^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev, S. Juutinen, D. J. Hartley	NDS 150, 1 (2018)	1-Feb-2018

Parent: ^{188}Re: E=0; $J^\pi=1^-$; $T_{1/2}$=17.005 h *3*; Q(β^-)=2120.42 *15*; %β^- decay=100.0

2001Sc23: Measured gamma-ray and x-ray emission probabilities using $4\pi\beta$-γ coin method and liquid scintillation counting.

2000Mi03: Measured gamma-ray emission probabilities for 7 gamma rays and relative intensities for about 20 γ rays using $4\pi\beta$-γ coin method.

1984Zh08 (also 1983Zh10): Measured Eγ, Iγ, $\gamma\gamma$.

1975Sv01 (also 1975SvZZ): Measured Eγ, Iγ, $\gamma\gamma$.

2000Sh48,2009Sh28: Measured Eγ, Iγ, $\gamma\gamma$ coin (identical papers).

Others:

γ: 1988BeYH, 1974Be75, 1969Ya02, 1967Be59, 1972Sh13, 1970St03, 1969GuZW, 1966Ma41, 1966Ba29, 1966El11, 1965Dz03, 1965Vi01, 1964Bu10, 1963Ma08, 1963Sc05, 1962Wa20, 1962Li15, 1960Ma13, 1960Ar01, 1959Ha07, 1957Ma16, 1956Po37, 1956Jo05, 1955Ry53, 1953Mc39, 1952Ri01, 1948Co23.

$\gamma\gamma$: 1969Ya02, 1966Ba29, 1966Ma41, 1964Bu10, 1962Wa20, 1960Ar01, 1956Po37, 1956Jo05.

$\gamma\gamma(\theta)$: 1960Ar01, 1960Ma19, 1959Ki44, 1956Wi39, 1956Po13, 1972RaYO, 1974PrZA.

$\gamma\gamma(\theta$,H), g factor: 1967Mu05, 1967Ke01, 1962Le17, 1961Ka09, 1972Ge15.

$\gamma(\theta$,H,t), Q: 1983Oe01, 1981Oe01, 1981Er01.

ce, main references: 1966Ba29, 1966Er03, 1965Ma44, 1964Bu10, 1959Ki44, 1958Ni04, 1956Jo05. Others: 1974Ba50, 1974Be75, 1960Bo38, 1968Bo01, 1966El11, 1964Th02, 1964He19, 1962Fo15, 1956Po37, 1952Ri01, 1948Co23.

β- (main references): 1970An08 (also 1968An11), 1970Tr01, 1969Va17, 1965Ma44, 1964Bu10, 1956Jo05. Others: 1969An24, 1968An07, 1963Bo28, 1958Ni04, 1956Po37, 1954Dz19, 1952Ri01, 1949Be60, 1947Go01.

β- spectral shape: 1970An08, 1970Tr01, 1969Va17, 1969An24, 1968An11, 1965Ma44, 1963Ba54, 1971VaZF, 1975RaYS.

(β-)(ce) coin: 1974Ba50.

$\beta\gamma$ coin: 1970Tr01, 1969Va17, 1956Po37, 1952Ri01.

$\beta\gamma$(t): 1968Ma14, 1963Fo02, 1962Ba14, 1955Su64.

$\beta(\theta)$, polarized source: 1970Br09.

$\beta\gamma(\theta)$: 1971Ma43, 1970Tr01, 1970Br09 (also 1970BrZW), 1965Gr26, 1964Pe19, 1963Wy01.

β- (polarization): 1967Tr10, 1965Ka06.

Additional information 1.

^{188}Os Levels

E(level)†	J^π‡	$T_{1/2}$	Comments
0.0	0^+		
155.044 *4*	2^+	0.704 ns *7*	$T_{1/2}$: From Adopted Levels. Values measured in ^{188}Re β^- decay: 0.718 ns *17* (1971Bb09), 0.680 ns *30* (β(t),1968Ma14), 0.71 ns *2* (β-ce(k)(155γ)(t), 1963Fo02), 0.73 ns *6* (β-ce(k)(155γ)(t), 1962Ba14), 0.652 *153* (1955Su64) and 1.698 *194* (1953Mc39). g: from (931γ)(155γ)(θ,H): 0.36 *4* (1962Le17) and 0.30 *3* with H=29.2 kG and $\omega\tau$=0.0423 *34* (1961Ka09).
477.966 *15*	4^+		
633.045 *13*	2^+		g: from (1133γ)(633γ)(θ,H(Fe)): 0.66 *20* (1967Ke01) and 0.38 *8* (1967Mu05), both used $T_{1/2}$=6.3 ps and H(Fe)=−1.11 MG.
789.967 *19*	3^+		
965.72 *7*	4^+		
1086.386 *25*	0^+		J^π: from (931γ)(155γ)(θ) (1960Ma19).
1304.83 *4*	2^+		
1413.83 *11*	(3^-)		
1443.52? *5*			E(level): proposed from $\gamma\gamma$ coin. in 1984Zh08, but the assignmnet is questionable, since no such level has been reported in any other studies of ^{188}Os levels. It is possible that 810.5γ deexcites the 965-keV level.
1457.41 *4*	2^+		
1462.503 *22*	2^-		

Continued on next page (footnotes at end of table)

^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01 (continued)

^{188}Os Levels (continued)

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
1478.09 *4*	0^+	1729.55 *5*	2^+	1842.86 *3*	$(2)^+$	1957.13 *5*	$(1^+,2^+)$
1620.48 *5*	2^+	1765.372 *22*	0^+	1936.9 *3*	$(1,2^+)$	1965.00 *7*	$(2)^+$
1685.30 *7*	(3^+)	1807.60 *3*	2^+	1941.05 *6*	$(2)^+$	2020.02 *8*	$(1,2)^+$
1704.31 *8*	0^+	1824.93 *6*	0^+	1948.591 *25*	1,2	2022.44 *13*	$(1,2)^+$

† From least-squares fit to Eγ′s.
‡ From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ⁻†‡	Log *ft*	Comments
(97.98 *20*)	2022.44	0.00208 *10*	8.155 *21*	av Eβ=25.513 *54*
(100.40 *17*)	2020.02	0.00623 *22*	7.711 *16*	av Eβ=26.171 *47*
(155.42 *17*)	1965.00	0.00274 *17*	8.65 *3*	av Eβ=41.439 *47*
(163.29 *16*)	1957.13	0.0556 *11*	7.414 *9*	av Eβ=43.671 *50*
(171.83 *15*)	1948.591	0.0841 *17*	7.303 *9*	av Eβ=46.107 *44*
(179.37 *16*)	1941.05	0.1094 *21*	7.247 *9*	av Eβ=48.273 *47*
(183.5 *3*)	1936.9	0.0016 *7*	9.11 *19*	av Eβ=49.469 *97*
(277.56 *15*)	1842.86	0.00383 *15*	9.302 *17*	av Eβ=77.407 *47*
(295.49 *16*)	1824.93	0.0306 *6*	8.487 *9*	av Eβ=82.913 *50*
(312.82 *15*)	1807.60	0.0463 *16*	8.387 *15*	av Eβ=88.281 *48*
(355.05 *15*)	1765.372	0.205 *4*	7.918 *9*	av Eβ=101.574 *49*
(390.87 *16*)	1729.55	0.00137 *9*	10.23 *3*	av Eβ=113.072 *52*
(416.11 *17*)	1704.31	0.0105 *13*	9.43 *6*	av Eβ=121.288 *56*
(435.12 *17*)	1685.30	0.00110 *10*	10.43[1u] *4*	av Eβ=138.335 *55*
(642.33 *16*)	1478.09	0.0183 *5*	9.823 *12*	av Eβ=198.742 *56*
(657.92 *15*)	1462.503	0.492 *10*	8.429 *9*	av Eβ=204.305 *55*
(663.01 *16*)	1457.41	0.0435 *18*	9.494 *18*	av Eβ=206.128 *56*
(815.59 *16*)	1304.83	0.0317 *17*	9.943 *24*	av Eβ=261.918 *58*
(1034.03 *15*)	1086.386	0.683 *13*	8.975 *9*	av Eβ=345.311 *60*
(1330.45 *15*)	789.967	0.0072 *25*	12.08[1u] *15*	av Eβ=458.217 *59*
(1487.38 *15*)	633.045	1.85 *13*	9.12 *3*	av Eβ=527.779 *63*
(1965.38 *15*)	155.044	25.8 *5*	8.436 *9*	av Eβ=728.88 E(decay): Measured values: 1962 *2* (1975RaYS), 1958 *5* (1970An08), 1962 *5* (1969Va17), and 1973 *10* (1965Ma44).
(2120.42 *15*)	0.0	70.7 *6*	8.125 *4*	av Eβ=795.41 E(decay): Measured values: 2120 *2* (1975RaYS), 2116 *2* (1956Jo05), 2112 *5* (1970An08), 2117 *5* (1969Va17), 2128 *10* (1965Ma44), 2000 *22* (1970Tr01) and 2153 *5* (1964Bu10). Iβ⁻: from %Iγ(155γ)=15.49 *6* and the decay scheme. Others: 79 (1956Jo05), 74 *6* (1965Ma44) and 70 (1969Va17).

