^{186}Ta β^- decay 1973Gu02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. C. Batchelder and A. M. Hurst, M. S. Basunia	NDS 183, 1 (2022)	1-Mar-2022

Parent: ^{186}Ta: E=0.0; $J^\pi=(3^-)$; $T_{1/2}$=10.39 min *3*; Q(β^-)=3900 *60*; %β^- decay=100.0

Other references: 2004Xu18, 1969Mo16, 1970Pa16, 1975Ka11, 1975Sz02.

1973Gu02: sources produced by ^{186}W(n,p) using 97.2% ^{186}W target, E(n)=14.8 MeV. Ge(Li) and Si(Li) detectors.

2004Xu18: Observed the decay of ^{186m}Ta by fitting the half-lives of the 198, 308, 418, 615 and 738, and 739 keV γ-rays.

The decay scheme is based on that of 1973Gu02. However, evaluators has made several modifications in order to improve consistency with adopted level and γ properties; in particular, some placements proposed in 1973Gu02 have become untenable in the light of more precise Eγ data from sources other than β^- decay, and some Iγ data from 1973Gu02 imply branching which is inconsistent with adopted branching. Significant problems remain, especially above 1300 keV; new decay measurements with a purer source and much higher precision Eγ data and extensive coincidence information would probably solve many of these. Currently, almost-degenerate energy doublets must be proposed at 1322, 1463, 1607 and 1628 keV because β^- decay and (n,n′γ) studies each report these levels but cannot agree on the gammas which deexcite them. Such a density of close doublets seems unlikely. 1973Gu02 note that their results were correlated with the γ-γ data in 1969Mo16, 1970Pa16 (^{186}Ta β- decay) and level energy data in (d,d′) (1971Gu17). 1973Gu02 do not report γ-γ coin measurements in their work.

^{186}W Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[#]	Comments
0.0[&]	0^+		
122.28[&] *10*	2^+	1.040 ns *10*	$T_{1/2}$: In reference of this dataset: 1.036 ns *10* (1975Ka11).
396.40[&] *13*	4^+	36.4 ps *25*	
737.64[a] *12*	2^+	4.78 ps *16*	
808.40[&] *24*	6^+	4.0 ps *3*	
861.88[a] *16*	3^+		
881.8[b] *5*	(0^+)		
952.54[c] *15*	$(2)^-$	0.193 ns *15*	
1006.56[a] *17*	4^+		
1014.67[@] *15*	$(2^+,3,4^+)$		
1031.6[b] *3*	2^+		
1045.16[c] *14*	3^-		
1171.4[c] *8*	$(4)^-$		
1278.9[@] *3*	(1,2,3)		
1284.2 *9*	2^+	4.0 ps *4*	
1298.4[b] *3*	4^+		
1322.17 *24*	(2^+)		
1463.15 *19*	$(2^+,3^+)$	<0.1 ns	
1521.43 *16*	(4^+)		
1607.5 *3*	$(2^+,3)$		
1628.36 *22*	$(2^+,3,4^+)$		
1661.11 *21*	$(2^-,3^-)$	4.92 ns *10*	$T_{1/2}$: Other: 5.15 ns *20* (1975Sz02).
1829.2 *4*	$(2^+,3,4^+)$		
2166.2 *7*			
2270.4 *5*			

[†] From least-squares fit to γ-ray energies, assuming ΔE=1 keV for Eγ without uncertainty.

[‡] From Adopted Levels.

[#] From Adopted Level. Half-life data from 1975Ka11 (delayed coin) or other references of this dataset are listed in comments.

[@] Existence of level is questioned in (n,n′γ) by 1978Av05 because strongest gammas deexciting it were either absent or differently

Continued on next page (footnotes at end of table)

^{186}Ta β^- decay 1973Gu02 (continued)

^{186}W Levels (continued)

placed in an (n,n′γ) study which was expected to excite all levels below E≈1200 for which J=1 to 4.

[&] Band(A): $K^\pi=0^+$ g.s. band.

[a] Band(B): K=2 γ band. Note that identity of J=4 member differs in Adopted Levels.

[b] Band(C): Possible K=0 β band. Note that suggested assignment of 1006 level as the J=2 member of this band has not been adopted.

[c] Band(D): Possible $K^\pi=2^-$ band.

β^- radiations

E(decay)[†]	E(level)	Iβ^-[‡#]	Log *ft*	Comments
(1.63×10^3 *6*)	2270.4	≈2.4	≈7.1	av Eβ=590 *26*
(1.73×10^3 *6*)	2166.2	1.0 *3*	7.61 *15*	av Eβ=633 *26*
(2.24×10^3 *6*)	1661.11	58 *6*	6.27 *7*	av Eβ=851 *27* E(decay): 2240 *60* – measured value in 1969Mo16.
(2.27×10^3 *6*)	1628.36	1.15 *19*	8.00 *9*	av Eβ=865 *27*
(2.29×10^3 *6*)	1607.5	≈4.8	≈7.4	av Eβ=874 *27*
(2.38×10^3 *6*)	1521.43	≈7.1	≈7.3	av Eβ=912 *27*
(2.58×10^3 *6*)	1322.17	2.2 *5*	7.93 *11*	av Eβ=999 *27*
(2.62×10^3 *6*)	1284.2	≈0.50	≈8.6	av Eβ=1016 *27*
(2.73×10^3 *6*)	1171.4	1.25 *13*	8.28 *6*	av Eβ=1065 *27*
(2.85×10^3 *6*)	1045.16	9.9 *24*	7.46 *12*	av Eβ=1121 *27*
(2.89×10^3 *6*)	1014.67	1.6 *5*	8.27 *14*	av Eβ=1135 *27*
(2.89×10^3 *6*)	1006.56	1.9 *7*	8.20 *17*	av Eβ=1138 *27*
(3.02×10^3[@] *6*)	881.8	1.0 *3*	8.55 *14*	av Eβ=1194 *27*
(3.78×10^3[@] *6*)	122.28	15 *10*	7.8 *3*	av Eβ=1532 *27*

[†] Measured β endpoint energies are as follows: 2620 *60*, 2240 *60*, 1740 *100* (complex) (1969Mo16); 3100 *150* (5%), 2500 *100* (32%), 2100 *100* (49%), 1500 *200* (14%) (1970Pa16). The strongest group (2240β of 1969Mo16, 2100β of 1970Pa16) populates primarily the 1661 level; each of the other groups presumably feeds a cluster of levels.

