Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	A. A. Sonzogni, M. Fadil, and B. Pfeiffer	NDS 110,2815 (2009)	30-Sep-2009

Q(β^-)=1835 *26*; S(n)=8678 *4*; S(p)=13567 *3*; Q(α)=−8837.3 *28* 2012Wa38
S(2n)=14496.4 *24*, S(2p)=25110.6 *30* (2012Wa38).
Additional information 1.
^{84}Se evaluated by A.A. Sonzogni, M. Fadil, and B. Pfeiffer .
Precise atomic mass measurement: 2008Ha23 (Penning-trap system). Other: 2006Ha62.
A 1360 γ has been assigned feeding the 2121 level in ^{252}Cf SF decay, while a 1361.4γ in ^{208}Pb(^{16}O,Fγ) (2004Pr10) and a 1361.5γ in ^{238}U(p,Fγ) (2013DrZY) has been placed feeding the 3537 level from a 4898 level. Evaluator treats the placement in ^{252}Cf SF decay as uncertain.

^{84}Se Levels

Cross Reference (XREF) Flags

A	^{84}As β^- decay (4.02 s)	E	Coulomb excitation	I	^{238}U(P,Fγ):prompt γ
B	^{85}As β^-n decay (2.021 s)	F	^{192}Os(^{82}Se,Xγ)	J	^{238}U(^{82}Se,^{84}Seγ)
C	^{252}Cf SF decay	G	^{9}Be,^{197}Au(^{84}Se,^{84}Se$'\gamma$)		
D	^{82}Se(t,p)	H	^{208}Pb(^{18}O,Xγ)		

E(level)‡	J$^\pi$†	T$_{1/2}$	XREF	Comments
0.0@	0$^+$	3.26 min *10*	ABCDEFGHIJ	%β^-=100 T$_{1/2}$: weighted average of 3.1 min *1* (1974KrZG), 3.1 min *2* (1975Hu02), 3.5 min *1* (1970Ei02), 3.1 min *2* (1968Re12), and 3.3 min *3* (1960Sa05).
1454.55@ *8*	2$^+$	0.42 ps *7*	ABCDEFGHIJ	B(E2)↑=0.105 *15* (2010Ga14) B(E2) from ^{197}Au(^{84}Se,^{84}Seγ); deduced T$_{1/2\ 1/2}$=0.42 ps *7*.
1967 *3*	(0$^+$)		D	
2097 *11*	(1$^-$)		D	
2121.65@ *10*	4$^+$	20.2 ps *+41−26*	ABC EFGHIJ	J$^\pi$: E2 γ to 2$^+$; systematics of N=50 nuclei. T$_{1/2}$: From RDDS, plunger method (2015Li42).
2244 *7*	0$^+$		D	
2461.38 *9*	(1,2$^+$)		A	J$^\pi$: γ rays to 0$^+$ and (2$^+$).
2654 *4*	0$^+$		D	
2699.47 *12*	(2,3,4)		AB	J$^\pi$: γ's to (2$^+$) and (4$^+$).
2716 *10*	(0$^+$)		D	
2740 *11*	(0$^+$)		D	
2984.75 *13*	2$^+$		A D J	
3024.30 *12*	(2$^+$)		A D	
3069.77 *22*			A	
3125.97 *15*			A	
3232.43 *14*			A	
3297.05 *12*			AB	
3370.54 *16*	(6$^+$)	8.2 ps *+17−39*	A C F HIJ	J$^\pi$: γ to 4$^+$; shell-model prediction (2013DrZY). T$_{1/2}$: From RDDS, plunger method (2015Li42).
3408.73 *14*			A J	XREF: J(?).
3439.15 *13*			A J	
3481.7? *10*			C	E(level): assuming 1360 γ feeds the 2121.6 level. See comment on top.
3537.09 *18*	(5$^+$)		C F HIJ	J$^\pi$: level fed from (6$^+$) and γ to (4$^+$), supported by shell model calculations.
3541.23 *10*	2$^+$		A d G	J$^\pi$: L(t,p)=2 for E(level)=3544 *6*.
3548.3 *3*			A d	J$^\pi$: L(t,p)=2 for E(level)=3544 *6*.
3698 *6*			D	

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Adopted Levels, Gammas (continued)

^{84}Se Levels (continued)