† From intensity balances considerations using %Iγ(155γ)=15.49 *6*.
‡ Absolute intensity per 100 decays.

^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01 (continued)

$\gamma(^{188}Os)$

Iγ normalization: From %Iγ(155γ)=15.49 *6*, unweighted average of 15.79 *15* (2001Sc23) and 15.43 *7* (2000Mi03) (absolute intensity measurements), 15.1 *4* (Ice(155K)/Iβ$^-$=0.049 *1* in 1964Bu10 and α(K)=0.324 *5* from BrIcc for the 155.041 keV *4* E2 transition in ^{188}Os) and 15.5 *5* (Ice(155(L1+L2+L3+M+N))/Iβ$^-$=0.075 *2* in 1964Bu10 and α(L1+L2+L3+M+N)=0.483 *6* from BrIcc for the 155.041 keV *4* E2 transition in ^{188}Os). Other: 13.6 *13* (Ice(155K)/Iβ$^-$=0.049 *1* in 1958Ni04 and α(K)=0.324 *5* from BrIcc for the 155.041 keV *4* E2 transition in ^{188}Os).

E_γ [†]	I_γ [a]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	α [&]	Comments
155.044 *4*	1440 *10*	155.044	2$^+$	0.0	0$^+$	E2	0.810	%Iγ=15.49 *6* α(K)=0.324 *5*; α(L)=0.367 *6*; α(M)=0.0931 *13* α(N)=0.0224 *4*; α(O)=0.00334 *5*; α(P)=2.95×10^{-5} *5* E_γ: Others: 155.032 *12* (1963Ma08), 155.04 *20* (1963Sc05), 155.04 *2* (1975Sv01) and 155.035 *6* (1984Zh08). I_γ: Weighted average of 1450 *19* (2001Sc23), 1437 *12* (2000Mi03) and 1433 *50* (1975Sv01). Other: 1535 *19* (1984Zh08). Mult.: α(K)exp=0.345 *10* (1962Fo15). K/L=0.840 *25*, K/L3=2.24 *7* (1968Bo38); L1/L3=0.266 *6*, L2/L3=1.38 *2* (1966Er03); M/L=0.255 *15*, (N+O+..)/M=0.25 (1968Bo01); α(K)exp=0.34 *3* and K/L1/L2/L3= 219 *11*/30 *4*/133 *7*/100 (1965Ma44).
218.5 *5*	0.0302[#] *13*	1304.83	2$^+$	1086.386	0$^+$	[E2]	0.247	%Iγ=0.000325 *14* α(K)=0.1346 *21*; α(L)=0.0852 *15*; α(M)=0.0214 *4* α(N)=0.00514 *9*; α(O)=0.000782 *14*; α(P)=1.281×10^{-5} *20* E_γ,I_γ: Not observed in ^{188}Re β^- decay.
222.3[c]		1842.86	(2)$^+$	1620.48	2$^+$			E_γ: Not observed in ^{188}Re β^- decay.
271.8 *5*	0.00070[#] *12*	1729.55	2$^+$	1457.41	2$^+$	[M1+E2]	0.339	%Iγ=7.5×10^{-06} *13* α(K)=0.281 *4*; α(L)=0.0450 *7*; α(M)=0.01030 *15* α(N)=0.00252 *4*; α(O)=0.000435 *6*; α(P)=3.25×10^{-5} *5* E_γ: Not observed in ^{188}Re β^- decay. Eγ=271.56 *5* from the least-squares fit adjustment, but the value is 5σ away from the level energy differences. The value from ^{187}Os(n,γ) E=th is adopted.
279.6[c]	[#]	1965.00	(2)$^+$	1685.30	(3$^+$)			E_γ: Not observed in ^{188}Re β^- decay.
[x]309.60[‡] *4*	0.19[‡]							%Iγ=0.002044 E_γ: Placement from a 307-keV level in 2000Sh48, 2009Sh28 is unlikely, since in no other reaction or decay, reported this level in ^{188}Os.
312.00 *2*	0.520 *19*	789.967	3$^+$	477.966	4$^+$	E2(+M1)	0.233	%Iγ=0.00559 *21* α(K)=0.193 *3*; α(L)=0.0307 *5*; α(M)=0.00704 *10* α(N)=0.001720 *24*; α(O)=0.000297 *5*; α(P)=2.22×10^{-5} *4* E_γ: 312.17 *14* (1975Sv01) and 312.00 *2* (1984Zh08). I_γ: Weighted average of 0.52 *6* (2001Sc23) and 0.52 *2* (1984Zh08) Other: 0.31 *8* (1975Sv01).
322.92 *2*	1.591 *24*	477.966	4$^+$	155.044	2$^+$	E2	0.0736	%Iγ=0.0171 *3*

$^{188}_{76}Os_{112}$-3

^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01 (continued)

$\gamma(^{188}Os)$ (continued)

E_γ [†]	I_γ [a]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	δ [@]	α [&]	$I_{(\gamma+ce)}$ [b]	Comments
										α(K)=0.0490 *7*; α(L)=0.0187 *3*; α(M)=0.00461 *7* α(N)=0.001112 *16*; α(O)=0.0001736 *25*; α(P)=4.97×10^{-6} *7* I_γ: Weighted average of 1.58 *3* (2001Sc23), 1.52 *9* (2000Mi03), 1.66 *5* (1984Zh08, but uncertainty increased to 3%), and 1.51 *11* (1975Sv01). E_γ: Others: 322.91 *4* (1984Zh08) and 322.96 *5* (1975Sv01).
347.2		1824.93	0^+	1478.09	0^+	E0			0.00360 *18*	E_γ: Not observed in ^{188}Re β^- decay. $I_{(\gamma+ce)}$: from adopted gammas.
350.0	0.32[#] *5*	1807.60	2^+	1457.41	2^+	E2		0.0584		%Iγ=0.0034 *6* α(K)=0.0400 *6*; α(L)=0.01401 *20*; α(M)=0.00343 *5* α(N)=0.000829 *12*; α(O)=0.0001303 *19*; α(P)=4.11×10^{-6} *6* E_γ: Not observed in ^{188}Re β^- decay.
385.46 *5*	0.0101[#] *10*	1842.86	$(2)^+$	1457.41	2^+	M1+E2	1.2 *+7−5*	0.080 *23*		%Iγ=0.000109 *11* α(K)=0.063 *21*; α(L)=0.0130 *20*; α(M)=0.0031 *4* α(N)=0.00075 *10*; α(O)=0.000124 *20*; α(P)=7.1×10^{-6} *25* E_γ: Not observed in ^{188}Re β^- decay.
424.71 *15*	0.00088[#] *15*	1729.55	2^+	1304.83	2^+	M1+E2	≤1.2	0.082 *20*		%Iγ=9.5×10^{-06} *17* α(K)=0.067 *18*; α(L)=0.0116 *19*; α(M)=0.0027 *4* α(N)=0.00065 *10*; α(O)=0.000111 *19*; α(P)=7.6×10^{-6} *21* E_γ: Not observed in ^{188}Re β^- decay.
448.1 *1*	0.075[#] *5*	1413.83	(3^-)	965.72	4^+	[E1]		0.00973		%Iγ=0.00081 *6* α(K)=0.00812 *12*; α(L)=0.001238 *18*; α(M)=0.000282 *4* α(N)=6.83×10^{-5} *10*; α(O)=1.159×10^{-5} *17*; α(P)=7.89×10^{-7} *11* E_γ: Not observed in ^{188}Re β^- decay.
453.34 *4*	7.65 *8*	1086.386	0^+	633.045	2^+	(E2)		0.0291		%Iγ=0.0823 *10* α(K)=0.0215 *3*; α(L)=0.00587 *9*; α(M)=0.001418 *20* α(N)=0.000343 *5*; α(O)=5.50×10^{-5} *8*; α(P)=2.26×10^{-6} *4* E_γ: 453.33 *3* (1975Sv01), 453.345 *21* (1984Zh08). I_γ: Weighted average of 7.62 *11* (2001Sc23) , 7.67 *15* (2000Mi03) and 7.71 *23* (1984Zh08, but uncertainty increased to 3%). Other: 6.78 *25* (1975Sv01).

