^{189}Os(n,γ) E=10.31 eV 1979Ca02

History

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

1979Ca02 (also 1975Ma46,1975Ma31): E=10.3 eV neutrons were produced from the Brookhaven National Laboratory High Flux Beam Reactor (HFBR). Target was 1.0 g 87.3% enriched ^{189}Os. γ rays were detected with a 35-cm^3 Ge(Li) detector. Measured Eγ, Iγ. Deduced levels.

^{190}Os Levels

E(level)‡	Jπ†
0.0	0^+
186.718 *2*	2^+
547.853 *7*	4^+
557.978 *5*	2^+
756.035 *14*	3^+
911.78 *5*	0^+
955.365 *15*	4^+
1050.5 *3*	6^+
1114.73 *4*	2^+
1163.21 *3*	4^+
1203.9 *1*	5^+
1382.9 *2*	0^+
1387.02 *3*	3^-
1435.78 *7*	2^+
1446.2 *2*	$(5)^+$
1545.35 *13*	0^+
1569.0 *2*	$(3)^+$
1570.3? *3*	
1584.30 *14*	4^-
1616.00 *13*	$(2)^+$
1675.74 *10*	$(2)^+$
1680.6 *3*	(1)
1681.6 *3*	5^-
1689.2 *2*	(2^+)
1732.9 *2*	0^+
1813.4? *5*	
1823.8 *2*	$(1,2)^+$
1859.2 *2*	(2^+)
1901.9? *3*	
1903.5 *3*	$(3^+,4^-)$
1910.5 *2*	$(2)^+$
1918.3 *4*	(1,2)
1941.7 *3*	(2^+)
1957.2? *6*	
1970.7 *3*	$(1^+,2)$
1992.3? *3*	
1995.0 *2*	$(2)^+$
2010.2? *11*	
2025.5? *7*	
2042.4? *16*	
2047.3 *11*	(1,2)
2071.4? *11*	
2111.2? *11*	
2118.4? *5*	
2125.0? *4*	
2135.9? *4*	
2153.7 *11*	$(1,2^+)$

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^{189}Os(n,γ) E=10.31 eV 1979Ca02 (continued)

^{190}Os Levels (continued)

E(level)‡	Jπ†	Comments
2175.4 *20*		
2192.5? *16*		
2198.4 *11*	(1,2)	
2211.2 *16*		
2223.6? *16*		
2263.1 *11*	(1,2+)	
2290.1 *11*	(1,2)	
2306.0? *16*		
2313.9? *16*		
2347.3 *11*		
2382.6? *11*		
2467.4? *11*		
2476.6 *11*	(1+,2+)	
S(n)+0.01031	1−	E(level): S(n)+E(n), where S(n)=7792.34 *19* (2017Wa10), E(n)=10.31 eV *3* (2018MuZZ). Jπ: s-wave neutron capture in ^{189}Os (g.s. $J^\pi=3/2^-$) and γ-ray intensity ratios (1976St14,1975Na02), same J^π in 2018MuZZ.

† From the Adopted Levels.
‡ From least-squares fit to Eγ values.

γ(^{190}Os)

Iγ normalization: Σ(I(γ+ce) to g.s.)=100, assuming that the unplaced intensity of 205 units (relative) deexcites mainly the excited states. Conversion coefficients were taken into account.

Eγ†	Iγ‡l	Ei(level)	J_i^π	E_f	J_f^π
182.0 *2*	4.0 *13*	1569.0	(3)+	1387.02	3−
186.718 *2*	350 *25*	186.718	2+	0.0	0+
197.7ne *2*	6.2n@d *10*	756.035	3+	557.978	2+
197.7ne *2*	0.3n *1*	955.365	4+	756.035	3+
197.7n *2*	0.9n *2*	1584.30	4−	1387.02	3−
203.1 *1*	1.1 *2*	1114.73	2+	911.78	0+
208.1n *1*	1.3ncf *1*	756.035	3+	547.853	4+
208.1n *1*	0.4nc *1*	1163.21	4+	955.365	4+
223.811 *7*	6.1c *4*	1387.02	3−	1163.21	4+
282.9 *2*	0.45 *7*	1446.2	(5)+	1163.21	4+
x312.0 *3*	1.6@ *2*				
321.2 *2*	2.3 *2*	1435.78	2+	1114.73	2+
353.86 *7*	4.9 *4*	911.78	0+	557.978	2+
358.69 *4*	7.6 *7*	1114.73	2+	756.035	3+
361.136 *6*	59 *4*	547.853	4+	186.718	2+
371.260 *5*	100	557.978	2+	186.718	2+
380.1 *3*	0.72 *10*	1584.30	4−	1203.9	5+
397.388 *17*	10.9 *8*	955.365	4+	557.978	2+
407.176 *25*	7.4 *7*	1163.21	4+	756.035	3+
407.543 *25*	7.4 *10*	955.365	4+	547.853	4+
420.8 *4*	0.44 *9*	1584.30	4−	1163.21	4+
431.6 *1*	5.0 *4*	1387.02	3−	955.365	4+
447.8 *1*	1.6 *1*	1203.9	5+	756.035	3+
x456.1 *5*	0.44 *12*				

