Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Alexandru Negret, Balraj Singh	NDS 124,1 (2015)	30-Nov-2014

Q(β^-)=−518.66 *20*; S(n)=9856.7 *20*; S(p)=11979 *3*; Q(α)=−8096.7 *14* 2012Wa38
S(2n)=16968.96 *1*, S(2p)=21895.9 *20*, Q(2β^-)=1257.5 *11* (2012Wa38).
^{86}Kr isotope identified in mass spectroscopic studies by Aston, Nature 105, 8 (1920); also 1921As01.
Other reaction:
^{86}Kr(n,n) E≤1 MeV: 1989Jo01 analyzed σ(E) to deduce optical model parameter.
Mean square charge radius and isotopic shift: 2000Ga58, 1995Ke04, 1992Sc19, 1990Ca26.
Additional information 1.

^{86}Kr Levels

Cross Reference (XREF) Flags

A	^{86}Br β^- decay (55.1 s)	F	^{86}Kr(γ,γ')	K	^{87}Rb(d,^{3}He)
B	^{86}Rb ε decay (18.642 d)	G	^{86}Kr(n,n$'\gamma$)	L	^{87}Rb(t,α)
C	^{87}Br β^-n decay (55.65 s)	H	^{86}Kr(p,p$'$)	M	^{208}Pb(^{18}O,Fγ)
D	^{82}Se(^{7}Li,p2nγ)	I	^{86}Kr(d,d$'$)		
E	^{84}Kr(t,p)	J	Coulomb excitation		

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$	XREF	Comments
0	0$^+$	stable	ABCDEFGHIJKLM	Spin: optical spectroscopy measurement (1933Ko02). RMS charge radius <r^2>$^{1/2}$=4.1835 fm *21* (2013An02).
1564.61 *7*	2$^+$	0.286 ps *+28−24*	A DEFGHIJKLM	μ=+2.20 *10* (2014Ku10) B(E2)↑=0.106 *10* (2013PrZY) β_2=0.106 (1974Ar29) μ: from g factor=+1.10 *5* (2014Ku10) measured using transient−field technique in Coulomb excitation. Other: +2.24 *28* (2001Me20,2014StZZ). J$^\pi$: L(t,p)=2. T$_{1/2}$: weighted average of 0.308 ps *17* (DSA, 2001Me20) and B(E2)=0.128 *10* (1981Ji03), both in Coulomb excitation. Other: B(E2)=0.11 *3* (1981Ca01) in Coulomb excitation. μ: (2001Me20).
2250.01 *10*	4$^+$	3.1 ns *6*	A DE GHIJKLM	μ=+4.12 *56* (2014Ku10) μ: from g=+1.03 *14* (2014Ku10) measured using transient-field technique in Coulomb excitation. J$^\pi$: L(p,p$'$)=4. T$_{1/2}$: from γ(t) in ^{82}Se(^{7}Li,p2nγ). Configuration=$\pi f^{-1}_{5/2}\otimes\pi p^{-1}_{3/2}$.
2349.47 *7*	2$^+$		A EFGHI KL	J$^\pi$: L(t,p)=2.
2726.4 *4*	0$^+$		E GH KL	J$^\pi$: L(t,p)=0.
2850.72 *9*	(2,3)$^+$		A HI KL	J$^\pi$: L(t,α)=1 from 3/2$^-$; γ to 2$^+$; γ from (3$^-$).
2916.83 *11*	(3$^-$)		A G	J$^\pi$: γ rays to 2$^+$ and 4$^+$; possible β feeding from (1$^-$) parent; no γ to g.s.
2926.16 *8*	(2)$^+$		A GH KL	J$^\pi$: γ to 0$^+$; L(t,α)=3 from 3/2$^-$; γ from (3$^-$).
3009.43 *11*	(1,2)$^+$		A GH L	J$^\pi$: L(t,α)=3 from 3/2$^-$; γ to g.s.
3098.85 *9*	3$^-$		A E GHI L	J$^\pi$: L(p,p$'$)=3. B(E3)=0.036 *12* (2002Ki06 evaluation based on β_3 from data in 1974Ar29 and 1978Ma11).
3328.1 *5*	(3$^+$,4$^+$)		GH L	J$^\pi$: L(p,p$'$)=(4) suggests (4$^+$); L(t,α)=(1) from 3/2$^-$ suggests (≤3)$^{(+)}$; γ to 2$^+$.
3541.3 *4*	0$^+$		E GH L	J$^\pi$: L(t,p)=0; γ to 2$^+$.

