Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	S. K. Basu, E. A. Mccutchan	NDS 165, 1 (2020)	1-Mar-2020

Q(β^-)=4405 *7*; S(n)=6494.8 *28*; S(p)=13974 *4*; Q(α)=−6881 *3* 2017Wa10
S(2n)=11411 *3*; S(2p)=25653 *4* (2017Wa10).
There are a number of γ-ray transitions initially proposed to belong to ^{90}Kr in ^{252}Cf and ^{248}Cm SF decay datasets, that have subsequently been assigned to ^{91}Kr in ^{235}U(n,Fγ). These transitions and their respective levels are not included in the Adopted Levels and Gammas. See the ^{252}Cf and ^{248}Cm SF decay datasets for their placements.
α: Additional information 1.

^{90}Kr Levels

Cross Reference (XREF) Flags

A	^{90}Br β^- decay	D	^{235}U(n,Fγ)
B	^{248}Cm SF decay	E	Coulomb excitation
C	^{252}Cf SF decay		

E(level)†	Jπ	$T_{1/2}$	XREF	Comments
0.0‡	0^+	32.32 s *9*	ABCDE	%β^-=100 $T_{1/2}$: From γ(t) with mass separation and Ge(Li) (1969Ca03). $\Delta<r^2>$ (^{89}Kr, ^{90}Kr)=0.116 fm^2 *11* (1996Li25); $\Delta<r^2>$ (^{86}Kr, ^{90}Kr)=0.5 fm^2 *1* (1995Ke04). Others: 1992Li24, 1992Ne09.
707.12‡ *5*	2^+	10.7 ps *16*	ABCDE	B(E2)↑=0.1500 *230* (2017El04) Jπ: E2 707γ to 0^+. $T_{1/2}$: deduced from B(E2) in Coulomb Excitation. Other: 10.4 ps *69* from centroid difference between 707γ and 1123γ in $LaBr_3$ coincidence spectra in ^{235}U(n,Fγ).
1362.25 *6*	2^+	1.1 ps *+4−2*	ABCDE	B(E2)↑=0.0330 *90* (2017El04) $T_{1/2}$: deduced from B(E2) in Coulomb Excitation. Jπ: E2 1362.32γ to 0^+.
1763.89 *15*	$(3,4,2)^+$		BCD	Jπ: $\gamma\gamma(\theta)$ data limit J to 2,3,4 in ^{235}U(n,Fγ). $J^\pi=2^+$ is less likely due to absence of a ground state transition. Q (assumed E2) transitions to 2^+ levels give positive parity.
1830.49‡ *15*	4^+		ABCD	Jπ: E2 1123.37γ to 2^+; band assignment.
1940.33 *8*			A	
2103.13 *8*			A	
2147.81 *10*			A	
2193.1 *4*			A	
2249.34 *14*	(2^+)	<0.23 ps	A E	B(E2)↑=0.0150 *110* (2017El04) Jπ: direct population in Coulomb excitation. $T_{1/2}$: deduced from B(E2) in Coloumb excitation.
2318.09 *7*			A	
2536.04 *21*			A	
2543.70 *10*			A	
2595.93 *14*			A	
2596.49 *25*			BCD	
2685.83 *13*			A	
2687.31 *13*			A	
2730.76 *17*			A	
2747.94 *15*			A	
2780.60 *9*			A	
2828.26 *22*			A	
2853.16 *22*	5		BCD	Jπ: D+Q 1022.7γ to 4^+.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{90}Kr Levels (continued)

E(level)[†]	Jπ	XREF	Comments
2864.15 *20*		A	
2987.32 *10*		A	
3084.86 *21*		BCD	
3140.25 *16*		A	
3223.5 *3*	(5^+,6^+)	BCD	Jπ: γγ(θ) data in ^{235}U(n,Fγ) are consistent with J=4,5,6; 4^+ is less likely due to the absence of transitions to any of the 2^+ states.
3231.44 *17*		A	
3285.10 *17*		A	
3318.4 *3*		A	
3372.6 *3*		A	
3508.2 *3*		A	
3695.5 *4*		CD	
3896.53 *24*		BCD	
4036.5 *5*		BCD	
4099.0 *10*		D	
4284.9 *4*		CD	
4291.0 *3*		A	
4546.6 *5*		A	
4785.78 *22*		A	
5004.4 *3*		A	
5053.0 *3*		BCD	
5080.0 *5*		A	
5385.4 *6*		A	
5683.3 *5*		A	
5730.1 *3*		A	
6298.3? *4*		C	E(level): observed only in ^{252}Cf SF decay.

