^{186}Ir ε decay (1.90 h) 1975Ya10

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}Ir: E=0.0+x; J$^{\pi}$=2$^-$; T$_{1/2}$=1.90 h *5*; Q(ε)=3828 *17*; %ε+%β^+ decay≈75.0

^{186}Ir-%ε+%β^+ decay: %ε+β^+≈75 based on value for %IT of between 20 and 30 (1991Be25); an uncertainty of 5% has been assumed for the purpose of calculating ε feeding and log *ft* values. This value should be considered a lower limit due to the uncertainty of the %IT value.

Other references: 1990Ed01, 1970FiZZ, 1970ZaZV, 1962Bo22, 1955Sm42.

The level scheme is that of 1975Ya10.

^{186}Os Levels

E(level)†	J$^{\pi}$‡	T$_{1/2}$	Comments
0.0	0$^+$	2.0×10^{15} y *11*	T$_{1/2}$: From Adopted Levels.
137.14 *3*	2$^+$	868 ps *12*	T$_{1/2}$: From Adopted Levels.
434.10 *6*	4$^+$		
767.44 *6*	2$^+$		
910.40 *7*	3$^+$		
1070.45 *7*	4$^+$		
1351.88 *8*	4$^+$		
1480.02 *9*	(3)$^-$		
1640.75 *12*			
1653.51 *12*	2$^+$,3,4$^+$		
1754.45 *8*	2$^{(+)}$		J=2 from 1754γ(θ,H,T) (1990Ed01).
1848.38 *9*	2$^+$,3		
2919.85 *16*	1,2$^+$		

† From a least-squares fit to γ-ray energies.
‡ From Adopted Levels.

ε,β^+ radiations

E(decay)†	E(level)	Iβ^+ †#	Iε#	Log *ft*‡	I($\varepsilon+\beta^+$)#	Comments
(908 *17*)	2919.85		1.31 *16*	6.93 *7*	1.31 *16*	εK=0.8026; εL=0.1497 *4*; εM+=0.04762 *15*
(1980 *17*)	1848.38	0.065 *9*	5.0 *6*	7.05 *6*	5.1 *5*	av Eβ=447 *9*; εK=0.8048; εL=0.13891 *21*; εM+=0.04366 *7*
(2074 *17*)	1754.45	0.33 *4*	18.6 *20*	6.53 *6*	18.9 *16*	av Eβ=489 *9*; εK=0.8013 *9*; εL=0.13791 *23*; εM+=0.04332 *8* From 1754γ(θ,H,T) (1990Ed01), β transition is ≈35% L=0, ≈65% L=1 if J=2 for Ir parent.
(2174 *17*)	1653.51	0.037 *6*	1.51 *21*	7.66 *7*	1.55 *21*	av Eβ=533 *9*; εK=0.7965 *11*; εL=0.1367 *3*; εM+=0.04292 *9*
(2187 *17*)	1640.75	0.029 *4*	1.13 *14*	7.79 *7*	1.16 *12*	av Eβ=539 *9*; εK=0.7958 *11*; εL=0.1365 *3*; εM+=0.04287 *9*
(2348 *17*)	1480.02	0.23 *5*	5.9 *13*	7.14 *10*	4.6 *11*	av Eβ=609 *9*; εK=0.7858 *15*; εL=0.1343 *3*; εM+=0.04213 *10*
(2476 *17*)	1351.88	0.010 *6*	0.7 *4*	9.47^{1u} *25*	0.7 *4*	av Eβ=672 *9*; εK=0.7974; εL=0.14338 *21*; εM+=0.04537 *8*
(2758 *17*)	1070.45	0.058 *16*	2.1 *6*	9.17^{1u} *12*	2.0 *6*	av Eβ=791 *9*; εK=0.7890; εL=0.14031 *24*; εM+=0.04432 *8*
(2918 *17*)	910.40	0.75 *18*	6.0 *14*	7.32 *11*	5.8 *12*	av Eβ=861 *9*; εK=0.728 *3*; εL=0.1230 *5*; εM+=0.03854 *16*
(3061 *17*)	767.44	2.2 *4*	14 *3*	7.00 *9*	19 *3*	av Eβ=924 *9*; εK=0.708 *3*; εL=0.1195 *6*; εM+=0.03741 *17*
(3394 *17*)	434.10	0.42 *11*	5.2 *14*	9.15^{1u} *12*	6.4 *15*	av Eβ=1063 *9*; εK=0.7517 *16*; εL=0.1313 *4*; εM+=0.04135 *11*

Continued on next page (footnotes at end of table)

^{186}Ir ε decay (1.90 h) 1975Ya10 (continued)

ϵ,β^+ radiations (continued)

E(decay)†	E(level)	$I\beta^+$ †#	$I\varepsilon$#	Log *ft*‡	$I(\varepsilon+\beta^+)$#	Comments
(3691 *17*)	137.14	≤3.7	≤10	≥7.3	≤14	av Eβ=1206 *9*; εK=0.605 *4*; εL=0.1014 *7*; εM+=0.03170 *20*

† Measured β^+ endpoint energies [intensities] are reported by 1962Bo22 as 3400 *1*, 2600 *20*, 1930 *44*, 1300 *12*, and 800 *22* keV. Presumably, the strong 1930 keV branch feeds the 767 and 910 levels, and the 2600 keV group feeds the 137 keV level (expected endpoint energies 2040, 1900 and 2670, respectively). The very weak 3400 keV group implies Q≥4422, cf. adopted Q=3828 (2021Wa16); it is unclear whether this represents an impurity or first forbidden unique g.s. feeding with very large analysis uncertainty.

‡ Calculated assuming negligible excitation energy for ^{186}Ir parent level (expected E<1.5; see ^{186}Ir, Adopted Levels), and allowing 5% uncertainty in $\%\varepsilon+\ \%\beta^+$.

Absolute intensity per 100 decays.

$\gamma(^{186}Os)$

Iγ normalization: Normalized assuming I(γ+ce)(137+767+1754+2920)=75, i.e. the sum of the transitions to the ground state = 75%. I(ε+β^+ to g.s.)=0 is assumed; a transition from 2^- to 0^+ would be a first forbidden unique transition with a logft of >9, with a corresponding branching ratio of <0.3%. In addition the positron measurements of 1962Bo22 suggest very little or no g.s. β^+ feeding. The total unplaced Iγ is about 21%. Iγ normalization would become 0.114 *8* if all unplaced gammas with E>2000 were to feed the g.s.

E_γ	I_γ[c]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	δ[&b]	α[a]	Comments
137.14 *3*	241[@] *24*	137.14	2^+	0.0	0^+	E2		1.271	%Iγ=52 *6* α(K)=0.434 *6*; α(L)=0.632 *9*; α(M)=0.1611 *23* α(N)=0.0386 *6*; α(O)=0.00575 *8*; α(P)=3.96×10^{-5} *6*
[x]276.59 *6*	6.1[@] *15*								%Iγ=0.60 *15* Eγ matches that for known 1629 to 1352 transition. coincidence data supports this assignment.
(281.50[†] *11*)	0.17[†] *6*	1351.88	4^+	1070.45	4^+	(E2)		0.1107	%Iγ=0.07 α(K)=0.0695 *10*; α(L)=0.0312 *5*; α(M)=0.00775 *11* α(N)=0.00187 *3*; α(O)=0.000289 *4*; α(P)=6.91×10^{-6} *10*
296.93 *5*	90[@] *12*	434.10	4^+	137.14	2^+	E2		0.0942	%Iγ=9.4 *4* α(K)=0.0606 *9*; α(L)=0.0255 *4*; α(M)=0.00631 *9* α(N)=0.001522 *22*; α(O)=0.000236 *4*; α(P)=6.08×10^{-6} *9*
301.87 *20*	6.2[@] *12*	1653.51	2^+,3,4^+	1351.88	4^+				%Iγ=0.59 *12*
[x]329.67 *14*	2.0 *4*								%Iγ=0.19 *4*
[x]361.55 *14*	4.8 *5*								%Iγ=0.46 *6*
[x]384.67 *7*	9.4 *5*								%Iγ=0.89 *8*
409.60 *22*	6.5[@] *6*	1480.02	$(3)^-$	1070.45	4^+				%Iγ=0.62 *7*
441.48 *11*	3.6[@] *25*	1351.88	4^+	910.40	3^+	M1+E2	+13.3 *+22−17*	0.0315	%Iγ=0.35 *15* α(K)=0.0231 *4*; α(L)=0.00642 *9*; α(M)=0.001552 *22* α(N)=0.000376 *6*; α(O)=6.02×10^{-5} *9*; α(P)=2.44×10^{-6} *4*
476.26 *14*	7.3 *12*	910.40	3^+	434.10	4^+	E2+M1	−22 *10*	0.0258 *5*	%Iγ=0.71 *13* α(K)=0.0192 *4*; α(L)=0.00504 *8*; α(M)=0.001212 *18* α(N)=0.000293 *5*; α(O)=4.73×10^{-5} *7*; α(P)=2.04×10^{-6} *4*
569.63 *12*	13.1[@] *18*	1480.02	$(3)^-$	910.40	3^+	E1		0.00582	%Iγ=1.2 *2* α(K)=0.00488 *7*; α(L)=0.000730 *11*; α(M)=0.0001658 *24* α(N)=4.03×10^{-5} *6*; α(O)=6.86×10^{-6} *10*; α(P)=4.81×10^{-7} *7*
584.44 *10*	10.0[@] *20*	1351.88	4^+	767.44	2^+	E2		0.01568	%Iγ=0.97 *21* α(K)=0.01211 *17*; α(L)=0.00274 *4*; α(M)=0.000650 *10* α(N)=0.0001577 *22*; α(O)=2.58×10^{-5} *4*; α(P)=1.294×10^{-6} *19*
630.32 *8*	164[@] *13*	767.44	2^+	137.14	2^+	M1+E2	−13.7 *+17−23*	0.01330	%Iγ=15.8 *17* α(K)=0.01040 *15*; α(L)=0.00223 *4*; α(M)=0.000528 *8* α(N)=0.0001280 *18*; α(O)=2.11×10^{-5} *3*; α(P)=1.115×10^{-6} *16*

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

E_γ	I_γ[c]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ[&b]	α[a]	Comments
636.32 *9*	17[@] *5*	1070.45	4+	434.10	4+	M1+E2	+24 +*26*−*8*	0.01294	%Iγ=1.6 *5* α(K)=0.01012 *15*; α(L)=0.00216 *3*; α(M)=0.000512 *8* α(N)=0.0001242 *18*; α(O)=2.04×10^{-5} *3*; α(P)=1.084×10^{-6} *16*
[x]685.13 *11*	14.4[@] *12*								%Iγ=1.37 *15* E_γ: Likely feeds 687 keV state based on coincidence data.
[x]687.43 *14*	12.7 *7*								%Iγ=1.21 *11*
712.57[‡] *10*	29[@‡] *10*	1480.02	(3)−	767.44	2+	[E1]		0.00370	%Iγ=3.3 *4* α(K)=0.00311 *5*; α(L)=0.000458 *7*; α(M)=0.0001039 *15* α(N)=2.52×10^{-5} *4*; α(O)=4.32×10^{-6} *6*; α(P)=3.10×10^{-7} *5*
730.35 *17*	5.5[@] *6*	1640.75		910.40	3+				%Iγ=0.52 *7*
742.99 *14*	6.1 *4*	1653.51	2+,3,4+	910.40	3+				%Iγ=0.58 *6*
767.46 *10*	193[@] *16*	767.44	2+	0.0	0+	E2		0.00856	%Iγ=18.5 *21* α(K)=0.00684 *10*; α(L)=0.001323 *19*; α(M)=0.000310 *5* α(N)=7.53×10^{-5} *11*; α(O)=1.254×10^{-5} *18*; α(P)=7.34×10^{-7} *11*
773.24 *10*	123[@] *11*	910.40	3+	137.14	2+	M1+E2	−60 +*12*−*20*	0.00842	%Iγ=11.7 *14* α(K)=0.00674 *10*; α(L)=0.001298 *19*; α(M)=0.000304 *5* α(N)=7.39×10^{-5} *11*; α(O)=1.231×10^{-5} *18*; α(P)=7.23×10^{-7} *11*
777.85 *22*	7.5 *6*	1848.38	2+,3	1070.45	4+				%Iγ=0.71 *8*
[x]783.20 *14*	17.9[@] *16*								%Iγ=1.7 *2*
844.08 *11*	21.6 *12*	1754.45	2(+)	910.40	3+				%Iγ=2.05 *19*
[x]858.65 *17*	4.9 *4*								%Iγ=0.47 *5*
873.32 *14*	6.7 *5*	1640.75		767.44	2+				%Iγ=0.64 *7*
886.1 *3*	4.0 *11*	1653.51	2+,3,4+	767.44	2+				%Iγ=0.38 *11*
[x]924.12 *16*	6.6 *5*								%Iγ=0.63 *7*
933.40 *10*	17.9[@] *23*	1070.45	4+	137.14	2+	E2		0.00570	%Iγ=1.7 *3* α(K)=0.00463 *7*; α(L)=0.000825 *12*; α(M)=0.000192 *3* α(N)=4.66×10^{-5} *7*; α(O)=7.84×10^{-6} *11*; α(P)=4.97×10^{-7} *7*
938.00 *12*	20.5 *13*	1848.38	2+,3	910.40	3+				%Iγ=1.95 *19*
[x]952.5 *3*	3.4 *4*								%Iγ=0.32 *4*
987.03 *10*	100	1754.45	2(+)	767.44	2+				%Iγ=9.5 *7*
[x]1018.77 *19*	4.6 *9*								%Iγ=0.44 *9*
[x]1024.54 *24*	4.4 *5*								%Iγ=0.42 *10* Likely feeds 434 keV state based on coincidence data.
[x]1039.13 *15*	7.5 *6*								%Iγ=0.71 *8*
1046.26[#d] *16*	9.3 *8*	1480.02	(3)−	434.10	4+				%Iγ=0.88 *10* E_γ: not adopted. See general comments.
[x]1057.25 *12*	5.2[@] *12*								%Iγ=0.49 *12* Likely feeds 434 keV state based on coincidence data.

$^{186}_{76}Os_{110}$-4

γ(^{186}Os) (continued)

E_γ	I_γ[c]	E_i(level)	J_i^π	E_f	J_f^π	Comments
1071.40 *17*	8.1 *7*	2919.85	1,2$^+$	1848.38	2$^+$,3	%Iγ=0.77 *9*
1081.26 *24*	9.1 *7*	1848.38	2$^+$,3	767.44	2$^+$	%Iγ=0.86 *9*
[x]1095.5 *3*	4.5 *10*					%Iγ=0.43 *10*
[x]1114.70 *25*	8.9 *14*					%Iγ=0.85 *15*
[x]1127.1 *3*	4.4 *10*					%Iγ=0.42 *10*
1165.4 *3*	3.5 *9*	2919.85	1,2$^+$	1754.45	2$^{(+)}$	%Iγ=0.33 *9*
[x]1316.7 *4*	9.7 *9*					%Iγ=0.92 *11*
1414.06 *22*	6.1 *8*	1848.38	2$^+$,3	434.10	4$^+$	%Iγ=0.58 *9*
[x]1455.23 *22*	7.2 *14*					%Iγ=0.68 *14*
1617.21 *15*	38 *4*	1754.45	2$^{(+)}$	137.14	2$^+$	%Iγ=3.6 *5*
1711.13 *18*	18.4 *19*	1848.38	2$^+$,3	137.14	2$^+$	%Iγ=1.75 *22*
1754.4 *3*	42 *4*	1754.45	2$^{(+)}$	0.0	0$^+$	%Iγ=4.0 *5*
[x]1910.2 *4*	5.9 *16*					%Iγ=0.56 *16*
[x]2173.2 *3*	11.9 *17*					%Iγ=1.13 *18*
[x]2186.95 *20*	27[@] *3*					%Iγ=2.5 *4*
[x]2207.3 *4*	3.2 *5*					%Iγ=0.30 *5*
[x]2224.1 *4*	9.7 *13*					%Iγ=0.92 *14*
[x]2275.8 *3*	4.2 *7*					%Iγ=0.40 *7*
[x]2472.08 *23*	5.3 *10*					%Iγ=0.50 *10*
[x]2508.8 *3*	4.5 *9*					%Iγ=0.43 *9*
[x]2517.4 *3*	3.2 *8*					%Iγ=0.30 *8*
[x]2725.1 *3*	3.7 *7*					%Iγ=0.35 *7*
[x]2793.1 *4*	3.6 *6*					%Iγ=0.34 *6*
[x]2797.8 *4*	3.1 *5*					%Iγ=0.29 *5*
[x]2904.7 *3*	7.1 *11*					%Iγ=0.67 *12*
2920.2 *4*	2.2 *4*	2919.85	1,2$^+$	0.0	0$^+$	%Iγ=0.21 *4*

[†] Eγ from adopted gammas (for known doublet); transition not observed in this decay. Iγ<11 deduced by evaluators assuming adopted branching for parent level.

[‡] In ^{186}Ir ε decay (16.64 h), the 713γ is a doublet; the observed 713γ-773γ and 713γ-767γ coin in ^{186}Ir ε decay (1.90 h) implies that it is a doublet here also. From I(570γ) and adopted branching, I(713γ)=29 *10* is expected from the 1480 level (cf. Iγ(doublet)=35 *3*), leaving I(713γ)=6 *10* to be placed from the 1623 level, known from other reaction or decay studies.

[#] Placement of a 1046γ from the 1480 level has not been confirmed in ^{186}Ir ε decay (16.64 h) or (α,2nγ) studies, even though its Iγ should have been within their detection ranges; therefore the transition is not included in the Adopted Levels.

[@] γ of similar energy present in ^{186}Ir ε decay (16.64 h); intensity of Ir (1.90 h) component determined by decay analysis (1975Ya10).

[&] From adopted gammas.

[a] Additional information 1.

[b] 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.

[c] For absolute intensity per 100 decays, multiply by ≈0.071.

[d] Placement of transition in the level scheme is uncertain.

[x] γ ray not placed in level scheme.

^{186}Ir ε decay (1.90 h) 1975Ya10

Decay Scheme

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