$^{188}_{76}Os_{112}$-4

^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01 (continued)

$\gamma(^{188}Os)$ (continued)

E_γ [†]	I_γ [a]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	δ [@]	α [&]	$I_{(\gamma+ce)}$ [b]	Comments
478.00 *2*	100	633.045	2^+	155.044	2^+	E2+M1+E0	−12 *3*	0.031 *4*		%Iγ=1.076 *5* α(K)=0.0193 *4*; α(L)=0.00500 *8*; α(M)=0.001203 *18* α(N)=0.000291 *5*; α(O)=4.70×10^{-5} *7*; α(P)=2.04×10^{-6} *4* E_γ: Others: 478.03 *3* (1972Sh13) and 477.96 *3* (1975Sv01). Mult.: α(K)exp=0.023 *3* (1959Ki44), 0.021 (1958Ni04) and 0.034 (1956Jo05). α: 0.031 *4*, deduced from α(K)exp=0.023 *3* (1959Ki44) and T/K=1.34 *3* from BrICC.
486.087 *11*	7.86 *8*	1948.591	1,2	1462.503	2^-					%Iγ=0.0845 *10* I_γ: Weighted average of 7.87 *12* (2001Sc23), 7.95 *15* (2000Mi03), 7.76 *23* (1984Zh08, but uncertainty increased to 3%) and 7.5 *4* (1975Sv01).
491.64 *8*	0.054[#] *9*	1457.41	2^+	965.72	4^+	[E2]		0.0238		%Iγ=0.00058 *10* α(K)=0.01779 *25*; α(L)=0.00456 *7*; α(M)=0.001095 *16* α(N)=0.000265 *4*; α(O)=4.28×10^{-5} *6*; α(P)=1.89×10^{-6} *3* E_γ: Not observed in ^{188}Re β^- decay.
514.88 *4*	0.525 *19*	1304.83	2^+	789.967	3^+	E2(+M1)	>3.3	0.0229 *18*		%Iγ=0.00565 *21* α(K)=0.0175 *15*; α(L)=0.00413 *18*; α(M)=0.00099 *4* α(N)=0.000239 *10*; α(O)=3.89×10^{-5} *18*; α(P)=1.88×10^{-6} *18* E_γ: 514.82 *7* (1975Sv01) and 514.94 *5* (1984Zh08). I_γ: Weighted average of 0.53 *9* (2001Sc23) , 0.53 *2* (1984Zh08) and 0.49 *5* (1975Sv01).
538.06 *8*	0.0083[#] *10*	1842.86	$(2)^+$	1304.83	2^+	[M1]		0.0548		%Iγ=8.9×10^{-05} *11* α(K)=0.0455 *7*; α(L)=0.00714 *10*; α(M)=0.001633 *23* α(N)=0.000399 *6*; α(O)=6.90×10^{-5} *10*; α(P)=5.19×10^{-6} *8* E_γ: Not observed in ^{188}Re β^- decay.
557.71 *10*	0.088 *16*	2020.02	$(1,2)^+$	1462.503	2^-	[E1]		0.00608		%Iγ=0.00095 *18* α(K)=0.00510 *8*; α(L)=0.000764 *11*; α(M)=0.0001736 *25* α(N)=4.21×10^{-5} *6*; α(O)=7.18×10^{-6} *10*; α(P)=5.02×10^{-7} *7* I_γ: From 1975Sv01. Other: 0.097 in 1984Zh08.

$^{188}_{76}Os_{112}$-5

^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01 (continued)

$\gamma(^{188}Os)$ (continued)

E_γ [†]	I_γ [a]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	δ [@]	α [&]	$I_{(\gamma+ce)}$ [b]	Comments
617.7		1704.31	0^+	1086.386	0^+	E0			0.000085 *15*	$I_{(\gamma+ce)}$: from adopted gammas.
623.9 *3*	0.24 *5*	1413.83	(3^-)	789.967	3^+	[E1]		0.00483		%Iγ=0.0026 *6* α(K)=0.00405 *6*; α(L)=0.000602 *9*; α(M)=0.0001367 *20* α(N)=3.32×10^{-5} *5*; α(O)=5.67×10^{-6} *8*; α(P)=4.01×10^{-7} *6* I_γ: Unweighted average of 0.19 *4* (1984Zh08) and 0.28 *5* (1975Sv01).
633.03 *3*	127.4 *10*	633.045	2^+	0.0	0^+	E2		0.01305		%Iγ=1.370 *11* α(K)=0.01020 *15*; α(L)=0.00219 *3*; α(M)=0.000518 *8* α(N)=0.0001258 *18*; α(O)=2.07×10^{-5} *3*; α(P)=1.092×10^{-6} *16* E_γ: 633.00 *5* (1975Sv01) and 632.981 *21* (1984Zh08). I_γ: Weighted average of 125.4 *19* (2001Sc23), 128.7 *13* (2000Mi03), 125 *4* (1984Zh08, but uncertainty increased to 3%) and 120 *11* (1975Sv01). Mult.: α(K)exp(633+635)=0.025 *3* (1974Ba50), 0.010 *2* (1959Ki44).
634.97 *4*	14.91 *19*	789.967	3^+	155.044	2^+	E2+M1	−7 *3*	0.0134 *9*		%Iγ=0.1604 *22* α(K)=0.0105 *8*; α(L)=0.00222 *10*; α(M)=0.000525 *23* α(N)=0.000127 *6*; α(O)=2.10×10^{-5} *10*; α(P)=1.13×10^{-6} *9* E_γ: 635.13 *20* (1975Sv01) and 634.98 *7* (1984Zh08). I_γ: Weighted average of 15.07 *22* (2001Sc23), 14.6 *7* (2000Mi03), 14.5 *4* (1984Zh08, but uncertainty increased to 3%) and 14 *5* (1975Sv01).
652.58 *15*	0.08[#] *3*	1957.13	$(1^+,2^+)$	1304.83	2^+	[M1]		0.0332		%Iγ=0.0009 *4* α(K)=0.0277 *4*; α(L)=0.00431 *6*; α(M)=0.000985 *14* α(N)=0.000241 *4*; α(O)=4.16×10^{-5} *6*; α(P)=3.14×10^{-6} *5* E_γ: Not observed in ^{188}Re β^- decay.
667.44 *17*	0.050 *11*	1457.41	2^+	789.967	3^+	[M1]		0.0314		%Iγ=0.00054 *12* α(K)=0.0261 *4*; α(L)=0.00407 *6*; α(M)=0.000929 *13* α(N)=0.000227 *4*; α(O)=3.93×10^{-5} *6*; α(P)=2.96×10^{-6} *5*
672.542 *16*	11.14 *10*	1462.503	2^-	789.967	3^+	E1		0.00415		%Iγ=0.1198 *12* α(K)=0.00349 *5*; α(L)=0.000515 *8*; α(M)=0.0001169 *17* α(N)=2.84×10^{-5} *4*; α(O)=4.86×10^{-6} *7*; α(P)=3.46×10^{-7} *5* E_γ: From 1984Zh08. Other: 672.51 *3* from 1975Sv01.

$^{188}_{76}Os_{112}$-6

^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01 (continued)

$\gamma(^{188}Os)$ (continued)

