^{99}Nb β^- decay (2.5 min) 1981Oh03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 145, 25 (2017)	1-Jul-2017

Parent: ^{99}Nb: E=365.27 *8*; $J^\pi=1/2^-$; $T_{1/2}$=2.5 min *2*; Q(β^-)=3635 *12*; %β^- decay=98 *2*
Additional information 1.

^{99}Mo Levels

E(level)	J^π[†]	$T_{1/2}$[‡]	Comments
0	$1/2^+$	65.924 h *6*	$T_{1/2}$: From Adopted Levels, Gammas.
97.785 *3*	$5/2^+$	13 μs *2*	
235.508 *8*	$7/2^+$		
351.20 *6*	$3/2^+$		
525.193 *16*	$1/2^+$		
548.71 *8*	$3/2^+$		
614.99 *11*	$5/2^+$		
631.78 *12*	$1/2^+,3/2^+$		
752.42 *22*	$3/2^+,5/2^+$		
754.06 *24*	$7/2^-$		
792.92 *12*	$3/2^+$		
890.58 *14*	$3/2^+$		
905.50 *14*	$1/2^+$		
944.82 *14*	$5/2^+$		
1025.67 *12*	$(5/2^+)$		
1167.45 *21*	$5/2^+$		
1197.69 *23*	$3/2^+$		
1282.9 *4*	$(3/2^+,5/2^+)$		
1354.2 *4*	$(5/2^+)$		
1382.6 *4*	$3/2^+,5/2^+$		
1442.1 *5*	$(3/2,5/2)^+$		
1493.50 *24*	$5/2^+$		
1560.60 *22*	$1/2,3/2,5/2^+$		
1571.3 *4*	$1/2,3/2,5/2^+$		
1682.2 *4*	$(3/2^+,5/2^+)$		
1893.41 *16*	$(1/2^-,3/2^-)$		
2134.47 *18*	$1/2^-,3/2^-$		
2340.25 *25*	1/2,3/2		
2641.26 *14*	$(3/2)^-$		
2686.95 *23*	$(3/2)^-$		
2729.9 *3*	$(3/2)^-$		
2785.76 *24*	$1/2^-,3/2^-$		
2851.6 *3*	$1/2^-,3/2^-$		
2944.0 *6*	1/2,3/2		

[†] From Adopted Levels.
[‡] From $\beta\gamma$(t) (1971Ca18), except where noted.

β^- radiations

E(decay)	E(level)	Iβ^-[†‡]	Log *ft*	Comments
(1056 *12*)	2944.0	0.25 *6*	6.17 *12*	av Eβ=376.3 *51*
(1149 *12*)	2851.6	3.5 *5*	5.17 *8*	av Eβ=415.5 *52*
(1215 *12*)	2785.76	1.83 *24*	5.54 *7*	av Eβ=443.7 *52*
(1270 *12*)	2729.9	1.54 *23*	5.69 *8*	av Eβ=467.9 *52*

Continued on next page (footnotes at end of table)

^{99}Nb β^- decay (2.5 min) 1981Oh03 (continued)

β^- radiations (continued)

