^{90}Rb β^- decay (158 s) 1981Ta05

History

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

Parent: ^{90}Rb: E=0; $J^\pi=0^-$; $T_{1/2}$=158 s *5*; Q(β^-)=6584 *7*; %β^- decay=100.0

1981Ta05: From ^{235}U(n,F). Mass separation of ^{90}Kr. NaI and Ge(Li). Measured Eγ, Iγ, $\gamma\gamma$ coin, $\gamma\gamma(\theta)$. The 158-s and 258-s ^{90}Rb activities were distinguished by varying collection and observation times.

1977Hu03: From ^{235}U(n,F). Mass separation. Measured $T_{1/2}$, Eγ, Iγ, $\gamma\gamma$ coin, Eβ.

1997Gr09: from ^{252}Cf. On-line mass separation and measurement of γ rays using a total absorption γ-ray spectrometer to determine β^- distributions of decay intensities of fission products. Detector consisted of a large NaI scintillator with a deep axial well for the radioactive source and a Si(Li) detector to measure $\beta\gamma$ coincidences.

Others: 1964Jo02, 1967Zh01, 1972Eh02, 1973Si12, 1973Cl02, 1974Gr29, 1976Wo05, 1978St02, 1978Wu04, 1978Wo15, 1980De02.

All data are from 1981Ta05, except as noted.

α: Additional information 1.

^{90}Sr Levels

For results of $\gamma\gamma$ correlations see ^{90}Rb β^- decay (258 s).

E(level)	J^π[†]	$T_{1/2}$[‡]	E(level)	J^π[†]	E(level)	J^π[†]
0	0^+	28.81[†] y *3*	3144.9 *4*	(5^-)	4646.35 *15*	
831.68 *4*	2^+	7 ps *2*	3383.41 *8*		4790.3? *5*	
1655.92 *8*	4^+	12 ps *2*	3555.84 *15*		4919.06? *20*	
1892.36 *5*	2^+	2 ps *1*	3627.0 *4*		4973.99 *18*	
2207.04 *5*	(3^-)	≤1 ps	3954.33 *19*		5041.01 *13*	
2497.31 *7*	(2^+)	≤3 ps	4019.4 *4*		5187.52 *7*	$(1^-,2^+)$
2570.62 *9*		10 ps *7*	4037.12 *10*		5254.32 *12*	
2674.0? *5*	(0^+)		4135.63 *10*	$(1,2^+)$	5333.15? *24*	
2927.71 *9*	4		4137.6 *9*		5426.66 *14*	
2971.14 *12*	0^+		4148.86 *8*		5600.3? *5*	
3032.87 *8*		≤1 ps	4366.05 *12*		5623.3 *3*	
3039.26 *8*	1		4580.8 *3*			

[†] From the Adopted Levels.

[‡] From $\beta\gamma$(t) (1991Ma05), except where noted.

β^- radiations

β^- branches are from I(γ+ce) imbalance at each level. Values from 1997Gr09 (total absorption γ-ray spectrometer) for excited levels are in reasonable agreement with those deduced from transition- intensity balances. However, that from transition-intensity balance to the 831-keV level is about a factor of two (on a relative scale) larger than values obtain by 1997Gr09 for other excited levels. In addition, these authors found no β^- population to levels above 5300 keV. These results disagree with the γ-rays measured by 1981Ta05 and placed on the decay scheme de-exciting levels up to 5623 keV. 1997Gr09 placed fictitious levels at about 2700, 2800, 2900, 3000, 3100, 3200, 3650, 3850, and 4950 keV to interpret their data.