E_γ †	I_γ a	E_i(level)	J_i^π	E_f	J_f^π	Mult. @	δ @	α &	Comments
									I_γ: Weighted average of 11.10 *16* (2001Sc23), 11.32 *15* (2000Mi03), 10.9 *3* (1984Zh08, but uncertainty increased to 3%) and 10.6 *4* (1975Sv01). Mult.: α(K)exp=0.0037 *4* (1966Ba29). (673γ)(635γ)(θ): A_2=+0.068 *8*, A_4=+0.017 *18* (1960Ma19). Other: 1959Ki44.
672.6 c *2*	0.06 # *6*	1304.83	2+	633.045	2+	[M1+E2]		0.0308	%Iγ=0.0006 *7* α(K)=0.0256 *4*; α(L)=0.00399 *6*; α(M)=0.000911 *13* α(N)=0.000222 *4*; α(O)=3.85×10^{-5} *6*; α(P)=2.91×10^{-6} *4* E_γ: Not observed in ^{188}Re β^- decay.
719.58 *15*	0.0055 # *17*	1685.30	(3+)	965.72	4+				%Iγ=5.9×10^{-05} *19* E_γ: Not observed in ^{188}Re β^- decay.
763.91 *15*	0.00081 # *19*	1729.55	2+	965.72	4+	[E2]		0.00864	%Iγ=8.7×10^{-06} *21* α(K)=0.00690 *10*; α(L)=0.001338 *19*; α(M)=0.000314 *5* α(N)=7.62×10^{-5} *11*; α(O)=1.269×10^{-5} *18*; α(P)=7.41×10^{-7} *11* E_γ: Not observed in ^{188}Re β^- decay.
780.9 *3*	0.038 # *3*	1413.83	(3−)	633.045	2+	[E1]		0.00310	%Iγ=0.00041 *4* α(K)=0.00260 *4*; α(L)=0.000381 *6*; α(M)=8.64×10^{-5} *13* α(N)=2.10×10^{-5} *3*; α(O)=3.60×10^{-6} *5*; α(P)=2.60×10^{-7} *4* E_γ: Not observed in ^{188}Re β^- decay.
810.49 c *5*	0.090 *19*	1443.52?		633.045	2+				%Iγ=0.00097 *21* E_γ: From 1984Zh08. Other: 810.5 *2* (1975Sv01). I_γ: Unweighted average of 0.109 *7* (1984Zh08) and 0.071 *22* (1975Sv01).
824.39 *8*	1.75 *11*	1457.41	2+	633.045	2+	M1(+E2)	≤1.2	0.015 *4*	%Iγ=0.0188 *12* α(K)=0.012 *3*; α(L)=0.0020 *4*; α(M)=0.00046 *9* α(N)=0.000111 *21*; α(O)=1.9×10^{-5} *4*; α(P)=1.4×10^{-6} *4* I_γ: Unweighted average of 1.552 *15* (2001Sc23), 1.97 *10* (2000Mi03) and 1.72 *5* (1984Zh08). Other: 4.9 *5* (1975Sv01), but the value is discrepant.
826.90 *2*	0.49 # *5*	1304.83	2+	477.966	4+	[E2]		0.00731	%Iγ=0.0053 *6* α(K)=0.00588 *9*; α(L)=0.001100 *16*; α(M)=0.000257 *4* α(N)=6.24×10^{-5} *9*; α(O)=1.044×10^{-5} *15*; α(P)=6.31×10^{-7} *9* E_γ: From 2009Sh28.
829.47 *4*	41.3 *3*	1462.503	2−	633.045	2+	E1		0.00276	%Iγ=0.444 *4* α(K)=0.00232 *4*; α(L)=0.000339 *5*; α(M)=7.67×10^{-5} *11* α(N)=1.86×10^{-5} *3*; α(O)=3.20×10^{-6} *5*; α(P)=2.32×10^{-7} *4* I_γ: Weighted average of 40.0 *5* (2001Sc23) , 42.3 *4* (2000Mi03), 40.4 *12* (1984Zh08, but uncertainty increased to 3%) and 39.3 *14* (1975Sv01). Mult.: α(K)exp=0.0025 *3* (1966Ba29). (829γ)(633γ)(θ): A_2=+0.295 *9*, A_4=+0.15 *20* (1960Ma19). Others: 1959Ki44, 1960Ar01.
845.05 *4*	0.691 *11*	1478.09	0+	633.045	2+	[E2]		0.00699	%Iγ=0.00743 *13*

$^{188}_{76}Os_{112}$-7

^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01 (continued)

$\gamma(^{188}Os)$ (continued)

E_γ[†]	I_γ[a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	δ[@]	α[&]	Comments
									α(K)=0.00563 *8*; α(L)=0.001044 *15*; α(M)=0.000243 *4* α(N)=5.92×10^{-5} *9*; α(O)=9.91×10^{-6} *14*; α(P)=6.05×10^{-7} *9* I_γ: Weighted average of 0.702 *13* (2001Sc23), 0.666 *20* (1984Zh08, but uncertainty increased to 3%) and 0.69 *5* (1975Sv01).
895.33 *8*	0.034[#] *4*	1685.30	(3$^+$)	789.967	3$^+$				%Iγ=0.00037 *5* E_γ: Not observed in ^{188}Re β^- decay.
931.34 *3*	55.3 *4*	1086.386	0$^+$	155.044	2$^+$	E2		0.00573	%Iγ=0.595 *5* α(K)=0.00465 *7*; α(L)=0.000829 *12*; α(M)=0.000193 *3* α(N)=4.68×10^{-5} *7*; α(O)=7.88×10^{-6} *11*; α(P)=4.99×10^{-7} *7* E_γ: 931.32 (1975Sv01), 931.348 *10* (1984Zh08). I_γ: Weighted average of 54.5 *7* (2001Sc23) , 55.9 *5* (2000Mi03), 54.3 *16* (1984Zh08, but uncertainty increased to 3%) and 54.0 *13* (1975Sv01). Mult.: α(K)exp=0.0047 *5* (1966Ba29). (931γ)(155γ)(θ): A_2=+0.276 *12*, A_4=+0.93 *3* (1960Ma19). Others: 1960Ar01, 1959Ki44.
939.57 *6*	0.0173[#] *15*	1729.55	2$^+$	789.967	3$^+$	M1(+E2)	≤0.8	0.0117 *15*	%Iγ=0.000186 *17* α(K)=0.0097 *13*; α(L)=0.00152 *18*; α(M)=0.00035 *4* α(N)=8.5×10^{-5} *10*; α(O)=1.46×10^{-5} *17*; α(P)=1.09×10^{-6} *15* E_γ: Not observed in ^{188}Re β^- decay.
979.35 *13*	0.101 *18*	1457.41	2$^+$	477.966	4$^+$	[E2]		0.00518	%Iγ=0.00109 *20* α(K)=0.00422 *6*; α(L)=0.000739 *11*; α(M)=0.0001712 *24* α(N)=4.16×10^{-5} *6*; α(O)=7.03×10^{-6} *10*; α(P)=4.52×10^{-7} *7* E_γ,I_γ: From 1984Zh08.
984.1 *5*	0.033 *2*	1462.503	2$^-$	477.966	4$^+$	[M2]		0.0291	%Iγ=0.000355 *22* α(K)=0.0238 *4*; α(L)=0.00405 *6*; α(M)=0.000937 *14* α(N)=0.000229 *4*; α(O)=3.95×10^{-5} *6*; α(P)=2.91×10^{-6} *4* E_γ,I_γ: From 1984Zh08.
999.38 *15*	0.025[#] *4*	1965.00	(2)$^+$	965.72	4$^+$	[E2]		0.00497	%Iγ=0.00027 *5* α(K)=0.00406 *6*; α(L)=0.000705 *10*; α(M)=0.0001634 *23* α(N)=3.97×10^{-5} *6*; α(O)=6.71×10^{-6} *10*; α(P)=4.35×10^{-7} *6* E_γ: Not observed in ^{188}Re β^- decay.
1017.68 *5*	1.476 *22*	1807.60	2$^+$	789.967	3$^+$	M1(+E2)	<0.6	0.0100 *8*	%Iγ=0.01588 *25* α(K)=0.0083 *7*; α(L)=0.00129 *10*; α(M)=0.000294 *22* α(N)=7.2×10^{-5} *6*; α(O)=1.24×10^{-5} *10*; α(P)=9.3×10^{-7} *8* I_γ: Weighted average of 1.489 *28* (2001Sc23), 1.55 *7* (2000Mi03), 1.43 *4* (1984Zh08, but uncertainty increased to 3%) and 1.43 *13* (1975Sv01).
1052.11 *20*	0.0083[#] *28*	1685.30	(3$^+$)	633.045	2$^+$	[M1]		0.00990	%Iγ=9×10^{-05} *3* α(K)=0.00826 *12*; α(L)=0.001268 *18*; α(M)=0.000289 *4* α(N)=7.06×10^{-5} *10*; α(O)=1.223×10^{-5} *18*; α(P)=9.30×10^{-7} *13* E_γ: Not observed in ^{188}Re β^- decay.
1071.28 *19*	0.066 *12*	1704.31	0$^+$	633.045	2$^+$	[E2]		0.00433	%Iγ=0.00071 *13*

$^{188}_{76}Os_{112}$-8

^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01 (continued)

$\gamma(^{188}Os)$ (continued)