E(decay)	E(level)	Iβ^-[†‡]	Log *ft*	Comments
(1313 *12*)	2686.95	1.38 *18*	5.79 *7*	av Eβ=486.5 *53*
(1359 *12*)	2641.26	7.8 *10*	5.10 *7*	av Eβ=506.5 *53*
(1660 *12*)	2340.25	1.20 *20*	6.25 *9*	av Eβ=640.2 *54*
(1866 *12*)	2134.47	2.0 *3*	6.24 *8*	av Eβ=733.3 *55*
(2107 *12*)	1893.41	1.56 *20*	6.56 *7*	av Eβ=843.7 *56*
(2318 *12*)	1682.2	0.12 *4*	7.84 *15*	av Eβ=941.4 *56*
(2429 *12*)	1571.3	0.060 *22*	8.23 *17*	av Eβ=993.0 *56*
(2440 *12*)	1560.60	0.38 *11*	7.44 *13*	av Eβ=998.0 *56*
(2507 *12*)	1493.50	0.65 *10*	8.50[1u] *8*	av Eβ=1031.9 *55*
(2558 *12*)	1442.1	0.067 *22*	8.28 *15*	av Eβ=1053.4 *57*
(2618 *12*)	1382.6	0.31 *6*	7.65 *10*	av Eβ=1081.2 *57*
(2646 *12*)	1354.2	0.43 *8*	8.82[1u] *9*	av Eβ=1095.9 *56*
(2717 *12*)	1282.9	0.13 *5*	8.10 *17*	av Eβ=1128.0 *57*
(2803 *12*)	1197.69	0.30 *6*	7.79 *10*	av Eβ=1168.0 *57*
(2833 *12*)	1167.45	0.06 *8*	9.9[1u] *6*	av Eβ=1182.1 *56*
(2975 *12*)	1025.67	1.20 *20*	7.30 *8*	av Eβ=1249.1 *57*
(3055 *12*)	944.82	0.76 *14*	8.95[1u] *9*	av Eβ=1285.5 *56*
(3095 *12*)	905.50	0.19 *10*	8.17 *24*	av Eβ=1305.9 *57*
(3110 *12*)	890.58	1.47 *20*	7.29 *7*	av Eβ=1312.9 *57*
(3207 *12*)	792.92	1.16 *19*	7.45 *8*	av Eβ=1359.2 *57*
(3248 *12*)	752.42	0.21 *9*	8.22 *19*	av Eβ=1378.4 *57*
(3368 *12*)	631.78	1.05 *21*	7.59 *10*	av Eβ=1435.6 *57*
(3385 *12*)	614.99	0.36 *9*	9.55[1u] *12*	av Eβ=1439.7 *57*
(3452 *12*)	548.71	1.50 *22*	7.48 *8*	av Eβ=1475.0 *57*
(3475 *12*)	525.193	1.04 *17*	7.65 *8*	av Eβ=1486.2 *57*
(3649 *12*)	351.20	1.5 *4*	7.58 *13*	av Eβ=1569.0 *58*
(3902 *12*)	97.785	0.9 *4*	9.53[1u] *20*	av Eβ=1683.3 *57*
(4000 *12*)	0	63 *5*	6.14 *5*	av Eβ=1736.5 *58*
				Iβ^-: deduced by 1981Oh03 from ΣIβ/Iγ(351γ).

[†] From intensity balance, unless noted otherwise.
[‡] Absolute intensity per 100 decays.

^{99}Nb β^- decay (2.5 min) 1981Oh03 (continued)

$\gamma(^{99}Mo)$

Iγ normalization: From ΣI(γ+ce)(g.s.)=35 *4* deduced from ΣIβ/Iγ(351γ) (1981Oh03).