E(level)‡	Jπ†	XREF	Comments
3701.47& *19*	(6+)	C F HIJ	Jπ: Q γ to (4+) and D γ to (5+), supported by shell model calculations.
3862.5 *10*		F	
3872.01 *14*		A	
3928 *9*	2+	D G	XREF: D(3934). E(level): assumed that 3934 *8* in (t,p) is the same as 3916 *11* in (^{84}Se,^{84}Se′γ); listed level energy is the weighted average of the two.
3985.27 *22*	2+	A D	
4082.18 *22*		A	
4106 *17*	0+	D	
4116.33 *17*		A	
4226 *4*	2+	D	
4282.12 *11*		A	
4307 *7*	(2+)	D	
4405.8#& *3*	(7+)	C F HI	Jπ: γ to (6+).
4445.19# *22*	(4+)	A D	
4602 *6*	2+	D	
4641.0		IJ	XREF: J(?).
4670 *9*	(2+)	D	
4723 *6*		D	
4813 *5*	(2+)	D	
4898.5 *4*	(6+)	HI	E(level): assuming 1361 γ feeds the 3537 level. See comment on top. Jπ: shell-model prediction (2013DrZY).
4903 *7*	(2+,0+)	D	
4981 *9*	1−	D	
5139 *6*	2+	D	
5161.17 *18*		A	
5185 *6*	2+	D	
5221.96 *16*		A	
5258 *6*	4+	D	
5295 *9*	2+	D	
5329.9&	(8+)	I	
5373 *9*		D	
5437# *9*	(5−)	D	
5507 *9*	2+	D	
5596.16 *20*	3−	A D	
5627 *9*	2+	D	
5637.6 *3*		A	
5661.53 *23*		A	
5725 *14*		D	
5815 *12*	2+	D	
5869.34 *23*		A	
5890.1 *3*	(3−,1−)	A D	
5922# *9*	(4+)	D	
6005# *12*	(4+)	D	
6019.90 *19*		A	
6249.60 *21*		A	
6329 *21*	2+	D	
6400.4 *3*	4+	A D	
6414.4&	(9,10)	I	
6541.5 *3*		A	
6604.6 *3*		A	

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Adopted Levels, Gammas (continued)

^{84}Se Levels (continued)

† From L-values observed in ^{82}Se(t,p) (1988Mu02), unless otherwise stated.
‡ Levels connected by γ rays are from least-squares fit to Eγ; others are from ^{82}Se(t,p).
# L(t,p) has possible admixture of L=0 indicating possibility for a doublet.
@ Band(A): Ground state sequence.
& Band(B): Sequence based on (6^+).