E_γ [†]	I_γ [a]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	δ [@]	α [&]	$I_{(\gamma+ce)}$ [b]	Comments
										α(K)=0.00355 *5*; α(L)=0.000604 *9*; α(M)=0.0001395 *20* α(N)=3.39×10^{-5} *5*; α(O)=5.75×10^{-6} *8*; α(P)=3.80×10^{-7} *6* I_γ: Unweighted average of 0.054 *7* (1984Zh08) and 0.077 *16* (1975Sv01).
[x]1086.4	0.237 *9*									%Iγ=0.00255 *10* E_γ,I_γ: observed only in 2001Sc23 and 2000Sh48. Placement in 2000Sh48 from 1086-keV, 0$^+$ level is not allowed from required mult=E0 for 1086-keV transition. This line may be due to 931+155 summing.
1086.5		1086.386	0$^+$	0.0	0$^+$	E0			0.00453 *22*	E_γ,$I_{(\gamma+ce)}$: From Adopted Levels.
1096.3 *3*	0.038[#] *3*	1729.55	2$^+$	633.045	2$^+$	M1(+E2)	≤0.7	0.0081 *8*		%Iγ=0.00041 *4* α(K)=0.0068 *7*; α(L)=0.00105 *10*; α(M)=0.000239 *22* α(N)=5.8×10^{-5} *6*; α(O)=1.01×10^{-5} *10*; α(P)=7.6×10^{-7} *8* I_γ: Other: 0.063 *16* in 1984Zh08. Eγ=1096.54 *6* from the least-squares fit adjustment, but the value is 3σ away from the level energy differences. The value from ^{187}Os(n,γ) E=th is adopted.
[x]1103.7[‡] *4*	0.035[‡]									%Iγ=0.00038 E_γ: Placement in 2000Sh48 from a 1413-keV level to a 309-keV level is unlikely. See the comment for 309.6γ above.
1132.310 *20*	8.44 *9*	1765.372	0$^+$	633.045	2$^+$	(E2)		0.00389		%Iγ=0.0908 *11* α(K)=0.00320 *5*; α(L)=0.000535 *8*; α(M)=0.0001233 *18* α(N)=3.00×10^{-5} *5*; α(O)=5.09×10^{-6} *8*; α(P)=3.42×10^{-7} *5*; α(IPF)=6.63×10^{-7} *10* I_γ: Weighted average of 8.37 *13* (2001Sc23), 8.61 *14* (2000Mi03), 8.13 *24* (1984Zh08, but uncertainty increased to 3%) and 8.5 *4* (1975Sv01). Mult.: (1132γ)(633γ)(θ): A_2=+0.37 *3*, A_4=+0.92 *7* (1960Ma19). Others: 1959Ki44, 1960Ar01.
1149.80 *9*	1.575 *25*	1304.83	2$^+$	155.044	2$^+$	[M1+E2]	≤2.1	0.0062 *17*		%Iγ=0.0169 *3* α(K)=0.0052 *15*; α(L)=0.00081 *21*; α(M)=0.00019 *5* α(N)=4.5×10^{-5} *12*; α(O)=7.8×10^{-6} *20*; α(P)=5.8×10^{-7} *17*; α(IPF)=1.55×10^{-6} *25* I_γ: Unweighted average of 1.55 *5* (1984Zh08) and 1.6 *4* (1975Sv01). Note that Iγ(1149.7γ+1151γ)=3.19 *7* (2001Sc23) and 3.39 *9* (2000Mi03).
1150.5 *4*	1.51 *5*	1941.05	(2)$^+$	789.967	3$^+$	[M1]		0.00792 *12*		%Iγ=0.0162 *6*

$^{188}_{76}Os_{112}$-9

^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01 (continued)

$\gamma(^{188}Os)$ (continued)

E_γ [†]	I_γ [a]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	δ [@]	α [&]	Comments
									α(K)=0.00661 *10*; α(L)=0.001012 *15*; α(M)=0.000231 *4* α(N)=5.63×10^{-5} *8*; α(O)=9.75×10^{-6} *14*; α(P)=7.43×10^{-7} *11*; α(IPF)=1.83×10^{-6} *4*
1174.57 *3*	1.79 *3*	1807.60	2$^+$	633.045	2$^+$	M1(+E2)	≤0.8	0.0068 *8*	E$_\gamma$,I$_\gamma$: From 1984Zh08. %Iγ=0.0193 *4* α(K)=0.0056 *7*; α(L)=0.00087 *10*; α(M)=0.000198 *21* α(N)=4.8×10^{-5} *5*; α(O)=8.4×10^{-6} *9*; α(P)=6.3×10^{-7} *8*; α(IPF)=3.40×10^{-6} *24* I$_\gamma$: Weighted average of 1.77 *3* (2001Sc23), 1.84 *7* (2000Mi03), 1.80 *8* (1984Zh08) and 1.94 *16* (1975Sv01).
1174.59[c] *10*	[#]	1965.00	(2)$^+$	789.967	3$^+$				E$_\gamma$: Not observed in ^{188}Re β^- decay.
1191.83 *10*	1.361 *17*	1824.93	0$^+$	633.045	2$^+$	[E2]		0.00353	%Iγ=0.01464 *20* α(K)=0.00290 *4*; α(L)=0.000479 *7*; α(M)=0.0001102 *16* α(N)=2.68×10^{-5} *4*; α(O)=4.56×10^{-6} *7*; α(P)=3.10×10^{-7} *5*; α(IPF)=3.68×10^{-6} *6* I$_\gamma$: Weighted average of 1.376 *19* (2001Sc23), 1.30 *4* (1984Zh08, but uncertainty increased to 3%) and 1.33 *10* (1975Sv01).
1209.80 *3*	0.298 *12*	1842.86	(2)$^+$	633.045	2$^+$	M1(+E2)	≤0.7	0.0064 *6*	%Iγ=0.00321 *13* α(K)=0.0053 *5*; α(L)=0.00082 *8*; α(M)=0.000187 *16* α(N)=4.6×10^{-5} *4*; α(O)=7.9×10^{-6} *7*; α(P)=6.0×10^{-7} *6*; α(IPF)=7.5×10^{-6} *5* I$_\gamma$: Unweighted average of 0.320 *9* (2001Sc23), 0.294 *9* (1984Zh08, but uncertainty increased to 3%) and 0.28 *3* (1975Sv01). δ: Other: −0.036 *11* (deduced by 1975Kr16 for J(1843)=1).
1251.64 *20*	0.00069[#] *21*	1729.55	2$^+$	477.966	4$^+$	[E2]		0.00322	%Iγ=7.4×10^{-06} *23* α(K)=0.00265 *4*; α(L)=0.000432 *6*; α(M)=9.92×10^{-5} *14* α(N)=2.41×10^{-5} *4*; α(O)=4.11×10^{-6} *6*; α(P)=2.83×10^{-7} *4*; α(IPF)=1.010×10^{-5} *15*
1302.31 *13*	0.56 *7*	1457.41	2$^+$	155.044	2$^+$	[E2+M1]		0.00584	E$_\gamma$: Not observed in ^{188}Re β^- decay. %Iγ=0.0060 *8* α(K)=0.00486 *7*; α(L)=0.000741 *11*; α(M)=0.0001688 *24* α(N)=4.12×10^{-5} *6*; α(O)=7.14×10^{-6} *10*; α(P)=5.45×10^{-7} *8*; α(IPF)=2.56×10^{-5} *4* I$_\gamma$: Unweighted average of 0.49 *3* (1984Zh08) and 0.62 *9* (1975Sv01). Other: Iγ(1302+1305)=0.42 *5* (2001Sc23).
1304.8 *2*	0.40 *13*	1304.83	2$^+$	0.0	0$^+$	(E2)		0.00298	%Iγ=0.0043 *14* α(K)=0.00245 *4*; α(L)=0.000395 *6*; α(M)=9.08×10^{-5} *13* α(N)=2.21×10^{-5} *3*; α(O)=3.77×10^{-6} *6*; α(P)=2.62×10^{-7} *4*; α(IPF)=1.78×10^{-5} *3* E$_\gamma$: 1304.7 *4* (1975Sv01) and 1304.9 *2* (1984Zh08). I$_\gamma$: Unweighted average of 0.27 *3* (1984Zh08) and 0.52 *8* (1975Sv01). Note that Iγ(1302+1305)=0.42 *5* (2001Sc23).

$^{188}_{76}Os_{112}$-10

^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01 (continued)

$\gamma(^{188}Os)$ (continued)