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^{189}Os(n,γ) E=10.31 eV 1979Ca02 (continued)

γ(^{190}Os) (continued)

E_γ †	I_γ ‡ l	E_i(level)	J_i^π	E_f	J_f^π	Comments
490.7 3	1.5# 2	1446.2	(5)$^+$	955.365	4$^+$	
502.6 3	0.92& 17	1050.5	6$^+$	547.853	4$^+$	
518.4 3	1.3 1	1681.6	5$^-$	1163.21	4$^+$	
524.0 2	2.1 2	1435.78	2$^+$	911.78	0$^+$	
x547.8 3	1.6 2					
557.972 14	147 10	557.978	2$^+$	0.0	0$^+$	
569.310 14	106 7	756.035	3$^+$	186.718	2$^+$	
574.6o 5	1.6 2	1689.2	(2$^+$)	1114.73	2$^+$	
605.26 7	12.9 9	1163.21	4$^+$	557.978	2$^+$	
630.9 2	8.1 6	1387.02	3$^-$	756.035	3$^+$	
x638.0 3	1.2 3					
679.75 9	3.9 3	1435.78	2$^+$	756.035	3$^+$	
691.0o 4	0.9# 1	1446.2	(5)$^+$	756.035	3$^+$	
725.07 8	15.6 12	911.78	0$^+$	186.718	2$^+$	
740.3 3	1.1 2	1903.5	(3$^+$,4$^-$)	1163.21	4$^+$	
x747.9 6	0.59 15					
x755.9 6	1.1# 2					
768.68 10	4.8 4	955.365	4$^+$	186.718	2$^+$	
828.89 11	7.4 5	1387.02	3$^-$	557.978	2$^+$	
x831.9 6	0.69 13					
839.0 3	2.1 2	1387.02	3$^-$	547.853	4$^+$	
859.9 4	1.2 2	1616.00	(2)$^+$	756.035	3$^+$	
877.73 12	5.0 4	1435.78	2$^+$	557.978	2$^+$	
887.9 3	<2.4	1435.78	2$^+$	547.853	4$^+$	Additional information 1.
x888.4 3	<2.4g					
919.64 14	2.7 3	1675.74	(2)$^+$	756.035	3$^+$	
927.92 12	19.9 14	1114.73	2$^+$	186.718	2$^+$	
932.9 4	1.0 2	1689.2	(2$^+$)	756.035	3$^+$	
955.1bo 5	1.3 3	1910.5	(2)$^+$	955.365	4$^+$	
976.6o 4	0.62c 14	1163.21	4$^+$	186.718	2$^+$	
987.33 13	10.7 9	1545.35	0$^+$	557.978	2$^+$	
x1001.0 5	1.1 2					
1011.0 2	3.6 4	1569.0	(3)$^+$	557.978	2$^+$	
x1018.6 4	<1.4h					
1021.0 4	<1.4	1569.0	(3)$^+$	547.853	4$^+$	Additional information 2.
x1025.1 5	1.2 2					
1036.0 3	<1.6	1584.30	4$^-$	547.853	4$^+$	Additional information 3.
x1037.6 11	<1.6i					
1057.8 3	3.3 3	1616.00	(2)$^+$	557.978	2$^+$	
1068.0mo 3	1.5m 3	1616.00	(2)$^+$	547.853	4$^+$	
1068.0mo 3	1.5mc 3	1823.8	(1,2)$^+$	756.035	3$^+$	
1103.1 3	3.6 3	1859.2	(2$^+$)	756.035	3$^+$	
1114.7 2	10.4 8	1114.73	2$^+$	0.0	0$^+$	
1117.7 2	5.7 5	1675.74	(2)$^+$	557.978	2$^+$	
1131.2 4	1.3 2	1689.2	(2$^+$)	557.978	2$^+$	
1141.8 4	1.0 2	1689.2	(2$^+$)	547.853	4$^+$	
1154.4 2	4.0 4	1910.5	(2)$^+$	756.035	3$^+$	
1174.6 3	5.5 7	1732.9	0$^+$	557.978	2$^+$	
1195.8 2	19.3 14	1382.9	0$^+$	186.718	2$^+$	
1200.0 5	0.8a 3	1387.02	3$^-$	186.718	2$^+$	
x1203.9 4	1.2 3					
1214.7 4	1.8 3	1970.7	(1$^+$,2)	756.035	3$^+$	
x1219.5 5	1.2 3					

