

Adopted Levels, Gammas

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

$Q(\beta^-)=-518.66$ 20; $S(n)=9856.7$ 20; $S(p)=11979$ 3; $Q(\alpha)=-8096.7$ 14 2012Wa38
 $S(2n)=16968.96$ 1, $S(2p)=21895.9$ 20, $Q(2\beta^-)=1257.5$ 11 (2012Wa38).

^{86}Kr isotope identified in mass spectroscopic studies by Aston, Nature 105, 8 (1920); also 1921As01.

Other reaction:

$^{86}\text{Kr}(n,n)$ $E \leq 1$ MeV: 1989Jo01 analyzed $\sigma(E)$ to deduce optical model parameter.

Mean square charge radius and isotopic shift: 2000Ga58, 1995Ke04, 1992Sc19, 1990Ca26.

Additional information 1.

 ^{86}Kr LevelsCross Reference (XREF) Flags

A	^{86}Br β^- decay (55.1 s)	F	$^{86}\text{Kr}(\gamma, \gamma')$	K	$^{87}\text{Rb}(d, ^3\text{He})$
B	^{86}Rb ε decay (18.642 d)	G	$^{86}\text{Kr}(n, n' \gamma)$	L	$^{87}\text{Rb}(t, \alpha)$
C	^{87}Br $\beta^- n$ decay (55.65 s)	H	$^{86}\text{Kr}(p, p')$	M	$^{208}\text{Pb}(^{18}\text{O}, F\gamma)$
D	$^{82}\text{Se}(^7\text{Li}, p2n\gamma)$	I	$^{86}\text{Kr}(d, d')$		
E	$^{84}\text{Kr}(t, p)$	J	Coulomb excitation		

E(level) [†]	J^π [‡]	$T_{1/2}$	XREF	Comments
0	0 ⁺	stable	ABCDEFGHIJKLM	Spin: optical spectroscopy measurement (1933Ko02). RMS charge radius $\langle r^2 \rangle^{1/2} = 4.1835$ fm 21 (2013An02).
1564.61 7	2 ⁺	0.286 ps +28-24	A DEFGHIJKLM	$\mu = +2.20$ 10 (2014Ku10) B(E2) $\uparrow = 0.106$ 10 (2013PrZY) $\beta_2 = 0.106$ (1974Ar29) μ : from g factor = +1.10 5 (2014Ku10) measured using transient-field technique in Coulomb excitation. Other: +2.24 28 (2001Me20, 2014StZZ). J^π : 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.
2250.01 10	4 ⁺	3.1 ns 6	A DE GHIJKLM	μ : (2001Me20). $\mu = +4.12$ 56 (2014Ku10) μ : from g = +1.03 14 (2014Ku10) measured using transient-field technique in Coulomb excitation. J^π : L(p,p')=4. $T_{1/2}$: from $\gamma(t)$ in $^{82}\text{Se}(^7\text{Li}, p2n\gamma)$. Configuration = $\pi f_{5/2}^{-1} \otimes \pi p_{3/2}^{-1}$.
2349.47 7	2 ⁺		A EFGHI KL	J^π : L(t,p)=2.
2726.4 4	0 ⁺		E GH KL	J^π : L(t,p)=0.
2850.72 9	(2,3) ⁺		A HI KL	J^π : L(t, α)=1 from 3/2 ⁻ ; γ to 2 ⁺ ; γ from (3 ⁻).
2916.83 11	(3 ⁻)		A G	J^π : 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^π : γ to 0 ⁺ ; L(t, α)=3 from 3/2 ⁻ ; γ from (3 ⁻).
3009.43 11	(1,2) ⁺		A GH L	J^π : L(t, α)=3 from 3/2 ⁻ ; γ to g.s..
3098.85 9	3 ⁻		A E GHI L	J^π : 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^π : 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^π : L(t,p)=0; γ to 2 ⁺ .

Continued on next page (footnotes at end of table)

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	(≤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 ^π =5 ⁺ is also proposed in (p,p') from σ(θ) data and ν(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 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=πf _{5/2} ⁻³ ⊗πp _{3/2} ⁻¹ ⊗πp _{1/2} ⁺² 0+⊗ νg _{9/2} ⁻¹ ⊗νd _{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 1	J ^π : L(p,p')=(4).
4194 10	2 ⁺	E 1	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=πg _{9/2} ⁺¹ ⊗πf _{5/2} ⁻¹ ⊗πg _{9/2} ⁺¹ ⊗πp _{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=νg _{9/2} ⁻¹ ⊗νd _{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=πg _{9/2} ⁺² .
5669.1 5		D M	
5707 10		E	
5788.4 3	(1) [@]	F	
5799 9		E H	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{86}Kr Levels (continued)

E(level) [†]	J ^π [‡]	XREF	Comments
5814.5 4	(9 ⁺)	D	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	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{86}Kr Levels (continued)

† From least-squares fit to E_γ 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 $\gamma(\theta)$ data in ($^7\text{Li}, p2n\gamma$), unless otherwise stated.

