^{190}Os(n,n′γ),(n,n′) 1984KlZY,1989Cl08

History

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

1984KlZY: (n,n′γ) E<3 MeV. Measured Eγ, Iγ, nγ-coin, γ(θ), excitation functions.
1989Cl08: (n,n′) E=8 MeV. Measured σ(θ). Data reported for first 0^+, 2^+, 4^+ and 3^- states.
Others:
1988Hi07: E<10 MeV, measured σ(θ).
1987HiZO (same group as 1988Hi07): E=2.5, 4.5 MeV. Measured σ(θ). Deduced reduced matrix elements.
1987CaZV: E(n)=6 eV to 500 keV, measured σ(θ) for (n,n).
1982Po07: E(n)=0.15 to 1 MeV. Measured σ for g.s. and first 2^+ level.
1980Bo36, 1971Ru15: E(n)=14.7 MeV, measured σ.
1978He05: E(n)=13 to 17 MeV, measured σ.
1974Be78: E(n)=4 to 300 eV, measured resonances.
1972GrZX: E(n)=2.1 MeV, measured σ.
All data are from 1984KlZY, unless otherwise noted.

^{190}Os Levels

E(level)†	J^π‡	Comments
0.0	0^+	
186.718 *2*	2^+	$β_2$=0.168 *5* (1989Cl08) (from σ(θ)).
547.858 *10*	4^+	$β_4$=−0.03 *1* (1989Cl08) (from σ(θ)).
557.973 *6*	2^+	
756.01 *2*	3^+	
911.80 *7*	0^+	
955.35 *6*	4^+	
1050.5 *2*	6^+	
1114.35 *9*	2^+	
1163.15 *5*	4^+	
1203.72 *8*	5^+#	
1382.3 *3*	0^+	
1386.96 *5*	3^-	$β_3$=0.06 (1989Cl08) (from σ(θ)).
1436.05 *9*	2^+#	
1446.22 *5*	$(5)^+$#	
1544.9 *3*	0^+	
1569.3 *3*	$(3)^+$#	
1570.3 *3*	(1,2)#	
1583.83 *8*	4^-	
1615.9 *2*	$(2)^+$	
1675.58 *13*	$(2)^+$#	
1679.5 *3*	(3)#	
1680.6 *3*	(1)#	
1681.50 *13*	5^-	
1688.92 *14*	#	
1689.2 *2*	(2^+)	
1708.1 *2*	$(2^+,3,4^+)$	
1732.9 *2*	0^+	
1802.7 *3*	$(1,2^+)$#	
1813.5 *2*	$(1^+,2,3^+)$#	
1823.7 *2*	$(1,2)^+$#	
1859.0 *2*	(2^+)	
1872.46 *9*	$(5)^-$	

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^{190}Os(n,n′γ),(n,n′) 1984KlZY,1989Cl08 (continued)

^{190}Os Levels (continued)

E(level)†	Jπ‡	Comments
1884.4 2	(1,2,3)#	
1902.1 4	(1,2,3)#	
1902.9 2		
1903.3 2	(3+,4−)	
1910.7 2	(2)+	
1918.3 4	(1,2)	
1935.3 2	(2+,3+,4)#	
1943.6 4	(2+)	Excitation function data do not support a 1383γ from this level as suggested by 1979Ca02 in (n,γ).
1958.1 3	(1,2+)	
1970.3 2	(1+,2)	
1992.4 3	(2,3)#	
1994.8 3	(2)+	
2025.5 3	(1,2)#	
2070.2 2	(1+,2)	
2112.1 7	(1,2+)	
2118.5 2	(1+,2)#	
2124.6 2	(2,3+,4+)#	
2135.5 3	(0+,1,2)#	
2175.5 10	(0+,1,2)	

† From least-squares fit to γ-ray energies.
‡ From the Adopted Levels, except when stated otherwise.
\# From γ(θ) and/or excitation function.