[‡] From intensity imbalance at level. 1970Pa16 and 1969Mo16 report no observable β branches to the g.s. or to excited states below≈600 keV. However, the intensity balance at the 122 level implies Iβ=16 *11*, so the evaluators show feeding of this level as tentative. Note that weak branches should be accepted with caution in view of uncertainties concerning placements for a number of the weaker gammas.

[#] Absolute intensity per 100 decays.

[@] Existence of this branch is questionable.

^{186}Ta β^- decay 1973Gu02 (continued)

$\gamma(^{186}W)$

Iγ normalization: assuming Σ (I(γ+ce) to the g.s.) is 100. No β feeding to g.s. has been observed (1969Mo16,1970Pa16).

E_γ	I_γ[f]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[c]	δ[ce]	α[d]	Comments
91.0 *5*	3.7 *15*	952.54	(2)$^-$	861.88	3$^+$	(E1)		0.478 *10*	%Iγ=1.8 *8* α(K)=0.388 *8*; α(L)=0.0694 *15*; α(M)=0.0158 *4* α(N)=0.00374 *8*; α(O)=0.000561 *12*; α(P)=2.73×10^{-5} *6* Mult.: from intensity balance through 862 level.
92.7 *3*	2.8 *5*	1045.16	3$^-$	952.54	(2)$^-$	M1+E2	1.3 *5*	5.52 *18*	%Iγ=1.40 *29* α(K)=2.44 *93*; α(L)=2.34 *60*; α(M)=0.58 *16* α(N)=0.138 *37*; α(O)=0.019 *5*; α(P)=2.38×10^{-4} *99*
122.3 *1*	50 *7*	122.28	2$^+$	0.0	0$^+$	E2		1.79	%Iγ=25.1 *12* α(K)=0.587 *9*; α(L)=0.908 *14*; α(M)=0.229 *4* α(N)=0.0540 *8*; α(O)=0.00743 *11*; α(P)=4.43×10^{-5} *7*
(164.77)	0.7 *1*	1171.4	(4)$^-$	1006.56	4$^+$				%Iγ=0.35 *6* γ expected but not reported in β^- decay; obscured by a ^{185}W line. Eγ from adopted gammas, Iγ from I(309γ) and adopted branching.
183.2 *1*	6 *1*	1045.16	3$^-$	861.88	3$^+$	E1		0.0783	%Iγ=3.0 *6* α(K)=0.0649 *10*; α(L)=0.01043 *15*; α(M)=0.00237 *4* α(N)=0.000563 *8*; α(O)=8.78×10^{-5} *13*; α(P)=5.03×10^{-6} *7*
184.2 *3*	1.0 *5*	1463.15	(2$^+$,3$^+$)	1278.9	(1,2,3)	[D,E2]		0.5 *4*	%Iγ=0.50 *25*
[x]195.0 *1*	1.5 *5*								%Iγ=0.75 *26*
197.9 *1*	100	1661.11	(2$^-$,3$^-$)	1463.15	(2$^+$,3$^+$)	E1		0.0643	%Iγ=50 *5* α(K)=0.0533 *8*; α(L)=0.00851 *12*; α(M)=0.00193 *3* α(N)=0.000460 *7*; α(O)=7.18×10^{-5} *11*; α(P)=4.18×10^{-6} *6* Mult.: from α(K)exp≤0.04, α(L)exp≤0.04 (1969Mo16); E1 is implied also by intensity balance at 1463 level.
214.9 *1*	85 *3*	952.54	(2)$^-$	737.64	2$^+$	E1		0.0522	%Iγ=42 *4* α(K)=0.0433 *6*; α(L)=0.00686 *10*; α(M)=0.001557 *22* α(N)=0.000371 *6*; α(O)=5.81×10^{-5} *9*; α(P)=3.43×10^{-6} *5* α(K)exp≤0.05, α(L)exp≤0.05 (1969Mo16).
(218.93)	1.8	1171.4	(4)$^-$	952.54	(2)$^-$	Q			%Iγ=0.90 *9* γ expected but not reported in β^- decay; probably obscured by contaminant. Eγ from adopted gammas, Iγ from I(309γ) and adopted branching.
268.8 *2*	1.6 *5*	1006.56	4$^+$	737.64	2$^+$	[E2]		0.1187	%Iγ=0.80 *26* α(K)=0.0762 *11*; α(L)=0.0324 *5*; α(M)=0.00795 *12* α(N)=0.00188 *3*; α(O)=0.000272 *4*; α(P)=6.40×10^{-6} *9*
274.2 *1*	13.5 *5*	396.40	4$^+$	122.28	2$^+$	E2		0.1116	%Iγ=6.7 *7* α(K)=0.0723 *11*; α(L)=0.0300 *5*; α(M)=0.00736 *11* α(N)=0.001744 *25*; α(O)=0.000252 *4*; α(P)=6.09×10^{-6} *9*

$^{186}_{74}W_{112}$-3

^{186}Ta β^- decay 1973Gu02 (continued)

$\gamma(^{186}W)$ (continued)