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Adopted Levels, Gammas (continued)

^{86}Kr Levels (continued)

E(level)[†]	J^{π}[‡]	XREF	Comments
3583.4 *5*	(0^+ to 4^+)	GH	J^{π}: γ to 2^+.
3782.8 *4*	$(\leq 3)^{(+)}$	F H L	J^{π}: L(t,α)=(1) from $3/2^-$.
3816.32 *19*	(5^+)	D Gh M	J^{π}: ΔJ=1 γ from (6^+); γ to 4^+.
3832 *10*	0^+	E h	J^{π}: L(t,p)=0.
3935.1 *3*	(5)	D GH M	XREF: H(3938). J^{π}: L(p,p′)=(5) suggests 5^-. $J^{\pi}=5^+$ is also proposed in (p,p′) from $\sigma(\theta)$ data and $\nu(d_{5/2}(g_{9/2})^{-1})$ excitation.
3959 *10*	(3^-,4^+)	E L	XREF: L(3930). J^{π}: L(t,p)=3,4; L(t,α)=(3) from $3/2^-$ suggests $(1 \text{ to } 5)^{(+)}$. E(level): this level is most likely different from 3935 due to different spin assignments implied from L-transfers.
4038.6 *3*	$(2,3)^-$	F H L	J^{π}: L(t,α)=4 from $3/2^-$; γ to g.s.
4064.12 *19*	(6^+)	D G M	Configuration=$(\pi f_{5/2})^{-3}\otimes(\pi p_{3/2})^{-1}\otimes(\pi p_{1/2})^2(0^+)\otimes(\nu g_{9/2})^{-1}\otimes(\nu d_{5/2})^1$. J^{π}: ΔJ=2, E2 γ to 4^+.
4072 *10*	(5^-)	E H	XREF: H(4090). J^{π}: L(t,p)=(5).
4111 *10*	2^+	E	J^{π}: L(t,p)=2.
4175 *20*	(4^+)	H l	J^{π}: L(p,p′)=(4).
4194 *10*	2^+	E l	E(level): this level is most likely different from 4175 due to different spin assignments implied from L-transfers. J^{π}: L(t,p)=2.
4277 *10*	(7^+)[#]	H L	
4315.82 *8*	(2^-)	A E H	XREF: E(4298)H(4308). J^{π}: γ rays to 2^+ and 3^-; no γ rays to 0^+ and 4^+; level not populated in (γ,γ'); possible allowed β transition (log *ft*=5.4) from (1^-) parent. L(t,p)=3,4 is inconsistent, unless S=1 is involved with L=3 in the transfer of two neutrons.
4399 *20*	(4^+)[#]	H	
4400.82 *10*	1[@]	F	
4430.50 *25*	(6^-)	D M	J^{π}: ΔJ=1, D+Q γ to (5^-) and probable configuration=$\pi g_{9/2}^{+1}\otimes\pi f_{5/2}^{-1}\otimes\pi g_{9/2}^{+1}\otimes\pi p_{3/2}^{-1}$.
4559 *20*	(4^+)[#]	H	
4666 *10*	(3^-,4^+)	E H	J^{π}: L(t,p)=3,4.
4693.3 *3*	(7)	D M	J^{π}: ΔJ=1 γ rays to (6^-) and (6^+).
4706 *9*		E H	
4755.77 *25*	(7^+)	D M	J^{π}: ΔJ=1, D+Q γ rays to (6^-) and (6^+); possible configuration=$\nu g_{9/2}^{-1}\otimes\nu d_{5/2}^{+1}$.
4819 *12*	(2^+)	E H	J^{π}: L(t,p)=(2).
4867.5 *6*	(1^-)[@]	F	
4928 *10*	(4^+)	H	J^{π}: L(p,p′)=(4).
4932.55 *20*		F	
4948 *10*	(2^+)	E	J^{π}: L(t,p)=(2).
4991 *10*		E	
5127 *20*		H	
5203 *20*		H	
5313.98 *20*		A H	
5406.10 *23*	(1,2)	A H	J^{π}: γ to 0^+.
5438 *10*		E	
5517.42 *18*	1^-[@]	A EF	
5571.2 *12*	1[@]	F H	
5637? *10*		E	
5660.3 *3*	(8^+)	D M	J^{π}: ΔJ=(2) γ to (6^+); ΔJ=1, D+Q γ to (7^+) and possible configuration=$\pi g_{9/2}^{+2}$.
5669.1 *5*		D M	
5707 *10*		E	
5788.4 *3*	(1)[@]	F	