E_γ[†]	I_γ[a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	δ[@]	α[&]	Comments
1307.64 *15*	1.20[#] *17*	1462.503	2^-	155.044	2^+	(E1)		1.27×10^{-3}	%Iγ=0.0129 *19* α(K)=0.001019 *15*; α(L)=0.0001452 *21*; α(M)=3.28×10^{-5} *5* α(N)=7.97×10^{-6} *12*; α(O)=1.376×10^{-6} *20*; α(P)=1.032×10^{-7} *15*; α(IPF)=6.22×10^{-5} *9* E_γ: Not observed in ^{188}Re β^- decay.
1308.03 *6*	6.55 *7*	1941.05	$(2)^+$	633.045	2^+	[M1]		0.00578	%Iγ=0.0705 *8* α(K)=0.00480 *7*; α(L)=0.000733 *11*; α(M)=0.0001669 *24* α(N)=4.07×10^{-5} *6*; α(O)=7.06×10^{-6} *10*; α(P)=5.39×10^{-7} *8*; α(IPF)=2.71×10^{-5} *4* I_γ: Weighted average of 6.44 *10* (2001Sc23), 6.85 *13* (2000Mi03), 6.35 *19* (1984Zh08, but uncertainty increased to 3%) and 6.5 *3* (1975Sv01). δ: <0.2 for J(1941)=2 from (1308γ)(633γ)(θ): A_2=+0.31 *7*, A_4=+0.04 *9* (1960Ar01). Other: 1959Ki44.
1323.04 *7*	1.312 *18*	1478.09	0^+	155.044	2^+	(E2)		0.00291	%Iγ=0.01411 *21* α(K)=0.00239 *4*; α(L)=0.000384 *6*; α(M)=8.81×10^{-5} *13* α(N)=2.15×10^{-5} *3*; α(O)=3.66×10^{-6} *6*; α(P)=2.55×10^{-7} *4*; α(IPF)=2.11×10^{-5} *3* I_γ: Weighted average of 1.308 *20* (2001Sc23) and 1.33 *4* (1984Zh08). Other: 0.83 *6* (1975Sv01), but the value is discrepant.
1329.1	0.30[#] *11*	1807.60	2^+	477.966	4^+	[E2]		0.00288	%Iγ=0.0032 *12* α(K)=0.00237 *4*; α(L)=0.000381 *6*; α(M)=8.73×10^{-5} *13* α(N)=2.12×10^{-5} *3*; α(O)=3.63×10^{-6} *5*; α(P)=2.53×10^{-7} *4*; α(IPF)=2.23×10^{-5} *4* E_γ: Not observed in ^{188}Re β^- decay.
1331.94 *7*	0.165 *10*	1965.00	$(2)^+$	633.045	2^+	M1(+E2)	≤1.4	0.0047 *9*	%Iγ=0.00177 *11* α(K)=0.0039 *8*; α(L)=0.00059 *11*; α(M)=0.000135 *25* α(N)=3.3×10^{-5} *6*; α(O)=5.7×10^{-6} *11*; α(P)=4.3×10^{-7} *9*; α(IPF)=3.0×10^{-5} *4* I_γ: Weighted average of 0.163 *11* (2001Sc23) and 0.170 *20* (1984Zh08).
1457.49 *9*	1.863 *25*	1457.41	2^+	0.0	0^+	E2		0.00246	%Iγ=0.0200 *3* α(K)=0.00200 *3*; α(L)=0.000315 *5*; α(M)=7.21×10^{-5} *10* α(N)=1.755×10^{-5} *25*; α(O)=3.00×10^{-6} *5*; α(P)=2.13×10^{-7} *3*; α(IPF)=5.44×10^{-5} *8* I_γ: Weighted average of 1.87 *3* (2001Sc23), 1.97 *10* (2000Mi03), 1.81 *5* (1984Zh08, but uncertainty increased to 3%) and 1.91 *13* (1975Sv01).
1463.0 *6*	0.08 *3*	1462.503	2^-	0.0	0^+	[M2]		0.01031	%Iγ=0.0009 *4* α(K)=0.00850 *12*; α(L)=0.001375 *20*; α(M)=0.000316 *5* α(N)=7.73×10^{-5} *11*; α(O)=1.336×10^{-5} *19*; α(P)=1.001×10^{-6} *14*;

$^{188}_{76}Os_{112}$-11

^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01 (continued)

$\gamma(^{188}Os)$ (continued)

E_γ[†]	I_γ[a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	δ[@]	α[&]	$I_{(\gamma+ce)}$[b]	Comments
										α(IPF)=2.79×10^{-5} *4* E_γ,I_γ: From 1984Zh08. It could partly result from 829γ+633γ summing.
1478.0		1478.09	0^+	0.0	0^+	E0			0.000347 *18*	$I_{(\gamma+ce)}$: from adopted gammas.
1487.01 *25*	0.026[#] *4*	1965.00	$(2)^+$	477.966	4^+	[E2]		0.00238		%Iγ=0.00028 *5* α(K)=0.00192 *3*; α(L)=0.000302 *5*; α(M)=6.92×10^{-5} *10* α(N)=1.684×10^{-5} *24*; α(O)=2.88×10^{-6} *4*; α(P)=2.05×10^{-7} *3*; α(IPF)=6.33×10^{-5} *9*
1530.06 *15*	0.055 *7*	1685.30	(3^+)	155.044	2^+					E_γ: Not observed in ^{188}Re β^- decay. %Iγ=0.00059 *8* I_γ: Weighted average of 0.055 *8* (2001Sc23) and 0.054 *16* (1984Zh08).
1549.26 *9*	0.25 *5*	1704.31	0^+	155.044	2^+	[E2]		0.00223		%Iγ=0.0027 *6* α(K)=0.001785 *25*; α(L)=0.000278 *4*; α(M)=6.36×10^{-5} *9* α(N)=1.550×10^{-5} *22*; α(O)=2.66×10^{-6} *4*; α(P)=1.90×10^{-7} *3*; α(IPF)=8.37×10^{-5} *12*
1574.52 *12*	0.069 *7*	1729.55	2^+	155.044	2^+	M1+E2	+0.65 *8*	0.00330 *10*		I_γ: From 1975Sv01. Other: 0.066 *5* (1984Zh08). %Iγ=0.00074 *8* α(K)=0.00265 *8*; α(L)=0.000404 *12*; α(M)=9.2×10^{-5} *3* α(N)=2.25×10^{-5} *7*; α(O)=3.89×10^{-6} *12*; α(P)=2.94×10^{-7} *9*; α(IPF)=0.000122 *3* I_γ: Unweighted average of 0.075 *8* (2001Sc23) and 0.062 *10* (1984Zh08).
1610.40 *5*	9.64 *9*	1765.372	0^+	155.044	2^+	[E2]		0.00210		%Iγ=0.1037 *11* α(K)=0.001663 *24*; α(L)=0.000258 *4*; α(M)=5.89×10^{-5} *9* α(N)=1.433×10^{-5} *20*; α(O)=2.46×10^{-6} *4*; α(P)=1.771×10^{-7} *25*; α(IPF)=0.0001057 *15* I_γ: Weighted average of 9.57 *13* (2001Sc23), 9.77 *15* (2000Mi03), 9.58 *29* (1984Zh08, but uncertainty increased to 3%) and 9.4 *5* (1975Sv01).
1652.42 *8*	0.306 *7*	1807.60	2^+	155.044	2^+	M1(+E2)	≤0.9	0.0031 *4*		%Iγ=0.00329 *8* α(K)=0.0025 *3*; α(L)=0.00037 *4*; α(M)=8.5×10^{-5} *9* α(N)=2.07×10^{-5} *21*; α(O)=3.6×10^{-6} *4*; α(P)=2.7×10^{-7} *3*; α(IPF)=0.000164 *13* I_γ: Weighted average of 0.303 *7* (2001Sc23), 0.349 *27* (1984Zh08) and 0.32 *5* (1975Sv01).
1669.89 *6*	1.023 *13*	1824.93	0^+	155.044	2^+	[E2]		0.00200		%Iγ=0.01100 *15*

$^{188}_{76}Os_{112}$-12

^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01 (continued)

$\gamma(^{188}Os)$ (continued)

E_γ †	I_γ a	E_i(level)	J_i^π	E_f	J_f^π	Mult. @	δ @	α &	$I_{(\gamma+ce)}$ b	Comments
										α(K)=0.001556 *22*; α(L)=0.000240 *4*; α(M)=5.47×10^{-5} *8* α(N)=1.333×10^{-5} *19*; α(O)=2.29×10^{-6} *4*; α(P)=1.657×10^{-7} *24*; α(IPF)=0.0001286 *18* I_γ: Weighted average of 1.026 *15* (2001Sc23), 1.01 *3* (1984Zh08, but uncertainty increased to 3%) and 1.02 *8* (1975Sv01). Mult.: (E1) from α(pair)=4.1×10^{-4} *4* (1974Be75) in conflict with expected E2 from ΔJ. α(pair)=1.6×10^{-4} *3* (1985AlZJ) agrees with α(pair)(theory for E2)=1.32×10^{-4} (1979Sc31). I(e$^+$,1653γ+1670γ)/I(e$^+$,1610γ)=0.27 *4* (1985AlZJ).
1688.04 *15*	0.0316 # *29*	1842.86	(2)$^+$	155.044	2$^+$	M1+E2	1.1 *9*	0.00255 *67*		%Iγ=0.00034 *4* α(K)=0.00200 *53*; α(L)=3.04×10^{-4} *79*; α(M)=6.9×10^{-5} *18* α(N)=1.69×10^{-5} *44*; α(O)=2.92×10^{-6} *77*; α(P)=2.19×10^{-7} *64*; α(IPF)=0.00016 *3*
1704		1704.31	0$^+$	0.0	0$^+$	E0			0.0070 *13*	E_γ: Not observed in ^{188}Re β^- decay. $I_{(\gamma+ce)}$: from adopted gammas. I(e$^+$)/I(e$^+$,1610γ)=0.19 *2* (1985AlZJ).
1765		1765.372	0$^+$	0.0	0$^+$	E0			0.0113 *6*	$I_{(\gamma+ce)}$: from adopted gammas. I(e$^+$)/I(e$^+$,1610γ)=0.29 *7* (1985AlZJ).
x1765.1	0.023 *4*									%Iγ=0.00025 *5* E_γ,I_γ: from 2001Sc23 only. This line may be due to 1610+155 summing.
1785.95 *12*	1.924 *22*	1941.05	(2)$^+$	155.044	2$^+$	M1,E2		0.00292		%Iγ=0.02070 *25* α(K)=0.00223 *4*; α(L)=0.000337 *5*; α(M)=7.68×10^{-5} *11* α(N)=1.87×10^{-5} *3*; α(O)=3.25×10^{-6} *5*; α(P)=2.49×10^{-7} *4*; α(IPF)=0.000254 *4* I_γ: Weighted average of 1.924 *26* (2001Sc23), 1.94 *6* (2000Mi03), 1.89 *6* (1984Zh08, but uncertainty increased to 3%) and 1.99 *12* (1975Sv01). Mult.: E2,M1 from α(pair)=1.6×10^{-4} *3* (1974Be75).
1802.05 *5*	3.64 *4*	1957.13	(1$^+$,2$^+$)	155.044	2$^+$	[M1+E2]		0.00288		%Iγ=0.0392 *5* α(K)=0.00219 *3*; α(L)=0.000330 *5*; α(M)=7.51×10^{-5} *11* α(N)=1.83×10^{-5} *3*; α(O)=3.18×10^{-6} *5*; α(P)=2.44×10^{-7} *4*; α(IPF)=0.000264 *4* I_γ: Weighted average of 3.65 *5* (2001Sc23), 3.74 *13* (2000Mi03), 3.55 *11* (1984Zh08, but