γ(^{190}Os)

Eγ†	Iγ†	Ei(level)	Jπi	Ef	Jπf	Mult.#	Comments
186.718‡ 2	319 32	186.718	2+	0.0	0+		A2=+0.16 1
223.811‡ 7	8.4 7	1386.96	3−	1163.15	4+		A2=+0.01 9 Iγ: low by ≈50%, as compared to branching in ^{190}Ir ε.
283.080 16	3.4 4	1446.22	(5)+	1163.15	4+	D	A2=−0.21 11 Iγ: high by ≈40%, as compared to branching in ^{190}Re β− and ^{190}Ir ε.
288.66 4	1.0 5	1872.46	(5)−	1583.83	4−		
x291.6 2	1.1 5						
294.7 2	1.7 5	1681.50	5−	1386.96	3−		
x308.44 14	1.9 4						
x312.6 2	2.0 4						
321.701 15	0.9 4	1436.05	2+	1114.35	2+		A2=+0.04 11 Iγ: low by a factor of ≈3, as compared to branching in (n,γ).
x343.85 18	1.1 4						
x350.95 16	1.1 3						
353.84 7	1.3 4	911.80	0+	557.973	2+		
361.139‡ 9	79.1 13	547.858	4+	186.718	2+		A2=+0.24 1
371.257‡ 6	72.5 11	557.973	2+	186.718	2+		A2=−0.08 1
x375.4 8	1.3 6						
380.12 4	2.1 4	1583.83	4−	1203.72	5+		
x388.8 4	0.8 3						

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^{190}Os(n,n′γ),(n,n′) 1984KlZY,1989Cl08 (continued)

γ(^{190}Os) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	Comments
[x]394.23 *18*	1.1 *3*						
397.4[‡] *1*	19.2 *18*	955.35	4+	557.973	2+		A_2=+0.25 *2*
407.33[&] *10*	15[&] *2*	955.35	4+	547.858	4+	D	A_2=−0.19 *3* I_γ: total Iγ for doublet=28 *2*. Split intensity based on branching at E(n)=1.2 MeV (1984KlZY). A_2 is for doublet.
407.33[&] *10*	13[&] *2*	1163.15	4+	756.01	3+		
420.71 *18*	1.3 *3*	1583.83	4−	1163.15	4+		A_2=+0.52 *19*
431.6[‡] *1*	6.1 *5*	1386.96	3−	955.35	4+		A_2=−0.07 *4*
447.8[‡] *1*	7.0 *6*	1203.72	5+	756.01	3+		A_2=+0.27 *4*
[x]464.1 *3*	1.1 *3*						
477.7 *2*	1.2 *2*	1681.50	5−	1203.72	5+		I_γ: high by a factor of ≈4, as compared to branching in ^{190}Ir ε.
484.5 *3*	1.2 *2*	1872.46	(5)−	1386.96	3−		E_γ: poor fit in the decay scheme, deviates by 1.0 keV.
490.3 *2*	3.3 *3*	1446.22	(5)+	955.35	4+		
[x]492.7 *4*	0.6 *2*						
502.4 *3*	3.7 *5*	1050.5	6+	547.858	4+		A_2=+0.24 *8*
518.4[‡] *3*	5.3 *4*	1681.50	5−	1163.15	4+		A_2=−0.05 *5*
524.1 *5*	0.7 *3*	1436.05	2+	911.80	0+		
557.956[‡] *16*	100 *8*	557.973	2+	0.0	0+		A_2=+0.16 *1*
569.291[‡] *20*	91 *7*	756.01	3+	186.718	2+	D	A_2=−0.05 *1*
[x]580.8 *2*	0.6 *2*						
605.2[‡] *1*	26 *2*	1163.15	4+	557.973	2+		A_2=+0.26 *2*
[x]611.8 *4*	0.47 *11*						
615.6 *4*	0.67 *16*	1163.15	4+	547.858	4+		
630.9[@‡] *2*	5.8[@] *4*	1386.96	3−	756.01	3+		A_2=+0.26 *3*
630.9[@] *2*	5.8[@] *4*	1681.50	5−	1050.5	6+		I_γ: expected value ≈0.1, as compared to branching in ^{190}Ir ε.
[x]638.5 *2*	1.6 *2*					D	A_2=−0.3 *2*
[x]641.6 *3*	0.67 *19*						
655.9 *2*	3.7 *3*	1203.72	5+	547.858	4+		A_2=−0.17 *10*
679.7 *2*	2.32 *17*	1436.05	2+	756.01	3+		A_2=−0.12 *11*
690.1 *2*	1.3 *2*	1446.22	(5)+	756.01	3+		A_2=+0.50 *20*
[x]692.1 *3*	0.88 *15*						A_2=−0.4 *5*
[x]711.4 *3*	0.6 *2*						
[x]720.1 *4*	0.4 *2*						
725.0[‡] *2*	7.2 *5*	911.80	0+	186.718	2+		A_2=−0.10 *3* γ(θ) should be isotropic. The 725γ may be mixed with a possible 726γ from 1682 level.
726[a]		1681.50	5−	955.35	4+		Possible γ mixed with 725γ (from 912 level).
740.1 *2*	2.6 *2*	1903.3	(3+,4−)	1163.15	4+		A_2=+0.14 *8*
768.6[‡] *2*	7.3 *5*	955.35	4+	186.718	2+		A_2=+0.23 *4*
[x]818.4 *2*	1.41 *16*						A_2=+0.48 *11*
828.9[‡] *2*	11.3 *7*	1386.96	3−	557.973	2+	D	A_2=−0.10 *5*
839.1 *2*	3.2 *3*	1386.96	3−	547.858	4+		A_2=0.00 *8*
[x]850.9 *4*	0.5 *2*						
[x]854.1 *6*	0.7 *2*						
859.6 *6*	1.0 *3*	1615.9	(2)+	756.01	3+		
877.7[‡] *2*	2.7 *2*	1436.05	2+	557.973	2+		A_2=−0.06 *7*
888.4 *2*	2.6 *2*	1436.05	2+	547.858	4+		A_2=+0.19 *6*