E(decay)	E(level)	Iβ^-[†]	Log *ft*	Comments
(961 *7*)	5623.3	0.45 *11*	5.72 *11*	av Eβ=339.2 *30*
(984 *7*)	5600.3?	0.073 *17*	6.54 *11*	av Eβ=348.8 *30*
(1157 *7*)	5426.66	3.93 *25*	5.08 *4*	av Eβ=422.5 *31*
(1251[‡] *7*)	5333.15?	0.47 *4*	6.13 *4*	av Eβ=463.0 *31*

Continued on next page (footnotes at end of table)

^{90}Rb β^- decay (158 s) 1981Ta05 (continued)

β^- radiations (continued)

E(decay)	E(level)	Iβ^-[†]	Log *ft*	Comments
(1330 *7*)	5254.32	1.28 *8*	5.80 *4*	av Eβ=497.4 *31* Iβ^-: 1.39% (1997Gr09).
(1396 *7*)	5187.52	4.29 *25*	5.36 *3*	av Eβ=526.9 *31* Iβ^-: 5.56% (1997Gr09).
(1543 *7*)	5041.01	0.49 *4*	6.47 *4*	av Eβ=592.1 *32* Iβ^-: 0.58% (1997Gr09).
(1610 *7*)	4973.99	0.61 *8*	6.45 *6*	av Eβ=622.2 *32* Iβ^-: 0.86% (1997Gr09).
(1665 *7*)	4919.06?	0.33 *3*	6.77 *5*	av Eβ=646.9 *32*
(1794 *7*)	4790.3?	0.14 *3*	7.28 *10*	av Eβ=705.4 *32*
(1938 *7*)	4646.35	2.84 *18*	6.11 *4*	av Eβ=771.2 *33* Iβ^-: 2.32% (1997Gr09).
(2003 *7*)	4580.8	0.32 *5*	7.11 *7*	av Eβ=801.4 *33* Iβ^-: 0.36% (1997Gr09).
(2218 *7*)	4366.05	8.8 *6*	5.86 *4*	av Eβ=900.8 *33* Iβ^-: 11.20% (1997Gr09).
(2435 *7*)	4148.86	<0.03	>8.5	av Eβ=1002.1 *33*
(2446 *7*)	4137.6	<0.1	>8.0	av Eβ=1007.4 *33*
(2448 *7*)	4135.63	7.7 *5*	6.09 *4*	av Eβ=1008.3 *33* Iβ^-: 10.84% (1997Gr09).
(2547 *7*)	4037.12	0.42 *4*	7.43 *5*	av Eβ=1054.5 *33* Iβ^-: 0.45% (1997Gr09).
(2565 *7*)	4019.4	0.074 *19*	8.20 *12*	av Eβ=1062.9 *33* Iβ^-: 0.08% (1997Gr09).
(3201 *7*)	3383.41	5.7 *4*	6.72 *4*	av Eβ=1363.7 *34* Iβ^-: 6.17% (1997Gr09).
(3545 *7*)	3039.26	0.44 *6*	8.02 *6*	av Eβ=1527.8 *34* Iβ^-: 0.48% (1997Gr09).
(3551 *7*)	3032.87	<0.01	>9.7	av Eβ=1530.9 *34*
(3656 *7*)	2927.71	<0.01	>9.7	av Eβ=1581.1 *34*
(3910[‡] *7*)	2674.0?	<0.05	>9.2	av Eβ=1702.6 *34*
(4692 *7*)	1892.36	2.7 *4*	7.77 *7*	av Eβ=2078.2 *34* Iβ^-: 4.01% (1997Gr09).
(5752 *7*)	831.68	26 *2*	7.19 *4*	av Eβ=2589.4 *34* Iβ^-: 13.12% (1997Gr09).
(6584 *7*)	0	33 *4*	7.35 *6*	av Eβ=2990.8 *34* Iβ^-: measured with a total absorption γ-ray spectrometer system operating in the 4 π γ- β coincidence mode (1996Gr20). Other values: 37% *5* (1976Wo05), and 53% *5* (1981Ta05) may be more inaccurate because of the difficulty for separating out the contributions from the decay of ^{90}Rb (158 s) and ^{90}Rb (258 s).

[†] Absolute intensity per 100 decays.
[‡] Existence of this branch is questionable.