$\gamma(^{84}Se)$

E$_i$(level)	J$_i^\pi$	E$_\gamma$†	I$_\gamma$†	E$_f$	J$_f^\pi$	Mult.	Comments
1454.55	2^+	1454.66 *10*	100	0.0	0^+	E2	B(E2)(W.u.)=9.6 *14* E$_\gamma$: weighted average of 1454.55 *10* (^{84}As β^- decay), 1455.1 *2* (^{85}As β^-n decay), 1454.5 *2* (^{208}Pb(^{18}O,Xγ)), 1454.7 *1* (^{192}Os(^{82}Se,Xγ)). Other: Eγ=1455.1 (^{252}Cf SF decay). Mult.: from ^{208}Pb(^{18}O,Xγ).
2121.65	4^+	666.99 *7*	100	1454.55	2^+	E2	B(E2)(W.u.)=10.0 *+16−17* E$_\gamma$: weighted average of 666.97 *10* (^{84}As β^- decay), 667.1 *2* (^{85}As β^-n decay), 666.8 *3* (^{208}Pb(^{18}O,Xγ)), 667.0 *1* (^{192}Os(^{82}Se,Xγ)). Other: Eγ=667.1 (^{252}Cf SF decay). Mult.: from ^{208}Pb(^{18}O,Xγ).
2461.38	$(1,2^+)$	1007.12 *10*	41.9 *17*	1454.55	2^+		
		2461.35 *15*	100 *5*	0.0	0^+		
2699.47	(2,3,4)	577.77 *14*	100 *3*	2121.65	4^+		E$_\gamma$: weighted average of 577.84 *10* (^{84}As β^- decay), 577.5 *2* (^{85}As β^-n decay). I$_\gamma$: weighted average of 100 *3* (^{84}As β^- decay), 100 *15* (^{85}As β^-n decay).
		1245.0 *4*	82 *6*	1454.55	2^+		E$_\gamma$: weighted average of 1245.3 *2* (^{84}As β^- decay), 1244.6 *2* (^{85}As β^-n decay). I$_\gamma$: weighted average of 85 *5* (^{84}As β^- decay), 67 *12* (^{85}As β^-n decay).
2984.75	2^+	522.2	9.5	2461.38	$(1,2^+)$		
		1530.19 *10*	100 *5*	1454.55	2^+		
3024.30	(2^+)	325.03 *10*	5.3 *16*	2699.47	(2,3,4)		
		1569.53 *10*	100 *3*	1454.55	2^+		
3069.77		1615.2 *2*	100	1454.55	2^+		
3125.97		426.4 *2*	29 *15*	2699.47	(2,3,4)		
		1671.45 *15*	100 *8*	1454.55	2^+		
3232.43		1110.77 *10*	100	2121.65	4^+		
3297.05		1175.9 *2*	9.8 *8*	2121.65	4^+		E$_\gamma$,I$_\gamma$: observed only in ^{84}As β^- decay.
		1843.24 *24*	100 *3*	1454.55	2^+		E$_\gamma$: weighted average of 1843.13 *10* (^{84}As β^- decay), 1843.7 *2* (^{85}As β^-n decay). I$_\gamma$: from ^{84}As β^- decay.
3370.54	(6^+)	1248.88 *13*	100	2121.65	4^+	[E2]	B(E2)(W.u.)=1.1 *+8−2* E$_\gamma$: weighted average of 1249.0 *2* (^{84}As β^- decay), 1248.7 *2* (^{208}Pb(^{18}O,Xγ)), 1249.0 *3* (^{192}Os(^{82}Se,Xγ)). Other: Eγ=1249.6 (^{252}Cf SF decay).
3408.73		1287.06 *10*	100	2121.65	4^+		
3439.15		1317.45 *10*	100 *5*	2121.65	4^+		
		1984.7 *2*	23.6 *14*	1454.55	2^+		
3481.7?		1360	100	2121.65	4^+		
3537.09	(5^+)	1415.30 *17*	100	2121.65	4^+		E$_\gamma$: weighted average of 1415.3 *2* (^{208}Pb(^{18}O,Xγ)),

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Adopted Levels, Gammas (continued)