E_γ	I_γ[f]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[c]	α[d]	Comments
277.0 *1*	2.5 *5*	1014.67	(2$^+$,3,4$^+$)	737.64	2$^+$			%Iγ=1.25 *28* Eγ is also consistent with a 1322 to 1045 level placement.
x292.5[g] *5*	6.7[g] *10*							%Iγ=3.3 *6* I$_\gamma$: see comment on 292.5γ from 1298 level.
292.5[g] *5*	<0.24[g]	1298.4	4$^+$	1006.56	4$^+$	[E2]	0.0917	%Iγ<0.120 α(K)=0.0609 *9*; α(L)=0.0235 *4*; α(M)=0.00574 *9* α(N)=0.001362 *21*; α(O)=0.000198 *3*; α(P)=5.20×10^{-6} *8* Iγ=6.9 *10* (1973Gu02) is possibly overestimated (Iγ=3.5 *4* in 1970Pa16). Additionally, the 293γ is a multiplet in (n,n′γ) and, from adopted I(293 multiplet)/I(1175γ)=0.41 *6*, one expects I(293γ)<0.24 from the 1298 level in β^- decay, leaving Iγ=6.7 *10* unplaced.
293.7 *5*	<0.3	1031.6	2$^+$	737.64	2$^+$			%Iγ<0.150 I$_\gamma$: limit is 0.18 *+13−10* based on I(635γ)/I(294γ triplet)=5.6 *8* in (n,n′γ); Iγ=1 *3* in 1973Gu02, 1.6 *2* in 1970Pa16. E$_\gamma$: from table 2 of 1973Gu02. Eγ=294.7 in fig. 1; probably a misprint since authors do not identify any impurity near this energy.
307.5 *1*	19.3 *10*	1045.16	3$^-$	737.64	2$^+$	E1	0.0216	%Iγ=9.6 *11* α(K)=0.0180 *3*; α(L)=0.00276 *4*; α(M)=0.000626 *9* α(N)=0.0001495 *21*; α(O)=2.37×10^{-5} *4*; α(P)=1.482×10^{-6} *21*
309.2[@] *1*	4.5 *5*	1607.5	(2$^+$,3)	1298.4	4$^+$			%Iγ=2.25 *34*
315.6 *2*	3.0 *5*	1322.17	(2$^+$)	1006.56	4$^+$	[E2]	0.0731	%Iγ=1.50 *29* α(K)=0.0499 *7*; α(L)=0.0177 *3*; α(M)=0.00431 *7* α(N)=0.001025 *15*; α(O)=0.0001496 *22*; α(P)=4.32×10^{-6} *6*
327.2 *5*	1.5 *5*	1278.9	(1,2,3)	952.54	(2)$^-$			%Iγ=0.75 *26*
338.5 *10*	1.0 *5*	1661.11	(2$^-$,3$^-$)	1322.17	(2$^+$)			%Iγ=0.50 *25*
341.0 *10*	≈0.5	737.64	2$^+$	396.40	4$^+$	[E2]	0.0584 *10*	%Iγ≈0.25 α(K)=0.0409 *7*; α(L)=0.01341 *24*; α(M)=0.00325 *6* α(N)=0.000772 *14*; α(O)=0.0001136 *20*; α(P)=3.58×10^{-6} *6*
383.2 *5*	1.0 *5*	1661.11	(2$^-$,3$^-$)	1278.9	(1,2,3)			%Iγ=0.50 *25* E$_\gamma$: from figure; authors give 383.8 in table.
x402.0[#] *10*	1.5[#] *5*							%Iγ=0.75 *26*
402.0[#h]	≈0.03[#]	1284.2	2$^+$	881.8	(0$^+$)			%Iγ≈0.015
412.0 *2*	1.0 *5*	808.40	6$^+$	396.40	4$^+$	E2	0.0346	%Iγ=0.50 *25* α(K)=0.0254 *4*; α(L)=0.00701 *10*; α(M)=0.001681 *24* α(N)=0.000400 *6*; α(O)=5.99×10^{-5} *9*; α(P)=2.28×10^{-6} *4*
417.7 *2*	25 *2*	1463.15	(2$^+$,3$^+$)	1045.16	3$^-$			%Iγ=12.5 *16*
440.0 *10*	1.6 *3*	1322.17	(2$^+$)	881.8	(0$^+$)			%Iγ=0.80 *17*
442.0 *10*	1.6 *3*	2270.4		1829.2	(2$^+$,3,4$^+$)			%Iγ=0.80 *17*
448.0 *11*	1.0 *5*	1463.15	(2$^+$,3$^+$)	1014.67	(2$^+$,3,4$^+$)			%Iγ=0.50 *25*
457.0 *11*	4.3 *5*	1463.15	(2$^+$,3$^+$)	1006.56	4$^+$			%Iγ=2.15 *33*
460.0[†h] *5*	≈0.5	1322.17	(2$^+$)	861.88	3$^+$			%Iγ≈0.25

^{186}Ta β^- decay 1973Gu02 (continued)

$\gamma(^{186}W)$ (continued)

