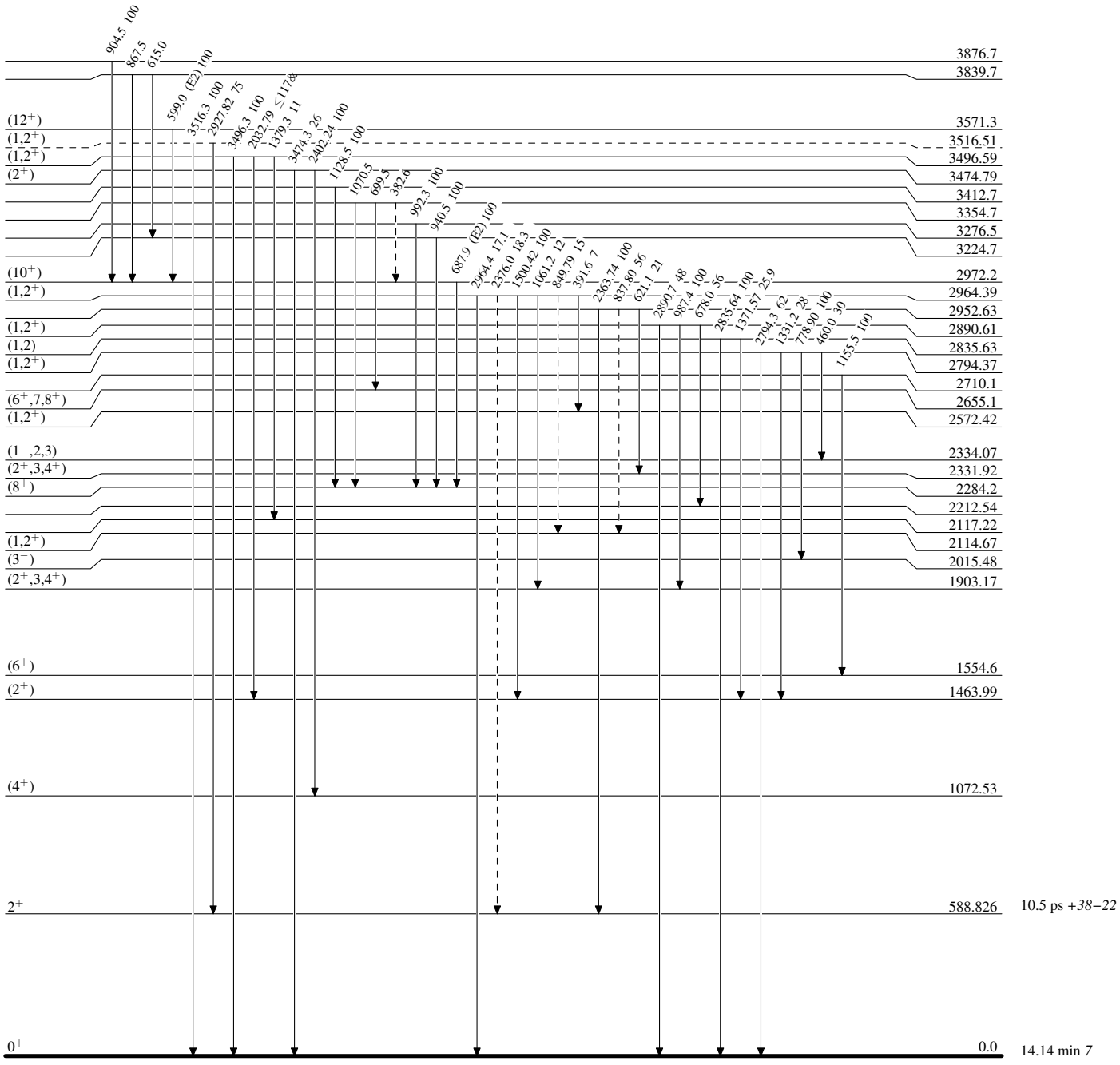
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

γ Decay (Uncertain)