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^{190}Os(n,n′γ),(n,n′) 1984KlZY,1989Cl08 (continued)

γ(^{190}Os) (continued)

Eγ[†]	Iγ[†]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	Comments
[x]891.9 *3*	0.8 *2*						
919.4 *2*	2.6 *3*	1675.58	(2)$^+$	756.01	3$^+$		A_2=−0.19 *7*
928.0[‡] *2*	9.7 *5*	1114.35	2$^+$	186.718	2$^+$		A_2=+0.15 *4*
933.2 *2*	1.4 *2*	1689.2	(2$^+$)	756.01	3$^+$		A_2=+0.2 *2*
951.6 *3*	1.7 *4*	1708.1	(2$^+$,3,4$^+$)	756.01	3$^+$	D	A_2=−0.46 *7*
955.7 *3*	1.2 *2*	1910.7	(2)$^+$	955.35	4$^+$		A_2=+0.7 *4*
976.3[a] *3*	1.4 *2*	1163.15	4$^+$	186.718	2$^+$		A_2=−0.2 *3* Placement based on the Adopted Gammas.
979.6 *3*	1.1 *2*	1935.3	(2$^+$,3$^+$,4)	955.35	4$^+$		A_2=0.0 *2*
[x]982.6 *3*	0.8 *2*						
986.9 *3*	4.0 *3*	1544.9	0$^+$	557.973	2$^+$		A_2=−0.07 *8*
[x]989.2 *6*	1.0 *2*						
1011.0[‡] *3*	4.9 *3*	1569.3	(3)$^+$	557.973	2$^+$	D	A_2=−0.50 *9*
[x]1019.4 *4*	1.3 *2*						
1021.9 *4*	0.9 *2*	1569.3	(3)$^+$	547.858	4$^+$		
1035.9 *3*	2.2 *2*	1583.83	4$^-$	547.858	4$^+$		A_2=+0.24 *8*
[x]1041.0 *3*	1.2 *2*						
1046.3 *3*	1.2 *2*	1958.1	(1,2$^+$)	911.80	0$^+$		
1057.8[‡] *3*	3.4 *2*	1615.9	(2)$^+$	557.973	2$^+$		A_2=+0.04 *8*
1067.9[&] *3*	2.0[&] *2*	1615.9	(2)$^+$	547.858	4$^+$		A_2=+0.1 *4* Iγ: total Iγ=2.2 *2*. Intensity split based on branching at E(n)=1.2 MeV (1984KlZY). A_2 is for doublet.
1067.9[&] *3*	0.2[&] *2*	1823.7	(1,2)$^+$	756.01	3$^+$		
[x]1084.8 *3*	1.6 *2*						A_2=+0.34 *11*
[x]1088.2 *4*	1.1 *2*						A_2=0.1 *2*
1103.6 *3*	2.0 *2*	1859.0	(2$^+$)	756.01	3$^+$	D	A_2=−0.17 *9*
1114.7[‡] *2*	5.8 *3*	1114.35	2$^+$	0.0	0$^+$		A_2=+0.27 *6*
1117.7[‡] *2*	5.6 *3*	1675.58	(2)$^+$	557.973	2$^+$		A_2=+0.26 *4*
[x]1124.0 *2*	1.0 *2*						
1127.9 *3*	0.8 *2*	1884.4	(1,2,3)	756.01	3$^+$		
1131.0 *2*	2.1 *2*	1688.92		557.973	2$^+$	D	A_2=−0.43 *11*
1141.0 *2*	1.4 *2*	1688.92		547.858	4$^+$		A_2=0.0 *2*
1146.9 *2*	2.1 *2*	1902.9		756.01	3$^+$		A_2=−0.34 *15*
1150.7 *3*	2.1 *2*	1708.1	(2$^+$,3,4$^+$)	557.973	2$^+$		A_2=+0.25 *14* Iγ: high by a factor of ≈3, as compared to branching in ^{190}Ir ε.
1154.4 *3*	6.0 *3*	1910.7	(2)$^+$	756.01	3$^+$		A_2=+0.22 *5*
1174.6[‡] *3*	4.9 *3*	1732.9	0$^+$	557.973	2$^+$		A_2=+0.02 *7*
1179.7 *4*	1.1 *2*	1935.3	(2$^+$,3$^+$,4)	756.01	3$^+$	D	A_2=−0.7 *4*
1195.6 *3*	4.1 *2*	1382.3	0$^+$	186.718	2$^+$		A_2=−0.06 *8*
1199.4 *3*	1.6 *2*	1386.96	3$^-$	186.718	2$^+$	D	A_2=−0.24 *16* Eγ: poor fit in the level scheme, deviates by 0.8 keV.
1214.0 *3*	2.6 *3*	1970.3	(1$^+$,2)	756.01	3$^+$		A_2=+0.15 *11*
[x]1217.0 *4*	1.1 *3*						
1236.4 *3*	3.6 *3*	1992.4	(2,3)	756.01	3$^+$		A_2=+0.19 *8*
1244.6 *4*	0.86 *17*	1802.7	(1,2$^+$)	557.973	2$^+$		
1249.0 *3*	5.1 *3*	1436.05	2$^+$	186.718	2$^+$		
[x]1253.9 *3*	3.5 *6*						A_2=−0.16 *14*
1255.4 *3*	5.0 *6*	1813.5	(1$^+$,2,3$^+$)	557.973	2$^+$		A_2=+0.20 *10*
1265.8[‡] *3*	6.7 *3*	1823.7	(1,2)$^+$	557.973	2$^+$		A_2=+0.17 *5*
[x]1285.8 *4*	1.3 *2*						
[x]1293.1 *4*	0.5 *2*						
1300.4 *3*	3.5 *3*	1859.0	(2$^+$)	557.973	2$^+$		A_2=+0.28 *12*