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^{189}Os(n,γ) E=10.31 eV 1979Ca02 (continued)

γ(^{190}Os) (continued)

E_γ †	I_γ ‡ l	E_i(level)	J_i^π	E_f	J_f^π	Comments
1236.3 bo 3	2.0 3	1992.3?		756.035	3+	
1249.2 3	6.2 6	1435.78	2+	186.718	2+	
1254.7 bo 5	6.7 & 6	1813.4?		557.978	2+	
1265.7 2	6.2 6	1823.8	(1,2)+	557.978	2+	
x1285.2 4	1.3 2					
1301.0 3	3.9 4	1859.2	(2+)	557.978	2+	
1311.5 3	5.4 & 6	1859.2	(2+)	547.853	4+	
x1342.4 4	1.5 3					
x1350.4 9	<0.6 j					
1353.0 bo 9	<0.6	1910.5	(2)+	557.978	2+	Additional information 4.
1360.3 9	3.5 & 4	1545.35	0+	186.718	2+	
1368.9 bo 9	0.8 3	2125.0?		756.035	3+	
x1377.7 3	3.9 4					
1383.6 mko 3	7.0 m 6	1382.9	0+	0.0	0+	
1383.6 mbo 3	7.0 m 6	1570.3?		186.718	2+	
1383.6 mo 3	7.0 m 6	1941.7	(2+)	557.978	2+	
1387.4 6	1.8 c 3	1387.02	3−	0.0	0+	Mult.: (E3) from the Adopted Gammas.
1396.9 bo 6	4.8 4	1941.7	(2+)	547.853	4+	
1412.6 4	1.8 4	1970.7	(1+,2)	557.978	2+	
1429.4 2	6.1 6	1616.00	(2)+	186.718	2+	
1437.0 2	6.5 5	1995.0	(2)+	557.978	2+	
x1462.7 5	5.9 # 7					
1467.5 bo 9	2.3 5	2025.5?		557.978	2+	
1489.2 2	10.1 8	1675.74	(2)+	186.718	2+	
x1493.2 4	2.0 4					
1502.1 4	1.9 3	1689.2	(2+)	186.718	2+	
1512.0 bo 3	5.5 5	2071.4?		557.978	2+	
1546.3 2	8.0 7	1732.9	0+	186.718	2+	
x1557.6 5	2.8 & 5					
1567.0 bo 4	2.9 4	2125.0?		557.978	2+	
x1571.5 4	2.5 4					
1577.6 bo 4	1.6 2	2135.9?		557.978	2+	
x1595.2 3	3.6 6					
x1600.9 5	1.8 5					
1616.1 3	6.6 5	1616.00	(2)+	0.0	0+	
1626.7 bo 5	2.3 3	1813.4?		186.718	2+	
x1640.5 6	2.8 & 5					
1672.5 3	7.2 6	1859.2	(2+)	186.718	2+	
1680.6 3	13.7 10	1680.6	(1)	0.0	0+	
1715.2 bo 3	6.1 a 6	1901.9?		186.718	2+	
1731.6 o 4	6.4 6	1918.3	(1,2)	186.718	2+	
1770.5 bo 6	5.2 5	1957.2?		186.718	2+	
1838.8 bo 7	2.8 & 6	2025.5?		186.718	2+	
x1859.9 5	2.1 4					
1883.9 bo 5	2.4 4	2071.4?		186.718	2+	
x1886.9 9	1.6 4					
x1898.8 7	2.4 5					
x1908.9 7	1.2 3					
x1918.3 6	1.5 3					
1925.4 bo 5	2.1 4	2111.2?		186.718	2+	
1931.7 bo 5	4.1 4	2118.4?		186.718	2+	

