

⁴⁴K β⁻ decay (22.13 min) 1976Co06

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen, Balraj Singh and John A. Cameron		NDS 112, 2357 (2011)	31-Jul-2011

Parent: ⁴⁴K: E=0; J^π=2⁻; T_{1/2}=22.13 min 19; Q(β⁻)=5687.38 53; %β⁻ decay=100.0

⁴⁴K-Q(β⁻): from 2011AuZZ, 2003Au03 give 5660 40.

1976Co06: Source of ⁴⁴K prepared by irradiating calcium metal foils of natural isotopic abundance in the Livermore 14-MeV neutron generator. Ge(Li) detector. Measured E_γ, I_γ. Deduced levels, γ-branchings, log ft.

Others:

T_{1/2}(⁴⁴K): 1973In02, 1961Hi17, 1960Su05, 1954Co70, 1954An25, 1937Wa06.

β⁻: 1970Le05, 1961Hi17, 1960Su05, 1954Co70.

γ: 1973In02 (also 1969Ta03), 1970La11, 1970Le05, 1961Hi17, 1960Su05, 1954Co70.

⁴⁴Ca Levels

E(level)	J ^π ‡	E(level)	J ^π ‡	E(level)	J ^π ‡	E(level)	J ^π ‡
0.0	0 ⁺	3580.4 6		4399.1 6	3 ⁻	4884.02 8	(1,2,3) ⁻
1157.018 3	2 ⁺	3661.526 10	1	4409.170 14	(1,2,3) ⁻	4892.6?† 8	
1883.515 14	0 ⁺	3676.080 13	(1 ⁻ to 3 ⁻)	4436.7 5	(1,2 ⁺)	5025.72 21	3 ⁻
2283.113 10	4 ⁺	3711.79 16	4 ⁻	4552.636 23	(1,2,3) ⁻	5130.8 7	(2,3) ⁺
2656.503 12	2 ⁺	3776.26 12	2	4561.8?† 6		5162.29 10	(1,2 ⁺)
3044.24 3	4 ⁺	4094.0 6	(2 ⁺ to 4 ⁺)	4572.6 5	(1,2,3)	5201.1 4	(1,2,3) ⁻
3301.25 5	2 ⁺	4260.3 4	(2 ⁺ ,3)	4649.4 5	2 ⁺	5325.0 5	
3307.864 10	3 ⁻	4315.22 14	(1,2,3)	4824.4 6	(1,2,3)	5367.5 7	
3357.2 4	(2 ⁺ to 4 ⁺)	4358.43 3	3 ⁻	4866.10 11	(1,2 ⁺)	5560.8 6	3 ⁻

† Uncertain population. This level is not included in Adopted Levels.

‡ From Adopted Levels.

β⁻ radiations

All data from 1976Co06, unless otherwise noted.

β⁻ feedings are from intensity imbalance at each level (g.s. feeding=34% 10 (1970Le05)).

E(decay)	E(level)	Iβ ⁻ †	Log ft	Comments
(126.6 8)	5560.8	0.027 18	4.1 11	av Eβ= 27 11
(319.9 9)	5367.5	0.023 19	5.8 9	av Eβ= 90 14
(362.4 7)	5325.0	0.009 5	6.4 5	av Eβ= 105 14
(486.3 7)	5201.1	0.11 6	5.8 4	av Eβ= 151 15
(525.1 6)	5162.29	0.083 18	6.11 16	av Eβ= 165 15
(556.6 9)	5130.8	0.029 18	6.6 5	av Eβ= 178 15
(661.7 6)	5025.72	0.0077 25	6.4 3	av Eβ= 219 16
(794.8‡ 10)	4892.6?	0.003 3		
(803.4 5)	4884.02	0.68 13	5.80 13	av Eβ= 277 17
(821.3 6)	4866.10	0.29 5	6.21 12	av Eβ= 284 17
(863.0 8)	4824.4	0.08 4	6.9 4	av Eβ= 302 17
(1038.0 7)	4649.4	0.08 5	7.2 5	av Eβ= 375 17
(1114.8 7)	4572.6	0.19 8	6.9 3	av Eβ= 409 17
(1125.6‡ 8)	4561.8?	0.046 25		
(1134.7 5)	4552.636	4.5 7	5.60 8	av Eβ= 418 17
(1250.7 7)	4436.7	0.024 13	8.0 4	av Eβ= 469 18
(1278.2 5)	4409.170	7.2 12	5.58 7	av Eβ= 481 18