[†] From least-squares fit to Eγ, by evaluators.
[‡] Band(A): Ground state band.

Adopted Levels, Gammas (continued)

γ(^{90}Kr)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	α	Comments
707.12	2^+	707.05 *6*	100	0.0	0^+	E2		1.18×10^{-3}	α(K)=0.001048 *15*; α(L)=0.0001136 *16*; α(M)=1.84×10^{-5} *3*; α(N)=1.84×10^{-6} *3* B(E2)(W.u.)=12.8 *19* Mult.: Q from γγ(θ) in ^{252}Cf and ^{248}Cm SF decay, M2 excluded by comparison to RUL.
1362.25	2^+	655.17 *6*	63.5 *15*	707.12	2^+	(M1+E2)	+0.507		B(E2)(W.u.)=14 *6*; B(M1)(W.u.)=0.022 *6* I_γ: from ^{235}U(n,Fγ). Mult.: D from γγ(θ) in ^{248}Cm SF decay, Δπ=no from level scheme.
		1362.32 *10*	100 *8*	0.0	0^+	E2		2.93×10^{-4}	α(K)=0.000223 *4*; α(L)=2.36×10^{-5} *4*; α(M)=3.82×10^{-6} *6*; α(N)=3.86×10^{-7} *6* B(E2)(W.u.)=2.8 *+6−8* Mult.: Q from γγ(θ) in ^{252}Cf and ^{248}Cm SF decay, M2 excluded by comparison to RUL.
1763.89	$(3,4,2)^+$	401.4[‡]	100 *4*	1362.25	2^+	E2		0.00638	α(K)=0.00563 *8*; α(L)=0.000633 *9*; α(M)=0.0001024 *15*; α(N)=1.011×10^{-5} *15* I_γ: from ^{235}U(n,Fγ).
		1056.2[‡]	24.1	707.12	2^+	E2		4.36×10^{-4}	α(K)=0.000388 *6*; α(L)=4.13×10^{-5} *6*; α(M)=6.69×10^{-6} *10*; α(N)=6.74×10^{-7} *10* I_γ: from ^{235}U(n,Fγ).
1830.49	4^+	1123.37 *15*	100	707.12	2^+	E2		3.81×10^{-4}	α(K)=0.000338 *5*; α(L)=3.59×10^{-5} *5*; α(M)=5.81×10^{-6} *9*; α(N)=5.86×10^{-7} *9*
1940.33		578.06 *18*	14.5 *16*	1362.25	2^+				
		1233.21 *8*	100 *4*	707.12	2^+				
2103.13		740.82 *8*	100 *5*	1362.25	2^+				
		1396.16 *13*	33 *3*	707.12	2^+				
2147.81		786.02 *12*	100 *7*	1362.25	2^+				
		1440.21 *12*	20.2 *19*	707.12	2^+				
2193.1		1486.0 *4*	100	707.12	2^+				
2249.34	(2^+)	1542.20 *13*	100	707.12	2^+				
		2249[@]	<23.0	0.0	0^+	[E2]			E_γ,I_γ: limit on unobserved transition in Coulomb excitation.
2318.09		955.84 *8*	98 *5*	1362.25	2^+				
		1610.80 *11*	100 *5*	707.12	2^+				
		2318.6 *2*	47 *4*	0.0	0^+				
2536.04		1828.90 *20*	100	707.12	2^+				
2543.70		1836.49 *10*	100 *6*	707.12	2^+				
		2543.93 *20*	20 *3*	0.0	0^+				
2595.93		1888.79 *13*	100	707.12	2^+				
2596.49		832.8[‡]	100	1763.89	$(3,4,2)^+$				
2685.83		1323.57 *12*	100	1362.25	2^+				

$^{90}_{36}Kr_{54}$-3

Adopted Levels, Gammas (continued)