E_γ	I_γ[a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	δ[†&]	α[@]	Comments
97.785[‡] *3*	100	97.785	5/2+	0	1/2+	E2		1.308	α(K)=1.056 *15*; α(L)=0.209 *3*; α(M)=0.0379 *6* α(N)=0.00533 *8*; α(O)=0.0001503 *21*
137.723[‡] *7*	19.9 *10*	235.508	7/2+	97.785	5/2+	(M1)		0.1040	α(K)=0.0910 *13*; α(L)=0.01072 *15*; α(M)=0.00192 *3* α(N)=0.000292 *4*; α(O)=1.619×10^{-5} *23*
174.4 *2*	4.1 *3*	525.193	1/2+	351.20	3/2+	M1+E2	0.8 *4*	0.097 *27*	α(K)=0.083 *23*; α(L)=0.0113 *37*; α(M)=0.00204 *67* α(N)=3.00×10^{-4} *95*; α(O)=1.3×10^{-5} *4*
197.5 *2*	3.7 *3*	548.71	3/2+	351.20	3/2+	[M1+E2]		0.072 *32*	α(K)=0.062 *27*; α(L)=0.0083 *43*; α(M)=0.00149 *77* α(N)=2.2×10^{-4} *11*; α(O)=1.00×10^{-5} *39* α: average of M1 and E2.
253.5 *1*	55.6 *30*	351.20	3/2+	97.785	5/2+	[M1+E2]		0.032 *12*	α(K)=0.0276 *95*; α(L)=0.0035 *15*; α(M)=6.3×10^{-4} *26* α(N)=9.4×10^{-5} *37*; α(O)=4.6×10^{-6} *14*
263.8 *1*	11.4 *9*	614.99	5/2+	351.20	3/2+	M1		0.0187	α(K)=0.01640 *23*; α(L)=0.00189 *3*; α(M)=0.000339 *5* α(N)=5.15×10^{-5} *8*; α(O)=2.90×10^{-6} *4*
271.6 *3*	2.3 *2*	1025.67	(5/2+)	754.06	7/2−				
280.5 *2*	3.9 *3*	631.78	1/2+,3/2+	351.20	3/2+	[M1,E2]		0.0232 *73*	α(K)=0.0201 *62*; α(L)=0.00252 *91*; α(M)=4.5×10^{-4} *17* α(N)=6.7×10^{-5} *24*; α(O)=3.36×10^{-6} *89*
351.2 *1*	41.7 *23*	351.20	3/2+	0	1/2+	M1(+E2)	0.2 *2*	0.0093 *6*	α(K)=0.0082 *5*; α(L)=0.00094 *7*; α(M)=0.000168 *12* α(N)=2.55×10^{-5} *17*; α(O)=1.43×10^{-6} *7*
[x]356.8 *3*	1.9 *2*								
365.2 *3*	4.4 *3*	890.58	3/2+	525.193	1/2+	[M1,E2]		0.0104 *22*	α(K)=0.0091 *19*; α(L)=0.0011 *3*; α(M)=0.00020 *5* α(N)=3.0×10^{-5} *7*; α(O)=1.5×10^{-6} *3*
379.6 *3*	2.7 *3*	614.99	5/2+	235.508	7/2+	E2		0.01112	α(K)=0.00968 *14*; α(L)=0.001200 *17*; α(M)=0.000215 *3* α(N)=3.21×10^{-5} *5*; α(O)=1.600×10^{-6} *23*
393.9 *3*	2.3 *3*	1025.67	(5/2+)	631.78	1/2+,3/2+				
427.401[‡] *15*	9.5 *8*	525.193	1/2+	97.785	5/2+				
441.7 *2*	2.9 *2*	792.92	3/2+	351.20	3/2+				
450.9 *1*	25.8 *14*	548.71	3/2+	97.785	5/2+	M1		0.00495	α(K)=0.00435 *6*; α(L)=0.000494 *7*; α(M)=8.83×10^{-5} *13* α(N)=1.345×10^{-5} *19*; α(O)=7.64×10^{-7} *11*
500.2 *3*	4.6 *6*	1025.67	(5/2+)	525.193	1/2+				
517.0 *3*	6.1 *11*	752.42	3/2+,5/2+	235.508	7/2+				
525.4 *2*	18.4 *11*	525.193	1/2+	0	1/2+	(M1)		0.00344	α(K)=0.00302 *5*; α(L)=0.000342 *5*; α(M)=6.11×10^{-5} *9* α(N)=9.31×10^{-6} *13*; α(O)=5.30×10^{-7} *8*
534.4[#] *4*	10.3 *14*	631.78	1/2+,3/2+	97.785	5/2+				
534.4[#] *4*	13.0 *14*	1560.60	1/2,3/2,5/2+	1025.67	(5/2+)				
535.5 *6*	1.6 *9*	1167.45	5/2+	631.78	1/2+,3/2+				

^{99}Nb β^- decay (2.5 min) 1981Oh03 (continued)

$\gamma(^{99}Mo)$ (continued)