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Adopted Levels, Gammas (continued)

^{86}Kr Levels (continued)

E(level)[†]	J^{π}[‡]	XREF	Comments
5799 *9*		E H	
5814.5 *4*	(9^+)	D M	J^{π}: ΔJ=2 γ to (7^+); ΔJ=1 γ to (8^+).
5862 *9*		E H	
5924.3 *4*	1^-[@]	F H	
5981 *10*		E	
6085.1 *5*		D M	
6089.1 *5*	(1,2)	A	J^{π}: γ to 0^+.
6118 *10*		E	
6160.34 *20*	1^-[@]	A F	
6211.8 *3*	1[@]	A EF	
6248.0 *4*	(10)	D M	J^{π}: ΔJ=1 γ to (9^+).
6318 *10*		E	
6328.8 *3*	1^-[@]	F	
6397 *10*		E	
6432.16 *20*	1^-[@]	F	
6463.2 *3*	1^-[@]	F	
6531.97 *20*	1^-[@]	F	
6678.9 *5*	1[@]	F	
6720.5 *6*	(1,2)	A	J^{π}: γ to 0^+.
6768.30 *22*	(1,2)	A	J^{π}: γ to 0^+.
6818.6 *4*	1^-[@]	F	
7028.4 *4*	1^-[@]	F	
7128.1 *5*	(10)	D	J^{π}: ΔJ=(1) γ to (9^+); γ to (10).
7234.6 *4*	(1)[@]	F	
7304.5 *5*	1^-[@]	F	
7314.6 *3*	1^-[@]	F	
7459.5 *5*	(11)	D	J^{π}: ΔJ=1 γ to (10).
7570.0 *4*	1^-[@]	F	
7675.7 *4*	1[@]	F	
7745.8 *4*	1[@]	F	
7797.9 *4*	1^-[@]	F	
7846.6 *5*	1^-[@]	F	
7874.2 *7*	1^-[@]	F	
7876.4 *6*	(12)	D	J^{π}: ΔJ=(1) γ to (11).
7958.4 *4*	1^-[@]	F	
8428.6 *4*	1^-[@]	F	
8621.7 *8*	1^-[@]	F	
8651.3 *3*	1^-[@]	F	
8802.5 *6*	1[@]	F	
8841.6 *8*	1^-[@]	F	
9014.4 *6*	1^-[@]	F	
9068.1 *10*	1[@]	F	
9086.1 *8*	1^-[@]	F	
9452.9 *5*	1[@]	F	
9478.0 *18*		F	
10116.2 *8*	1[@]	F	

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Adopted Levels, Gammas (continued)

^{86}Kr Levels (continued)

† From least-squares fit to Eγ values for levels populated in γ-ray studies. Others are weighted averages of values observed in particle reaction studies.

‡ For high-spin (J>6), the assignments are based on γ(θ) data in (^{7}Li,p2nγ), unless otherwise stated.

From σ(θ) in (p,p′) and assumption of $\nu(d_{5/2}g_{9/2}^{-1})$ excitation.

@ From (γγ′) data, transition to 0$^+$ g.s. is E1 or dipole.