E_γ	I_γ[f]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[c]	δ[ce]	α[d]	Comments
465.0 *5*	2.2 *5*	861.88	3^+	396.40	4^+	D+Q	−4.0 *5*	0.0277 *9*	%Iγ=1.10 *27* α(K)=0.0212 *7*; α(L)=0.00499 *10*; α(M)=0.001182 *23* α(N)=0.000282 *6*; α(O)=4.30×10^{-5} *9*; α(P)=1.96×10^{-6} *7* Mult.: Sign assumed by the evaluators.
488.0[@] *15*		1521.43	(4^+)	1031.6	2^+				
510.6 *5*	75 *5*	1463.15	$(2^+,3^+)$	952.54	$(2)^-$	(E1)		0.00679	%Iγ=37 *5* α(K)=0.00570 *8*; α(L)=0.000843 *12*; α(M)=0.000190 *3* α(N)=4.55×10^{-5} *7*; α(O)=7.32×10^{-6} *11*; α(P)=4.88×10^{-7} *7* Mult.: from α(K)exp≤0.01 (1969Mo16).
541.4 *5*	≈0.5	1278.9	(1,2,3)	737.64	2^+				%Iγ≈0.25
546.3[h] *5*	≈0.20[b]	1284.2	2^+	737.64	2^+	D+Q			%Iγ≈0.10
567.2[@] *6*	6.7 *10*	1521.43	(4^+)	952.54	$(2)^-$				%Iγ=3.3 *6*
583.2 *2*	2.2 *3*	1628.36	$(2^+,3,4^+)$	1045.16	3^-				%Iγ=1.10 *19*
596.5 *5*	≈0.5	1628.36	$(2^+,3,4^+)$	1031.6	2^+				%Iγ≈0.25
601.0 *5*	1.0 *5*	1463.15	$(2^+,3^+)$	861.88	3^+				%Iγ=0.50 *25*
610.5 *2*	6.8 *5*	1006.56	4^+	396.40	4^+	D+Q	−1.21 *10*	0.0214 *10*	%Iγ=3.4 *4* α(K)=0.0175 *8*; α(L)=0.00301 *10*; α(M)=0.000693 *23* α(N)=0.000166 *6*; α(O)=2.66×10^{-5} *10*; α(P)=1.69×10^{-6} *8* Mult.: Sign assumed by the evaluators.
615.3 *1*	56 *2*	737.64	2^+	122.28	2^+	M1+E2	−11 *+3−4*	0.01293 *24*	%Iγ=28.0 *30* α(K)=0.01020 *19*; α(L)=0.00210 *4*; α(M)=0.000492 *8* α(N)=0.0001177 *19*; α(O)=1.82×10^{-5} *3*; α(P)=9.43×10^{-7} *19*
618.3 *3*	1.0 *5*	1014.67	$(2^+,3,4^+)$	396.40	4^+				%Iγ=0.50 *25*
622.0 *5*	&	1628.36	$(2^+,3,4^+)$	1006.56	4^+				
635.0 *5*	1.0 *5*	1031.6	2^+	396.40	4^+	Q			%Iγ=0.50 *25*
641.6 *10*	≈0.7	2270.4		1628.36	$(2^+,3,4^+)$				%Iγ≈0.35
646.6 *10*	≈0.3	1661.11	$(2^-,3^-)$	1014.67	$(2^+,3,4^+)$				%Iγ≈0.150
649.5 *5*	≈0.3	1045.16	3^-	396.40	4^+				%Iγ≈0.15
654.9 *5*	3 *1*	1607.5	$(2^+,3)$	952.54	$(2)^-$				%Iγ=1.5 *5*
658.4[†h] *5*	≈2.5[&]	1521.43	(4^+)	861.88	3^+				%Iγ≈1.25 I_γ: 2.5 expected based on I(1124γ) and adopted branching.
703.0 *10*	1.0 *5*	2166.2		1463.15	$(2^+,3^+)$				%Iγ=0.50 *25*
[x]707.0 *10*	2.0 *5*								%Iγ=1.00 *27*
709.0 *10*	2.0[a] *5*	1661.11	$(2^-,3^-)$	952.54	$(2)^-$				%Iγ=1.00 *27* Possible sumpeak contribution from (197.9+510.6) (1973Gu02).
726.0 *5*	2.0[a] *5*	1463.15	$(2^+,3^+)$	737.64	2^+				%Iγ=1.00 *27* Possible sumpeak contribution from (214.9+510.6) (1973Gu02).

$^{186}_{74}W_{112}$-5

^{186}Ta β^- decay 1973Gu02 (continued)

$\gamma(^{186}W)$ (continued)

E_γ	I_γ[f]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[c]	δ[ce]	α[d]	Comments
737.5 *3*	58 *4*	737.64	2^+	0.0	0^+	E2		0.00850	%Iγ=29.0 *32* α(K)=0.00683 *10*; α(L)=0.001290 *19*; α(M)=0.000300 *5* α(N)=7.17×10^{-5} *10*; α(O)=1.124×10^{-5} *16*; α(P)=6.34×10^{-7} *9*
739.2 *3*	20 *2*	861.88	3^+	122.28	2^+	D+Q	−7 *2*	0.0087 *3*	%Iγ=10.0 *14* α(K)=0.00701 *22*; α(L)=0.00131 *3*; α(M)=0.000304 *7* α(N)=7.27×10^{-5} *17*; α(O)=1.14×10^{-5} *3*; α(P)=6.52×10^{-7} *22* Mult.: Sign assumed by the evaluators.
[x]740.5 *5*	≤9								%Iγ≤4.50
745.0 *10*	≈0.5	1607.5	$(2^+,3)$	861.88	3^+				%Iγ≈0.25
759.4 *5*	3.5 *5*	881.8	(0^+)	122.28	2^+				%Iγ=1.75 *30*
(783.34)	≈5.6	1521.43	(4^+)	737.64	2^+	Q			%Iγ≈2.80 γ not observed, but it is expected with Iγ≈5.6 based on I(1124γ) and adopted branching; it would have been obscured by a ^{183}Hf impurity in the decay study by 1973Gu02. Eγ is from adopted gammas.
799.8 *5*	4.8 *5*	1661.11	$(2^-,3^-)$	861.88	3^+				%Iγ=2.40 *35*
814.0 *5*	≈0.5[a]	1829.2	$(2^+,3,4^+)$	1014.67	$(2^+,3,4^+)$				%Iγ≈0.25 Possible sumpeak contribution from (197.9+615.3) (1973Gu02).
823.0 *5*	≈0.5	1829.2	$(2^+,3,4^+)$	1006.56	4^+				%Iγ≈0.25
830.0 *5*	3.0[a] *5*	952.54	$(2)^-$	122.28	2^+	(E1+M2)	+0.23 *10*	0.0044 *18*	%Iγ=1.50 *29* α(K)=0.0037 *15*; α(L)=5.7×10^{-4} *26*; α(M)=1.30×10^{-4} *58* α(N)=3.1×10^{-5} *14*; α(O)=5.1×10^{-6} *23*; α(P)=3.5×10^{-7} *16* Possible sumpeak contribution from (214.9+615.3) (1973Gu02).
869.5 *5*	≈0.5	1607.5	$(2^+,3)$	737.64	2^+				%Iγ≈0.25
884.1 *10*	3.9 *5*	1006.56	4^+	122.28	2^+	E2		0.00579	%Iγ=1.95 *32* α(K)=0.00472 *7*; α(L)=0.000827 *12*; α(M)=0.000191 *3* α(N)=4.57×10^{-5} *7*; α(O)=7.24×10^{-6} *11*; α(P)=4.38×10^{-7} *7*
893.0 *10*	1.5 *2*	1014.67	$(2^+,3,4^+)$	122.28	2^+				%Iγ=0.75 *12*
(902.40)	≈0.26	1298.4	4^+	396.40	4^+	D+Q	+1.7 *2*		%Iγ≈0.13 Eγ from adopted gammas; transition expected based on adopted 1298-level branching, but would have been obscured in β^- decay study by 1973Gu02 by a ^{184}Ta line. Iγ≈0.26 from I(1175γ) and adopted branching.
909.0 *10*	≈1	1031.6	2^+	122.28	2^+	(M1+E2)	+7.1 *3*	0.00560	%Iγ≈0.50 α(K)=0.00458 *7*; α(L)=0.000790 *12*; α(M)=0.000182 *3* α(N)=4.36×10^{-5} *7*; α(O)=6.92×10^{-6} *10*; α(P)=4.26×10^{-7} *7*
923.0 *10*	2.3 *5*	1045.16	3^-	122.28	2^+				%Iγ=1.15 *27*