E_γ	I_γ[a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[@]	Comments
539.2 *4*	2.2 *3*	890.58	$3/2^+$	351.20	$3/2^+$			
548.9 *2*	7.5 *5*	548.71	$3/2^+$	0	$1/2^+$	M1+E2	0.0034 *3*	α(K)=0.00294 *22*; α(L)=0.00034 *4*; α(M)=6.1×10^{-5} *6* α(N)=9.2×10^{-6} *9*; α(O)=5.1×10^{-7} *3*
554.3 *2*	7.6 *5*	905.50	$1/2^+$	351.20	$3/2^+$			
593.6 *3*	5.4 *4*	944.82	$5/2^+$	351.20	$3/2^+$			
600.2 *3*	8.3 *6*	1354.2	$(5/2^+)$	754.06	$7/2^-$			
631.8 *2*	24.3 *13*	631.78	$1/2^+,3/2^+$	0	$1/2^+$			
656.3 *4*	11.4 *9*	754.06	$7/2^-$	97.785	$5/2^+$	E1	7.89×10^{-4}	α(K)=0.000696 *10*; α(L)=7.74×10^{-5} *11*; α(M)=1.378×10^{-5} *20* α(N)=2.10×10^{-6} *3*; α(O)=1.180×10^{-7} *17*
668.0 *4*	1.8 *2*	1282.9	$(3/2^+,5/2^+)$	614.99	$5/2^+$			
672.3 *5*	1.8 *4*	1197.69	$3/2^+$	525.193	$1/2^+$			
674.5 *3*	12.1 *6*	1025.67	$(5/2^+)$	351.20	$3/2^+$			
694.8 *3*	13.5 *8*	792.92	$3/2^+$	97.785	$5/2^+$			
[x]713.6 *4*	2.3 *3*							
767.8 *5*	3.2 *4*	1382.6	$3/2^+,5/2^+$	614.99	$5/2^+$			
780.3 *5*	1.9 *5*	2134.47	$1/2^-,3/2^-$	1354.2	$(5/2^+)$			
793.0[#] *2*	13.4 *14*	792.92	$3/2^+$	0	$1/2^+$			
793.0[#] *2*	11.6 *14*	890.58	$3/2^+$	97.785	$5/2^+$			
847.0 *2*	15.0 *9*	944.82	$5/2^+$	97.785	$5/2^+$			
[x]867.3 *5*	1.6 *5*							
890.2 *4*	6.6 *5*	890.58	$3/2^+$	0	$1/2^+$			
905.5 *3*	10.0 *8*	905.50	$1/2^+$	0	$1/2^+$			
927.8 *3*	15.2 *9*	1025.67	$(5/2^+)$	97.785	$5/2^+$			
944.8 *4*	7.2 *5*	944.82	$5/2^+$	0	$1/2^+$			
948.4 *5*	4.4 *3*	1893.41	$(1/2^-,3/2^-)$	944.82	$5/2^+$			
988.0 *4*	3.3 *4*	1893.41	$(1/2^-,3/2^-)$	905.50	$1/2^+$			
1002.8 *4*	2.8 *4*	1893.41	$(1/2^-,3/2^-)$	890.58	$3/2^+$			
1025.4 *3*	6.6 *4*	1025.67	$(5/2^+)$	0	$1/2^+$			
1047.0 *8*	1.0 *4*	1282.9	$(3/2^+,5/2^+)$	235.508	$7/2^+$			
1069.5 *3*	6.3 *5*	1167.45	$5/2^+$	97.785	$5/2^+$			
1080.6 *3*	4.2 *3*	2641.26	$(3/2)^-$	1560.60	$1/2,3/2,5/2^+$			
1090.9 *5*	1.0 *3*	1442.1	$(3/2,5/2)^+$	351.20	$3/2^+$			
1100.0 *3*	2.3 *3*	1197.69	$3/2^+$	97.785	$5/2^+$			
1108.5 *3*	3.3 *2*	2134.47	$1/2^-,3/2^-$	1025.67	$(5/2^+)$			
[x]1111.9 *5*	0.9 *4*							
1126.1 *3*	3.1 *3*	2686.95	$(3/2)^-$	1560.60	$1/2,3/2,5/2^+$			
1140.9 *4*	1.0 *4*	1893.41	$(1/2^-,3/2^-)$	752.42	$3/2^+,5/2^+$			
1146.9 *4*	1.5 *4*	1382.6	$3/2^+,5/2^+$	235.508	$7/2^+$			
[x]1157.7 *5*	1.5 *5*							
1197.6 *5*	0.4 *3*	1197.69	$3/2^+$	0	$1/2^+$			
1220.1 *4*	0.9 *3*	1571.3	$1/2,3/2,5/2^+$	351.20	$3/2^+$			
1228.9 *3*	3.0 *3*	2134.47	$1/2^-,3/2^-$	905.50	$1/2^+$			