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

@ From $(\gamma\gamma')$ data, transition to 0^+ g.s. is E1 or dipole.

$E_i(\text{level})$	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 $(n, n'\gamma)$.
		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 $(n, n'\gamma)$ 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 $(n, n'\gamma)$.
		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	$(0^+ \text{ to } 4^+)$	2018.8	100	1564.61	2^+		
3782.8	$(\leq 3)^{+}$	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 $(n, n'\gamma)$.
		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^+		

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) $\gamma(^{86}\text{Kr})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	Comments
5313.98		2387.79 18	100 11	2926.16	(2) ⁺		
		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	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

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

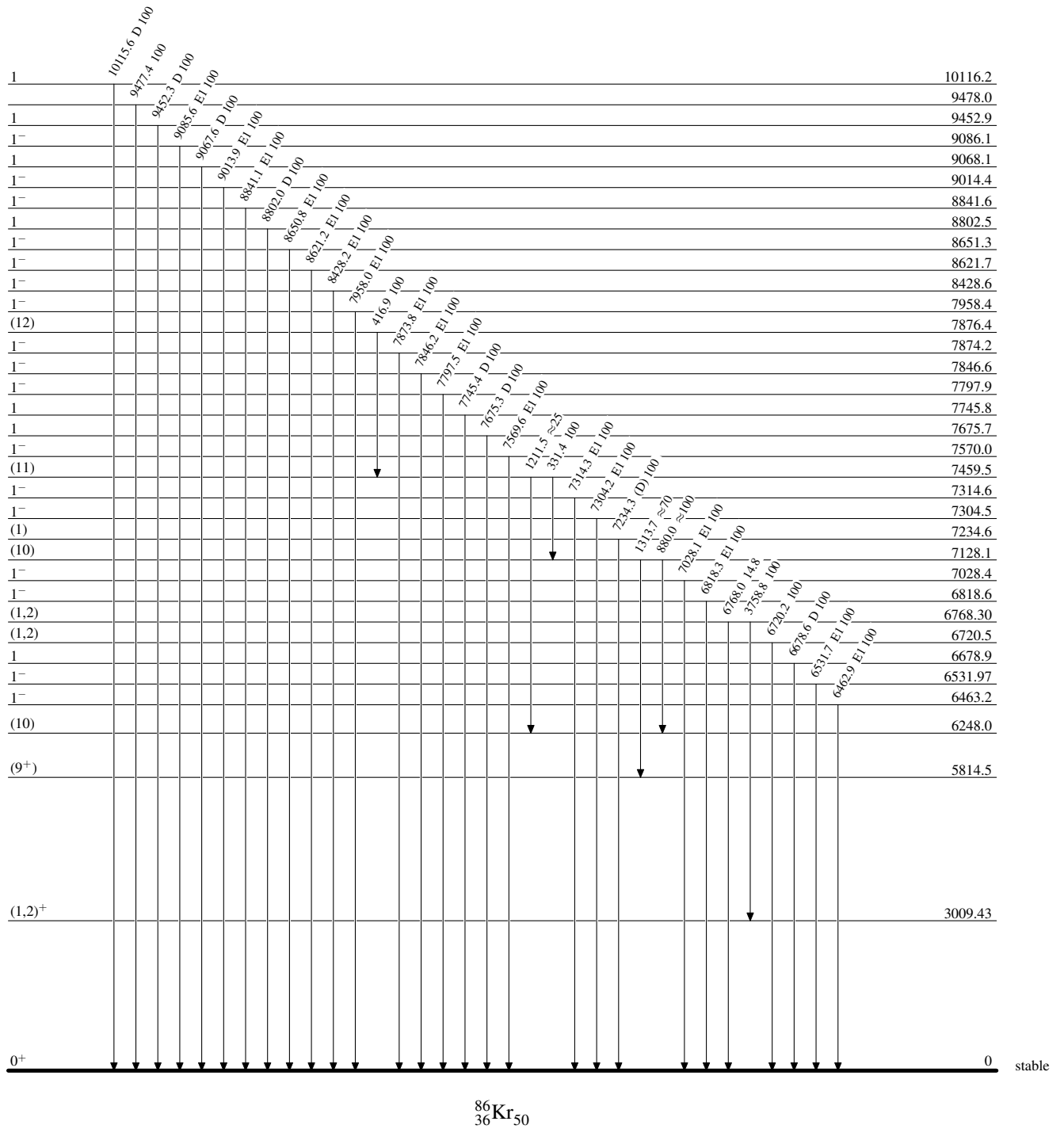
<u>$E_i(\text{level})$</u>	<u>J_i^π</u>	<u>E_γ</u>	<u>I_γ</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.</u>
9478.0		9477.4 18	100	0	0 ⁺	
10116.2	1	10115.6 8	100	0	0 ⁺	D