γ(^{86}Kr)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	Comments
1564.61	2$^+$	1564.67† *9*	100	0	0$^+$	E2	B(E2)(W.u.)=9.4 *8*
2250.01	4$^+$	685.35 *7*	100	1564.61	2$^+$	E2	B(E2)(W.u.)=0.054 *11*
2349.47	2$^+$	784.96 *8*	41 *4*	1564.61	2$^+$		I_γ: unweighted average from ^{86}Br β^- and (n,n′γ).
		2349.37 *12*	100	0	0$^+$		
2726.4	0$^+$	376.8	70 *6*	2349.47	2$^+$		
		1162.0	100	1564.61	2$^+$		
2850.72	(2,3)$^+$	501.25 *7*	22.2 *20*	2349.47	2$^+$		
		1286.08 *9*	100.0 *19*	1564.61	2$^+$		
2916.83	(3$^-$)	666.77 *7*	100	2250.01	4$^+$		
		1352.1	25 *4*	1564.61	2$^+$		γ from (n,n′γ) only, not reported in β^- decay.
2926.16	(2)$^+$	576.72 *8*	4.8 *4*	2349.47	2$^+$		γ from β^- decay only, not reported in (n,n′γ).
		1361.63 *10*	100	1564.61	2$^+$		
		2925.93 *20*	21.3 *25*	0	0$^+$		
3009.43	(1,2)$^+$	660.02 *10*	79 *6*	2349.47	2$^+$		
		3009.0 *3*	100	0	0$^+$		
3098.85	3$^-$	1534.24 *8*	100	1564.61	2$^+$		
3328.1	(3$^+$,4$^+$)	1763.5	100	1564.61	2$^+$		
3541.3	0$^+$	1191.6	100	2349.47	2$^+$		
		1976.9	50 *8*	1564.61	2$^+$		
3583.4	(0$^+$ to 4$^+$)	2018.8	100	1564.61	2$^+$		
3782.8	(≤3)$^{(+)}$	3782.7 *4*	100	0	0$^+$		
3816.32	(5$^+$)	1566.3 *2*	100	2250.01	4$^+$		
3935.1	(5)	1685.1 *3*	100	2250.01	4$^+$		
4038.6	(2,3)$^-$	4038.5 *3*	100	0	0$^+$	[M2,E3]	
4064.12	(6$^+$)	247.8 *3*	38	3816.32	(5$^+$)	D+Q	E_γ: γ not reported in (n,n′γ).
		1814.1 *2*	100	2250.01	4$^+$	E2	
4315.82	(2$^-$)	1217.02 *9*	34.6 *7*	3098.85	3$^-$		
		1306.57 *25*	2.01 *23*	3009.43	(1,2)$^+$		
		1389.73 *9*	53.2 *10*	2926.16	(2)$^+$		
		1398.48 *22*	1.8 *3*	2916.83	(3$^-$)		
		1465.09 *10*	39.0 *10*	2850.72	(2,3)$^+$		
		1966.27 *11*	34.4 *10*	2349.47	2$^+$		
		2751.06 *15*	100 *3*	1564.61	2$^+$		
		4316.5‡ *6*	0.6 *3*	0	0$^+$	[M2]	
4400.82	1	4400.7 *1*	100	0	0$^+$	D	
4430.50	(6$^-$)	495.3 *4*	42	3935.1	(5)		
		614.2 *3*	100	3816.32	(5$^+$)		
4693.3	(7)	262.8 *3*	100	4430.50	(6$^-$)		
		629.3 *4*	76	4064.12	(6$^+$)		
		758.2 *4*	≈32	3935.1	(5)		
4755.77	(7$^+$)	325.3 *4*	20	4430.50	(6$^-$)		
		691.6 *2*	100	4064.12	(6$^+$)		
4867.5	(1$^-$)	4867.4 *6*	100	0	0$^+$	(E1)	
4932.55		4932.4 *2*	100	0	0$^+$		
5313.98		2387.79 *18*	100 *11*	2926.16	(2)$^+$		

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Adopted Levels, Gammas (continued)