Continued on next page (footnotes at end of table)

^{44}K β^- decay (22.13 min) 1976Co06 (continued) β^- radiations (continued)

E(decay)	E(level)	$I\beta^-$ [†]	Log <i>ft</i>	Comments
(1288.3 8)	4399.1	0.035 19	7.9 3	av $E\beta^-$ = 486 18
(1328.9 5)	4358.43	1.5 3	6.33 8	av $E\beta^-$ = 504 18
(1372.2 6)	4315.22	0.37 8	7.00 13	av $E\beta^-$ = 523 18
(1427.1 7)	4260.3	0.12 5	7.6 3	av $E\beta^-$ = 548 18
(1593.4 8)	4094.0	0.12 5	7.8 3	av $E\beta^-$ = 624 18
(1911.1 6)	3776.26	0.23 6	7.80 12	av $E\beta^-$ = 770 19
(2011.3 5)	3676.080	11.0 18	6.21 5	av $E\beta^-$ = 816 19
(2025.9 5)	3661.526	6.2 10	6.48 5	av $E\beta^-$ = 823 19
(2107.0 8)	3580.4	0.041 24	8.7 6	av $E\beta^-$ = 861 19
(2330.2 7)	3357.2	0.05 7	8.5 3	av $E\beta^-$ = 966 19
(2379.5 5)	3307.864	28.5 5	6.11 4	av $E\beta^-$ = 990 19
(2386.1 5)	3301.25	0.21 11	8.3 3	av $E\beta^-$ = 993 19
(2643.1 5)	3044.24	0.12 9	10.1 ^{1u} 10	av $E\beta^-$ = 1133 19
(3404.3 5)	2283.113	0.52 21	10.0 ^{1u} 2	av $E\beta^-$ = 1495 19
(3803.9 5)	1883.515	1.5 3	9.88 ^{1u} 9	av $E\beta^-$ = 1687 19
(4530.4 5)	1157.018	1.6 7	8.6 2	av $E\beta^-$ = 2027 20
(5687.4 5)	0.0	34 10	9.64 ^{1u} 17	av $E\beta^-$ = 2601 20

 $I\beta^-$: value adopted from 1970Le05.[†] Absolute intensity per 100 decays.[‡] Existence of this branch is questionable.

⁴⁴K β⁻ decay (22.13 min) 1976Co06 (continued)