$^{188}_{76}Os_{112}$-13

^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01 (continued)

$\gamma(^{188}Os)$ (continued)

E_γ [†]	I_γ [a]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	α [&]	$I_{(\gamma+ce)}$ [b]	Comments
									uncertainty increased to 3%) and 3.61 *19* (1975Sv01). Mult.: E2,M1 from α(pair)=1.8×10^{-4} *2* (1974Be75), but α(K)exp in ^{188}Ir ε decay suggests (E1). α(pair)(theory for E1)=4.0×10^{-4} (1979Sc31).
1807.36 *12*	0.086 *4*	1807.60	2$^+$	0.0	0$^+$	[E2]	0.00180		%Iγ=0.00093 *5* α(K)=0.001348 *19*; α(L)=0.000205 *3*; α(M)=4.68×10^{-5} *7* α(N)=1.139×10^{-5} *16*; α(O)=1.96×10^{-6} *3*; α(P)=1.433×10^{-7} *20*; α(IPF)=0.000186 *3* Iγ: Weighted average of 0.081 *7* (2001Sc23), 0.087 *5* (1984Zh08) and 0.0105 *17* (1975Sv01).
1809.85 *26*	0.039 *10*	1965.00	(2)$^+$	155.044	2$^+$	M1+E2+E0	0.00285		%Iγ=0.00042 *11* α(K)=0.00216 *3*; α(L)=0.000327 *5*; α(M)=7.43×10^{-5} *11* α(N)=1.81×10^{-5} *3*; α(O)=3.15×10^{-6} *5*; α(P)=2.41×10^{-7} *4*; α(IPF)=0.000269 *4* E$_\gamma$,I$_\gamma$: From 1984Zh08. α: From adopted gammas.
1825.2		1824.93	0$^+$	0.0	0$^+$	E0		0.00143 *7*	E$_\gamma$: Not observed in ^{188}Re β^- decay. I$_{(\gamma+ce)}$: from adopted gammas. I(e$^+$)/I(e$^+$,1610γ)=0.13 *4* (1985AlZJ).
1843.0 *4*	0.0069[#] *12*	1842.86	(2)$^+$	0.0	0$^+$	[E2]	1.76×10^{-3}		%Iγ=7.4×10^{-05} *13* α(K)=0.001301 *19*; α(L)=0.000198 *3*; α(M)=4.50×10^{-5} *7* α(N)=1.096×10^{-5} *16*; α(O)=1.89×10^{-6} *3*; α(P)=1.382×10^{-7} *20*; α(IPF)=0.000201 *3* E$_\gamma$: Not observed in ^{188}Re β^- decay.
1864.69 *12*	0.492 *8*	2020.02	(1,2)$^+$	155.044	2$^+$	E2,M1	0.00270		%Iγ=0.00529 *9* α(K)=0.00201 *3*; α(L)=0.000303 *5*; α(M)=6.90×10^{-5} *10* α(N)=1.685×10^{-5} *24*; α(O)=2.92×10^{-6} *4*; α(P)=2.24×10^{-7} *4*; α(IPF)=0.000303 *5* Iγ: Weighted average of 0.491 *9* (2001Sc23), 0.490 *15* (1984Zh08, but uncertainty increased to 3%) and 0.54 *5* (1975Sv01). Mult.: E2,D from α(pair)=3.4×10^{-4} *5* (1974Be75). Other: I(e$^+$)/I(e$^+$,1610γ)= 0.13 *4*; α(pair)=2.1×10^{-4} *6* (1985AlZJ).
1867.20 *22*	0.045 *8*	2022.44	(1,2)$^+$	155.044	2$^+$	[M1]	0.00270		%Iγ=0.00048 *9* α(K)=0.00200 *3*; α(L)=0.000302 *5*; α(M)=6.88×10^{-5} *10*

$^{188}_{76}Os_{112}$-14

^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01 (continued)

$\gamma(^{188}Os)$ (continued)

E_γ †	I_γ a	E_i(level)	J_i^π	E_f	J_f^π	Mult. @	α &	Comments
								α(N)=1.679×10^{-5} *24*; α(O)=2.91×10^{-6} *4*; α(P)=2.23×10^{-7} *4*; α(IPF)=0.000304 *5* E_γ,I_γ: From 1984Zh08. %Iγ=0.0016 *7*
1936.9 *3*	0.15 *6*	1936.9	(1,2$^+$)	0.0	0$^+$			I_γ: Unweighted average of 0.009 *6* (2001Sc23) and 0.021 *2* (1984Zh08).
1940.91 *23*	0.183 *4*	1941.05	(2)$^+$	0.0	0$^+$	(E2)	1.66×10^{-3}	%Iγ=0.00197 *5* α(K)=0.001184 *17*; α(L)=0.000179 *3*; α(M)=4.07×10^{-5} *6* α(N)=9.91×10^{-6} *14*; α(O)=1.707×10^{-6} *24*; α(P)=1.258×10^{-7} *18*; α(IPF)=0.000245 *4* I_γ: Weighted average of 0.184 *5* (2001Sc23), 0.181 *5* (1984Zh08, but uncertainty increased to 3%) and 0.200 *16* (1975Sv01). Mult.: E2,M1 from α(pair)=3.1×10^{-4} *4* (1974Be75).
1957.10 *17*	1.459 *17*	1957.13	(1$^+$,2$^+$)	0.0	0$^+$	[E2]	1.65×10^{-3}	%Iγ=0.01569 *20* α(K)=0.001167 *17*; α(L)=0.0001759 *25*; α(M)=4.00×10^{-5} *6* α(N)=9.75×10^{-6} *14*; α(O)=1.679×10^{-6} *24*; α(P)=1.239×10^{-7} *18*; α(IPF)=0.000253 *4* I_γ: Weighted average of 1.455 *20* (2001Sc23), 1.45 *6* (2000Mi03), 1.47 *4* (1984Zh08, but uncertainty increased to 3%) and 1.51 *11* (1975Sv01). Mult.: E2,M1 from α(pair)=2.6×10^{-4} *2* (1974Be75).
2022.53 *16*	0.149 *3*	2022.44	(1,2)$^+$	0.0	0$^+$			%Iγ=0.00160 *4* I_γ: Weighted average of 0.147 *4* (2001Sc23), 0.149 *4* (1984Zh08, but uncertainty increased to 3%) and 0.169 *16* (1975Sv01). Mult.: E2,M1 from α(pair)=2.8×10^{-4} *3* (1974Be75).