$\gamma(^{86}Kr)$ (continued)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	Comments
5313.98		3064.38‡ *19*	34 *4*	2250.01	4^+		
5406.10	(1,2)	2480.4 *5*	7.1 *11*	2926.16	$(2)^+$		
		5405.80 *25*	100 *6*	0	0^+		
5517.42	1^-	2418.24 *23*	22 *9*	3098.85	3^-		E_γ: γ from ^{86}Br decay only.
		5517.58 *25*	100 *5*	0	0^+	E1	
5571.2	1	5571.0 *12*	100	0	0^+	D	
5660.3	(8^+)	904.4 *4*	63	4755.77	(7^+)		
		967.0 *4*	100	4693.3	(7)		
		1596.2 *4*	88	4064.12	(6^+)		
5669.1		1238.6 *4*	100	4430.50	(6^-)		
5788.4	(1)	5788.2 *3*	100	0	0^+	(D)	
5814.5	(9^+)	154.2 *3*	100	5660.3	(8^+)		
		1058.7 *3*	63	4755.77	(7^+)		
5924.3	1^-	5924.1 *4*	100	0	0^+	E1	
6085.1		1391.8 *4*	100	4693.3	(7)		
6089.1	(1,2)	6088.9 *5*	100	0	0^+		
6160.34	1^-	6160.1 *2*	100	0	0^+	E1	
6211.8	1	6211.6 *3*	100	0	0^+	D	
6248.0	(10)	433.5 *2*	100	5814.5	(9^+)		
6328.8	1^-	6328.6 *3*	100	0	0^+	E1	
6432.16	1^-	6431.9 *2*	100	0	0^+	E1	
6463.2	1^-	6462.9 *3*	100	0	0^+	E1	
6531.97	1^-	6531.7 *2*	100	0	0^+	E1	
6678.9	1	6678.6 *5*	100	0	0^+	D	
6720.5	(1,2)	6720.2 *6*	100	0	0^+		
6768.30	(1,2)	3758.8 *3*	100 *12*	3009.43	$(1,2)^+$		
		6768.0 *3*	14.8 *16*	0	0^+		
6818.6	1^-	6818.3 *4*	100	0	0^+	E1	
7028.4	1^-	7028.1 *4*	100	0	0^+	E1	
7128.1	(10)	880.0 *4*	≈100	6248.0	(10)		
		1313.7 *4*	≈70	5814.5	(9^+)		
7234.6	(1)	7234.3 *4*	100	0	0^+	(D)	
7304.5	1^-	7304.2 *5*	100	0	0^+	E1	
7314.6	1^-	7314.3 *3*	100	0	0^+	E1	
7459.5	(11)	331.4 *3*	100	7128.1	(10)		
		1211.5 *4*	≈25	6248.0	(10)		
7570.0	1^-	7569.6 *4*	100	0	0^+	E1	
7675.7	1	7675.3 *4*	100	0	0^+	D	
7745.8	1	7745.4 *4*	100	0	0^+	D	
7797.9	1^-	7797.5 *4*	100	0	0^+	E1	
7846.6	1^-	7846.2 *5*	100	0	0^+	E1	
7874.2	1^-	7873.8 *7*	100	0	0^+	E1	
7876.4	(12)	416.9 *3*	100	7459.5	(11)		
7958.4	1^-	7958.0 *4*	100	0	0^+	E1	
8428.6	1^-	8428.2 *4*	100	0	0^+	E1	
8621.7	1^-	8621.2 *8*	100	0	0^+	E1	
8651.3	1^-	8650.8 *3*	100	0	0^+	E1	
8802.5	1	8802.0 *6*	100	0	0^+	D	
8841.6	1^-	8841.1 *8*	100	0	0^+	E1	
9014.4	1^-	9013.9 *6*	100	0	0^+	E1	
9068.1	1	9067.6 *10*	100	0	0^+	D	
9086.1	1^-	9085.6 *8*	100	0	0^+	E1	
9452.9	1	9452.3 *5*	100	0	0^+	D	
9478.0		9477.4 *18*	100	0	0^+		
10116.2	1	10115.6 *8*	100	0	0^+	D	