$^{186}_{74}W_{112}$-6

^{186}Ta β^- decay 1973Gu02 (continued)

$\gamma(^{186}W)$ (continued)

E_γ	I_γ[f]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[c]	δ[ce]	α[d]	Comments
[x]935.0 *10*	1.3 *5*								%Iγ=0.65 *26*
[x]936.5 *10*	≈0.5[a]								%Iγ≈0.25 Possible sumpeak contribution from (197.9+737.5) (1973Gu02).
947.5 *10*	≈0.5	2270.4		1322.17	(2$^+$)				%Iγ≈0.25
[x]952.5 *5*	1.0[a] *5*								%Iγ=0.50 *25* Possible sumpeak contribution from (214.9+737.5) (1973Gu02).
[x]1046[‡] *1*	≈0.5[‡]								%Iγ≈0.25
1092.5 *10*	≈1.0	1829.2	(2$^+$,3,4$^+$)	737.64	2$^+$				%Iγ≈0.50
1124.5 *15*	≈1[a]	1521.43	(4$^+$)	396.40	4$^+$				%Iγ≈0.50 Possible sumpeak contribution from (510.6+615.3) (1973Gu02).
1162 *1*	≈0.5	1284.2	2$^+$	122.28	2$^+$	M1+E2	+6 *1*	0.00344 *7*	%Iγ≈0.25 α(K)=0.00285 *6*; α(L)=0.000457 *8*; α(M)=0.0001043 *18* α(N)=2.50×10^{-5} *5*; α(O)=4.03×10^{-6} *7*; α(P)=2.65×10^{-7} *5*; α(IPF)=1.84×10^{-6} *6*
1175.0[†h] *15*	≈0.5	1298.4	4$^+$	122.28	2$^+$	E2		0.00328	%Iγ≈0.25 α(K)=0.00271 *4*; α(L)=0.000436 *7*; α(M)=9.95×10^{-5} *15* α(N)=2.39×10^{-5} *4*; α(O)=3.84×10^{-6} *6*; α(P)=2.52×10^{-7} *4*; α(IPF)=2.58×10^{-6} *11*
1199.5 *10*	≈0.5	1322.17	(2$^+$)	122.28	2$^+$				%Iγ≈0.25
1210.0 *15*	≈0.5	1607.5	(2$^+$,3)	396.40	4$^+$				%Iγ≈0.25 A γ with similar energy is placed from a different level in Adopted Levels, Gammas.
1213.0 *15*	≈0.4	2166.2		952.54	(2)$^-$				%Iγ≈0.20
[x]1224.0 *15*	≈0.5								%Iγ≈0.25
1231.0 *15*	≈0.3	1628.36	(2$^+$,3,4$^+$)	396.40	4$^+$				%Iγ≈0.15
1238.0 *15*	≈0.4	2270.4		1031.6	2$^+$				%Iγ≈0.20
[x]1247.5 *15*	≈1[a]								%Iγ≈0.50 Possible sumpeak contribution from (510.6+737.5) (1973Gu02).
1284.0 *15*	≈0.5	1284.2	2$^+$	0.0	0$^+$	E2		0.00278	%Iγ≈0.25 α(K)=0.00229 *4*; α(L)=0.000361 *6*; α(M)=8.23×10^{-5} *12* α(N)=1.98×10^{-5} *3*; α(O)=3.18×10^{-6} *5*; α(P)=2.13×10^{-7} *3*; α(IPF)=1.50×10^{-5} *3*
[x]1298.0 *15*	≈0.5								%Iγ≈0.25 E_γ: Placed ub 1973Gu02 from 1298 keV level. A comparable 1297.81 *6* γ in (n,n′γ) is unplaced. Iγ/I(1175) is much lower in (n,n′γ) than in β- decay. Reported peak may be due to summing. Evaluators list as unplaced.
1319.0 *15*	≈0.5	2270.4		952.54	(2)$^-$				%Iγ≈0.25 E_γ: from fig. 6(b) of 1973Gu02; Eγ is misprinted as 1310 in table 2.
1322.0 *15*	≈0.6	1322.17	(2$^+$)	0.0	0$^+$				%Iγ≈0.30

$^{186}_{74}W_{112}$-7

^{186}Ta β^- decay 1973Gu02 (continued)

$\gamma(^{186}W)$ (continued)

E_γ	I_γ[f]	E_i(level)	J_i^π	E_f	J_f^π	Comments
1399.26[@] *13*	≈0.8	1521.43	(4^+)	122.28	2^+	%Iγ≈0.40 E_γ: From Adopted Gammas. Other: 1398 *1* (1973Gu02).
1409 *1*	≈1	2270.4		861.88	3^+	%Iγ≈0.50
1429 *1*	≈0.5	2166.2		737.64	2^+	%Iγ≈0.25
1485.0 *15*	≈0.5	1607.5	$(2^+,3)$	122.28	2^+	%Iγ≈0.25 A γ with similar energy is placed from a different level in Adopted Levels, gammas.
1507.0[†h] *15*	&	1628.36	$(2^+,3,4^+)$	122.28	2^+	
[x]1520.0[@] *15*	≈0.5					%Iγ≈0.25 E_γ: Placed from 1520 (1521 in this dataset) keV level in 1973Gu02. Evaluators list as unplaced as a (4^+) to 0^+ transition.