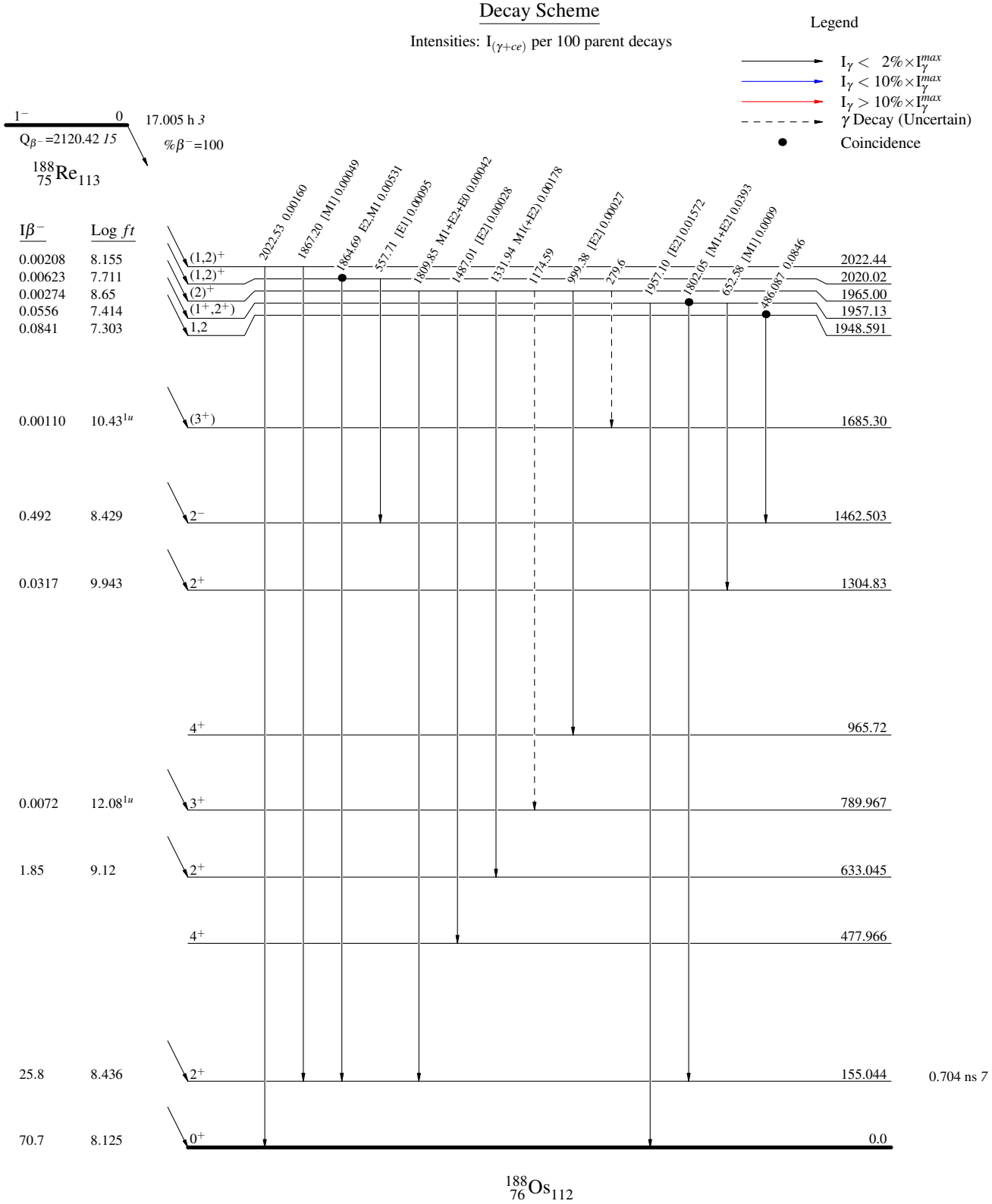
† From adopted gammas. Values from ^{188}Re β^- decay (17.005 h) are given in the comments.
‡ γ reported only by 2000Sh48.
# From adopted branching ratios and relative to the strongest branch.
@ From adopted gammas, unless otherwise stated. Pair conversion data (magnetic spectrometer) are from 1974Be75 and 1985AlZJ. I(e±)/Iγ values from 1974Be75 are given relative to that for 1610γ as 1.09×10^{-4} assumed as E2 (theoretical value from 1979Sc31).
& Additional information 2.
a For absolute intensity per 100 decays, multiply by 0.01076 *4*.
b Absolute intensity per 100 decays.
c Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

$^{188}_{76}Os_{112}$-15

^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01

Decay Scheme

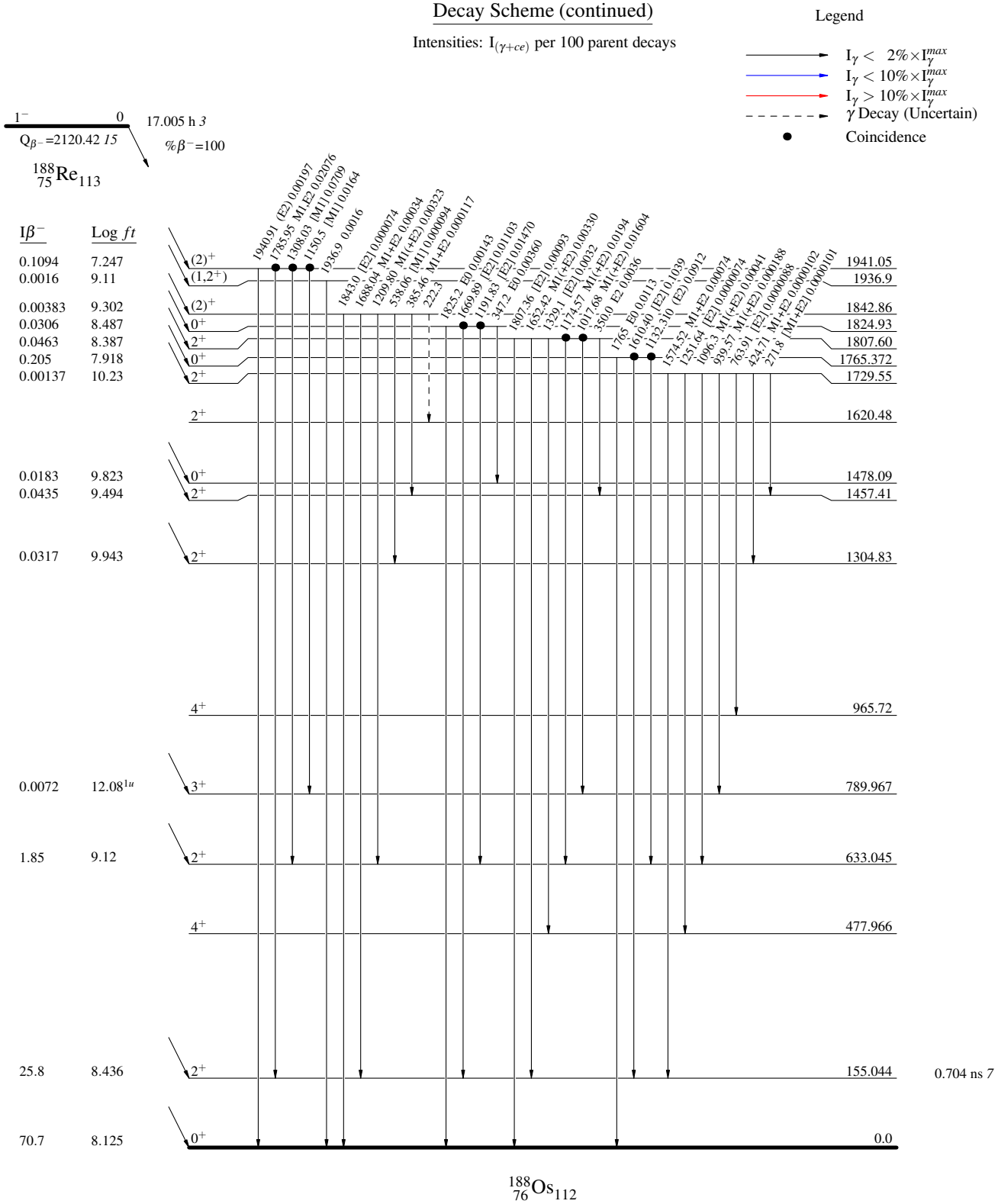
Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01

Decay Scheme (continued)

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



^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01

Decay Scheme (continued)

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

1^- 0 17.005 h *3*

Q_{β^-}=2120.42 *15* $\%\beta^-$=100

$^{188}_{75}Re_{113}$

Iβ⁻	Log *ft*			
0.0105	9.43	0^+	1704 E0 0.0070	1704.31
0.00110	10.43[1u]	(3^+)	1549.26 [E2] 0.0027	1685.30
0.0183	9.823	0^+	1071.28 [E2] 0.00071	1478.09
0.492	8.429	2^-	617.7 E0 0.000085	1462.503
0.0435	9.494	2^+	1530.06 0.00059	1457.41
			1052.11 [M1] 0.00009	1443.52
		(3^-)	895.33 0.00037	1413.83
			719.58 0.000059	
0.683	8.975	0^+	1478.0 E0 0.000347	1086.386
		4^+	1323.04 (E2) 0.01416	965.72
0.0072	12.08[1u]	3^+	845.05 [E2] 0.00749	789.967
1.85	9.12	2^+	1463.0 [M2] 0.0009	633.045
		4^+	1307.64 (E1) 0.0129	477.966
25.8	8.436	2^+	984.1 [M2] 0.000365	155.044
70.7	8.125	0^+	829.47 E1 0.446	0.0
			672.542 E1 0.1204	
			1457.49 E2 0.0201	
			1302.31 [E2+M1] 0.0061	
			979.35 [E2] 0.00109	
			824.39 M1(+E2) 0.0191	
			667.44 [M1] 0.00055	
			491.64 [E2] 0.00059	
			810.49 0.00097	
			780.9 [E1] 0.00041	
			623.9 [E1] 0.0026	
			448.1 [E1] 0.00081	

0.704 ns *7*

$^{188}_{76}Os_{112}$

^{188}Re β^- decay (17.005 h) 2001Sc23,1984Zh08,1975Sv01

Decay Scheme (continued)

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