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$^{190}Os(n,n'\gamma),(n,n')$ 1984KlZY,1989Cl08 (continued)

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

E_γ [†]	I_γ [†]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [#]	Comments
							I_γ: high by a factor of ≈2, as compared to branching in (n,γ).
1310.6 *4*	1.0 *3*	1859.0	(2$^+$)	547.858	4$^+$		A_2=+0.20 *16*
1326.9 *3*	2.9 *3*	1884.4	(1,2,3)	557.973	2$^+$		A_2=−0.01 *9*
^{x}1342.2 *4*	0.8 *4*						
^{x}1349.9 *4*	1.8 *3*						
1352.5 *4*	1.2 *3*	1910.7	(2)$^+$	557.973	2$^+$		
1362.8 *4*	1.9 *3*	1910.7	(2)$^+$	547.858	4$^+$		
1368.6 *3*	1.5 *4*	2124.6	(2,3$^+$,4$^+$)	756.01	3$^+$		
1383.6[‡] *3*	4.2 *3*	1570.3	(1,2)	186.718	2$^+$		A_2=−0.17 *11*
1387.6 *3*	3.4 *3*	1935.3	(2$^+$,3$^+$,4)	547.858	4$^+$		A_2=+0.35 *8*
1395.9 *4*	1.3 *3*	1943.6	(2$^+$)	547.858	4$^+$		
^{x}1398.1 *4*	2.1 *3*						A_2=+0.09 *8*
1412.7 *3*	3.0 *3*	1970.3	(1$^+$,2)	557.973	2$^+$		A_2=−0.07 *11*
1429.2[‡] *3*	5.9 *7*	1615.9	(2)$^+$	186.718	2$^+$		A_2=0.07 *5*
1436.7 *3*	5.3 *6*	1994.8	(2)$^+$	557.973	2$^+$		A_2=+0.05 *6*
^{x}1453.1 *3*	1.3 *2*						A_2=−0.15 *19*
1467.5 *3*	2.5 *2*	2025.5	(1,2)	557.973	2$^+$		A_2=+0.16 *12*
^{x}1482.6 *3*	2.5 *3*						A_2=+0.3 *3*
1489.0[‡] *3*	5.1 *3*	1675.58	(2)$^+$	186.718	2$^+$		A_2=+0.01 *8*
1492.8 *3*	3.2 *3*	1679.5	(3)	186.718	2$^+$		A_2=+0.02 *9*
1502.5 *3*	2.5 *3*	1689.2	(2$^+$)	186.718	2$^+$		A_2=+0.54 *11*
1512.1 *3*	5.2 *4*	2070.2	(1$^+$,2)	557.973	2$^+$		A_2=+0.04 *6*
^{x}1521.8 *3*	0.88 *11*						
^{x}1526.0 *4*	0.99 *12*						
^{x}1535.4 *4*	1.8 *2*						
^{x}1540.7 *2*	2.0 *2*						
1546.3[‡] *2*	9.7 *5*	1732.9	0$^+$	186.718	2$^+$		A_2=+0.13 *5* γ(θ) should be isotropic. The 1546γ may be contaminated by an impurity.
^{x}1550.9 *6*	0.84 *11*						
1560.5 *2*	2.0 *2*	2118.5	(1$^+$,2)	557.973	2$^+$		A_2=+0.47 *18*