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^{189}Os(n,γ) E=10.31 eV 1979Ca02 (continued)

γ(^{190}Os) (continued)

E_γ †	I_γ ‡ l	E_i(level)	J_i^π	E_f	J_f^π
1942.5 *7*	4.9& *5*	1941.7	(2$^+$)	0.0	0$^+$
1949.2bo *8*	2.8 *4*	2135.9?		186.718	2$^+$
x1964.9 *6*	4.7 *6*				
x1971.9 *6*	1.8 *5*				
1988.6bo *4*	4.3 *5*	2175.4		186.718	2$^+$
x2023.3 *4*	6.6 *7*				
x2051.9 *6*	1.8 *4*				
x2075.0 *5*	4.9 *5*				
x2085.1 *5*	1.5 *4*				
x2096.7 *8*	1.8 *4*				
x2103.6 *7*	1.9 *4*				
x2111.1 *6*	5.3 *6*				
x2118.9 *6*	1.3 *4*				
x2141.3 *9*	2.2 *8*				
x2143.6 *5*	2.9 *9*				
x2162.1 *7*	2.1 *4*				
x2183.4 *5*	2.5 *4*				
x2192.1 *4*	4.7 *5*				
x2202.9 *9*	1.4 *4*				
x2211.9 *9*	1.3 *4*				
x2241.9 *5*	3.5 *5*				
x2261.5 *5*	5.6 *6*				
x2267.8 *9*	3.3 *5*				
x2288.3 *6*	7.0& *8*				
x2297.1 *7*	2.4 *4*				
x2304.5 *6*	2.1 *4*				
x2327.7 *9*	1.9 *5*				
x2359.6 *7*	3.3 *6*				
x2405.5 *6*	8.7& *9*				
x2417.4 *7*	4.1 *6*				
5315.5 *10*	4.6 *8*	S(n)+0.01031	1$^-$	2476.6	(1$^+$,2$^+$)
5324.7o *10*	<1.9	S(n)+0.01031	1$^-$	2467.4?	
5409.5o *10*	<1.2	S(n)+0.01031	1$^-$	2382.6?	
5444.8 *10*	5.5 *9*	S(n)+0.01031	1$^-$	2347.3	
5478.2o *15*	<1.2	S(n)+0.01031	1$^-$	2313.9?	
5486.1o *15*	<1.2	S(n)+0.01031	1$^-$	2306.0?	
5502.0 *10*	7.0 *12*	S(n)+0.01031	1$^-$	2290.1	(1,2)
5529.0 *10*	3.5 *6*	S(n)+0.01031	1$^-$	2263.1	(1,2$^+$)
5568.5o *15*	<1.0	S(n)+0.01031	1$^-$	2223.6?	
5580.9 *15*	4.2 *9*	S(n)+0.01031	1$^-$	2211.2	
5593.7 *10*	4.5 *8*	S(n)+0.01031	1$^-$	2198.4	(1,2)
5599.6o *15*	<2.6	S(n)+0.01031	1$^-$	2192.5?	
5616.7 *20*	3.7 *9*	S(n)+0.01031	1$^-$	2175.4	
5638.4 *10*	11.1 *12*	S(n)+0.01031	1$^-$	2153.7	(1,2$^+$)
5680.9o *10*	<1.0	S(n)+0.01031	1$^-$	2111.2?	
5720.7o *10*	<2.7	S(n)+0.01031	1$^-$	2071.4?	
5744.8 *10*	6.8 *10*	S(n)+0.01031	1$^-$	2047.3	(1,2)
5749.7o *15*	<2.7	S(n)+0.01031	1$^-$	2042.4?	
5781.9o *10*	<1.0	S(n)+0.01031	1$^-$	2010.2?	
5797.2o *10*	<1.0	S(n)+0.01031	1$^-$	1995.0	(2)$^+$
5821.4o *10*	<1.0	S(n)+0.01031	1$^-$	1970.7	(1$^+$,2)
5850.2o *10*	<1.0	S(n)+0.01031	1$^-$	1941.7	(2$^+$)
5873.8 *10*	5.1 *2*	S(n)+0.01031	1$^-$	1918.3	(1,2)