γ(^{90}Kr) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
2687.31		539.50 *8*	100	2147.81				
2730.76		2024.1 *3*	26 *4*	707.12	2^+			
		2730.5 *2*	100 *7*	0.0	0^+			
2747.94		2040.79 *14*	100	707.12	2^+			
2780.60		840.29 *10*	100 *8*	1940.33				
		1418.34 *11*	84 *8*	1362.25	2^+			
		2073.0 *5*	16 *4*	707.12	2^+			
2828.26		1465.9 *3*	98 *12*	1362.25	2^+			
		2121.2 *3*	100 *11*	707.12	2^+			
2853.16	5	1022.7[‡]	100	1830.49	4^+	D+Q	+0.072 *19*	Mult.,δ: from γγ(θ) in ^{235}U(n,Fγ).
2864.15		2864.1 *2*	100	0.0	0^+			
2987.32		1625.11 *13*	100 *7*	1362.25	2^+			
		2987.1 *2*	66 *5*	0.0	0^+			
3084.86		1254.4[‡]		1830.49	4^+			
		1321.5[‡]		1763.89	$(3,4,2)^+$			
3140.25		2433.09 *15*	100	707.12	2^+			
3223.5	$(5^+,6^+)$	1393.2[‡]		1830.49	4^+			
		1460.3[‡]		1763.89	$(3,4,2)^+$			
3231.44		913.38 *20*	7.6 *10*	2318.09				
		3231.3 *3*	100 *10*	0.0	0^+			
3285.10		1344.76 *15*	100	1940.33				
3318.4		3318.5 *3*	100	0.0	0^+			
3372.6		2665.4 *3*	100	707.12	2^+			
3508.2		2801.0 *3*	100	707.12	2^+			
3695.5		1099.0[‡]	100	2596.49				
3896.53		672.9[‡]		3223.5	$(5^+,6^+)$			E_γ: observed only in ^{252}Cf SF decay.
		811.7[‡]		3084.86				E_γ: observed only in ^{252}Cf SF decay.
		1043.4[‡]		2853.16	5			
4036.5		813.4[‡]	100	3223.5	$(5^+,6^+)$			
4099.0		1245.8	100	2853.16	5			E_γ: from ^{235}U(n,fγ).
4284.9		1200.0[‡]	100	3084.86				
4291.0		4290.9 *3*	100	0.0	0^+			
4546.6		2002.9 *5*	100	2543.70				
4785.78		2682.6 *2*	100	2103.13				
5004.4		4297.2 *3*	100	707.12	2^+			
5053.0		1156.6[‡]	100	3896.53				
5080.0		4372.8 *5*	100	707.12	2^+			
5385.4		4023.1 *6*	100	1362.25	2^+			
5683.3		4320.9 *5*	100	1362.25	2^+			
5730.1		2411.8 *3*	71 *12*	3318.4				

$^{90}_{36}Kr_{54}$-4

Adopted Levels, Gammas (continued)

$\gamma(^{90}Kr)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Comments
5730.1		4367.3 *5*	100 *13*	1362.25	2^+	
6298.3?		1245.3[‡@]	100	5053.0		E_γ: observed only in ^{252}Cf SF decay.

[†] From ^{90}Br β^- decay, except where noted.
[‡] From ^{252}Cf SF decay.
[#] From $\gamma\gamma(\theta)$ in ^{235}U(n,Fγ), except where noted. Q transitions are assumed to be E2 in character.
[@] Placement of transition in the level scheme is uncertain.