1566.7 *2*	2.6 *2*	2124.6	(2,3$^+$,4$^+$)	557.973	2$^+$		A_2=+0.23 *12*
^{x}1571.4 *3*	2.7 *2*						A_2=−0.08 *11*
1577.5 *3*	0.8 *2*	2135.5	(0$^+$,1,2)	557.973	2$^+$		
^{x}1582.6 *4*	0.52 *11*						
^{x}1595.4 *3*	1.2 *2*						
^{x}1600.8 *3*	2.5 *3*						A_2=+0.12 *16*
1616.1[&‡] *3*	4.3[&] *7*	1615.9	(2)$^+$	0.0	0$^+$		A_2=−0.20 *3* I_γ: total Iγ=10.1 *8*. Intensity split based on branching at E(n)=1.2 MeV (1984KlZY). A_2 is for doublet.
1616.1[&‡] *3*	5.8[&] *7*	1802.7	(1,2$^+$)	186.718	2$^+$		
1626.9 *3*	1.58 *16*	1813.5	(1$^+$,2,3$^+$)	186.718	2$^+$		A_2=+0.09 *14*
1636.6 *4*	1.66 *16*	1823.7	(1,2)$^+$	186.718	2$^+$		
^{x}1640.6 *3*	1.54 *15*						
1672.7 *3*	3.1 *3*	1859.0	(2$^+$)	186.718	2$^+$		A_2=+0.13 *10*
1680.6[‡] *3*	11.8 *6*	1680.6	(1)	0.0	0$^+$	D	A_2=−0.15 *4*
^{x}1699.2 *4*	1.5 *2*						
^{x}1702.4 *4*	1.0 *2*						
1715.4 *4*	6.1 *3*	1902.1	(1,2,3)	186.718	2$^+$		A_2=−0.01 *6*
^{x}1725.1 *5*	1.5 *3*						A_2=+0.20 *18*
1731.6[‡] *4*	2.3 *3*	1918.3	(1,2)	186.718	2$^+$		A_2=−0.10 *13*
1771.5 *5*	2.2 *2*	1958.1	(1,2$^+$)	186.718	2$^+$		A_2=+0.01 *9*

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^{190}Os(n,n′γ),(n,n′) 1984KlZY,1989Cl08 (continued)

γ(^{190}Os) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J^π_i	E_f	J^π_f	Comments
1808.9 7	0.7 2	1994.8	(2)$^+$	186.718	2$^+$	
1838.8[‡] 7	3.6 3	2025.5	(1,2)	186.718	2$^+$	A_2=+0.24 8
1883.9 5	3.1 3	2070.2	(1$^+$,2)	186.718	2$^+$	A_2=−0.10 16
1925.4 7	1.4 2	2112.1	(1,2$^+$)	186.718	2$^+$	A_2=−0.03 20
1932.1 7	3.3 2	2118.5	(1$^+$,2)	186.718	2$^+$	A_2=+0.24 10
1942.8 8	2.3 3	1943.6	(2$^+$)	0.0	0$^+$	A_2=−0.05 22
1949.2 8	1.9 3	2135.5	(0$^+$,1,2)	186.718	2$^+$	A_2=−0.02 13
[x]1960.7 9	1.2 3					
[x]1965.2 9	3.1 4					A_2=0.07 9
[x]1981.0 14	0.74 13					
1988.8 10	1.5 2	2175.5	(0$^+$,1,2)	186.718	2$^+$	