$^{99}_{42}Mo_{57}$-4

^{99}Nb β^- decay (2.5 min) 1981Oh03 (continued)

$\gamma(^{99}Mo)$ (continued)

E_γ	I_γ[a]	E_i(level)	J_i^π	E_f	J_f^π
[x]1244.5 *4*	1.6 *4*				
[x]1253.6 *5*	3.2 *3*				
1258.1 *3*	8.7 *9*	1493.50	$5/2^+$	235.508	$7/2^+$
[x]1303.8 *4*	2.0 *3*				
1314.6 *3*	8.7 *8*	2340.25	1/2,3/2	1025.67	$(5/2^+)$
1345.1 *5*	0.7 *4*	1893.41	$(1/2^-,3/2^-)$	548.71	$3/2^+$
1367.8 *4*	2.6 *3*	1893.41	$(1/2^-,3/2^-)$	525.193	$1/2^+$
[x]1375.1 *4*	1.9 *3*				
1382.3 *4*	1.9 *3*	2134.47	$1/2^-,3/2^-$	752.42	$3/2^+,5/2^+$
1395.5 *4*	1.0 *3*	1493.50	$5/2^+$	97.785	$5/2^+$
[x]1403.3 *4*	1.1 *4*				
[x]1412.3 *5*	0.5 *2*				
1446.7 *4*	1.8 *5*	1682.2	$(3/2^+,5/2^+)$	235.508	$7/2^+$
1473.6 *3*	7.0 *5*	2641.26	$(3/2)^-$	1167.45	$5/2^+$
[x]1531.5 *4*	4.4 *4*				
1542.2 *3*	5.4 *5*	1893.41	$(1/2^-,3/2^-)$	351.20	$3/2^+$
[x]1569.0 *4*	2.1 *3*				
[x]1587.9 *4*	2.6 *4*				
[x]1647.9 *3*	3.4 *3*				
1660.9 *6*	0.9 *5*	2944.0	1/2,3/2	1282.9	$(3/2^+,5/2^+)$
1696.4 *3*	11.8 *11*	2641.26	$(3/2)^-$	944.82	$5/2^+$
1708.2 *4*	2.7 *9*	2340.25	1/2,3/2	631.78	$1/2^+,3/2^+$
1735.8 *4*	8.5 *8*	2641.26	$(3/2)^-$	905.50	$1/2^+$
[x]1750.3 *6*	1.8 *4*				
[x]1780.5 *9*	2.0 *6*				
1783.6 *9*	3.3 *6*	2134.47	$1/2^-,3/2^-$	351.20	$3/2^+$
[x]1796.6 *5*	4.1 *6*				
1848.1 *4*	2.0 *3*	2641.26	$(3/2)^-$	792.92	$3/2^+$
1893.9[#] *5*	3.2 *4*	1893.41	$(1/2^-,3/2^-)$	0	$1/2^+$
1893.9[#] *5*	1.4 *4*	2686.95	$(3/2)^-$	792.92	$3/2^+$
[x]1931.0 *4*	2.0 *2*				
[x]1937.7 *4*	4.8 *5*				
[x]1950.4 *6*	3.3 *6*				
[x]1961.3 *4*	1.7 *8*				
1992.7 *4*	9.0 *8*	2785.76	$1/2^-,3/2^-$	792.92	$3/2^+$
2009.6 *4*	7.7 *6*	2641.26	$(3/2)^-$	631.78	$1/2^+,3/2^+$
2026.5 *5*	4.0 *4*	2641.26	$(3/2)^-$	614.99	$5/2^+$
2055.5 *5*	2.6 *3*	2686.95	$(3/2)^-$	631.78	$1/2^+,3/2^+$