$^{90}_{36}Kr_{54}$-5

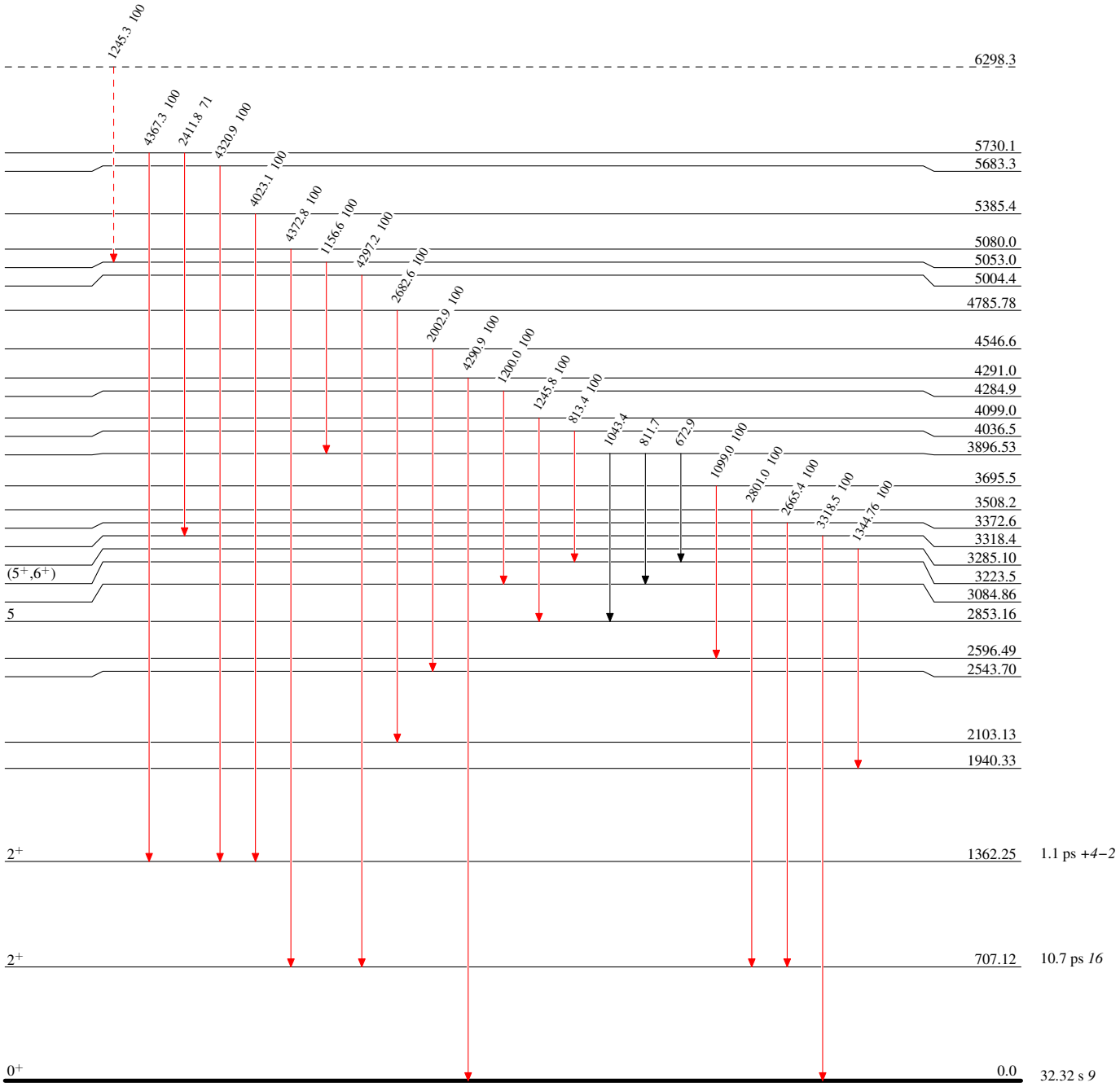
Adopted Levels, Gammas

Level Scheme

Intensities: Type not specified

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)