† For E(n)=2.5 MeV (1984KlZY).
‡ 1984KlZY take energy from ^{189}Os(n,γ) (1979Ca02) and use it for calibration.
# Mult=D assigned by evaluators from negative A_2.
@ Multiply placed with undivided intensity.
& Multiply placed with intensity suitably divided.
a Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

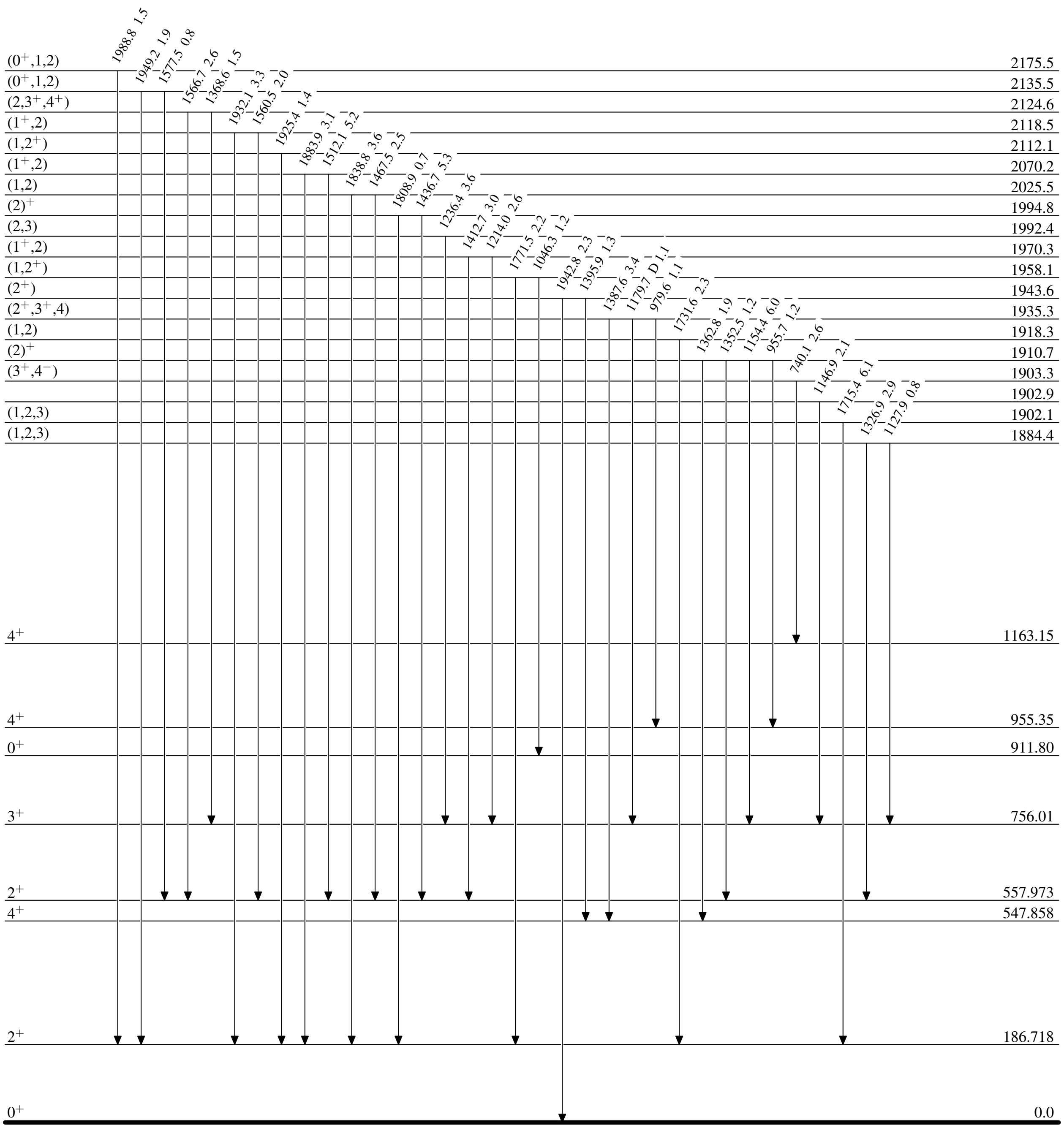
$^{190}Os(n,n'\gamma),(n,n')$ 1984KlZY,1989Cl08