2092.7 *5*	3.1 *3*	2641.26	$(3/2)^-$	548.71	$3/2^+$
2098.2 *4*	5.9 *5*	2729.9	$(3/2)^-$	631.78	$1/2^+,3/2^+$
[x]2111.8 *8*	1.6 *5*				
[x]2115.0 *8*	1.5 *5*				
2134.7 *4*	16.9 *11*	2134.47	$1/2^-,3/2^-$	0	$1/2^+$
[x]2183.6 *5*	5.6 *5*				
[x]2189.9 *6*	2.5 *4*				
[x]2207.8 *5*	1.5 *4*				
2237.1 *4*	10.0 *10*	2785.76	$1/2^-,3/2^-$	548.71	$3/2^+$
2290.2 *6*	1.9 *6*	2641.26	$(3/2)^-$	351.20	$3/2^+$
2302.6 *6*	1.1 *5*	2851.6	$1/2^-,3/2^-$	548.71	$3/2^+$
2326.2 *5*	3.3 *4*	2851.6	$1/2^-,3/2^-$	525.193	$1/2^+$
2336.1 *9*	2.3 *4*	2686.95	$(3/2)^-$	351.20	$3/2^+$
2340.9 *7*	6.6 *16*	2340.25	1/2,3/2	0	$1/2^+$
[x]2375.0 *9*	1.6 *5*				
2377.9 *9*	3.0 *6*	2729.9	$(3/2)^-$	351.20	$3/2^+$
2434.8 *6*	1.0 *3*	2785.76	$1/2^-,3/2^-$	351.20	$3/2^+$
[x]2462.3 *5*	2.6 *6*				
2500.8 *6*	0.7 *3*	2851.6	$1/2^-,3/2^-$	351.20	$3/2^+$
[x]2518.2 *6*	0.7 *3*				
2543.7 *5*	11.8 *9*	2641.26	$(3/2)^-$	97.785	$5/2^+$
2589.8 *9*	1.7 *6*	2686.95	$(3/2)^-$	97.785	$5/2^+$
2593.0 *8*	2.9 *6*	2944.0	1/2,3/2	351.20	$3/2^+$
[x]2614.5 *6*	0.7 *2*				
2632.0 *6*	2.1 *6*	2729.9	$(3/2)^-$	97.785	$5/2^+$
2641.3 *5*	55.5 *33*	2641.26	$(3/2)^-$	0	$1/2^+$
[x]2660.9 *6*	0.9 *3*				
[x]2681.7 *6*	2.3 *9*				
2687.0 *5*	9.6 *8*	2686.95	$(3/2)^-$	0	$1/2^+$
2729.9 *5*	12.1 *18*	2729.9	$(3/2)^-$	0	$1/2^+$
2753.6 *9*	0.7 *3*	2851.6	$1/2^-,3/2^-$	97.785	$5/2^+$
2785.6 *5*	7.5 *11*	2785.76	$1/2^-,3/2^-$	0	$1/2^+$
2851.5 *5*	46.5 *30*	2851.6	$1/2^-,3/2^-$	0	$1/2^+$
[x]2869.7 *6*	1.4 *2*				
[x]2923.7 *5*	2.9 *4*				
[x]2970.9 *6*	0.4 *2*				
[x]3001.7 *5*	2.2 *4*				
[x]3028.5 *5*	1.0 *3*				
[x]3090.6 *9*	0.3 *2*				
[x]3095.1 *9*	0.3 *2*				
[x]3141.0 *6*	1.2 *3*				
[x]3177.2 *6*	0.7 *3*				
[x]3263.3 *7*	0.6 *3*				

$^{99}_{42}Mo_{57}$-5

^{99}Nb β^- decay (2.5 min) 1981Oh03 (continued)