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^{189}Os(n,γ) E=10.31 eV 1979Ca02 (continued)

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

E_γ [†]	I_γ [‡] [l]	E_i(level)	J_i^π	E_f	J_f^π
5881.2[o] *10*	<1.0	S(n)+0.01031	1^-	1910.5	$(2)^+$
5932.2 *10*	17.2 *15*	S(n)+0.01031	1^-	1859.2	(2^+)
5968.8[o] *15*	<1.0	S(n)+0.01031	1^-	1823.8	$(1,2)^+$
6058.5[o] *10*	<1.0	S(n)+0.01031	1^-	1732.9	0^+
6112.3 *15*	3.6 *6*	S(n)+0.01031	1^-	1680.6	(1)
6222.7[o] *15*	<1.0	S(n)+0.01031	1^-	1570.3?	
6246.5 *10*	12.5 *14*	S(n)+0.01031	1^-	1545.35	0^+
6356.6 *10*	5.5 *11*	S(n)+0.01031	1^-	1435.78	2^+
6408.7 *10*	19.2 *25*	S(n)+0.01031	1^-	1382.9	0^+
6677.4 *10*	8.3 *7*	S(n)+0.01031	1^-	1114.73	2^+
7035.6[o] *15*	<1.0	S(n)+0.01031	1^-	756.035	3^+
7234.3 *10*	4.8 *5*	S(n)+0.01031	1^-	557.978	2^+
7605.9 *10*	7.2 *6*	S(n)+0.01031	1^-	186.718	2^+
7792.8 *10*	10.9 *8*	S(n)+0.01031	1^-	0.0	0^+

[†] Weighted averaged values from E(n)=th and resonance data of different E(n) in 1979Ca02. Uncertainties on primary γ rays are not given in 1979Ca02 and assigned by the evaluators from a general statement by 1979Ca02 that relative uncertainty varies from 0.5 to 1.5 keV.
[‡] From 1979Ca02.
[#] Contains an impurity contribution.
[@] May contain a small impurity contribution.
[&] Broad peak.
[a] Corrected for contribution from impurity peak.
[b] Tentative placement (evaluator) based on results from (n,n′γ); unplaced in 1979Ca02.
[c] Intensity disagrees with results from other experiments, see ^{189}Os(n,γ) E=th.
[d] Total Iγ=7.4 *5*.
[e] 199.3 from level energy difference.
[f] Total Iγ=1.7 *2*.
[g] Iγ(887.9γ+888.4γ)=2.4 *2*.
[h] Iγ(1018.6γ+1021.0γ)=1.4 *2*.
[i] Iγ(1036.0γ+1037.6γ)=1.6 *5*.
[j] Iγ(1350.4γ+1353.0γ)=0.6 *3*.
[k] Placement not supported by results from (n,n′γ). Instead, it is placed with a 1570 level. This placement to 0^+ g.s. is also unlikely because of $J^\pi(1383)=0^+$ from L(p,t)=0.
[l] For intensity per 100 neutron captures, multiply by 0.142 *10*.
[m] Multiply placed with undivided intensity.
[n] Multiply placed with intensity suitably divided.
[o] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