Level Scheme

Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



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

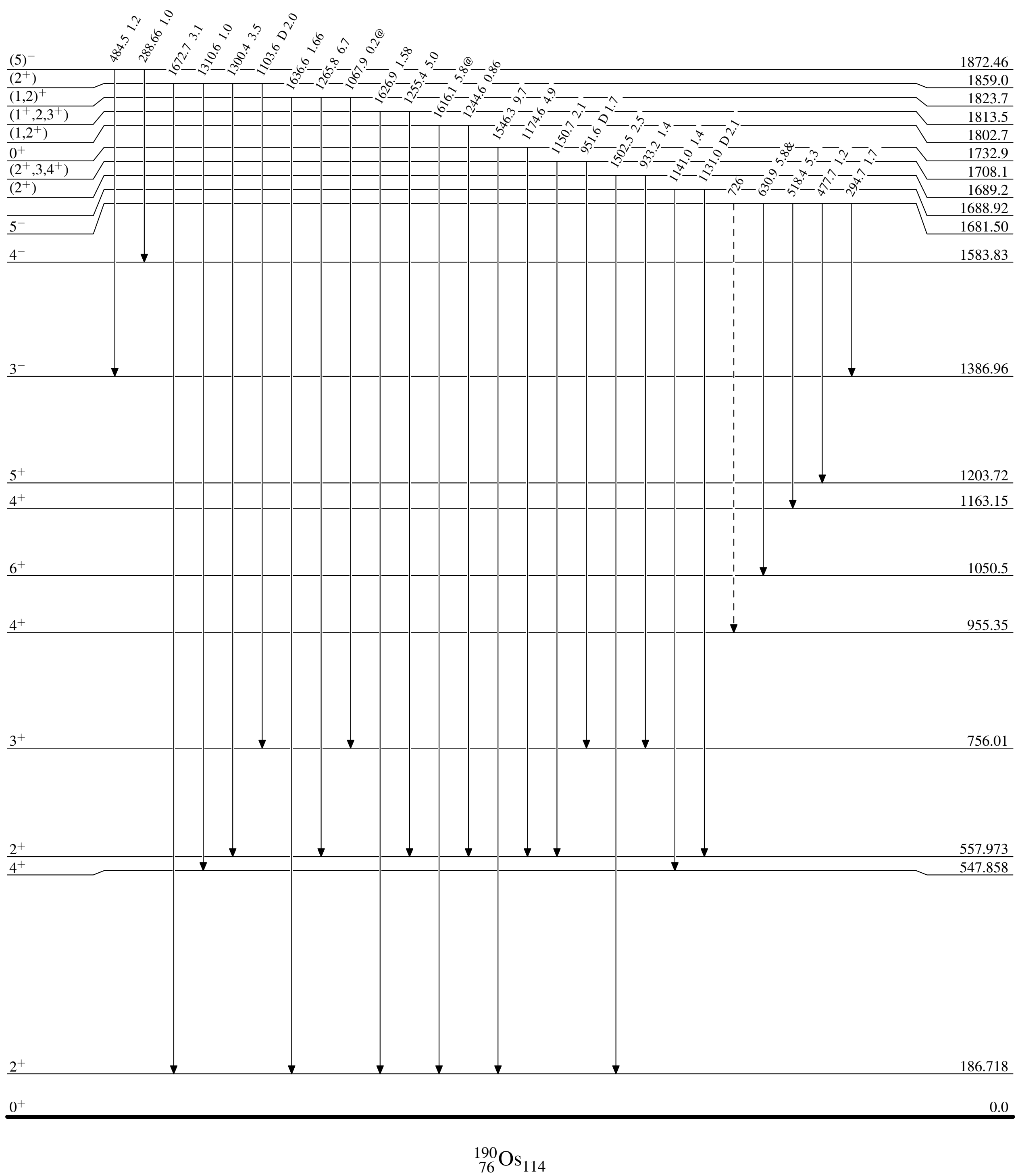
^{190}Os(n,n′γ),(n,n′) 1984KlZY,1989Cl08

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

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)