^{90}Rb β^- decay (158 s) 1981Ta05 (continued)

$\gamma(^{90}Sr)$

Iγ normalization: from ΣI(γ+ce) (to g.s.)=67% *3*, using a measured value of 33% *4* (1996Gr20) for the β^- feeding to the g.s..

E_γ[†]	I_γ[†#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	α	Comments
196.8 *4*	2.4 *4*	5623.3		5426.66					
314.5 *3*	0.22 *2*	2207.04	(3$^-$)	1892.36	2$^+$	[E1]			
543.6 *10*	1.6 *7*	4580.8		4037.12					
551.20 *25*	0.23 *3*	2207.04	(3$^-$)	1655.92	4$^+$	[E1]			
720.70 *9*	0.34 *3*	2927.71	4	2207.04	(3$^-$)				
739.2 *4*	1.26 *22*	4366.05		3627.0					
752.1 *3*	1.77 *22*	4135.63	(1,2$^+$)	3383.41					
765.1 *7*	0.04 *2*	4148.86		3383.41					
824.23 *10*	5.2 *4*	1655.92	4$^+$	831.68	2$^+$	E2		9.22×10^{-4}	α(K)=0.000816 *12*; α(L)=8.97×10^{-5} *13*; α(M)=1.506×10^{-5} *21*; α(N)=1.88×10^{-6} *3* α(O)=1.204×10^{-7} *17* Mult.: (824γ)(831γ)(θ): A_2=0.12 *5*, A_4=0.04 *6* (1981Ta05).
831.69 *5*	1000 *37*	831.68	2$^+$	0	0$^+$	E2		9.02×10^{-4}	α(K)=0.000798 *12*; α(L)=8.77×10^{-5} *13*; α(M)=1.471×10^{-5} *21*; α(N)=1.84×10^{-6} *3* α(O)=1.178×10^{-7} *17*
886.3 *3*	1.6 *3*	3383.41		2497.31	(2$^+$)				
892.5 *7*	0.7 *3*	4037.12		3144.9	(5$^-$)				
985.4 *5*	0.59 *18*	3555.84		2570.62					
997.85 *6*	11.4 *4*	4037.12		3039.26	1				
1003.9 *9*	0.028 *14*	4148.86		3144.9	(5$^-$)				I_γ: From branching relative to the 3317γ in 258-s β^- decay.
1027.1 *4*	0.50 *7*	3954.33		2927.71	4				
1038.63 *7*	7.8 *3*	5187.52	(1$^-$,2$^+$)	4148.86					
1060.70 *4*	239 *8*	1892.36	2$^+$	831.68	2$^+$	M1+E2	+0.50 *3*	4.97×10^{-4}	α(K)=0.000440 *7*; α(L)=4.75×10^{-5} *7*; α(M)=7.97×10^{-6} *12*; α(N)=1.002×10^{-6} *14*; α(O)=6.59×10^{-8} *10* Mult.: D+Q from γγ(θ). Δπ=no required by the level scheme.
1140.50 *6*	1.63 *10*	3032.87		1892.36	2$^+$				
1146.96 *25*	1.07 *13*	3039.26	1	1892.36	2$^+$				
1176.9 *9*	1.0 *4*	3383.41		2207.04	(3$^-$)				
1271.77 *7*	0.98 *6*	2927.71	4	1655.92	4$^+$				
1326.46 *21*	3.3 *4*	4366.05		3039.26	1				
1375.36 *3*	4.5 *7*	2207.04	(3$^-$)	831.68	2$^+$	(E1(+M2))	−0.02 *6*	2.98×10^{-4}	α(K)=0.000124 *3*; α(L)=1.32×10^{-5} *4*; α(M)=2.22×10^{-6} *6*; α(N)=2.79×10^{-7} *7*; α(O)=1.83×10^{-8} *5*
[x]1430.4 *4*	1.26 *22*								
1438.3 *8*	0.8 *3*	4366.05		2927.71	4				
1456.7 *3*	0.95 *9*	3954.33		2497.31	(2$^+$)				
1485.6 *7*	1.7 *5*	5041.01		3555.84					
1489.0 *4*	0.77 *14*	3144.9	(5$^-$)	1655.92	4$^+$				
1522.1 *4*	0.96 *22*	4019.4		2497.31	(2$^+$)				