$\gamma(^{44}\text{Ca})$									
E_γ	I_γ #	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. ‡	δ^\ddagger	$\alpha^@$	Comments
^x 174.35 25	1.0 2								
^x 209.98 25	0.3 2								
263.53 6	1.9 5	3307.864	3 ⁻	3044.24	4 ⁺				
353.67 25	0.3 2	3661.526	1	3307.864	3 ⁻				
368.207 14	38.8 7	3676.080	(1 ⁻ to 3 ⁻)	3307.864	3 ⁻				
374.85 10	3.3 8	3676.080	(1 ⁻ to 3 ⁻)	3301.25	2 ⁺				
403.86 20	1.1 3	3711.79	4 ⁻	3307.864	3 ⁻				
^x 463.3 4	0.3 3								
646.5 3	1.5 5	4358.43	3 ⁻	3711.79	4 ⁻				
651.355 9	52 2	3307.864	3 ⁻	2656.503	2 ⁺				
682.34 3	1.3 7	4358.43	3 ⁻	3676.080	(1 ⁻ to 3 ⁻)				Additional information 4.
696.9 ^a	≤0.1	4358.43	3 ⁻	3661.526	1				
726.490 16	65 2	1883.515	0 ⁺	1157.018	2 ⁺	E2			
733.0 4	2.8 12	4409.170	(1,2,3) ⁻	3676.080	(1 ⁻ to 3 ⁻)				
747.63 3	36 2	4409.170	(1,2,3) ⁻	3661.526	1				
761.10 3	2 1	3044.24	4 ⁺	2283.113	4 ⁺	M1+E2	-0.25 20		
^x 766.8 5	0.8 7								
772.97 ^a	≤0.1	2656.503	2 ⁺	1883.515	0 ⁺				
876.53 3	29.8 6	4552.636	(1,2,3) ⁻	3676.080	(1 ⁻ to 3 ⁻)				
891.09 12	1.6 6	4552.636	(1,2,3) ⁻	3661.526	1				
^x 983.58 15	3 1								
1005.0 9	0.5	3661.526	1	2656.503	2 ⁺				
1019.55 7	14.5 6	3676.080	(1 ⁻ to 3 ⁻)	2656.503	2 ⁺				
1024.738 17	115 2	3307.864	3 ⁻	2283.113	4 ⁺				
1050.60 10	9.6 14	4358.43	3 ⁻	3307.864	3 ⁻				
1074.1 4	1.5 9	3357.2	(2 ⁺ to 4 ⁺)	2283.113	4 ⁺				
1101.3 5	0.2 2	4409.170	(1,2,3) ⁻	3307.864	3 ⁻				
^x 1106.26 25	1.7 5								
1107.98 9	11.5 8	4409.170	(1,2,3) ⁻	3301.25	2 ⁺				
1119.7 4	0.3 2	3776.26	2	2656.503	2 ⁺				
1126.076 10	131 2	2283.113	4 ⁺	1157.018	2 ⁺	E2+M3	-0.05 4		
1157.002 3	1000 1	1157.018	2 ⁺	0.0	0 ⁺	E2		6.48×10 ⁻⁵	
^x 1195.4 2	0.8 7								
1195.4	0.8 7	4552.636	(1,2,3) ⁻	3357.2	(2 ⁺ to 4 ⁺)				
1222.50 8	8.3 8	4884.02	(1,2,3) ⁻	3661.526	1				
1244.75 5	14.3 5	4552.636	(1,2,3) ⁻	3307.864	3 ⁻				
^x 1272.8 4	1.4 13								
1285.0 ^a 10	≤0.3	4866.10	(1,2 ⁺)	3580.4					
1363.7 8	0.2 2	5025.72	3 ⁻	3661.526	1				
^x 1377.6 5	2 1								
^x 1427.5 4	1.9 9								
1428.7 4	0.4 2	3711.79	4 ⁻	2283.113	4 ⁺				

⁴⁴K β⁻ decay (22.13 min) **1976Co06** (continued)

γ(⁴⁴Ca) (continued)