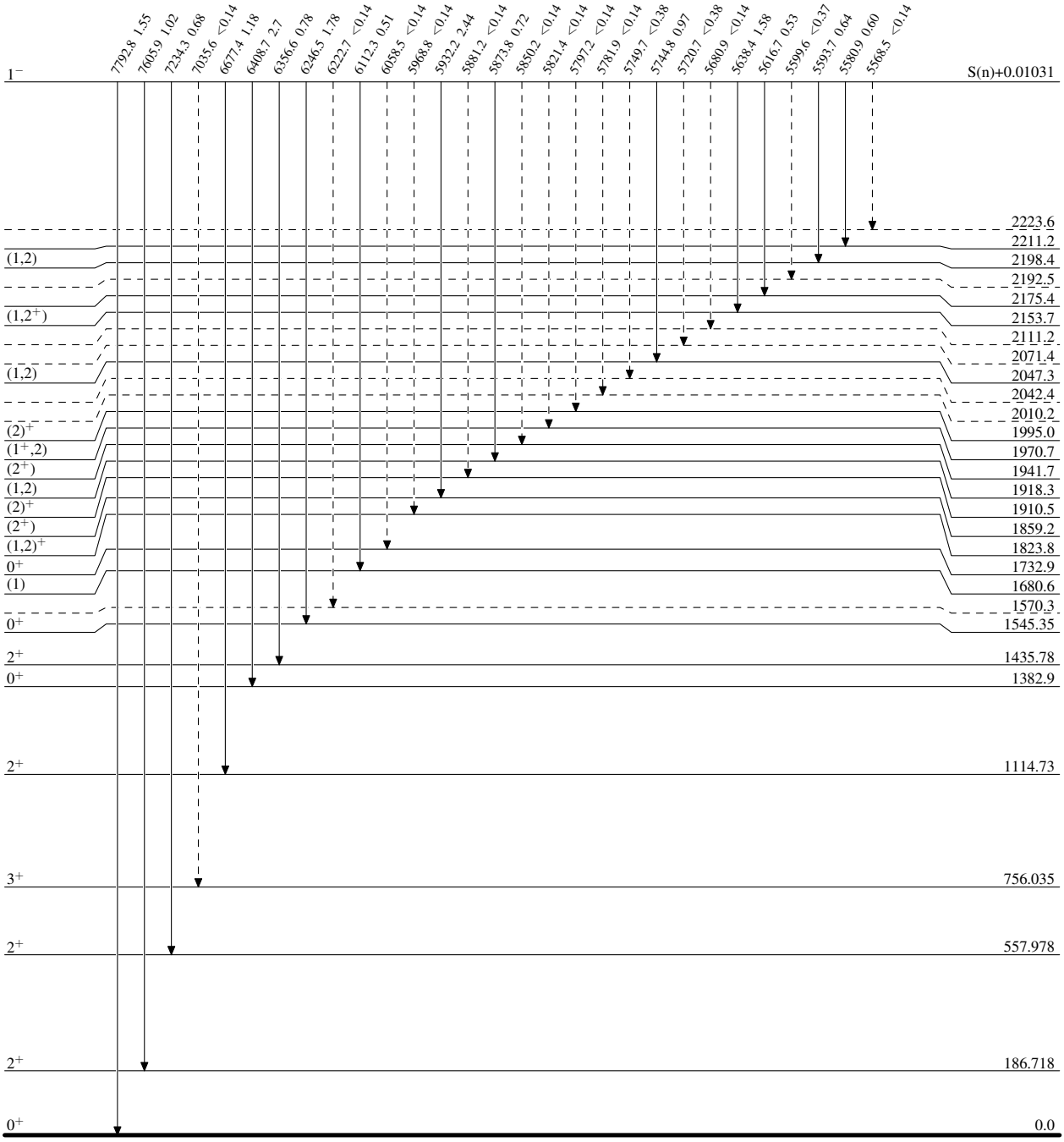
^{189}Os(n,γ) E=10.31 eV 1979Ca02

Level Scheme

Intensities: Iγ per 100 n-captures

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)