$^{90}_{38}Sr_{52}$-3

^{90}Rb β^- decay (158 s) 1981Ta05 (continued)

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

E_γ [†]	I_γ [†#]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	α	Comments
1547.8 *5*	1.6 *4*	4580.8		3032.87				
1590.3 *3*	3.5 *4*	4973.99		3383.41				
1631.78 *20*	2.1 *4*	5187.52	$(1^-,2^+)$	3555.84				
1665.61 *7*	5.40 *22*	2497.31	(2^+)	831.68	2^+			
1668.9 *6*	3.8 *13*	5623.3		3954.33				
1738.93 *8*	0.58 *2*	2570.62		831.68	2^+			
1747.3 *3*	0.95 *11*	3954.33		2207.04	(3^-)			
1804.10 *7*	15.2 *5*	5187.52	$(1^-,2^+)$	3383.41				
1842.3 [@] *5*	0.6 *4*	2674.0?	(0^+)	831.68	2^+			
1870.7 *4*	1.9 *4*	5254.32		3383.41				
1892.28 *8*	14.4 *6*	1892.36	2^+	0	0^+	[E2]	4.11×10^{-4}	α(K)=0.0001370 *20*; α(L)=1.464×10^{-5} *21*; α(M)=2.45×10^{-6} *4*; α(N)=3.09×10^{-7} *5*; α(O)=2.03×10^{-8} *3*
1941.81 *17*	0.31 *3*	4148.86		2207.04	(3^-)			
1973.3 [@] *10*	1.0 *4*	5600.3?		3627.0				
1996.0 *10*	1.0 *4*	5623.3		3627.0				
[x]2119.7 *8*	1.9 *7*							
2139.33 *18*	11.1 *6*	2971.14	0^+	831.68	2^+	E2	4.99×10^{-4}	α(K)=0.0001094 *16*; α(L)=1.167×10^{-5} *17*; α(M)=1.96×10^{-6} *3*; α(N)=2.46×10^{-7} *4* α(O)=1.625×10^{-8} *23* Mult.: $(2139\gamma)(831\gamma)(\theta)$: A_2=0.23 *12*, A_4=1.28 *14* (1981Ta05).
2148.2 *3*	5.5 *7*	5187.52	$(1^-,2^+)$	3039.26	1			
2207.47 *11*	11.4 *5*	3039.26	1	831.68	2^+	D		Mult.: $(2207\gamma)(831\gamma)(\theta)$: A_2=−0.47 *10*, A_4=−0.01 *11* (1981Ta05).
2216.29 *14*	12.5 *7*	5187.52	$(1^-,2^+)$	2971.14	0^+			
2239.7 *8*	4.1 *22*	5623.3		3383.41				
2245.2 *9*	1.6 *10*	4137.6		1892.36	2^+			
2256.55 *17*	0.32 *2*	4148.86		1892.36	2^+			
2298.1 *9*	1.4 *6*	3954.33		1655.92	4^+			
2473.94 *20*	15.4 *15*	4366.05		1892.36	2^+			
2476.7 *11*	2.7 *17*	4973.99		2497.31	(2^+)			
2497.27 *15*	0.85 *9*	2497.31	(2^+)	0	0^+			
2688.9 *5*	3.1 *6*	4580.8		1892.36	2^+			
2724.26 *21*	3.2 *4*	3555.84		831.68	2^+			
2924.3 *7*	1.8 *6*	4580.8		1655.92	4^+			
2980.7 *6*	2.4 *5*	5187.52	$(1^-,2^+)$	2207.04	(3^-)			
3039.17 *12*	18.7 *7*	3039.26	1	0	0^+			
3081.3 *4*	3.9 *7*	4973.99		1892.36	2^+			
3148.58 *12*	10.5 *4*	5041.01		1892.36	2^+			
3295.09 *14*	21.6 *10*	5187.52	$(1^-,2^+)$	1892.36	2^+			
3303.91 *13*	22.1 *9*	4135.63	$(1,2^+)$	831.68	2^+			
3317.00 *12*	7.12 *22*	4148.86		831.68	2^+			
3361.88 *13*	24.4 *10*	5254.32		1892.36	2^+			
3383.24 *12*	168 *5*	3383.41		0	0^+			
3534.24 *13*	101 *3*	5426.66		1892.36	2^+			