<u>E_γ</u>	<u>I_γ[#]</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.[‡]</u>	<u>δ[‡]</u>	<u>Comments</u>
1499.45 4	135 5	2656.503	2 ⁺	1157.018	2 ⁺	M1+E2	-0.123 16	
1525.0		5201.1	(1,2,3) ⁻	3676.080	(1 ⁻ to 3 ⁻)			E _γ , I _γ : obscured by an impurity.
1575.9 3	3.0 9	4884.02	(1,2,3) ⁻	3307.864	3 ⁻			
^x 1625.0 7	0.6 4							
^x 1634.52 11	4.0 9							Placement: 5309 to 3675 (table I of 1976Co06). See also 1973In02 .
1658.69 18	3.7 9	4315.22	(1,2,3)	2656.503	2 ⁺			
1701.9 3	1.7 7	4358.43	3 ⁻	2656.503	2 ⁺			
1752.629 10	70 1	4409.170	(1,2,3) ⁻	2656.503	2 ⁺			
1777.973 20	36.5 8	3661.526	1	1883.515	0 ⁺			
1810.4 7	1.2 8	4094.0	(2 ⁺ to 4 ⁺)	2283.113	4 ⁺			Additional information 3.
1884.5 10	0.4 3	5560.8	3 ⁻	3676.080	(1 ⁻ to 3 ⁻)			
1887.21 28	2 1	3044.24	4 ⁺	1157.018	2 ⁺	E2+M3	-0.08 5	
1893.2 4	1.9 9	5201.1	(1,2,3) ⁻	3307.864	3 ⁻			
1896.0 9	1.9 14	4552.636	(1,2,3) ⁻	2656.503	2 ⁺			Additional information 5.
1916.0 8	2.3 12	4572.6	(1,2,3)	2656.503	2 ⁺			
^x 1923	≤0.9							Placement: 5231 to 3308 (table I of 1976Co06).
1976.9 7	0.9 7	4260.3	(2 ⁺ , 3)	2283.113	4 ⁺			
1992.4 5	1.2 8	4649.4	2 ⁺	2656.503	2 ⁺			
2144.23 8	12.9 8	3301.25	2 ⁺	1157.018	2 ⁺			
2150.786 17	391 8	3307.864	3 ⁻	1157.018	2 ⁺			
2167.8 6	1.3 7	4824.4	(1,2,3)	2656.503	2 ⁺			
2200.3	0.2 2	3357.2	(2 ⁺ to 4 ⁺)	1157.018	2 ⁺			
2268.5 10	0.5 4	4552.636	(1,2,3) ⁻	2283.113	4 ⁺			
2280.8 ^a 7	≤0.5	5325.0		3044.24	4 ⁺			E _γ , I _γ : possibly a contaminant from ⁸⁸ Rb decay.
^x 2324.3	0.6 4							Placement 3581 to 1157 shown in table I of 1976Co06 is incorrect.
^x 2338.3 6	0.7 4							Additional information 1.
2423.3 6	0.7 4	3580.4		1157.018	2 ⁺			Additional information 2.
^x 2497.3 9	0.6 5							
2504.39 6	11.2 9	3661.526	1	1157.018	2 ⁺			
2518.991 18	167 3	3676.080	(1 ⁻ to 3 ⁻)	1157.018	2 ⁺			
^x 2598.4 6	0.7 5							
2619.16 12	3.6 7	3776.26	2	1157.018	2 ⁺	D+Q	-0.62 8	
2656.41 3	16.9 8	2656.503	2 ⁺	0.0	0 ⁺	E2		
2668 ^a	≤0.05	5325.0		2656.503	2 ⁺			
2711	0.3 3	5367.5		2656.503	2 ⁺			
^x 2740.4 8	0.11 9							
^x 2745.0 10	≤0.2							
2847.6 7	0.5 3	5130.8	(2,3) ⁺	2283.113	4 ⁺			
2937.8 10	0.8 3	4094.0	(2 ⁺ to 4 ⁺)	1157.018	2 ⁺			
^x 2973.0 10	0.3 2							
2982.47 15	2.2 3	4866.10	(1,2 ⁺)	1883.515	0 ⁺			

⁴⁴K β⁻ decay (22.13 min) 1976Co06 (continued)γ(⁴⁴Ca) (continued)