γ(^{84}Se) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.	Comments
							1415.3 *3* (^{192}Os(^{82}Se,Xγ)). Other: Eγ=1415 (^{252}Cf SF decay).
3541.23	2$^+$	1080.15 *10*	15.8 *7*	2461.38	(1,2$^+$)		
		2086.69 *10*	100 *4*	1454.55	2$^+$		
3548.3		1426.6 *3*	100	2121.65	4$^+$		
3701.47	(6$^+$)	164.18 *21*	41 *8*	3537.09	(5$^+$)	D	Eγ: weighted average of 164.1 *2* (^{208}Pb(^{18}O,Xγ)), 164.7 *5* (^{192}Os(^{82}Se,Xγ)). Other: Eγ=165 (^{252}Cf SF decay). Iγ: weighted average of 80 *40* (^{208}Pb(^{18}O,Xγ)), 39 *8* (^{192}Os(^{82}Se,Xγ)). Mult.: from γ(θ) in ^{192}Os(^{82}Se,Xγ).
		1580.00 *21*	100 *15*	2121.65	4$^+$	Q	Eγ: weighted average of 1579.8 *3* (^{208}Pb(^{18}O,Xγ)), 1580.2 *3* (^{192}Os(^{82}Se,Xγ)). Other: Eγ=1580 (^{252}Cf SF decay). Iγ: weighted average of 100 *21* (^{208}Pb(^{18}O,Xγ)), 100 *22* (^{192}Os(^{82}Se,Xγ)). Mult.: from γ(θ) in ^{192}Os(^{82}Se,Xγ).
3862.5		492.0[‡]	100	3370.54	(6$^+$)		
3872.01		573.9	21.4	3297.05			
		1750.35 *10*	100 *4*	2121.65	4$^+$		
3928	2$^+$	2462 *11*	100	1454.55	2$^+$		
3985.27	2$^+$	1863.6 *2*	100	2121.65	4$^+$		
4082.18		1960.5 *2*	100	2121.65	4$^+$		
4116.33		574.9	77	3541.23	2$^+$		
		2661.74 *15*	100 *5*	1454.55	2$^+$		
4282.12		741.23 *10*	100 *9*	3541.23	2$^+$		
		985.20 *10*	61.3 *21*	3297.05			
		2159.0 *2*	31.7 *21*	2121.65	4$^+$		
		4280.9 *3*	27.9 *17*	0.0	0$^+$		
4405.8	(7$^+$)	704.34 *24*	100	3701.47	(6$^+$)		Eγ: weighted average of 704.4 *4* (^{208}Pb(^{18}O,Xγ)), 704.3 *3* (^{192}Os(^{82}Se,Xγ)). Other: Eγ=703.5 (^{252}Cf SF decay).
4445.19	(4$^+$)	2323.5 *2*	100	2121.65	4$^+$		
4641.0		1270.0		3370.54	(6$^+$)		
4898.5	(6$^+$)	1361.4 *4*	100	3537.09	(5$^+$)		
5161.17		3039.46 *15*	100	2121.65	4$^+$		
5221.96		1925.5 *2*	73 *5*	3297.05			
		2522.10 *15*	100 *5*	2699.47	(2,3,4)		
5329.9	(8$^+$)	924.4		4405.8	(7$^+$)		
5596.16	3$^-$	2299.0 *2*	90 *7*	3297.05			
		3474.6 *3*	100 *7*	2121.65	4$^+$		
5637.6		4182.9 *3*	100	1454.55	2$^+$		
5661.53		2962.0 *2*	100	2699.47	(2,3,4)		
5869.34		3169.4 *3*	100 *6*	2699.47	(2,3,4)		
		3748.0 *3*	94 *6*	2121.65	4$^+$		
5890.1	(3$^-$,1$^-$)	4435.4 *3*	100	1454.55	2$^+$		
6019.90		2722.80 *15*	100	3297.05			
6249.60		2840.8 *2*	53 *13*	3408.73			
		4127.9 *3*	100 *7*	2121.65	4$^+$		
6400.4	4$^+$	4945.7 *3*	100	1454.55	2$^+$		
6414.4	(9,10)	1084.5		5329.9	(8$^+$)		
6541.5		5086.8 *3*	100	1454.55	2$^+$		
6604.6		5149.9 *3*	100	1454.55	2$^+$		

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Adopted Levels, Gammas (continued)