^{90}Rb β^- decay (158 s) 1981Ta05 (continued)

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

E_γ †	I_γ †#	E_i(level)	J_i^π	E_f	J_f^π	E_γ †	I_γ †#	E_i(level)	J_i^π	E_f	J_f^π
3627.4 *7*	3.2 *13*	3627.0		0	0^+	x4635.1 *4*	0.6 *3*				
x3664.0 *5*	2.1 *4*					4646.45 *20*	56.4 *22*	4646.35		0	0^+
3814.36 *20*	14.7 *10*	4646.35		831.68	2^+	4790.2@ *7*	1.6 *4*	4790.3?		0	0^+
3958.4@ *8*	2.0 *6*	4790.3?		831.68	2^+	4919.0@ *4*	1.92 *22*	4919.06?		0	0^+
4019.3 *13*	0.9 *4*	4019.4		0	0^+	x4934.8 *7*	0.89 *22*				
x4061.7 *3*	6.0 *7*					4974.14 *25*	5.2 *4*	4973.99		0	0^+
4087.26@ *23*	6.4 *4*	4919.06?		831.68	2^+	x5007.7 *9*	0.59 *22*				
4135.51 *17*	168 *6*	4135.63	$(1,2^+)$	0	0^+	x5070.2 *3*	3.6 *3*				
x4278.4 *8*	1.3 *4*					5187.44 *23*	29.2 *12*	5187.52	$(1^-,2^+)$	0	0^+
x4332.14 *20*	9.9 *6*					5254.27 *25*	5.8 *4*	5254.32		0	0^+
4355.78 *22*	11.1 *6*	5187.52	$(1^-,2^+)$	831.68	2^+	x5299.5 *9*	0.43 *14*				
4365.90 *18*	200 *7*	4366.05		0	0^+	5333.01@ *24*	10.8 *5*	5333.15?		0	0^+
4500.8@ *10*	0.9 *4*	5333.15?		831.68	2^+	5600.1@ *5*	0.83 *14*	5600.3?		0	0^+

† From 1981Ta05, except where noted.
‡ From the Adopted Gammas.
# For absolute intensity per 100 decays, multiply by 0.0399 *22*.
@ Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