<u>E_γ</u>	<u>I_γ[#]</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.[‡]</u>	<u>Comments</u>
^x 3067.0 [†] 8	0.2 2						
3103.2 4	1.1 4	4260.3	(2 ⁺ ,3)	1157.018	2 ⁺		
3158.07 20	2.6 4	4315.22	(1,2,3)	1157.018	2 ⁺		
3201.27 7	12.1 9	4358.43	3 ⁻	1157.018	2 ⁺		
^x 3217.3 5	0.5 3						Placement: 4374 to 1157 (table I of 1976Co06).
^x 3227.1 8	0.3 2						Placement: 4384 to 1157 (table I of 1976Co06).
3242.0 6	0.6 3	4399.1	3 ⁻	1157.018	2 ⁺		
3252.07 12	2.7 4	4409.170	(1,2,3) ⁻	1157.018	2 ⁺		
3279.0 ^{&} 7	0.3 ^{&} 2	4436.7	(1,2 ⁺)	1157.018	2 ⁺		
3279.0 ^{&} 7	0.3 ^{&} 2	5162.29	(1,2 ⁺)	1883.515	0 ⁺		
3301.21 14	5.5 9	3301.25	2 ⁺	0.0	0 ⁺	E2	
3307.7 5	0.3 1	3307.864	3 ⁻	0.0	0 ⁺	E3	
3395.51 4	28.7 8	4552.636	(1,2,3) ⁻	1157.018	2 ⁺		
3404.6 6	0.8 4	4561.8?		1157.018	2 ⁺		
3415.5 6	1.0 4	4572.6	(1,2,3)	1157.018	2 ⁺		
3661.363 11	105 2	3661.526	1	0.0	0 ⁺		
3676.7 6	0.25 11	3676.080	(1 ⁻ to 3 ⁻)	0.0	0 ⁺		
3708.90 ^a 12	≤0.8	4866.10	(1,2 ⁺)	1157.018	2 ⁺		
3726.6 4	0.5 1	4884.02	(1,2,3) ⁻	1157.018	2 ⁺		
^x 3747.1	≤0.01						Placement: 4904 to 1157 (table I of 1976Co06).
^x 3755.2 9	0.14 9						
3868.56 22	1.1 3	5025.72	3 ⁻	1157.018	2 ⁺		
^x 3967.8	0.11 9						
4005	0.02 2	5162.29	(1,2 ⁺)	1157.018	2 ⁺		
4044 ^a	≤0.05	5201.1	(1,2,3) ⁻	1157.018	2 ⁺		
^x 4074.0 10	0.08 8						Placement: 5231 to 1157 (table I of 1976Co06).
^x 4162.5 [†] 8	0.09 8						
4167.8 5	0.16 8	5325.0		1157.018	2 ⁺		
4210.1 10	0.09 8	5367.5		1157.018	2 ⁺		
^x 4337.9 [†] 8	0.09 8						
^x 4355	≤0.05						Placement: 5512 to 1157.
4403.6 6	0.06 4	5560.8	3 ⁻	1157.018	2 ⁺		
4408.91 18	0.92 15	4409.170	(1,2,3) ⁻	0.0	0 ⁺		
4437.0 7	0.12 8	4436.7	(1,2 ⁺)	0.0	0 ⁺		
^x 4471.5 6	0.11 8						
4651	0.14 8	4649.4	2 ⁺	0.0	0 ⁺		
4865.81 15	2.8 1	4866.10	(1,2 ⁺)	0.0	0 ⁺		
4892.3 8	0.06 5	4892.6?		0.0	0 ⁺		
5025.4 8	0.03 2	5025.72	3 ⁻	0.0	0 ⁺		
5161.96 10	1.11 7	5162.29	(1,2 ⁺)	0.0	0 ⁺		
^x 5231.0	≤0.01						Placement: 5231 to g.s.
5561.3 ^a 10	0.05 4	5560.8	3 ⁻	0.0	0 ⁺		

$\gamma(^{44}\text{Ca})$ (continued)

† Uncertain assignment.

‡ From Adopted Gammas.

For absolute intensity per 100 decays, multiply by 0.058 9.

@ Total theoretical internal conversion coefficients, calculated using the BrIcc code ([2008Ki07](#)) with Frozen orbital approximation based on γ -ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

& Multiply placed with undivided intensity.

^a Placement of transition in the level scheme is uncertain.

^x γ ray not placed in level scheme.