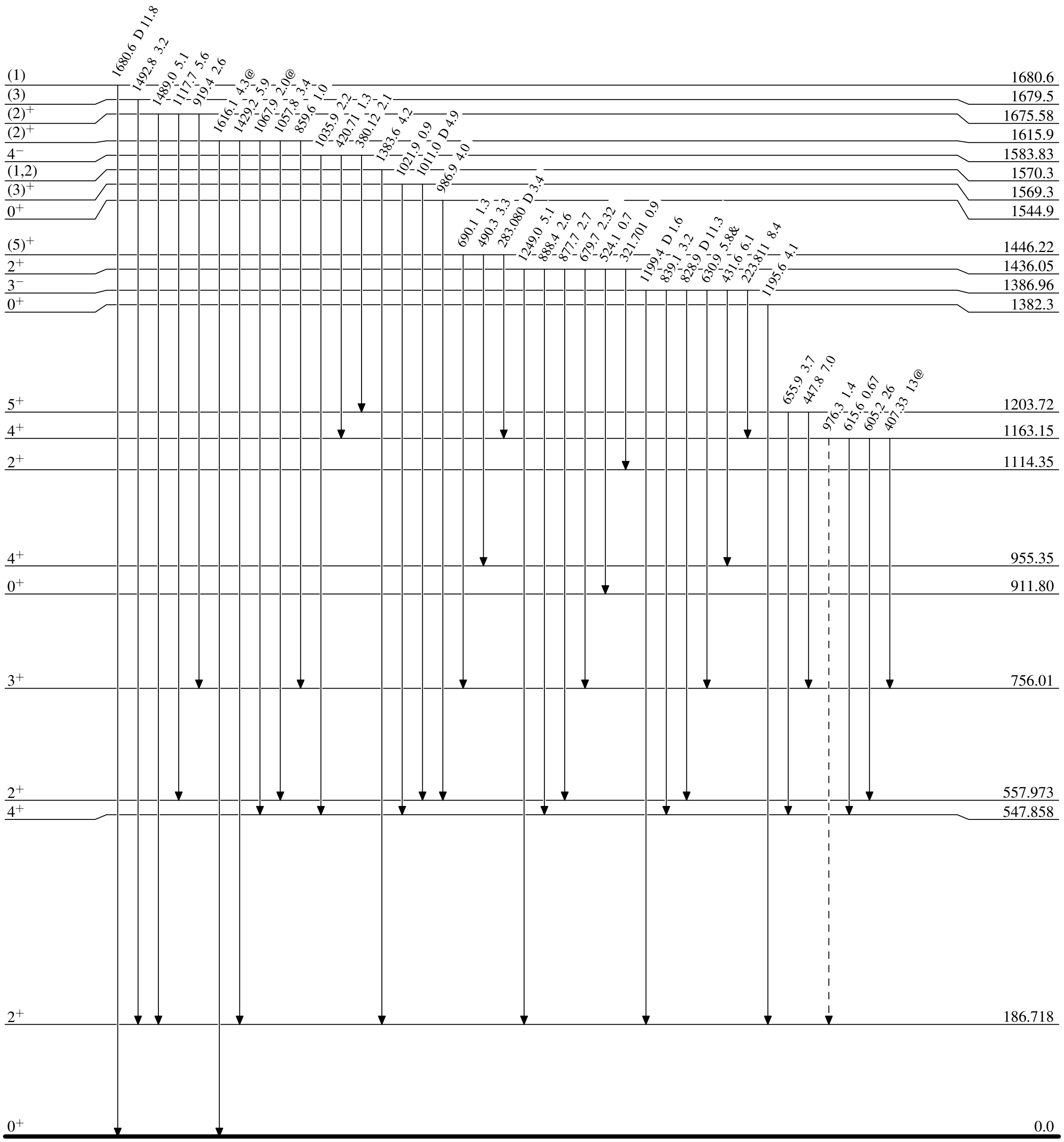


$^{190}Os(n,n'\gamma),(n,n')$ 1984KlZY,1989Cl08

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

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)



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

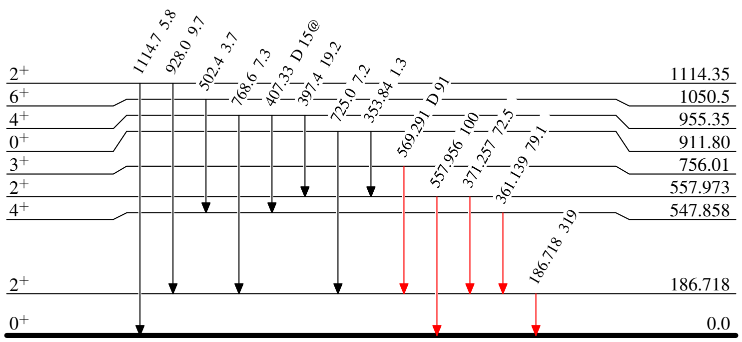
^{190}Os(n,n′γ),(n,n′) 1984KlZY,1989Cl08

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



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