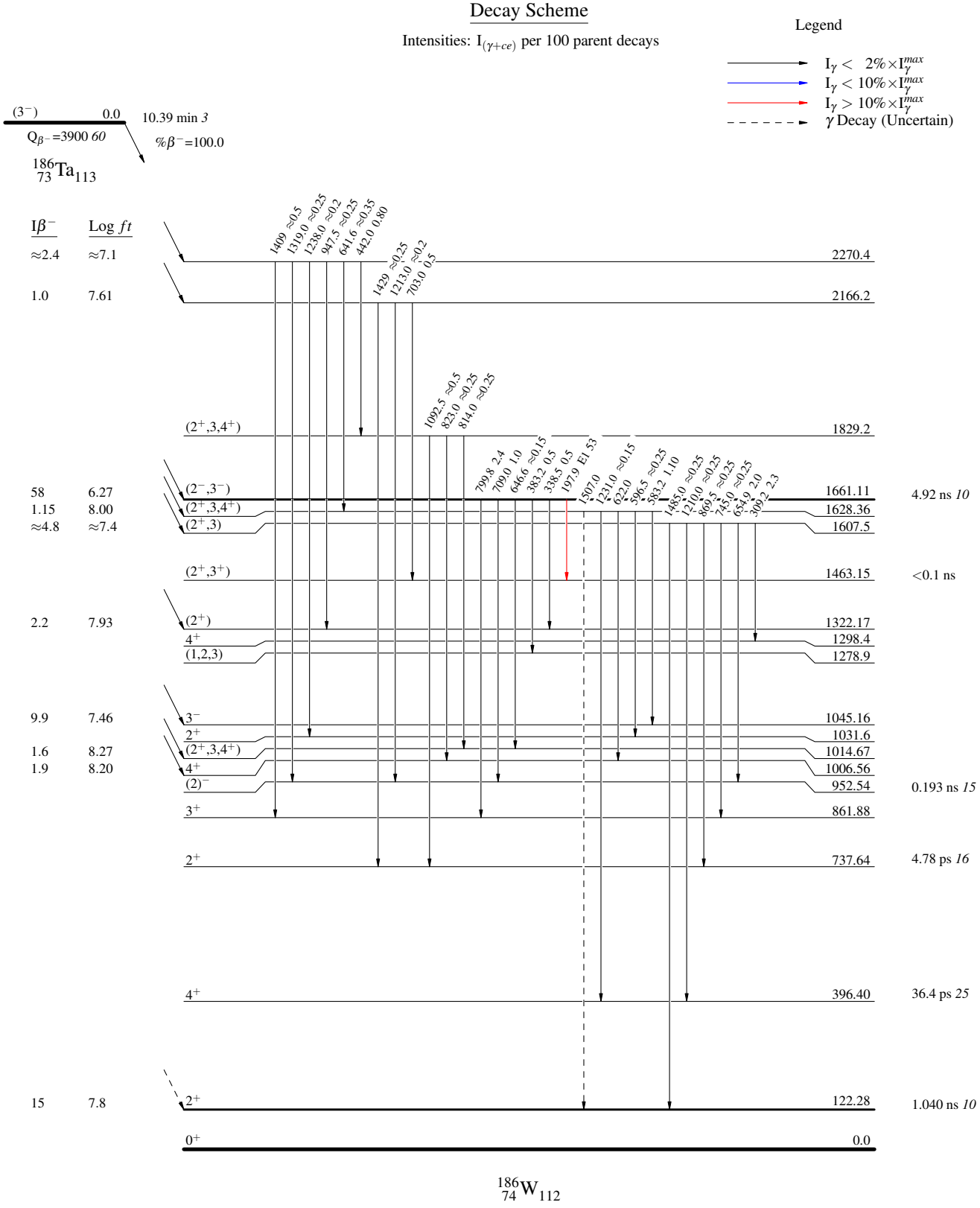
[†] Assignment to ^{186}Ta β^- decay is uncertain.
[‡] Eγ correct for expected (1045 level to g.s.) transition. However, a branch with this intensity should also have been observable in (n,n′γ) and is not reported there; also, this branching, combined with measured B(E3)(1045 level), would imply $T_{1/2}$≈0.7 ns for that level.
[#] 1973Gu02 place the 402γ from the 1284 level, based only on Eγ; however, Iγ=1.5 *5* is far too intense for consistency with branching in (n,n′γ) or with nonobservance of such a branch in Coulomb excitation. From adopted branching, I(402γ)≈0.03 from 1284 level is expected.
[@] Comparable Eγ reported in (n,n′γ) with different placements or without placement compared to that in 1973Gu02. In previous evaluation (2003Ba44) these γ were placed as of the (n,n′γ) dataset (secondary source). In this revised version, placements follows mostly 1973Gu02 placements. New experiment is needed to resolve the issues.
[&] Weak (1973Gu02).
[a] May contain contribution from summing.
[b] I(546γ)≈0.20 based on I(1284γ) and adopted branching; measured Iγ=1.0 *2* is inconsistent with the latter, and Eγ is lower than the adopted value (547.41), suggesting that line is complex in 1973Gu02.
[c] From adopted gammas.
[d] Additional information 1.
[e] 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.
[f] For absolute intensity per 100 decays, multiply by 0.50 *5*.
[g] Multiply placed with intensity suitably divided.
[h] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