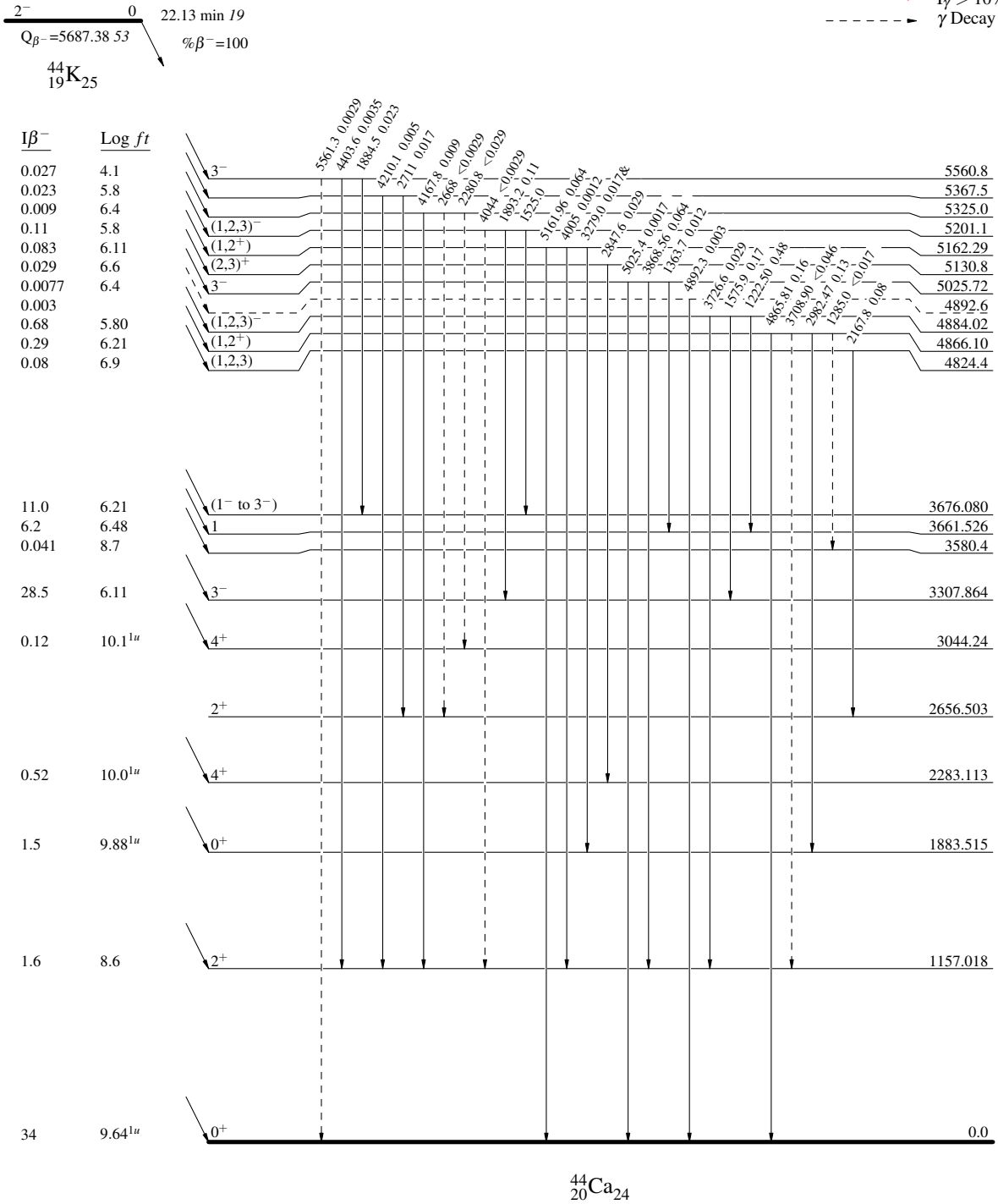
$^{44}\text{K} \beta^-$ decay (22.13 min) 1976Co06

Decay Scheme

Intensities: I_γ per 100 parent decays
& Multiply placed: undivided intensity given