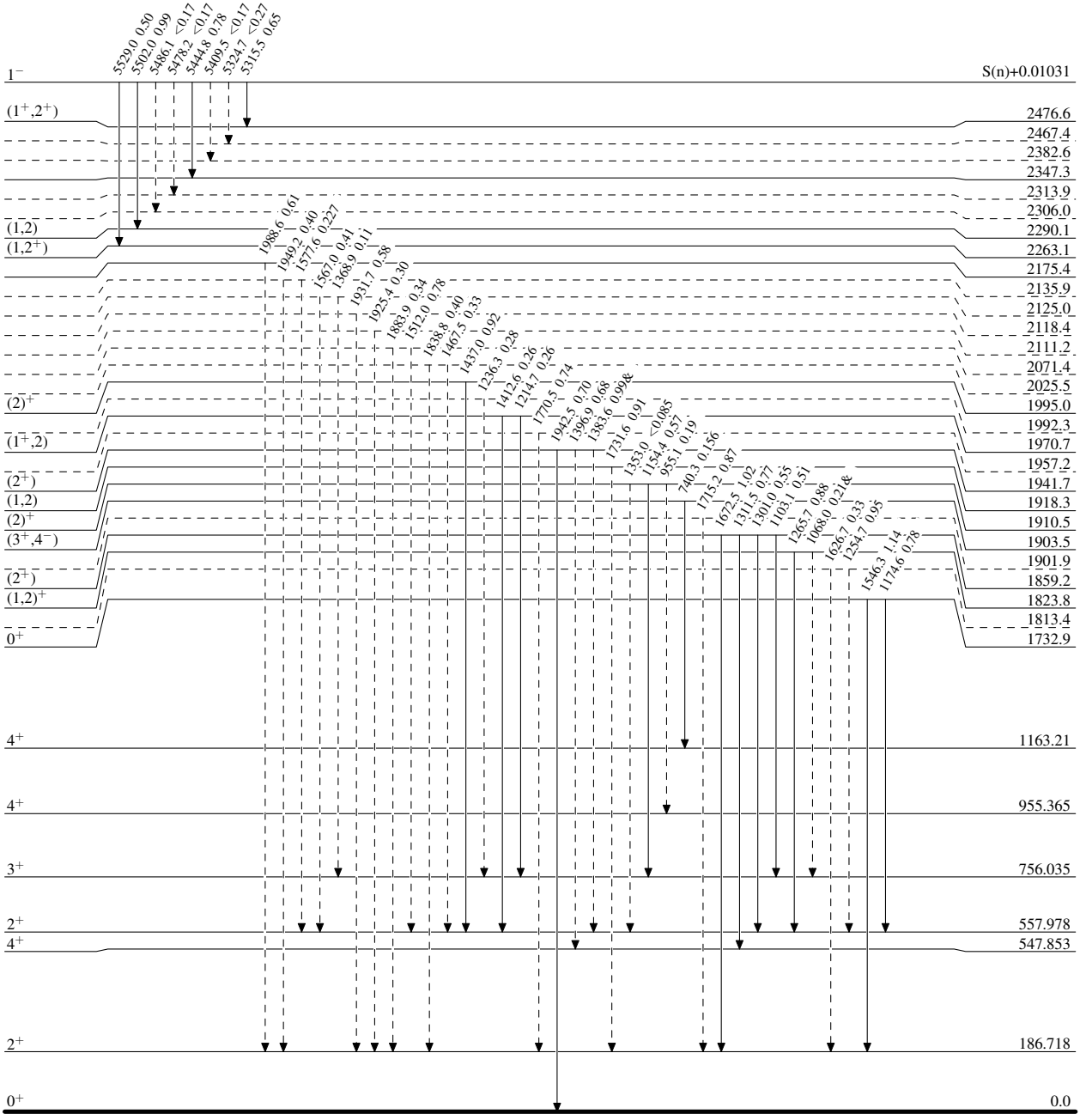
$^{190}_{76}Os_{114}$

^{189}Os(n,γ) E=10.31 eV 1979Ca02

Level Scheme (continued)

Intensities: Iγ per 100 n-captures
& Multiply placed: undivided intensity given

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)