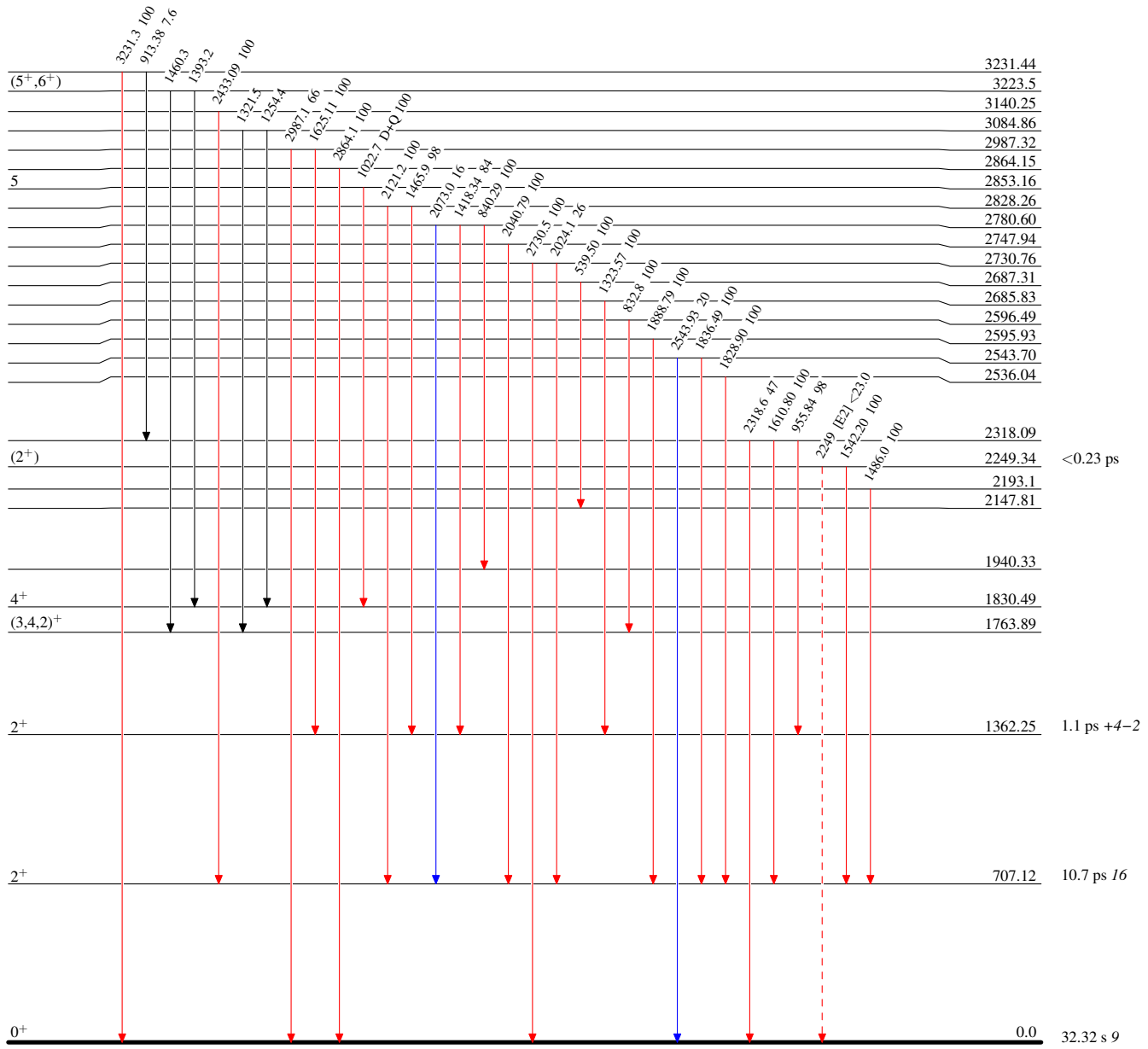


$^{90}_{36}Kr_{54}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

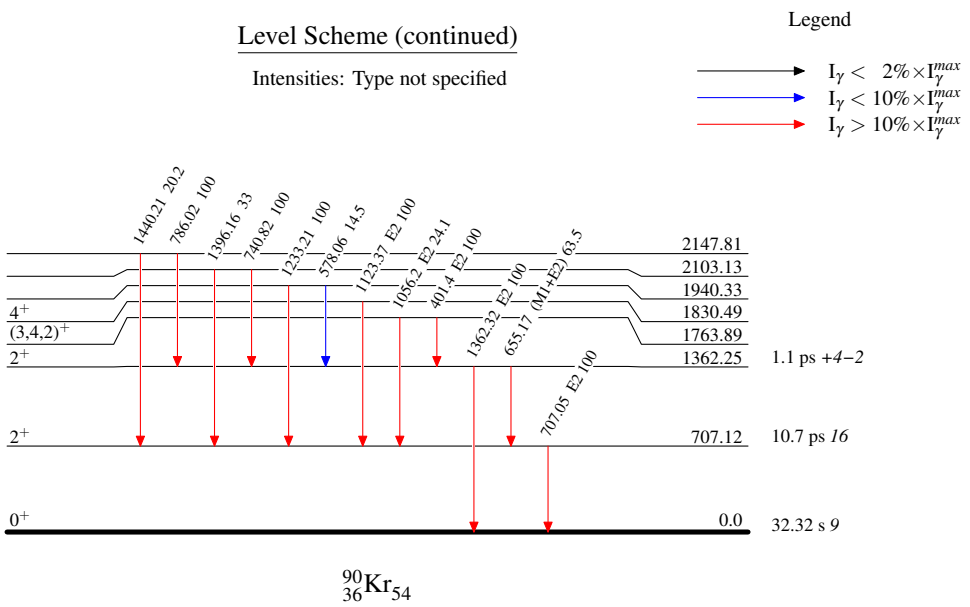


$^{90}_{36}Kr_{54}$

Adopted Levels, Gammas

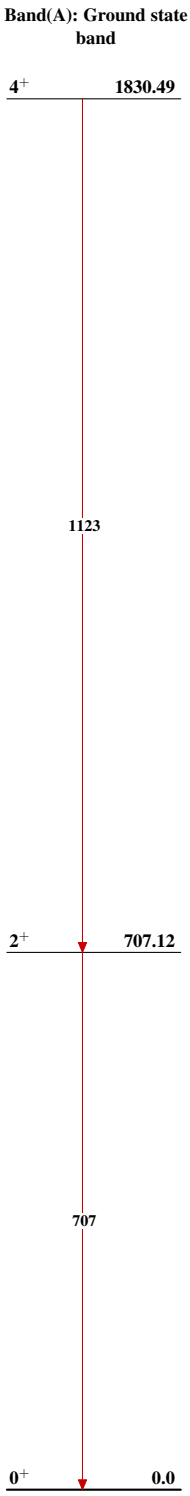
Level Scheme (continued)

Intensities: Type not specified



$^{90}_{36}Kr_{54}$

Adopted Levels, Gammas



$^{90}_{36}Kr_{54}$