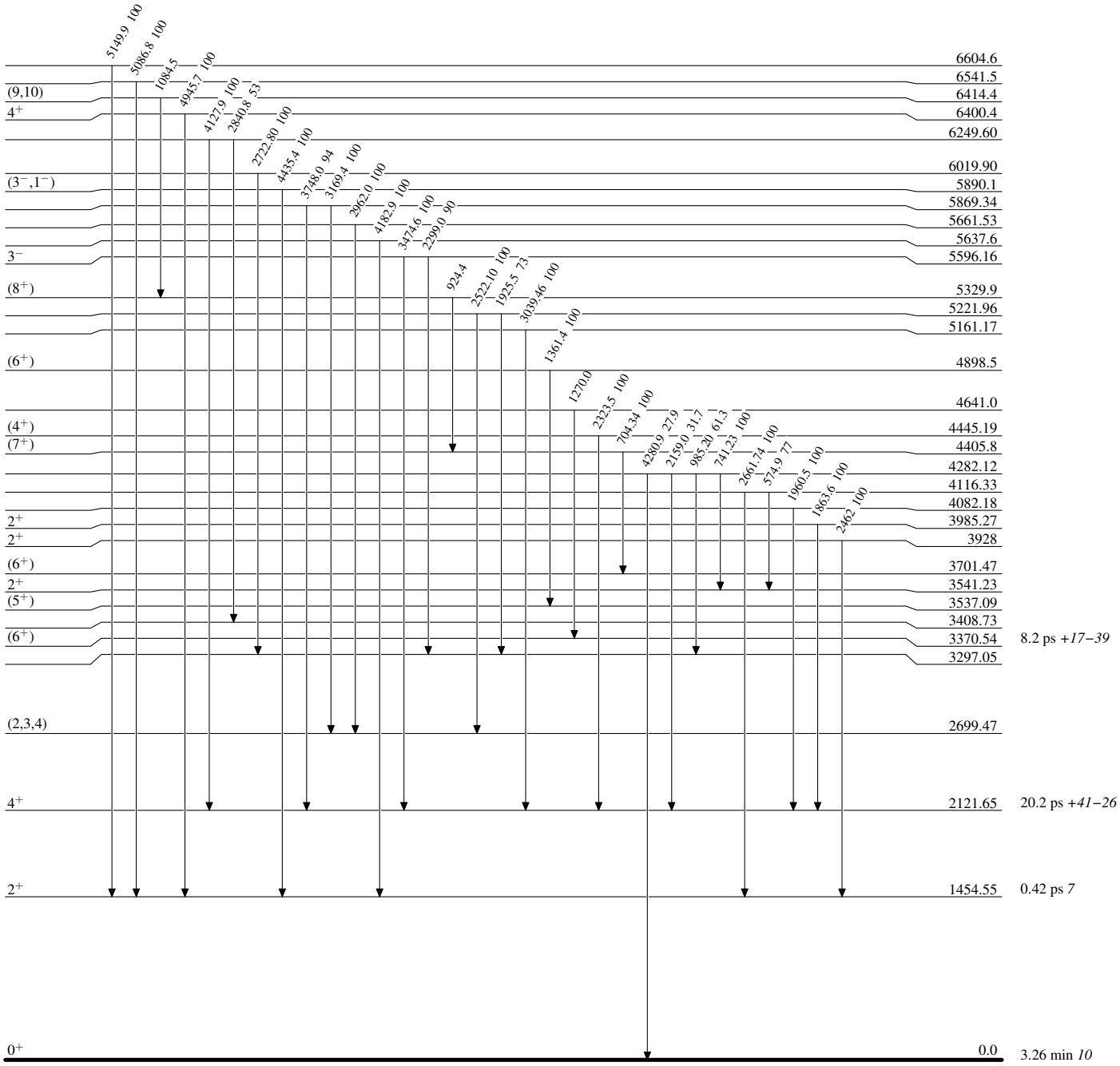
$\gamma(^{84}Se)$ (continued)

† From the corresponding dataset when only one XREF is available. Otherwise, see individual comments for the source.
‡ Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{84}_{34}Se_{50}$