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Adopted Levels, Gammas (continued)

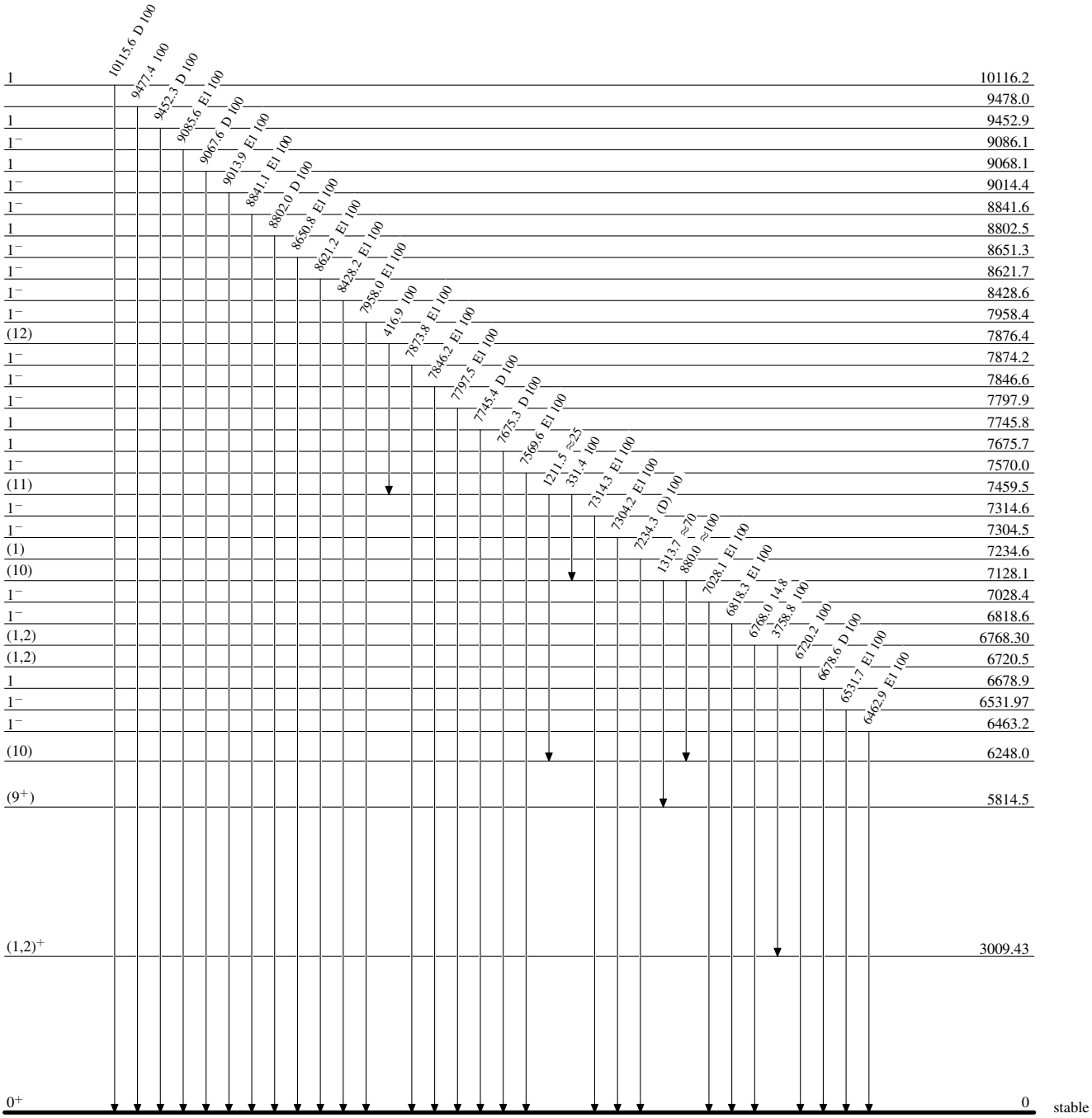
$\gamma(^{86}Kr)$ (continued)