† Weighted average from $^{86}\text{Br} \beta^-$ and ($^7\text{Li}, p2n\gamma$).

‡ Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas**Level Scheme**

Intensities: Relative photon branching from each level

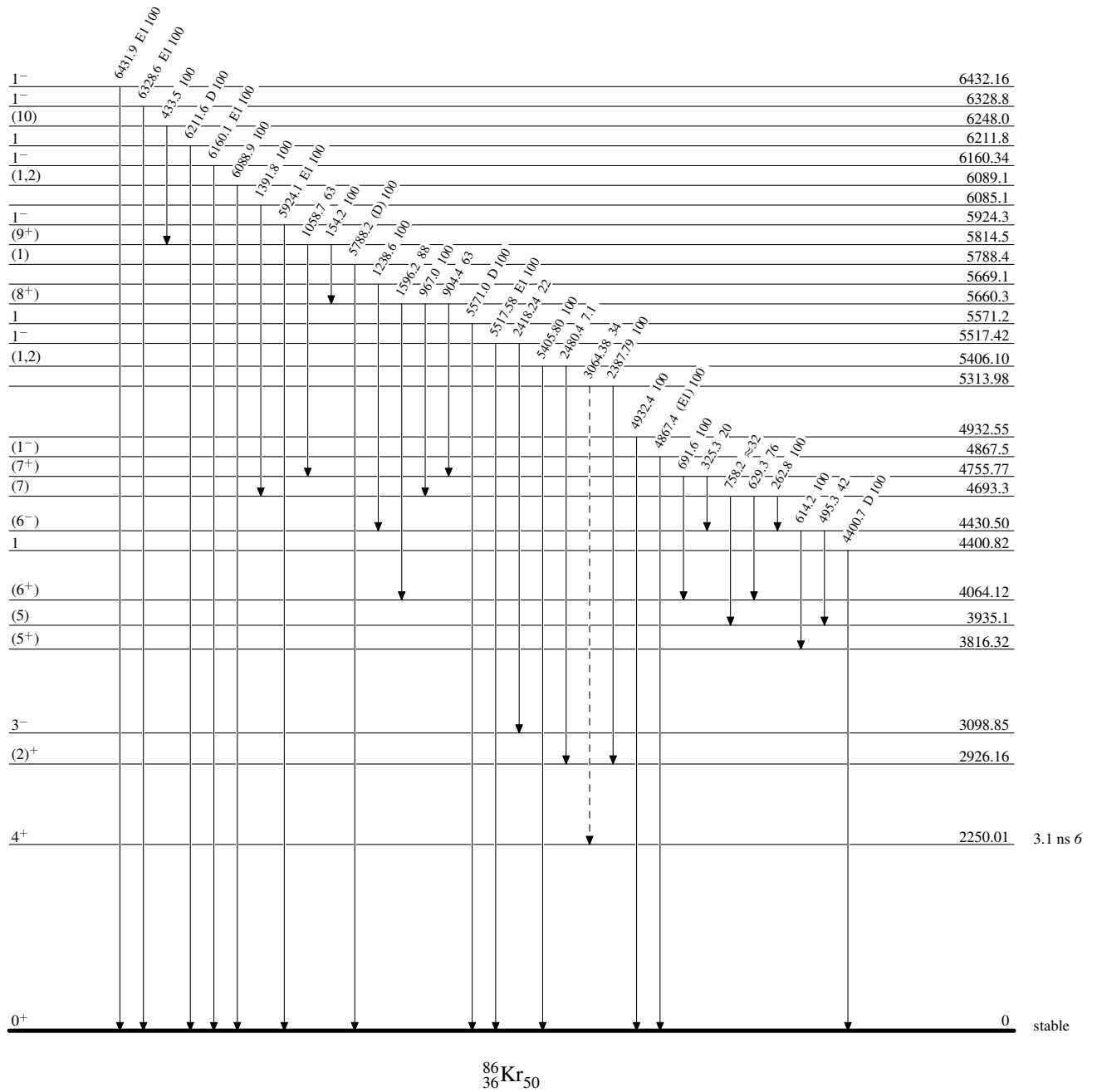


Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

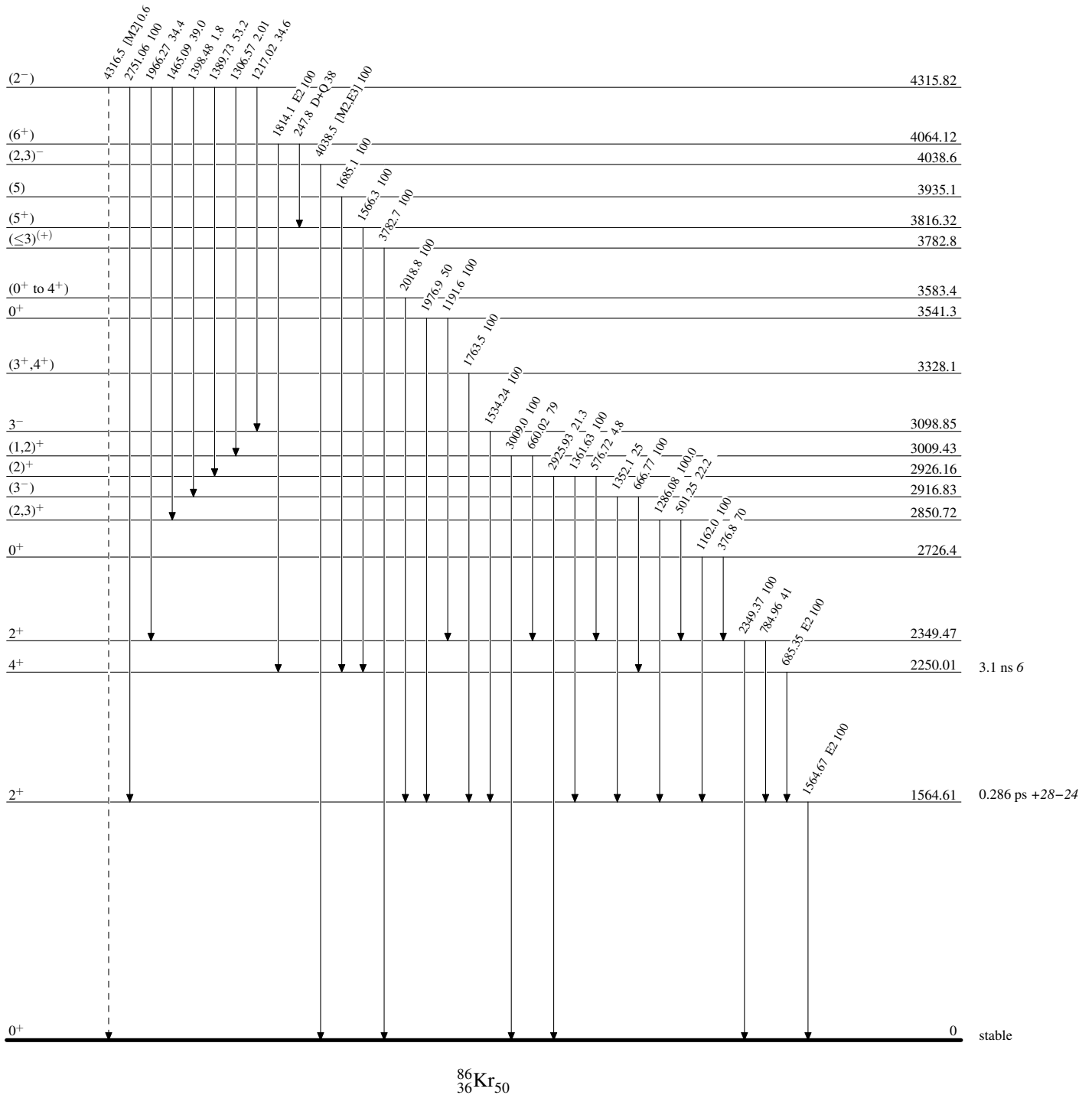
-----▶ γ Decay (Uncertain) $^{86}_{36}\text{Kr}_{50}$

Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

-----▶ γ Decay (Uncertain) $^{86}_{36}\text{Kr}_{50}$