$^{90}_{38}Sr_{52}$-5

^{90}Rb β^- decay (158 s) 1981Ta05

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

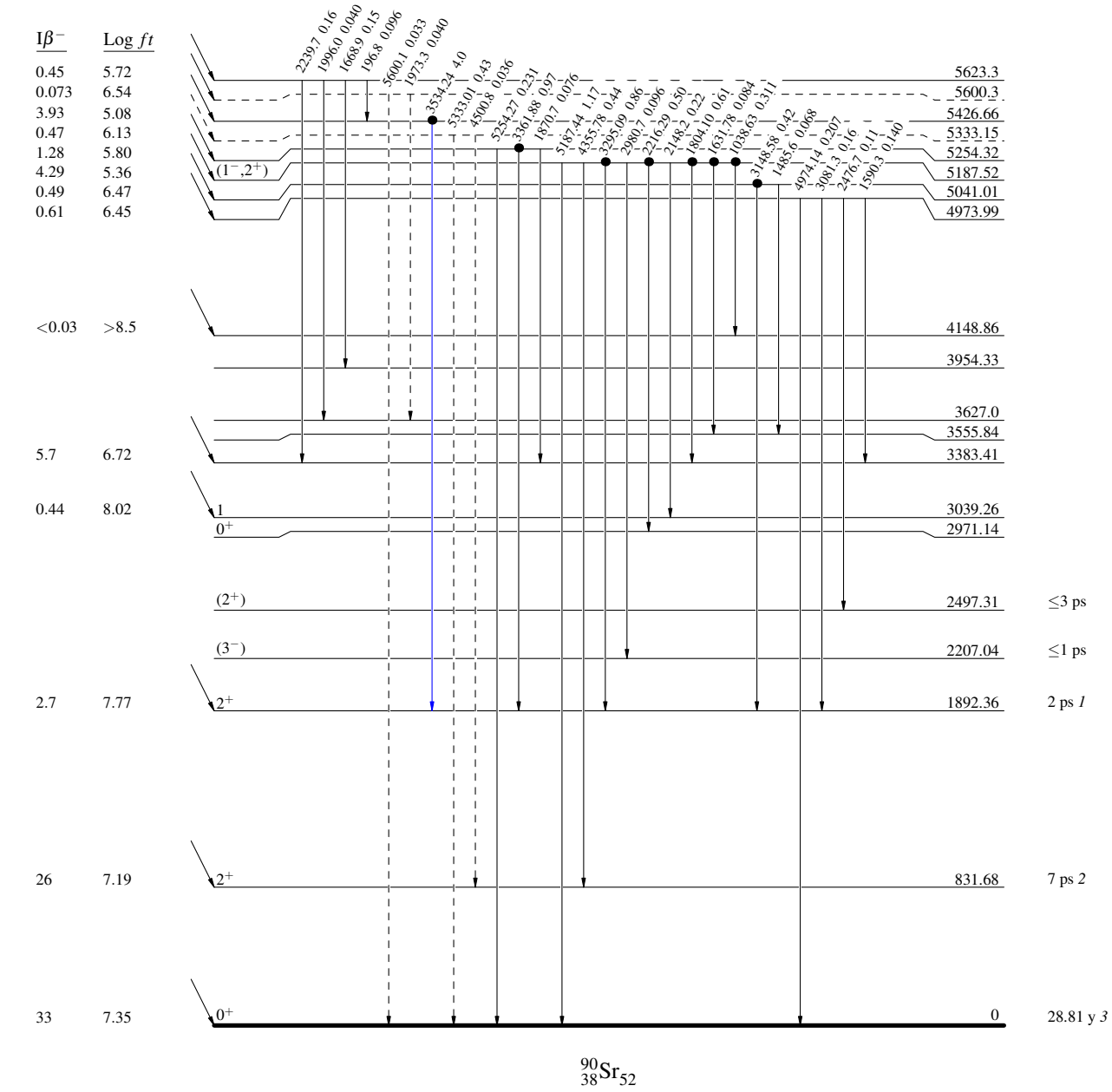
Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)
- Coincidence

0^- 0 158 s 5

Q_{β^-}=6584 7 $\%\beta^-$=100

$^{90}_{37}Rb_{53}$

Iβ⁻	Log *ft*
0.45	5.72
0.073	6.54
3.93	5.08
0.47	6.13
1.28	5.80
4.29	5.36
0.49	6.47
0.61	6.45
<0.03	>8.5
5.7	6.72
0.44	8.02
2.7	7.77
26	7.19
33	7.35