$^{186}_{74}W_{112}$-8

^{186}Ta β^- decay 1973Gu02

Decay Scheme

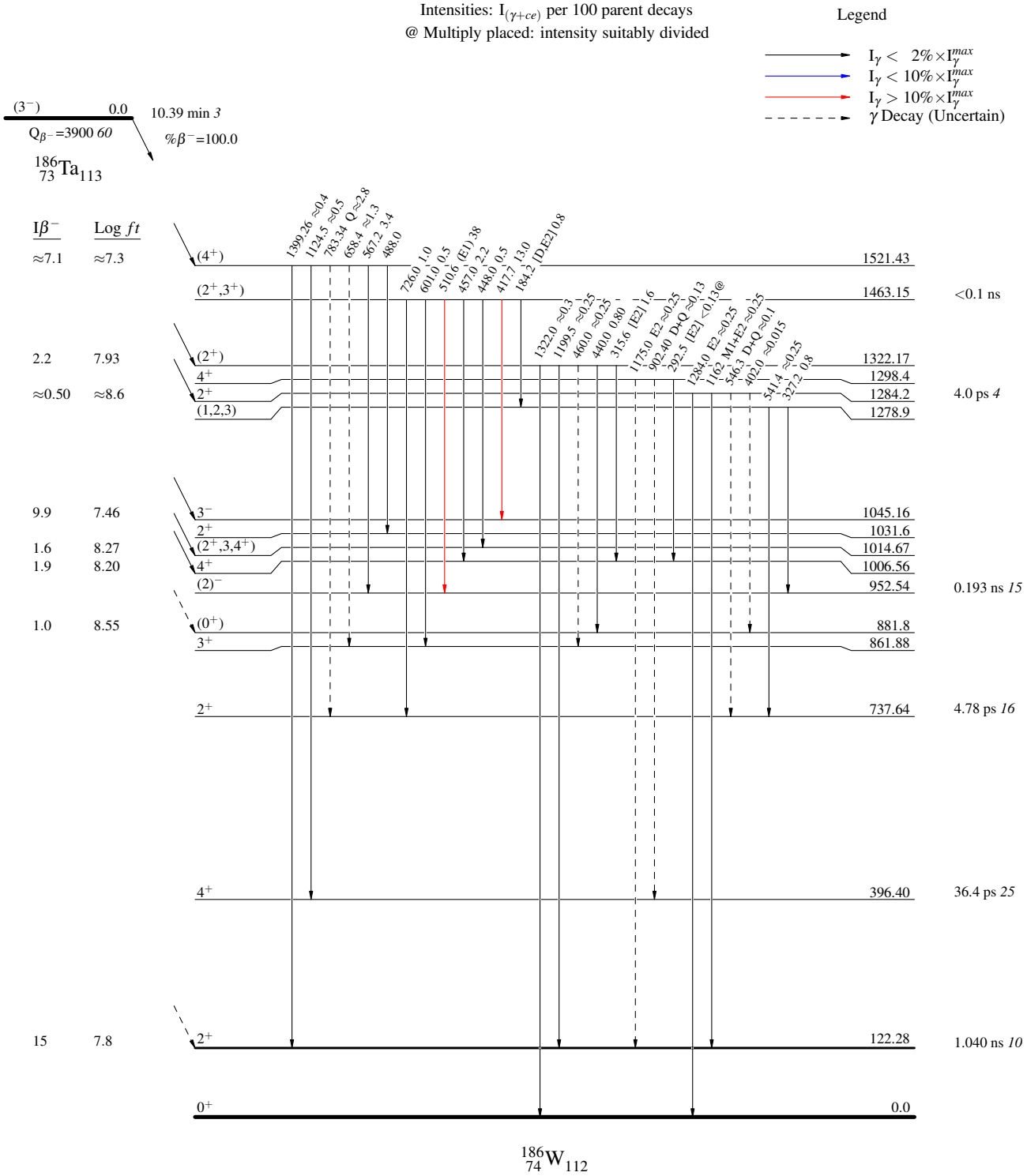
Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



^{186}Ta β^- decay 1973Gu02

Decay Scheme (continued)

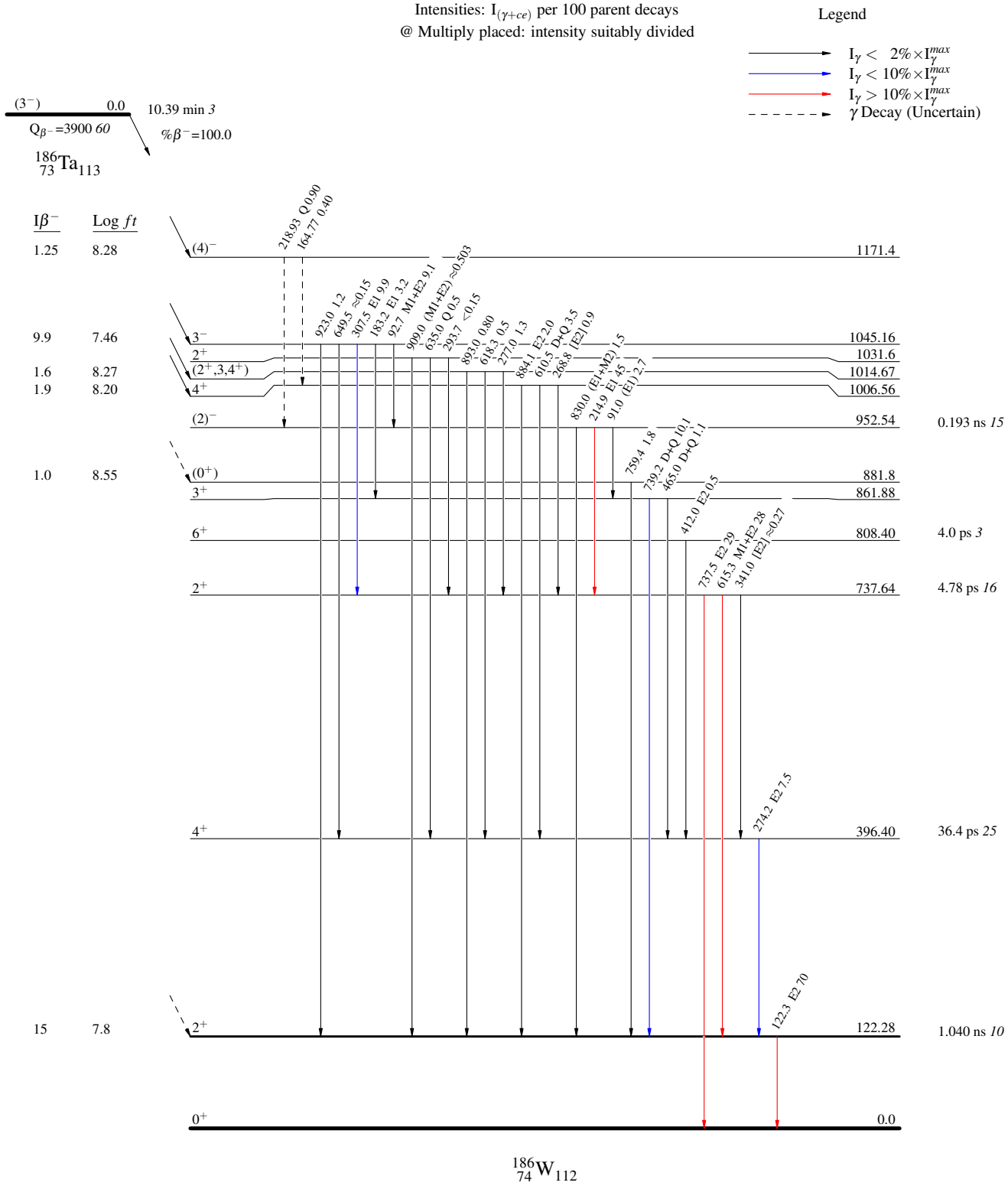
Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
@ Multiply placed: intensity suitably divided