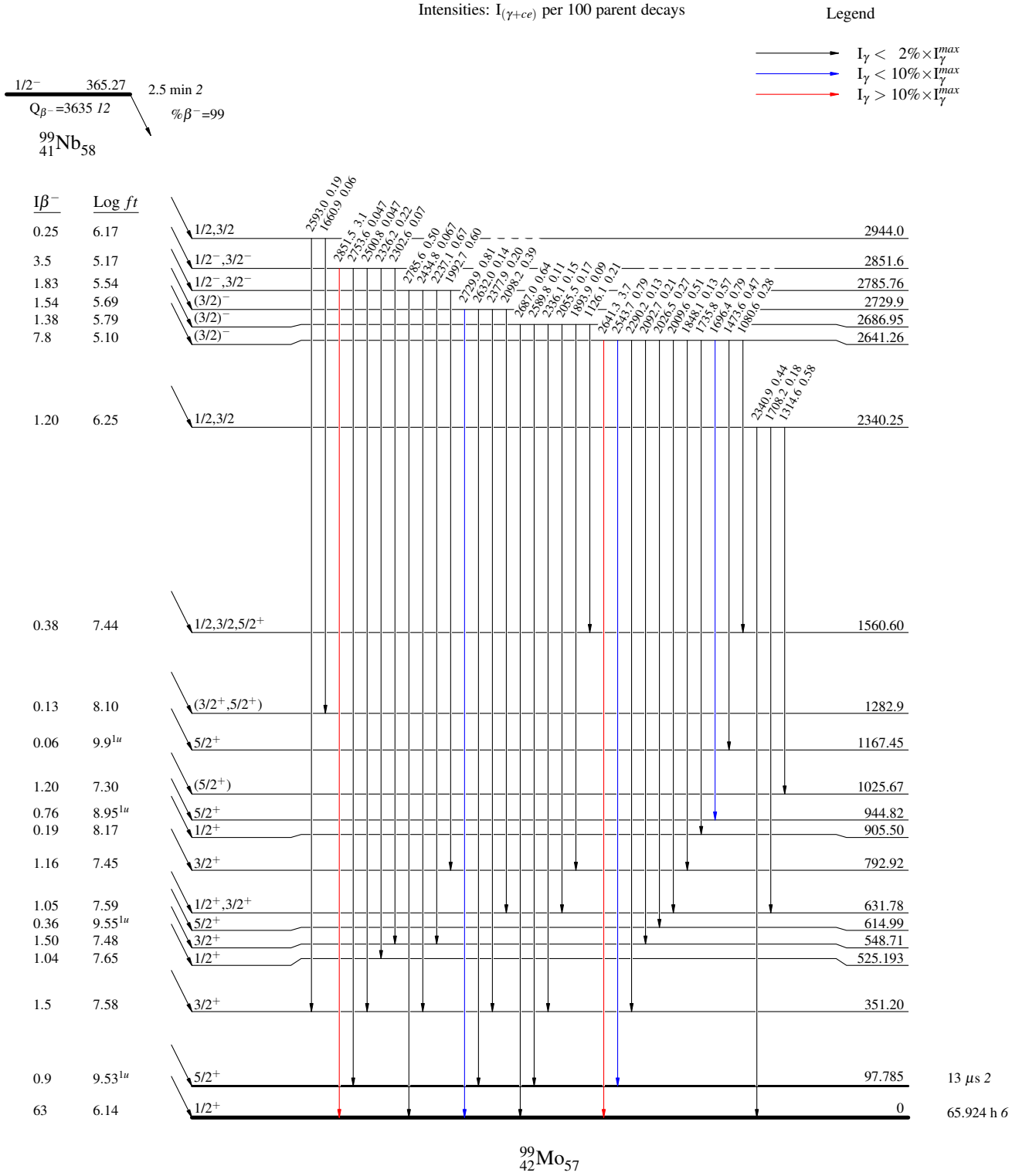
$\gamma(^{99}Mo)$ (continued)

† From Adopted Gammas.
‡ From Curved-Crystal measurement (1979Bo26).
# Doublet.
@ Additional information 2.
& If No value given it was assumed δ=1.00 for E2/M1, δ=1.00 for E3/M2 and δ=0.10 for the other multipolarities.
[a] For absolute intensity per 100 decays, multiply by 0.067 *8*.
[x] γ ray not placed in level scheme.