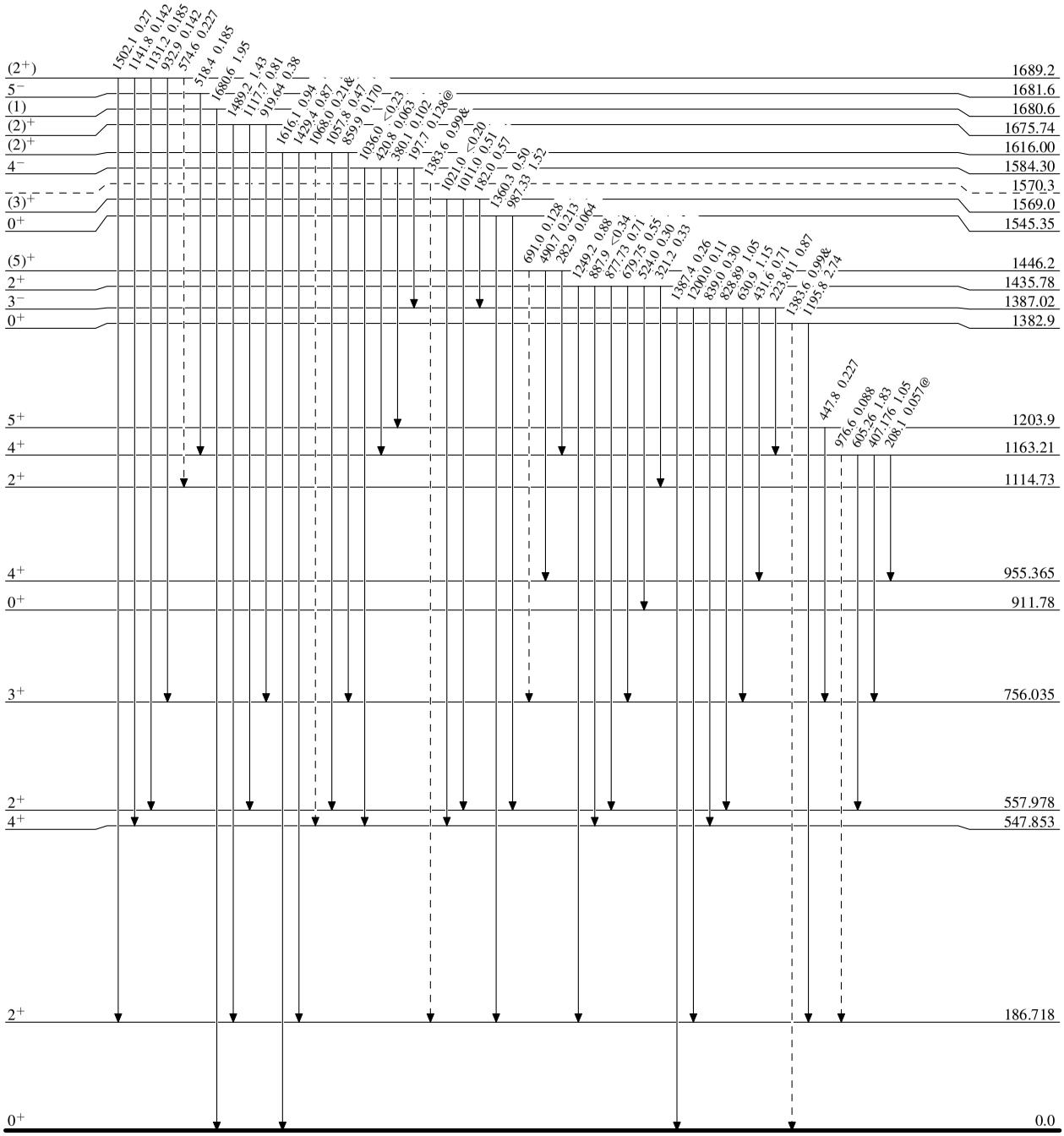
$^{190}_{76}Os_{114}$

^{189}Os(n,γ) E=10.31 eV 1979Ca02

Level Scheme (continued)

Intensities: Iγ per 100 n-captures
& 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)



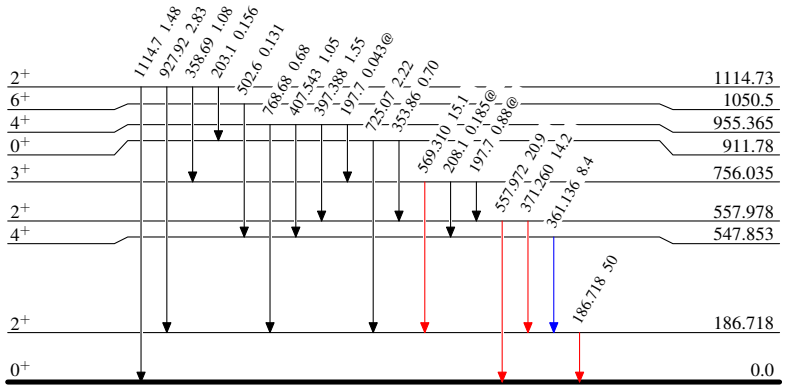
$^{190}_{76}Os_{114}$

^{189}Os(n,γ) E=10.31 eV 1979Ca02

Level Scheme (continued)

Intensities: Iγ per 100 n-captures
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

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



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