$^{138}_{54}Xe_{84}$

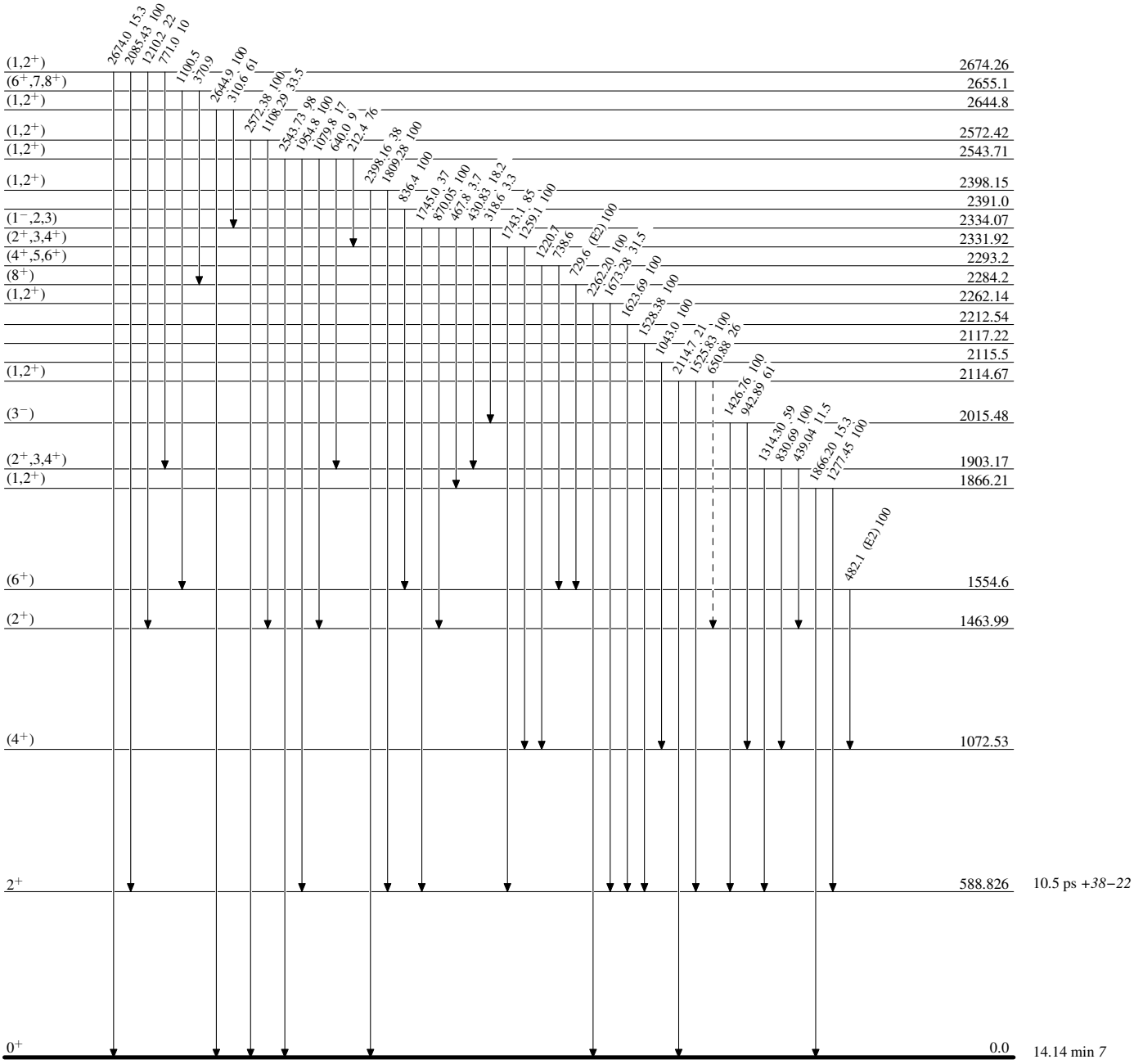
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

- - - - - - ► γ Decay (Uncertain)

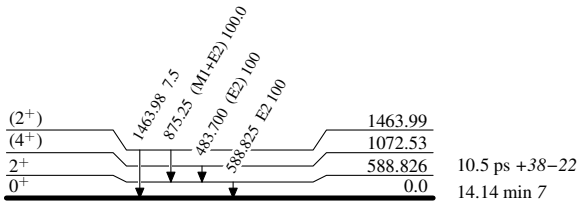


$^{138}_{54}Xe_{84}$

Adopted Levels, Gammas

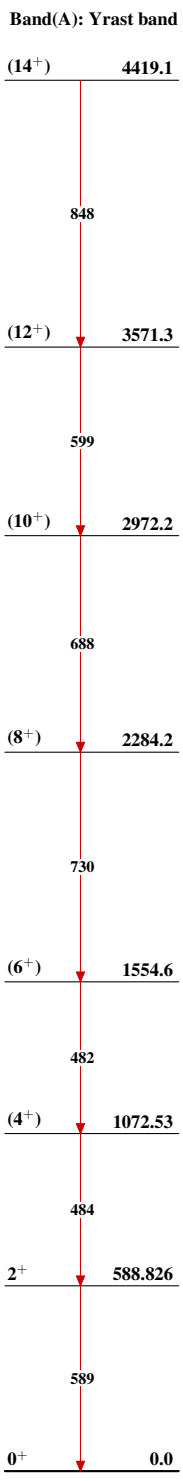
Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



$^{138}_{54}Xe_{84}$

Adopted Levels, Gammas



$^{138}_{54}Xe_{84}$