† Weighted average from ^{86}Br β^- and (^7Li,p2nγ).
‡ Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{86}_{36}Kr_{50}$

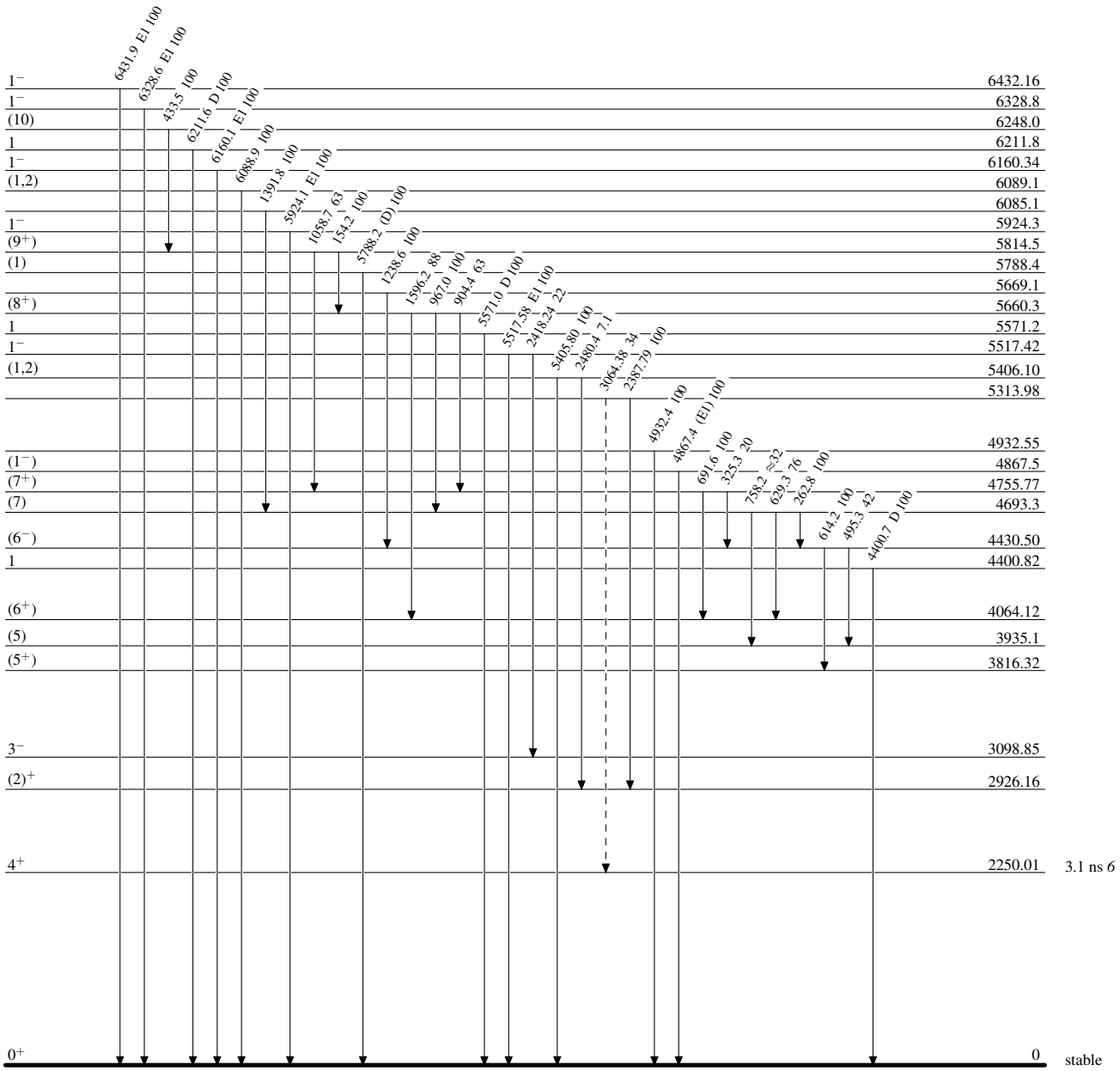
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{86}_{36}Kr_{50}$