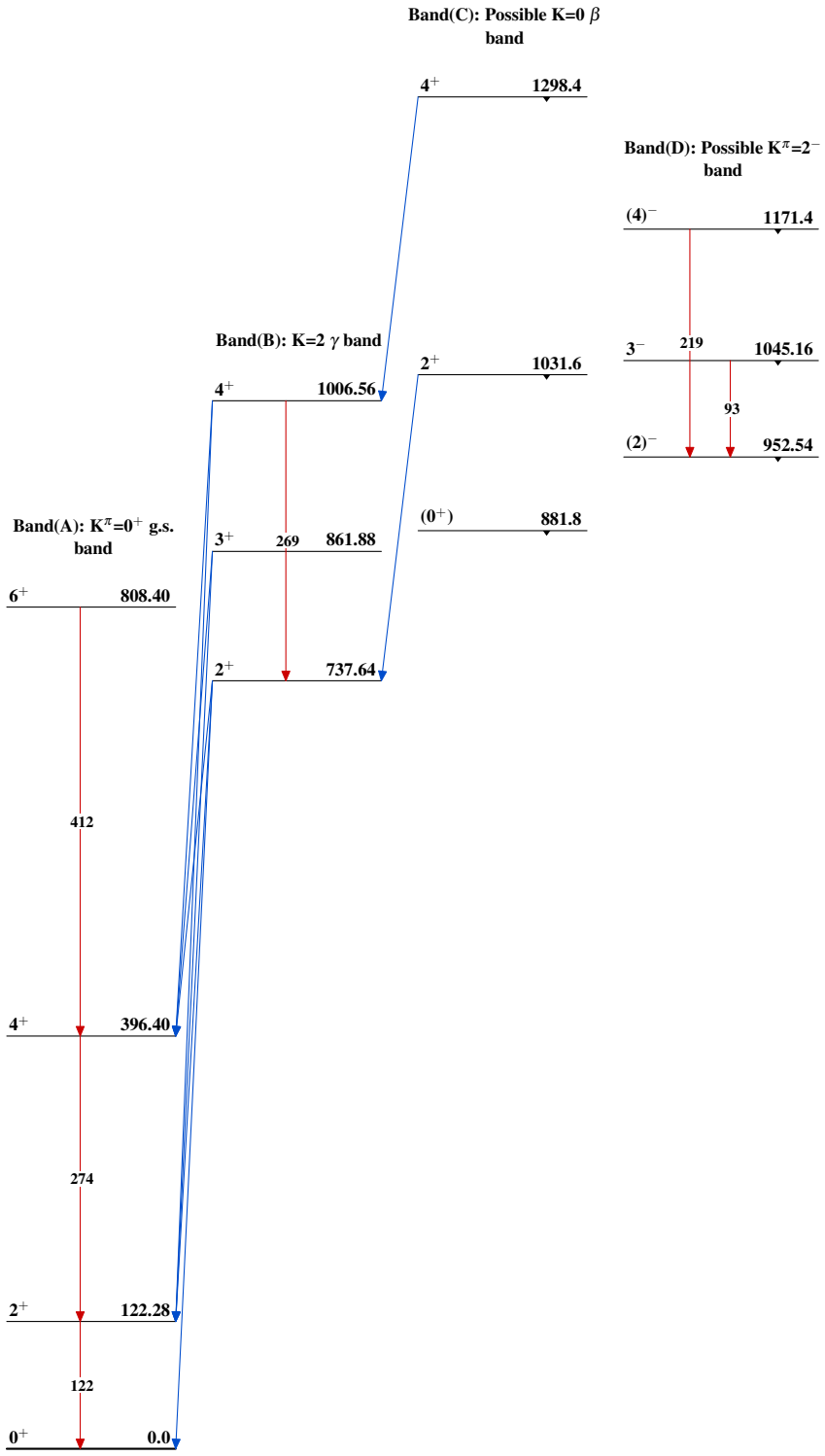
^{186}Ta β^- decay 1973Gu02

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
@ Multiply placed: intensity suitably divided



^{186}Ta β^- decay 1973Gu02



$^{186}_{74}W_{112}$