Legend

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



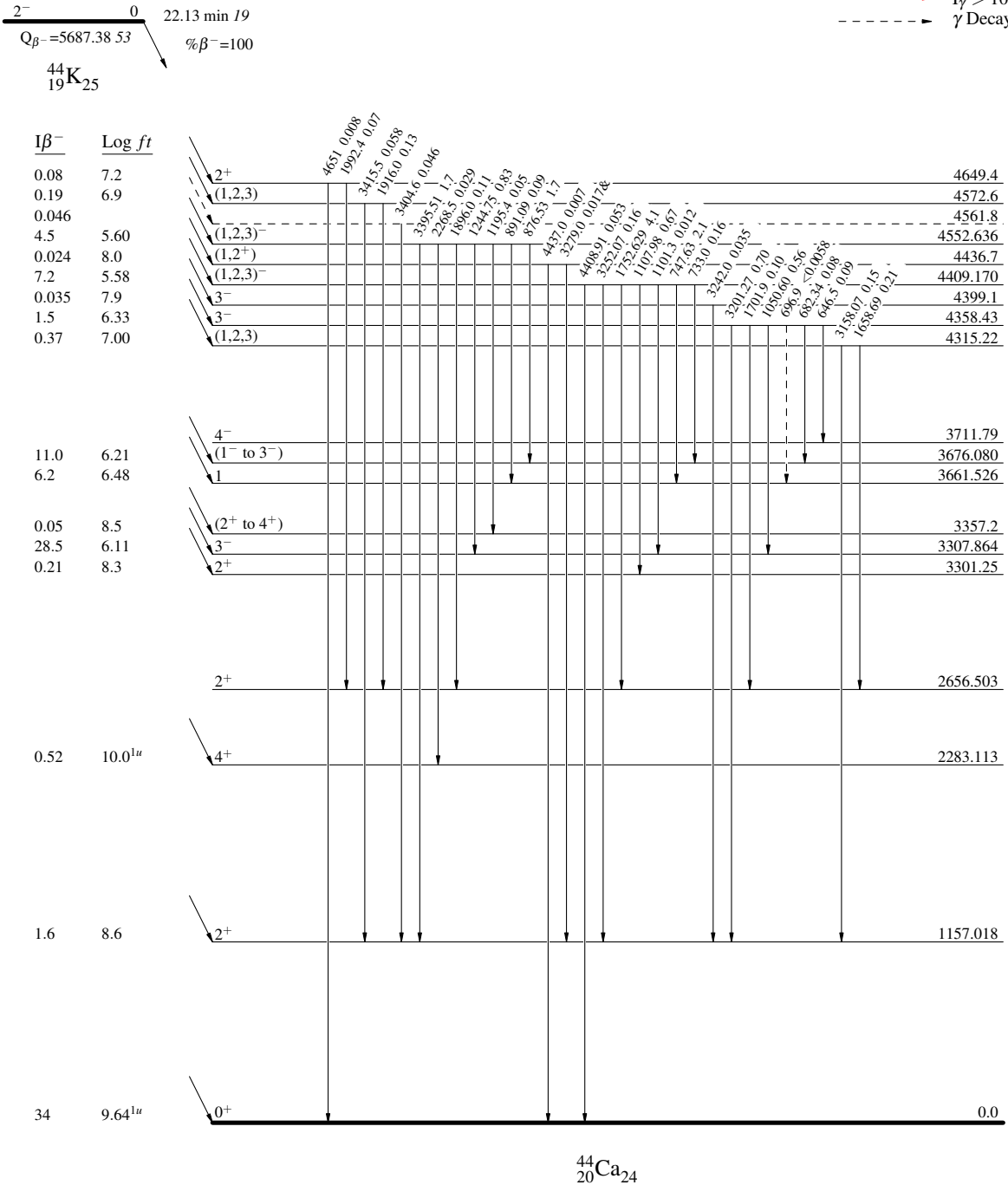
$^{44}\text{K} \beta^-$ decay (22.13 min) 1976Co06

Decay Scheme (continued)

Intensities: I_γ per 100 parent decays
& Multiply placed: undivided intensity given

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)