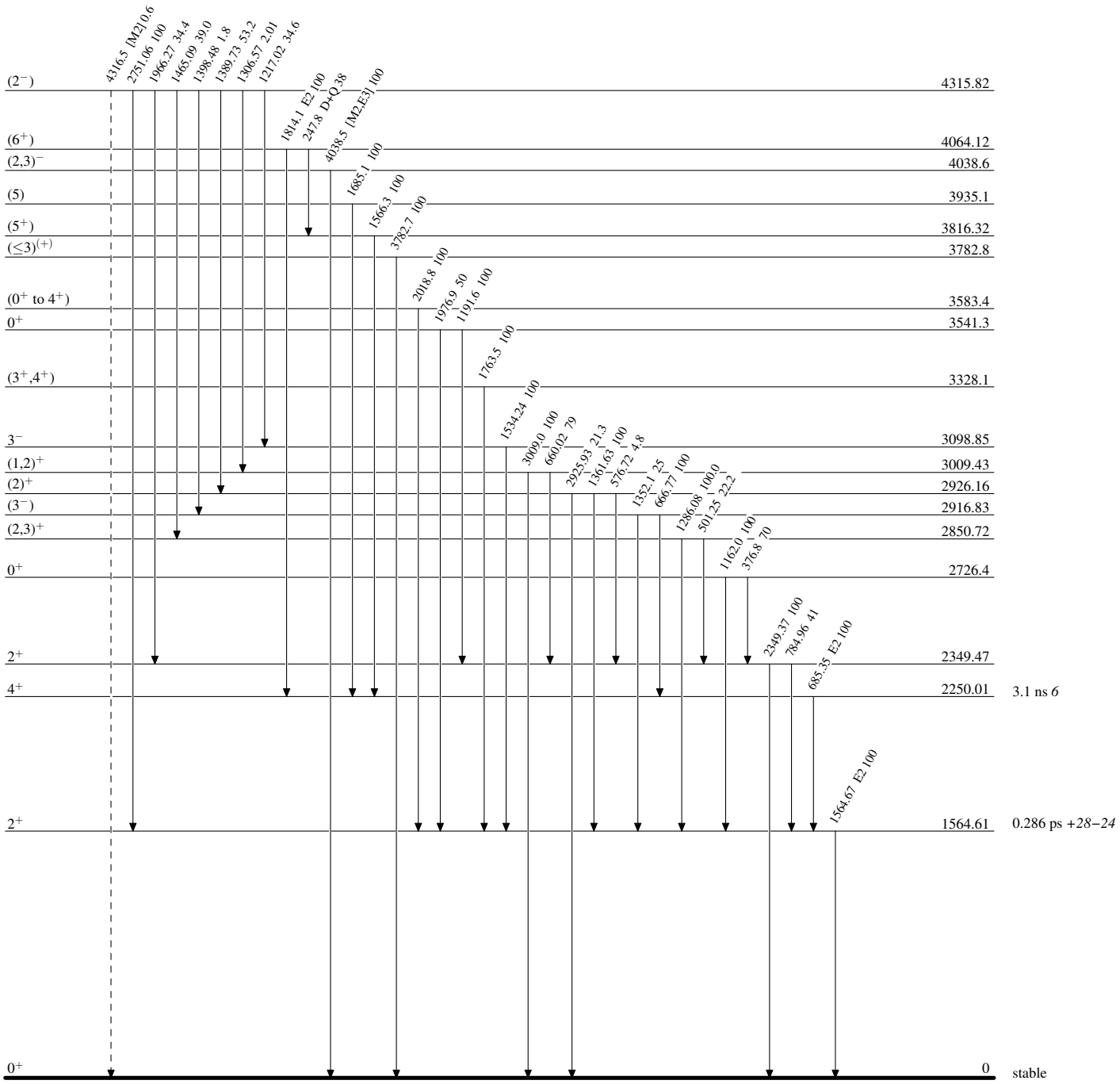
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{86}_{36}Kr_{50}$