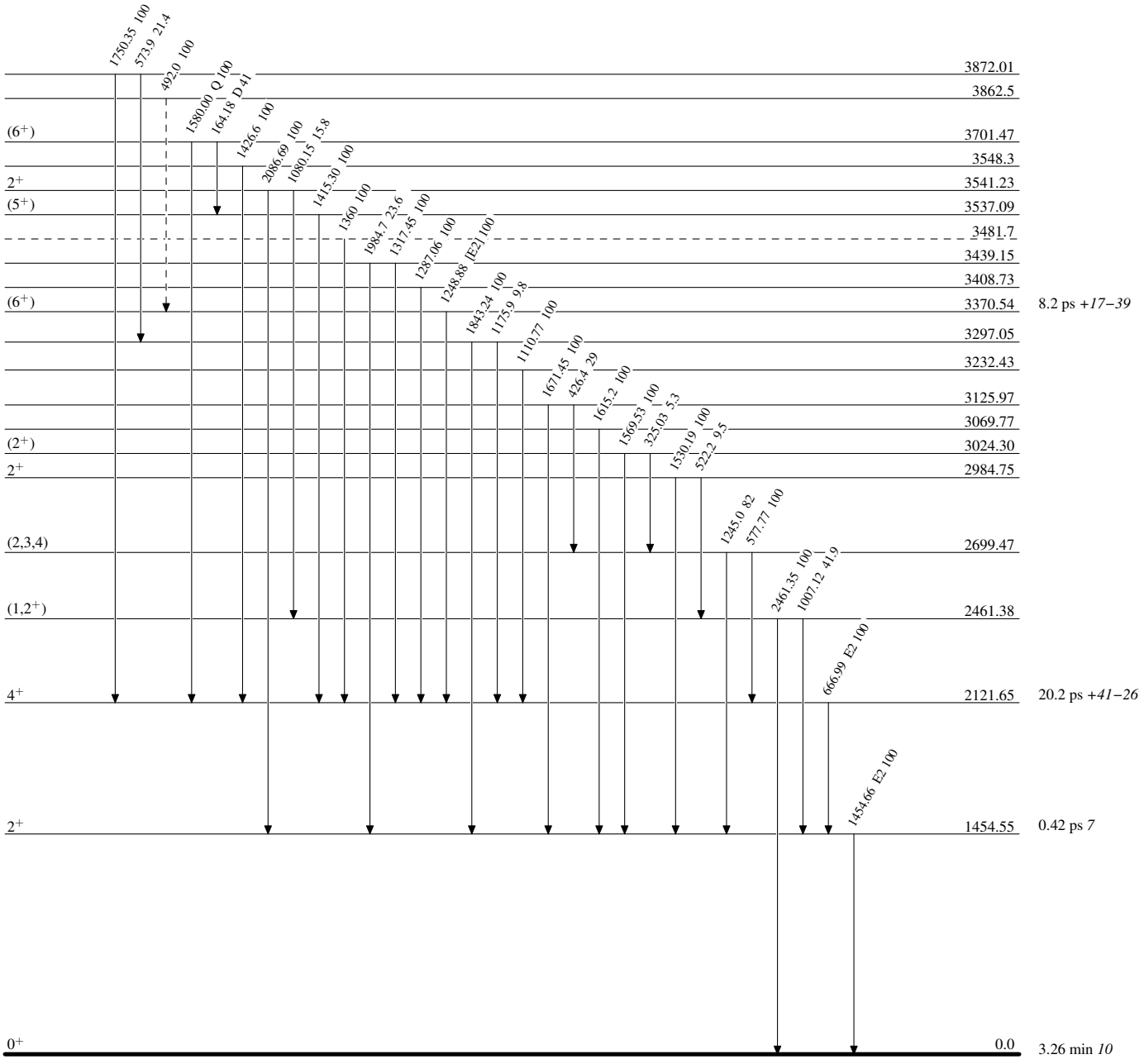
Adopted Levels, Gammas

Legend

Level Scheme (continued)

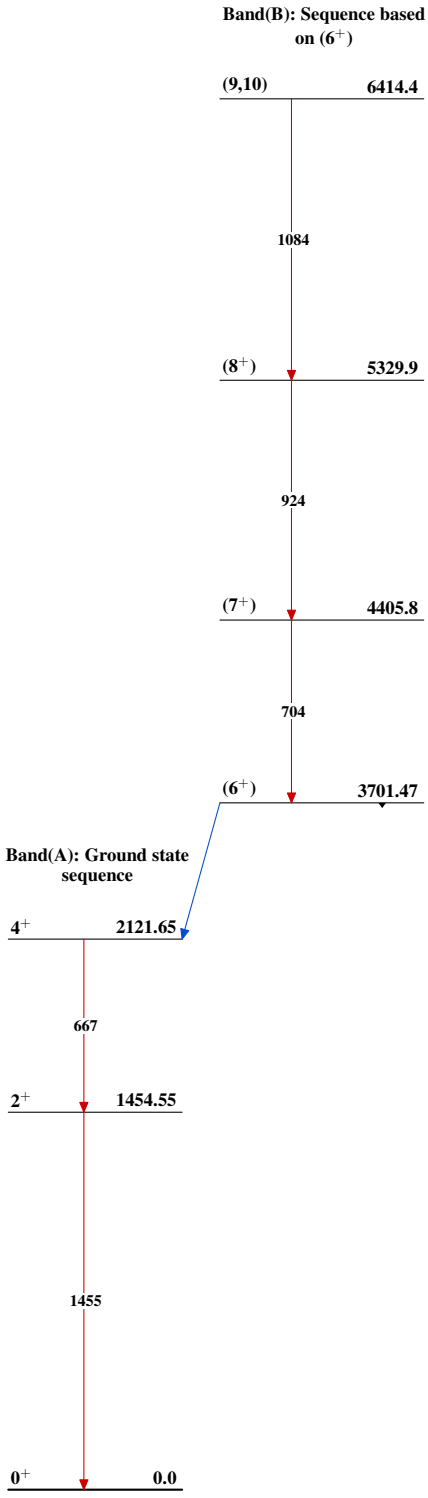
Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{84}_{34}Se_{50}$

Adopted Levels, Gammas



$^{84}_{34}Se_{50}$