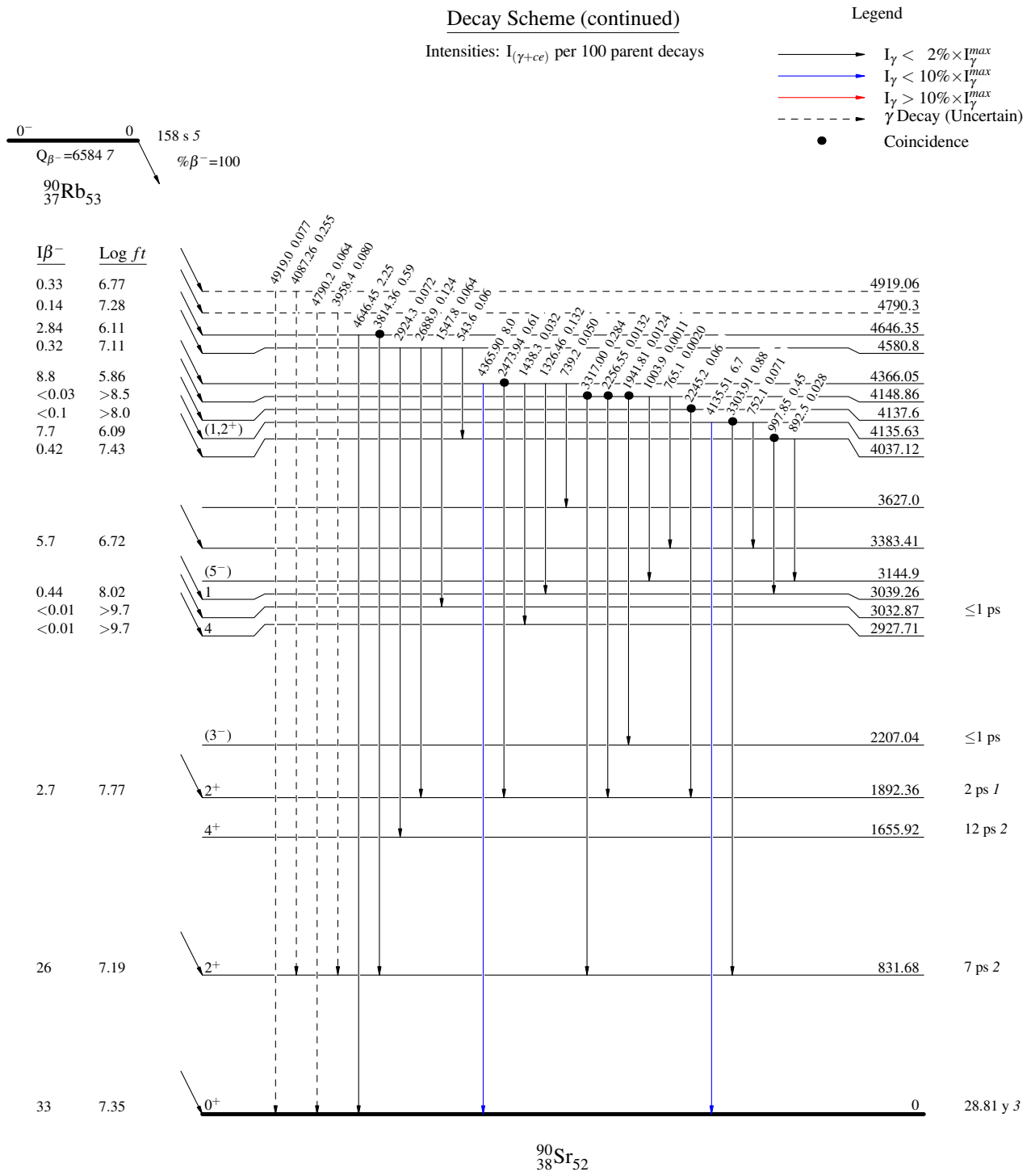


$^{90}_{38}Sr_{52}$

^{90}Rb β^- decay (158 s) 1981Ta05

Decay Scheme (continued)