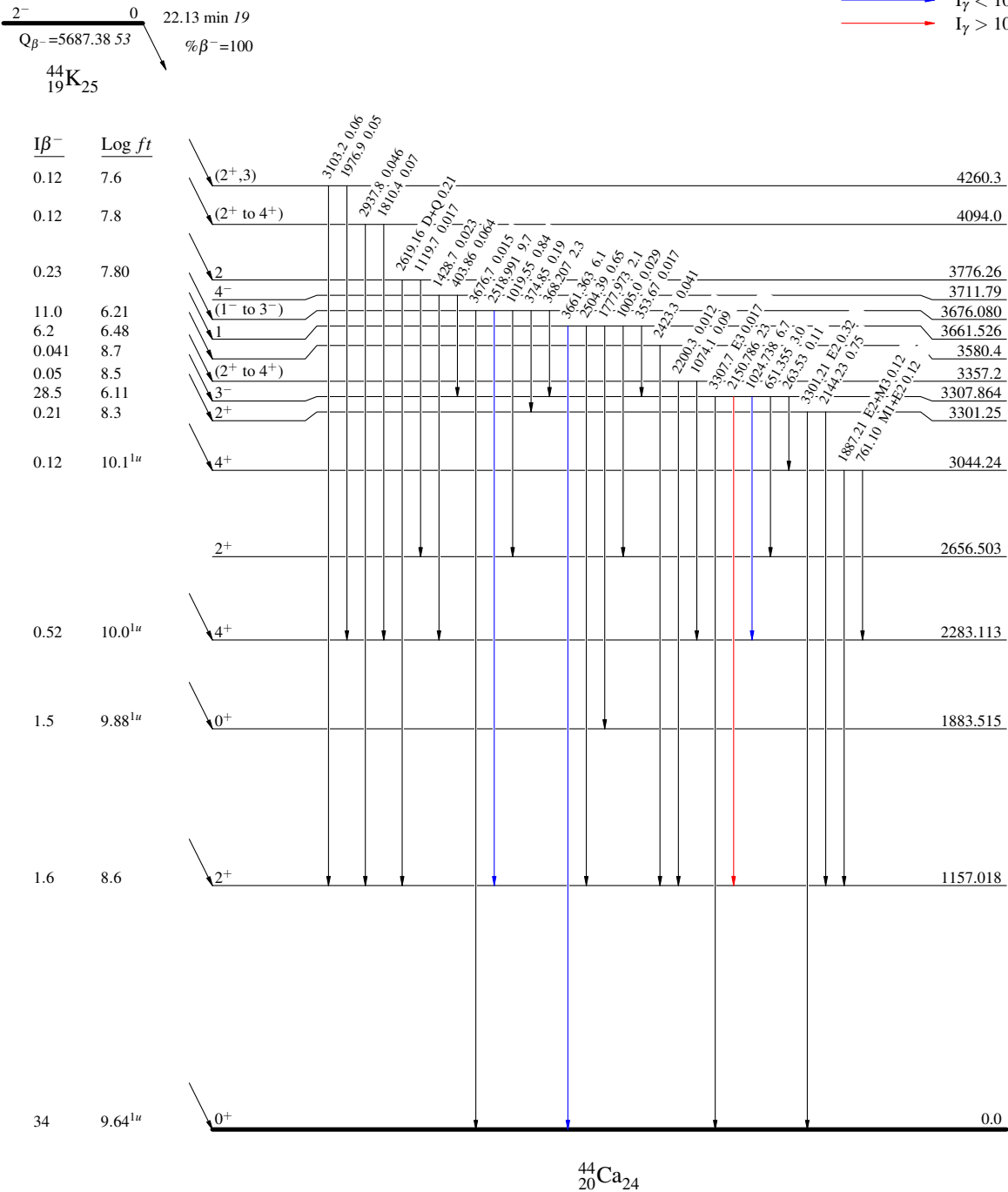
$^{44}\text{K} \beta^-$ decay (22.13 min) 1976Co06

Decay Scheme (continued)

Intensities: I_γ per 100 parent decays
& Multiply placed: undivided intensity given

Legend

- $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
- $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
- $I_\gamma > 10\% \times I_\gamma^{\text{max}}$



^{44}K β^- decay (22.13 min) 1976Co06

Decay Scheme (continued)

Intensities: I_γ per 100 parent decays
& Multiply placed: undivided intensity given

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)