^{99}Nb β^- decay (2.5 min) 1981Oh03

Decay Scheme

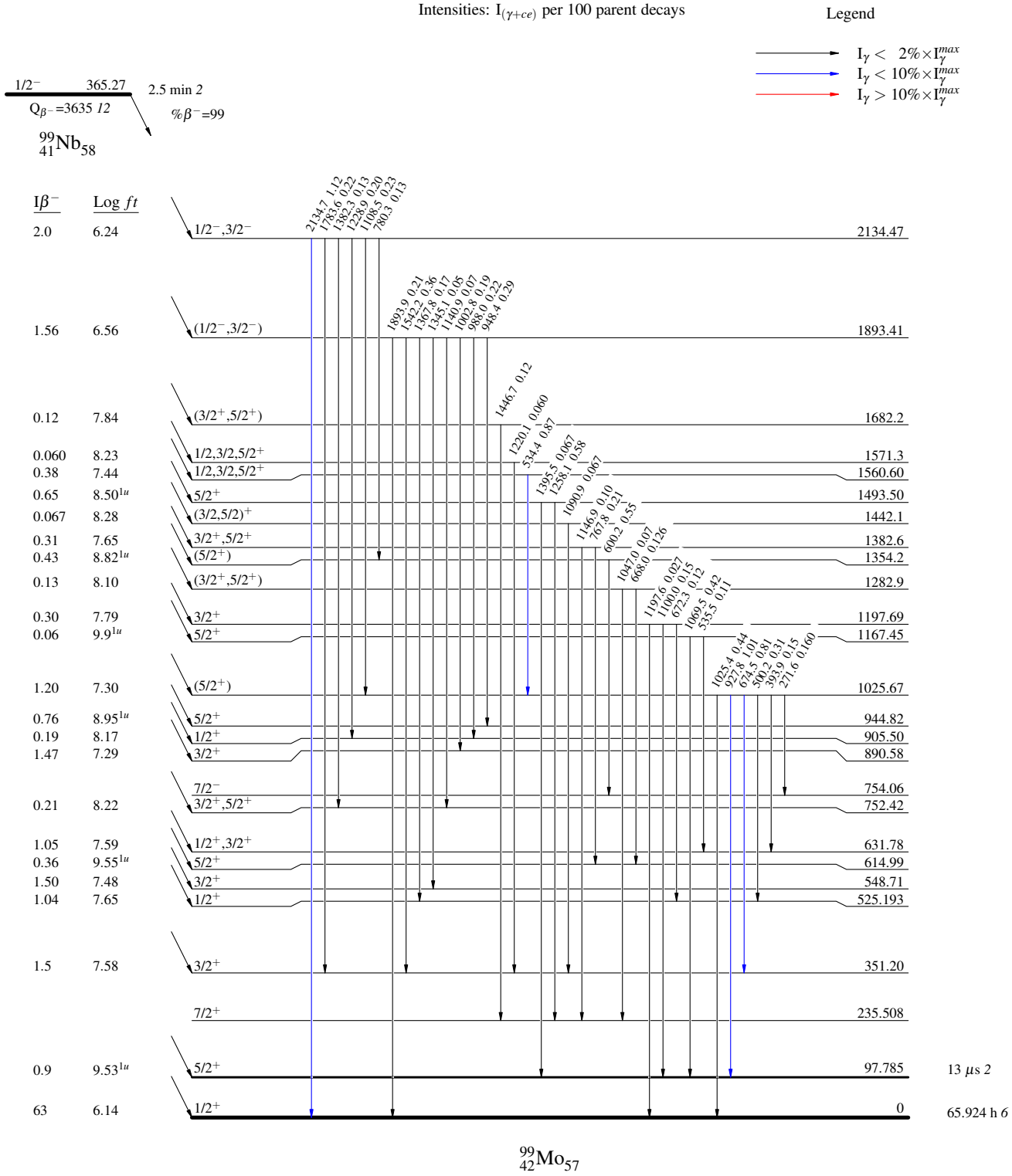
Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



^{99}Nb β^- decay (2.5 min) 1981Oh03

Decay Scheme (continued)

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



^{99}Nb β^- decay (2.5 min) 1981Oh03

Decay Scheme (continued)

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