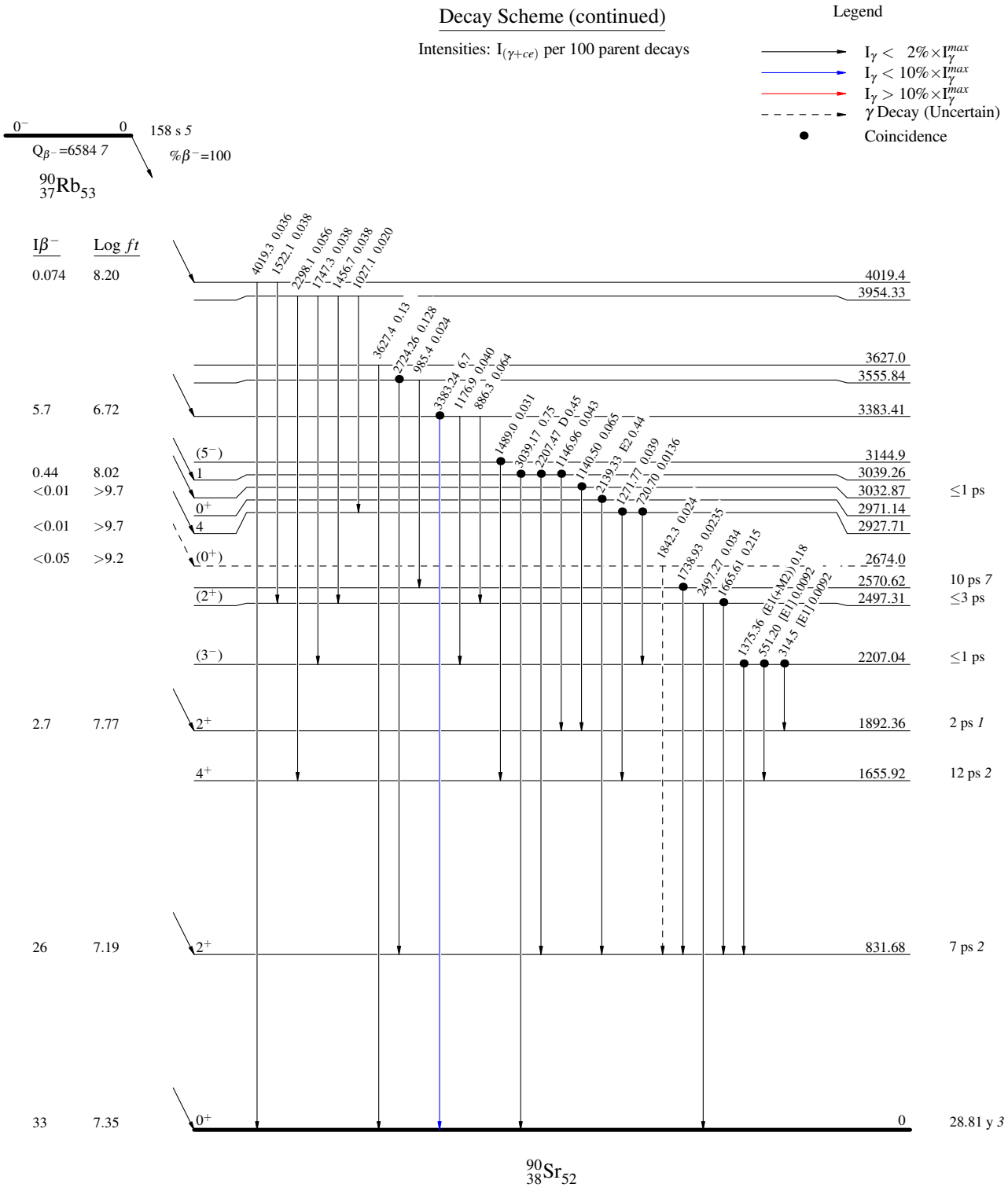
Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



^{90}Rb β^- decay (158 s) 1981Ta05

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



^{90}Rb β^- decay (158 s) 1981Ta05

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays