^{190}Ir ε decay (11.78 d) 1974Ya02,1964Ha06

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, [1] and Jun Chen[2]	NDS 169,1 (2020)	15-Oct-2020

Parent: ^{190}Ir: E=0; J$^{\pi}$=4^{-}; T$_{1/2}$=11.78 d *10*; Q(ε)=1954.2 *12*; %ε+%β^{+} decay=100

^{190}Ir-J$^{\pi}$,T$_{1/2}$: From ^{190}Ir Adopted Levels.

^{190}Ir-Q(ε): From 2017Wa10.

1974Ya02 (also 1974YaZU): ^{190}Ir ions were produced by the (d,α) reaction with natural osmium bombarded with a 18 MeV deuteron beam from the ANL 152-cm cyclotron. γ rays were detected with Ge(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, γ(t). Deduced T$_{1/2}$ of g.s. and isomer.

1964Ha06: The 11.1-d isomer of ^{190}Ir produced by proton irradiation of enriched ^{190}Os at ORNL. Conversion electrons were analyzed with photographic-recording, permanent-magnet spectrographs. Measured E(ce), I(ce). Deduced conversion sub-shell ratios.

Others:

γ: 1969Ya03, 1969Sa18, 1969Ha44, 1967Sy02, 1960Ka14, 1959Ni30, 1958Di44, 1955At32, 1954NiZZ, 1969TeZZ, 1947Go01.

$\gamma\gamma$: 1969Ya03.

ce: 1969Ya03, 1969Sa18, 1967Sy02, 1966Sy01, 1960Ka14, 1959Ni30.

$\gamma\gamma(\theta)$: 1974He08, 1971Kr01 (also 1970KrZW), 1969Ya03.

ce$\gamma(\theta)$, ce-ce(θ): 1969Sa18, 1965Ya01, 1963Ya01, 1958Ca18.

$\gamma\gamma(\theta$,H): 1970Le04 (also 1970LeZZ).

$\gamma(\theta$,t) (oriented nuclei): 1983Al15, 1980Mu07.

T$_{1/2}$(^{190}Ir): 1975Ba35, 1969Sa18, 1963Gr22, 1960Ka14, 1955At32, 1950Ch11, 1947Go01, 1970Bo22, 1969TeZZ.

β^{+}: 1950Ch11.

^{190}Os Levels

Levels reported at 1781.7, 1886.8, 1963.9 by 1964Ha06 have been discarded for lack of confirmation by later studies. The transitions reported with these levels have either not been seen in γ-ray studies or have been assigned to different levels.

E(level)†	J$^{\pi}$‡	Comments
0.0	0^{+}	
186.69 *4*	2^{+}#	μ=0.54 *6* (1970Le04) μ: from integral perturbed angular correlation (IPAC) in 1970Le04.
547.88 *5*	4^{+}#	μ=0.88 *48* (1970Le04) μ: from integral perturbed angular correlation (IPAC) in 1970Le04.
557.93 *5*	2^{+}#	
755.92 *5*	3^{+}#	
955.24 *5*	4^{+}#	
1050.40 *9*	6^{+}#	
1163.11 *5*	4^{+}#	
1203.81 *7*	5^{+}#	
1386.91 *5*	3^{-}#	
1446.02 *6*	(5)$^{+}$	
1583.82 *7*	4^{-}#	
1681.60 *6*	5^{-}#	
1708.30 *21*	(2^{+},3,4^{+})	
1872.10 *8*	(5)$^{-}$	
1903.31 *12*	(3^{+},4^{-})	

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

‡ From the Adopted Levels.

$\gamma(\theta)$ and/or $\gamma\gamma(\theta)$ results support adopted spin assignments.

^{190}Ir ε decay (11.78 d) 1974Ya02,1964Ha06 (continued)

ε,β$^+$ radiations

E(decay)	E(level)	Iβ$^+$ ‡	Iε†‡	Log *ft*	I(ε+β$^+$)‡	Comments
(50.9 *12*)	1903.31		0.44 *3*	6.18 *4*	0.44 *3*	εL=0.669 *3*; εM+=0.331 *3*
(82.1 *12*)	1872.10		3.7 *3*	5.77 *5*	3.7 *3*	εK=0.058 *15*; εL=0.669 *10*; εM+=0.272 *5*
(245.9 *12*)	1708.30		0.18 *2*	8.64 *5*	0.18 *2*	εK=0.7154 *8*; εL=0.2127 *6*; εM+=0.07191 *22*
(272.6 *12*)	1681.60		47 *2*	6.339 *20*	47 *2*	εK=0.7302 *6*; εL=0.2021 *5*; εM+=0.06775 *17*
(370.4 *12*)	1583.82		10.0 *9*	7.34 *4*	10.0 *9*	εK=0.7616 *3*; εL=0.17942 *19*; εM+=0.05895 *8*
(508.2 *12*)	1446.02		1.1 *1*	8.62 *4*	1.1 *1*	εK=0.7819 *2*; εL=0.16480 *9*; εM+=0.05334 *4*
(567.3 *12*)	1386.91		1.4 *12*	8.6 *4*	1.4 *12*	εK=0.7871 *1*; εL=0.16104 *7*; εM+=0.05191 *3*
(791.1 *12*)	1163.11		25 *3*	7.69 *6*	25 *3*	εK=0.7989; εL=0.15244 *4*; εM+=0.04864 *2*
(999.0 *12*)	955.24		5.1 *8*	8.60 *7*	5.1 *8*	εK=0.8048; εL=0.14820 *2*; εM+=0.047041 *8*
(1767.5# *12*)	186.69	0.03 *2*	5 *3*	9.1^{1u} *3*	5 *3*	av Eβ=353.06 *53*; εK=0.8098; εL=0.1409; εM+=0.04433 The existence of this branch is simply from I(γ+ce) imbalance at 187 level which however could be also due to possible missing transitions to 187 level, and therefore is questionable.

† From I(γ+ce) imbalance at each level.

‡ Absolute intensity per 100 decays.

Existence of this branch is questionable.

$\gamma(^{190}Os)$

Iγ normalization: From Σ(I(γ+ce) to g.s.)=100.

The A_2 and A_4 coefficients in $\gamma\gamma(\theta)$ are from 1974He08, unless otherwise stated. The A_2 coefficients in $\gamma(\theta$,t) are from 1983Al15.

The following weak transitions, reported by 1964Ha06 in ce data are omitted for lack of confirmation in γ-ray data of 1974Ya02: 90.5, 100.0, 137.8, 182.1, 251.4, 402.4, 449.5, 462.5, 472.5, 750.7, 772.2, 801.2, 826.5, 833.2, 836.5, 925.5, 932.7, 1078.7, 1110.4, 1115.8, 1130.7, 1184.4, 1233.7, 1313.8, 1329.3, 1338.8, 1390.9, 1402.6, 1414.0, 1436.7, 1463.7, 1473.4, 1482.4, 1516.9, 1525.0, 1534.5, 1543.4, 1584.2, 1605.6, 1677.3, 1685.1, 1700.1, 1710.9.

The following γ rays reported by 1969Ya03 are probably due to impurities: 137.8, 147.0, 217.0, 272.0, 334.0, 344.0, 375.2, 449.5, 482.5.

Absolute K x ray(Os) measurement: 1987Re05 (% Kα_2 x ray=26.1 *13*, % Kα_1 x ray=45.0 *23*).

E_γ[†]	I_γ[†@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	δ[#]	α[&]	Comments
97.93 *15*	0.42 *6*	1681.60	5⁻	1583.82	4⁻	M1+E2	0.40 *12*	5.80 *13*	α(K)=4.4 *4*; α(L)=1.10 *17*; α(M)=0.26 *5* α(N)=0.064 *11*; α(O)=0.0104 *15*; α(P)=0.00051 *4* L2:L3:M:N=37 *6*:7.5 *11*:5.0 *8*:13 *2* (1964Ha06) α(K)exp>3.2; α(L2)exp=1.18 *31*; α(L3)exp=0.24 *6*; α(M)exp=0.16 *4*; α(N)exp=0.41 *11* δ: from deduced conversion coefficients above (by evaluators using BrIccMixing). I(ce(K))>100 (1964Ha06).
186.68 *4*	230 *9*	186.69	2⁺	0.0	0⁺	E2		0.420	α(K)=0.203 *3*; α(L)=0.1642 *23*; α(M)=0.0415 *6* α(N)=0.00997 *14*; α(O)=0.001504 *21*; α(P)=1.88×10^{-5} *3* K:L2:L3=3500 *525*:1500 *225*:1100 *165* (1964Ha06) $\gamma(\theta)$: U_2A_2=−0.075 *6* (1983Al15).
190.52 *20*	0.59 *11*	1872.10	(5)⁻	1681.60	5⁻	M1		0.903	α(K)=0.747 *11*; α(L)=0.1204 *18*; α(M)=0.0276 *4* α(N)=0.00675 *10*; α(O)=0.001165 *17*; α(P)=8.68×10^{-5} *13* α(K)exp=0.90 *26* Mult.: deduced α(K)exp from I(ce(K))=40 *6* in 1964Ha06.
196.85 *15*	15.0 *15*	1583.82	4⁻	1386.91	3⁻	E2+M1	+1.0 *5*	0.59 *15*	α(K)=0.43 *16*; α(L)=0.121 *7*; α(M)=0.0292 *24* α(N)=0.0071 *6*; α(O)=0.00113 *5*; α(P)=4.8×10^{-5} *19* K:M:N=410 *62*:44 *7*:11 *2* (1964Ha06); α(K)exp=0.36 *8* δ: from (197γ)(829γ)(θ): A_2=−0.11 *3*, A_4=−0.09 *5* (1974He08).
198.08 *20*	8.5 *10*	755.92	3⁺	557.93	2⁺	E2+M1	−9 *+2−5*	0.349 *7*	α(K)=0.180 *5*; α(L)=0.1277 *19*; α(M)=0.0321 *5* α(N)=0.00773 *12*; α(O)=0.001171 *18*; α(P)=1.70×10^{-5} *6* α(K)exp=0.137 *34* Mult.: deduced α(K)exp from I(ce(K))=87 *13* in 1964Ha06. 1964Ha06 gives mult=E2. δ: from (198γ)(558γ)(θ): A_2=−0.32 *3*, A_4=−0.02 *4* (1974He08).
199.3 *3*	1.0 *3*	955.24	4⁺	755.92	3⁺	E2		0.336	α(K)=0.1712 *25*; α(L)=0.1246 *20*; α(M)=0.0314 *5* α(N)=0.00755 *12*; α(O)=0.001143 *18*; α(P)=1.604×10^{-5} *24*

γ(^{190}Os) (continued)

$E_γ$[†]	$I_γ$[†@]	E_i(level)	$J^π_i$	E_f	$J^π_f$	Mult.[‡]	δ[#]	α[&]	Comments
									α(K)exp=0.133 *52* Mult.: deduced α(K)exp from I(ce(K))=10 *2* in 1964Ha06.
207.91[a] *6*	5.2[a] *7*	755.92	3⁺	547.88	4⁺	E2(+M1)	−16 *+5−20*	0.293	α(K)=0.155 *3*; α(L)=0.1045 *15*; α(M)=0.0263 *4* α(N)=0.00632 *9*; α(O)=0.000959 *14*; α(P)=1.47×10⁻⁵ *3* α(K)exp=0.133 *34* Mult.: deduced α(K)exp from I(ce(K))=67 *10* in 1964Ha06 and Iγ=6.7 *9* for the doublet (1974Ya02). 1964Ha06 gives mult=E2. δ: from (208γ)(361γ)(θ): A_2=+0.07 *2*, A_4=−0.17 *4* (1974He08).
207.91[a] *6*	1.5[a] *5*	1163.11	4⁺	955.24	4⁺	(E2)		0.291	α(K)=0.1533 *22*; α(L)=0.1045 *15*; α(M)=0.0263 *4* α(N)=0.00632 *9*; α(O)=0.000959 *14*; α(P)=1.446×10⁻⁵ *21* α(K)exp=0.133 *34* Mult.: deduced α(K)exp from I(ce(K))=67 *10* in 1964Ha06 and Iγ=6.7 *9* for the doublet (1974Ya02).
223.81 *5*	16.4 *8*	1386.91	3⁻	1163.11	4⁺	E1		0.0500 *13*	α(K)=0.0414 *10*; α(L)=0.00669 *22*; α(M)=0.00153 *6* α(N)=0.000370 *13*; α(O)=6.15×10⁻⁵ *22*; α(P)=3.76×10⁻⁶ *15* Mult.: K:L1:L3=55 *8*:9.0 *14*:2.0 *3* (1964Ha06), deduced α(K)exp=0.044 *10*. δ: δ(M2/E1)=0.00 *2* from (224γ)(605γ)(θ): A_2=−0.11 *2*, A_4=−0.07 *3* (1974He08). γ(θ): U_2A_2=+0.10 *8* (1983Al15).
235.50 *12*	1.86 *14*	1681.60	5⁻	1446.02	(5)⁺	E1		0.0441	α(K)=0.0365 *6*; α(L)=0.00587 *9*; α(M)=0.001342 *19* α(N)=0.000324 *5*; α(O)=5.41×10⁻⁵ *8*; α(P)=3.34×10⁻⁶ *5* α(K)exp=0.043 *10* Mult.: deduced α(K)exp from I(ce(K))=6 *1* in 1964Ha06.
[x]248.2 *3*	0.53 *9*								
282.93 *6*	2.1 *4*	1446.02	(5)⁺	1163.11	4⁺	E2(+M1)	>2.5	0.122 *14*	α(K)=0.081 *13*; α(L)=0.0313 *8*; α(M)=0.00771 *16* α(N)=0.00186 *4*; α(O)=0.000290 *9*; α(P)=8.4×10⁻⁶ *16* Mult.,δ: from deduced α(K)exp≈0.095, α(L3)exp=0.0114 *34*, from I(ce(K))≈15, I(L3)=1.8 *3* (1964Ha06).
288.22 *10*	7.2 *6*	1872.10	(5)⁻	1583.82	4⁻	E2+M1	2.2 *+11−5*	0.135 *17*	α(K)=0.095 *16*; α(L)=0.0302 *10*; α(M)=0.00736 *18* α(N)=0.00178 *5*; α(O)=0.000282 *10*; α(P)=1.01×10⁻⁵ *19* K:L2:L3=46 *7*:5.5 *8*:3.0 *5* (1964Ha06) α(K)exp=0.085 *20*; α(L)exp=0.0102 *23*; α(L3)exp=0.0056 *14* δ: from K:L2:L3 in 1964Ha06 (by evaluators using BrIccMixing).
294.75 *12*	29 *3*	1681.60	5⁻	1386.91	3⁻	(E2)		0.0963	α(K)=0.0618 *9*; α(L)=0.0262 *4*; α(M)=0.00649 *10* α(N)=0.001565 *22*; α(O)=0.000243 *4*; α(P)=6.19×10⁻⁶ *9* K:L3:M:N=205 *31*:16 *3*:15 *2*:3.5 *5* (1964Ha06)

From ENSDF

γ(^{190}Os) (continued)

E_γ[†]	I_γ[†@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	δ[#]	α[&]	Comments
									α(K)exp=0.094 *23*; α(L3)exp=0.0074 *20*; α(M)exp=0.0069 *16* δ: ≈3 (2.3 *+2−5* from α(K)exp, >3 from α(L3)exp). (295γ)(829γ)(θ): A_2=−0.05 *3*, A_4=+0.01 *6* (1974He08), deduced δ(829γ)=+0.06 *6*. γ(θ): U_2A_2=−0.3945 *4* (1983Al15).
361.09 *5*	57.1 *17*	547.88	4+	186.69	2+	E2		0.0535	α(K)=0.0370 *6*; α(L)=0.01255 *18*; α(M)=0.00307 *5* α(N)=0.000742 *11*; α(O)=0.0001169 *17*; α(P)=3.82×10^{-6} *6* K:L3=185 *28*:13 *2* (1964Ha06); α(K)exp=0.043 *10* γ(θ): U_2A_2=−0.33 *3* (1983Al15).
371.24 *5*	100	557.93	2+	186.69	2+	E2+M1	−8.1 *8*	0.0510	α(K)=0.0359 *6*; α(L)=0.01151 *17*; α(M)=0.00281 *4* α(N)=0.000679 *10*; α(O)=0.0001074 *16*; α(P)=3.73×10^{-6} *7* K:M:N=315 *47*:23 *4*:7.5 *11* (1964Ha06); α(K)exp=0.042 *9* Mult.: 1964Ha06 gives mult=E2. δ: weighted average of −13 *6* (1983Al15), −12 *+3−5*, −7.5 *+20−40* (1974He08), −8.5 *10* (1971Kr01), −6.5 *13* (1969Sa18), −14 *6* (1965Ya01). Other: 1.9<δ<4.0 from K:M:N in (1964Ha06) (using BrIccMixing). (371γ)(187γ)(θ): A_2=−0.01 *2*, A_4=+0.28 *3* (1974He08). Others: 1971Kr01, 1969Sa18 and 1965Ya01 (γ,ce(θ)). γ(θ): U_2A_2=+0.14 *4* (1983Al15).
380.03 *12*	8.9 *4*	1583.82	4−	1203.81	5+	E1		0.01407	α(K)=0.01173 *17*; α(L)=0.00181 *3*; α(M)=0.000413 *6* α(N)=0.0001000 *14*; α(O)=1.690×10^{-5} *24*; α(P)=1.125×10^{-6} *16* α(K)exp=0.0142 *31* Mult.: deduced α(K)exp from I(ce(K))=9.5 *14* in 1964Ha06. γ(θ): U_2A_2=0.05 *9* (1983Al15).
[x]394.5 *4*	0.19 *7*					(M1)		0.1239	α(K)exp≈0.14 α(K)=0.1028 *15*; α(L)=0.01629 *24*; α(M)=0.00373 *6* α(N)=0.000911 *13*; α(O)=0.0001575 *23*; α(P)=1.180×10^{-5} *17* α(K) exp from I(ce(K))≈=2 in 1964Ha06. Mult.: from α(K)exp.
397.36 *6*	28.7 *9*	955.24	4+	557.93	2+	E2		0.0412	α(K)=0.0293 *5*; α(L)=0.00904 *13*; α(M)=0.00220 *3* α(N)=0.000532 *8*; α(O)=8.44×10^{-5} *12*; α(P)=3.05×10^{-6} *5* K:L3=74 *11*:4.2 *6* (1964Ha06); α(K)exp=0.034 *8* (397γ)(558γ)(θ): A_2=+0.10 *2*, A_4=−0.01 *4* (1974He08). γ(θ): U_2A_2=+0.344 *20* (1983Al15).
407.22[a] *6*	20[a] *3*	955.24	4+	547.88	4+	E2+M1	−3.4 *+6−9*	0.045 *3*	α(K)=0.0330 *23*; α(L)=0.0089 *3*; α(M)=0.00214 *6* α(N)=0.000517 *14*; α(O)=8.3×10^{-5} *3*; α(P)=3.5×10^{-6} *3* K:L3:M:N=330 *50*:17.5 *26*:23 *4*:5.5 *8* (1964Ha06); α(K)exp=0.035 *8* α(K)exp from Iγ=125 *6* for the doublet (1974Ya02). δ: from (407γ)(361γ)(θ): A_2=+0.12 *4*, A_4=+0.04 *6* (1974He08). γ(θ): U_2A_2=+0.255 *39* for doublet (1983Al15).

γ(^{190}Os) (continued)

E_γ[†]	I_γ[†@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	δ[#]	α[&]	Comments
407.22[a] *6*	105[a] *5*	1163.11	4^+	755.92	3^+	E2+M1	−2.6 +*8*−*14*	0.048 *8*	α(K)=0.036 *8*; α(L)=0.0092 *8*; α(M)=0.00220 *16* α(N)=0.00053 *4*; α(O)=8.6×10^{-5} *8*; α(P)=3.9×10^{-6} *9* K:L3:M:N=330 *50*:17.5 *26*:23 *4*:5.5 *8* (1964Ha06); α(K)exp=0.035 *8* α(K)exp using Iγ=125 *6* for the doublet (1974Ya02). δ: from (407γ)(569γ)(θ): A_2=0.049 *11*, A_4=0.096 *17* (1974He08) using δ(569γ)=−11.5. γ(θ) (doublet): U_2A_2=0.26 *4* (1983Al15), deduced δ=−6.5 *20*.
420.63 *12*	7.2 *3*	1583.82	4^-	1163.11	4^+	[E1]		0.01119	α(K)=0.00934 *13*; α(L)=0.001430 *20*; α(M)=0.000326 *5* α(N)=7.90×10^{-5} *11*; α(O)=1.338×10^{-5} *19*; α(P)=9.03×10^{-7} *13*
426.2 *4*	0.11 *4*	1872.10	$(5)^-$	1446.02	$(5)^+$				
431.62 *7*	12.0 *7*	1386.91	3^-	955.24	4^+	[E1]		0.01056	α(K)=0.00882 *13*; α(L)=0.001348 *19*; α(M)=0.000307 *5* α(N)=7.44×10^{-5} *11*; α(O)=1.261×10^{-5} *18*; α(P)=8.55×10^{-7} *12* γ(θ): U_2A_2=0.16 *6* (1983Al15).
447.81 *8*	11.2 *6*	1203.81	5^+	755.92	3^+	E2		0.0301	α(K)=0.0221 *3*; α(L)=0.00611 *9*; α(M)=0.001475 *21* α(N)=0.000357 *5*; α(O)=5.72×10^{-5} *8*; α(P)=2.32×10^{-6} *4* Mult.: deduced α(K)exp=0.027 *7*, from I(ce(K))=23 *4* in 1964Ha06. γ(θ): U_2A_2=−0.48 *7*, deduced δ(M3/E2)=+0.18 *9* (1983Al15).
477.8 *3*	8.0 *9*	1681.60	5^-	1203.81	5^+				
485.23 *20*	3.2 *7*	1872.10	$(5)^-$	1386.91	3^-	E2		0.0245	α(K)=0.0183 *3*; α(L)=0.00474 *7*; α(M)=0.001141 *16* α(N)=0.000276 *4*; α(O)=4.45×10^{-5} *7*; α(P)=1.94×10^{-6} *3* α(K)exp=0.018 *6* Mult.: deduced α(K)exp from I(ce(K))=4.5 *7* in 1964Ha06.
490.76 *7*	3.42 *17*	1446.02	$(5)^+$	955.24	4^+	(E2)		0.0239	α(K)=0.0179 *3*; α(L)=0.00458 *7*; α(M)=0.001101 *16* α(N)=0.000267 *4*; α(O)=4.30×10^{-5} *6*; α(P)=1.89×10^{-6} *3* Mult.: deduced α(K)exp=0.0195 *45*, from I(ce(K))=5.0 *8* in 1964Ha06. No multipolarity is given in 1964Ha06.
502.55 *8*	5.5 *3*	1050.40	6^+	547.88	4^+	E2		0.0225	α(K)=0.01693 *24*; α(L)=0.00426 *6*; α(M)=0.001022 *15* α(N)=0.000248 *4*; α(O)=4.00×10^{-5} *6*; α(P)=1.80×10^{-6} *3* α(K)exp=0.032 *7* Mult.: deduced α(K)exp from I(ce(K))=13 *2* in 1964Ha06. No multipolarity is given in 1964Ha06. (503γ)(361γ)(θ): A_2=+0.12 *4*, A_4=+0.04 *6* (1974He08).
518.55 *7*	149 *5*	1681.60	5^-	1163.11	4^+	E1(+M2)	+0.010 *15*	0.00711 *14*	α(K)=0.00595 *11*; α(L)=0.000897 *19*; α(M)=0.000204 *5* α(N)=4.95×10^{-5} *11*; α(O)=8.42×10^{-6} *19*; α(P)=5.84×10^{-7} *13* K:L1:M=105 *16*:17 *3*:4.0 *6* (1964Ha06) α(K)exp=0.0094 *21*; α(L1)exp=0.0015 *4*; α(M)exp=0.00036 *8* δ: from (519γ)(605γ)(θ): A_2=−0.066 *9*, A_4=0.002 *14* (1974He08). Other: 1971Kr01. (519γ)(558γ)(θ): A_2=−0.102 *15*, A_4=−0.01 *2* (1974He08),

From ENSDF

$\gamma(^{190}Os)$ (continued)

E_γ†	I_γ†@	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	δ#	α&	Comments
									deduced δ(519γ)=−0.05 *3*. $\gamma(\theta)$: U_2A_2=+0.2761 *3* (1983Al15).
557.95 *7*	132 *4*	557.93	2+	0.0	0+	E2		0.01748	α(K)=0.01340 *19*; α(L)=0.00312 *5*; α(M)=0.000745 *11* α(N)=0.000181 *3*; α(O)=2.94×10^{-5} *5*; α(P)=1.430×10^{-6} *20* α(K)exp=0.021 *5* α(K)exp from I(ce(K))=210 *32* in 1964Ha06. $\gamma(\theta)$: U_2A_2=−0.387 *20* (1983Al15).
569.30 *7*	125 *4*	755.92	3+	186.69	2+	E2+M1	−9.8 *10*	0.01699 *25*	α(K)=0.01310 *20*; α(L)=0.00298 *5*; α(M)=0.000709 *10* α(N)=0.0001720 *25*; α(O)=2.81×10^{-5} *4*; α(P)=1.401×10^{-6} *21* K:N=180 *27*:11 *2* (1964Ha06); α(K)exp=0.0192 *42* Mult.: 1964Ha06 gives mult=E2. δ: weighted average of −8.1 *+13−21* (1983Al15), −11.5 *15* (1974He08),−9.0 *15* (1971Kr01), −14 *14* (1965Ya01). (569γ)(187γ)(θ): A_2=−0.282 *15*, A_4=−0.05 *2* (1974He08). Others: 1971Kr01, 1965Ya01 (γ,ce(θ)). $\gamma(\theta)$: U_2A_2=+0.06 *3* (1983Al15).
605.14 *7*	175 *6*	1163.11	4+	557.93	2+	E2		0.01447	α(K)=0.01123 *16*; α(L)=0.00248 *4*; α(M)=0.000589 *9* α(N)=0.0001427 *20*; α(O)=2.34×10^{-5} *4*; α(P)=1.202×10^{-6} *17* K:M=225 *34*:13.5 *20*; α(K)exp=0.0172 *38* (605γ)(187γ)(θ): A_2=−0.04 *2*, A_4=0.00 *4*, deduced δ(371γ)>6 (1974He08). (605γ)(371γ)(θ): A_2=−0.043 *9*, A_4=−0.004 *13*, deduced δ(371γ)=−7.5 *+2−4* (1974He08). (605γ)(558γ)(θ): A_2=+0.098 *10*, A_4=−0.001 *16* (1971Kr01). $\gamma(\theta)$: U_2A_2=−0.42 *2* (1983Al15).
615.39 *15*	2.06 *12*	1163.11	4+	547.88	4+				
628.4 *3*	3.3 *4*	1583.82	4−	955.24	4+				
630.91 *16*	12.9 *15*	1386.91	3−	755.92	3+	[E1]		0.00472	α(K)=0.00396 *6*; α(L)=0.000588 *9*; α(M)=0.0001335 *19* α(N)=3.24×10^{-5} *5*; α(O)=5.54×10^{-6} *8*; α(P)=3.92×10^{-7} *6*
≈631	3.7 *10*	1681.60	5−	1050.40	6+				
656.02 *8*	5.1 *3*	1203.81	5+	547.88	4+	E2+M1	−1.7 *14*	0.017 *14*	α(K)=0.014 *12*; α(L)=0.0026 *15*; α(M)=0.0006 *4* α(N)=0.00015 *9*; α(O)=2.5×10^{-5} *15*; α(P)=1.5×10^{-6} *14* Mult.: K:L1=8.0 *12*:1.4 *2* (1964Ha06), deduced α(K)exp=0.0209 *47*. No multipolarity is given in 1964Ha06. δ: from $\gamma(\theta)$ (1983Al15). Other: −9 *+3−8* (1974He08). (656γ)(361γ)(θ): A_2=−0.20 *3*, A_4=−0.05 *4* (1974He08). $\gamma(\theta)$: U_2A_2=0.72 *23* (1983Al15).
668.1 *3*	0.23 *6*	1872.10	(5)−	1203.81	5+				
690.04 *8*	1.24 *12*	1446.02	(5)+	755.92	3+	(E2)		0.01077	α(K)=0.00851 *12*; α(L)=0.001738 *25*; α(M)=0.000409 *6* α(N)=9.94×10^{-5} *14*; α(O)=1.645×10^{-5} *23*; α(P)=9.12×10^{-7} *13* Mult.: deduced α(K)exp≈0.016, from I(ce(K))≈1.5 in 1964Ha06. No multipolarity is given in 1964Ha06.

γ(^{190}Os) (continued)

E_γ [†]	I_γ [†@]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [‡]	α [&]	Comments
709.1 *3*	0.32 *5*	1872.10	(5)$^-$	1163.11	4$^+$			
726.22 *8*	16.6 *5*	1681.60	5$^-$	955.24	4$^+$	E1	0.00357	α(K)=0.00300 *5*; α(L)=0.000441 *7*; α(M)=9.99×10^{-5} *14* α(N)=2.43×10^{-5} *4*; α(O)=4.16×10^{-6} *6*; α(P)=2.98×10^{-7} *5* K:L1=8.0 *12*:1.5 *2* (1964Ha06); α(K)exp=0.0064 *14* δ(M2/E1)=0.00 *2* from γ(θ): U_2A_2=+0.27 *5* (1983Al15).
^{x}731.1 *4*	0.16 *5*							
740.19 *14*	0.85 *7*	1903.31	(3$^+$,4$^-$)	1163.11	4$^+$			
753.0 *4*	0.11 *3*	1708.30	(2$^+$,3,4$^+$)	955.24	4$^+$			
768.57 *8*	9.7 *4*	955.24	4$^+$	186.69	2$^+$	E2	0.00853	α(K)=0.00682 *10*; α(L)=0.001318 *19*; α(M)=0.000309 *5* α(N)=7.50×10^{-5} *11*; α(O)=1.250×10^{-5} *18*; α(P)=7.32×10^{-7} *11* α(K)exp=0.0124 *34* Mult.: deduced α(K)exp from I(ce(K))=9 *2* in 1964Ha06. No multipolarity is given in 1964Ha06. γ(θ): U_2A_2=−0.386 *32*.
821.78 *14*	1.42 *9*	1872.10	(5)$^-$	1050.40	6$^+$			
≈828	2.5 *6*	1583.82	4$^-$	755.92	3$^+$			
828.99 *7*	15.2 *12*	1386.91	3$^-$	557.93	2$^+$	E1	0.00276	α(K)=0.00232 *4*; α(L)=0.000339 *5*; α(M)=7.68×10^{-5} *11* α(N)=1.87×10^{-5} *3*; α(O)=3.20×10^{-6} *5*; α(P)=2.33×10^{-7} *4* Mult.: deduced α(K)exp<0.008, from I(ce(K))<9 in 1964Ha06. No multipolarity is given in 1964Ha06. δ(M2/E1)=−0.01 *5* from (829γ)(558γ)(θ): A_2=−0.08 *4*, A_4=−0.02 *6* (1974He08). Other: +0.06 *6* from (295γ)(829γ)(θ) (1974He08).
839.14 *12*	5.0 *2*	1386.91	3$^-$	547.88	4$^+$	(E1)	0.00270	α(K)=0.00227 *4*; α(L)=0.000331 *5*; α(M)=7.50×10^{-5} *11* α(N)=1.82×10^{-5} *3*; α(O)=3.13×10^{-6} *5*; α(P)=2.27×10^{-7} *4* Mult.: deduced a(K)exp≈0.0053, from I(ce(K))≈2 in 1964Ha06.
916.75 *25*	0.55 *6*	1872.10	(5)$^-$	955.24	4$^+$			E_γ: 915.5 unplaced in 1964Ha06, with I(ce(K))=0.7 *1*.
948.0 *3*	0.30 *5*	1903.31	(3$^+$,4$^-$)	955.24	4$^+$			
952.3 *3*	0.43 *7*	1708.30	(2$^+$,3,4$^+$)	755.92	3$^+$	(M1)	0.01271	α(K)=0.01060 *15*; α(L)=0.001633 *23*; α(M)=0.000372 *6* α(N)=9.09×10^{-5} *13*; α(O)=1.575×10^{-5} *22*; α(P)=1.195×10^{-6} *17* α(K)exp≈0.016 E_γ: not placed in 1964Ha06. Mult.: deduced α(K)exp from I(ce(K))≈0.5 in 1964Ha06.
976.4 *3*	0.25 *7*	1163.11	4$^+$	186.69	2$^+$			
1036.05 *20*	10.6 *6*	1583.82	4$^-$	547.88	4$^+$	E1	0.00182	α(K)=0.001539 *22*; α(L)=0.000222 *4*; α(M)=5.01×10^{-5} *7* α(N)=1.218×10^{-5} *17*; α(O)=2.10×10^{-6} *3*; α(P)=1.550×10^{-7} *22* K:L=3.9 *6*:0.90 *14* (1964Ha06); α(K)exp=0.0049 *11* γ(θ): U_2A_2=−0.32 *7* (1983Al15). (1036γ)(361γ)(θ): 1969Ya03.
1123.8 *3*	0.14 *3*	1681.60	5$^-$	557.93	2$^+$	[E3]	0.00856	α(K)=0.00672 *10*; α(L)=0.001413 *20*; α(M)=0.000334 *5* α(N)=8.14×10^{-5} *12*; α(O)=1.358×10^{-5} *19*; α(P)=7.90×10^{-7} *11*; α(IPF)=1.142×10^{-7} *22*

$\gamma(^{190}Os)$ (continued)

E_γ [†]	I_γ [†@]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	α [&]	Comments
1133.77 *20*	1.88 *11*	1681.60	5^-	547.88	4^+	E1	1.55×10^{-3}	α(K)=0.001309 *19*; α(L)=0.000188 *3*; α(M)=4.24×10^{-5} *6* α(N)=1.032×10^{-5} *15*; α(O)=1.777×10^{-6} *25*; α(P)=1.321×10^{-7} *19*; α(IPF)=3.45×10^{-6} *6* α(K)exp=0.0043 *10* Mult.: deduced α(K)exp from I(ce(K))=0.6 *1* in 1964Ha06.
1147.3 *3*	0.58 *6*	1903.31	$(3^+,4^-)$	755.92	3^+			
1150.7 *5*	0.15 *4*	1708.30	$(2^+,3,4^+)$	557.93	2^+			
1160.4 *5*	0.13 *4*	1708.30	$(2^+,3,4^+)$	547.88	4^+			
1200.24 *12*	1.93 *10*	1386.91	3^-	186.69	2^+	(E1)	1.42×10^{-3}	α(K)=0.001184 *17*; α(L)=0.0001693 *24*; α(M)=3.82×10^{-5} *6* α(N)=9.30×10^{-6} *13*; α(O)=1.603×10^{-6} *23*; α(P)=1.196×10^{-7} *17*; α(IPF)=1.82×10^{-5} *3* Mult.: deduced α(K)exp=0.0073 *16*, from I(ce(K))=1.05 *16* in 1964Ha06.
1324.30 *18*	2.1 *3*	1872.10	$(5)^-$	547.88	4^+	E1	1.25×10^{-3}	α(K)=0.000997 *14*; α(L)=0.0001419 *20*; α(M)=3.20×10^{-5} *5* α(N)=7.80×10^{-6} *11*; α(O)=1.345×10^{-6} *19*; α(P)=1.010×10^{-7} *15*; α(IPF)=7.06×10^{-5} *10* α(K)exp=0.0057 *15* Mult.: deduced α(K)exp from I(ce(K))=0.90 *14* in 1964Ha06.
1355.6 *3*	0.30 *3*	1903.31	$(3^+,4^-)$	547.88	4^+			
1386.95 *12*	0.68 *5*	1386.91	3^-	0.0	0^+	(E3)	0.00542	α(K)=0.00434 *6*; α(L)=0.000818 *12*; α(M)=0.000191 *3* α(N)=4.66×10^{-5} *7*; α(O)=7.86×10^{-6} *11*; α(P)=5.00×10^{-7} *7*; α(IPF)=1.382×10^{-5} *20* Mult.: deduced α(K)exp=0.0118 *28*, from I(ce(K))=0.6 *1* in 1964Ha06.
1397.24 *14*	0.66 *5*	1583.82	4^-	186.69	2^+	(M2)	0.01158	α(K)=0.00955 *14*; α(L)=0.001553 *22*; α(M)=0.000357 *5* α(N)=8.73×10^{-5} *13*; α(O)=1.509×10^{-5} *22*; α(P)=1.129×10^{-6} *16*; α(IPF)=1.753×10^{-5} *25* α(K)exp=0.0162 *37* Mult.: deduced α(K)exp from I(ce(K))=0.80 *12* in 1964Ha06.
1494.9 *3*	0.27 *4*	1681.60	5^-	186.69	2^+	[E3]	0.00464	α(K)=0.00373 *6*; α(L)=0.000681 *10*; α(M)=0.0001586 *23* α(N)=3.86×10^{-5} *6*; α(O)=6.54×10^{-6} *10*; α(P)=4.26×10^{-7} *6*; α(IPF)=2.89×10^{-5} *4*

[†] From 1974Ya02, unless otherwise stated. Energy values in 1974Ya02 are obtained by the authors from weighted averages when possible from their measurements of ^{190}Ir ε decay (11.78 d) and ^{190}Re β^- decay (3.2 h and 3.1 min). Conversion electron intensities from 1964Ha06 are given under comments (including those given in sub-shell ratios), normalized to 1100 for the ce(L3) line of 186.7γ. A 15% uncertainty has been assigned to I(ce) according to a general statement in 1964Ha06.

[‡] Deduced by evaluators from sub-shell ratios of conversion electron intensities in 1964Ha06 where available under comments, and otherwise from α(exp) deduced from Iγ of 1974Ya02 and I(ce(K)) of 1964Ha06 where no sub-shell ratios are available, and $\gamma(\theta)$ and/or $\gamma\gamma(\theta)$ data. The α(exp) values are deduced by evaluators by normalizing I(ce(K))/Iγ to α(K)=0.203 *3* (from BrIcc) for 186.7γ, giving a normalization factor of 0.0133 *21*. The same multipolarities are recommended in the Adopted Gammas.

γ(^{190}Os) (continued)

[#] From γγ(θ) in 1974He08, γ(θ) in 1983Al15, and ce data in 1964Ha06. The same values are recommended in the Adopted Gammas.
[@] For absolute intensity per 100 decays, multiply by 0.216 *7*.
[&] 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.
[a] Multiply placed with intensity suitably divided.
[x] γ ray not placed in level scheme.

$^{190}_{76}Os_{114}$-10

^{190}Ir ε decay (11.78 d) 1974Ya02,1964Ha06

Decay Scheme

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