^{192}Os(n,n′γ) 1983Kl06

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 113, 1871 (2012)	15-Jun-2012

Others: 1982Po07, 1984Ya02.

The level scheme and data are from 1983Kl06, except where noted.

1983Kl06: E(n)=1.0-3.0 MeV; osmium metal targets enriched to 99.06% in ^{192}Os; measured Eγ, Iγ (Ge(Li), FWHM=2.2 keV at 1332 keV, shielded detectors), γ-ray excitation functions, γ-ray angular distributions (40° to 150° (12 angles), 157°). Used interacting boson approximation and boson expansion theory to interpret structure of positive-parity states (negative-parity band structure not observed). Used delayed γ-ray data to show absence of isomeric levels ($T_{1/2}$<5 ns for all states).

^{192}Os Levels

E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]
0.0[#]	0+	1612.87 *10*	2+	1996.93 *10*	1
205.79439[#] *9*	2+	1665.09 *9*	(1,2)+	2043.26 *19*	
489.0612[@] *8*	2+	1733.79 *12*	(2+)	2047.40 *6*	(1+,2)[a]
580.2800[#] *8*	4+	1780.34 *11*	(2+,3,4+)[a]	2051.83 *11*	(2,3)
690.3703[@] *4*	3+	1807.71 *11*	(2+)	2081.17 *12*	(1,2+)[a]
909.595[@] *10*	4+	1826.51 *6*	1	2099.00 *10*	(2+)
956.54 *3*	0+	1837.40 *11*	(1,2)+	2127.92 *17*	
1069.651[&] *23*	4+	1858.07 *8*	(2,3)+	2147.15 *9*	(0+,1,2)[a]
1089.25[#] *7*	6+	1867.87 *12*	(2+)	2173.02 *11*	(1,2+)[a]
1127.51 *6*	2+	1868.70 *9*	(2,3)	2187.26 *8*	(2+,3)[a]
1143.47[@] *3*	5+	1878.85 *8*	(2+)	2208.36 *14*	
1206.29 *20*	0+	1894.93 *17*	(3+)	2223.48 *9*	
1341.239 *19*	3−	1902.68 *9*	(1,2)+	2258.18 *20*	
1361.96[&] *3*	5+	1921.68 *15*	[b]	2275.32 *8*	(3,4+)[a]
1409.86 *6*	2+	1936.9 *4*	(2+)	2308.6 *20*	(2+,3,4)[a]
1450.31 *5*	(2+)	1940.80 *16*	(0+,1,2)[a]	2337.32 *8*	(1,2)
1456.6 *3*	(4+)	1947.77 *8*	(2)	2358.88 *20*	
1465.50[@] *10*	6+	1951.54 *7*	(1,2+)[a]		
1591.82 *4*	(3)	1984.5 *4*	(1,2+)[a]		

† From least-squares fit of Eγ, omitting the 760.85γ (for which Eγ is at least 5σ higher than expected for placement).

‡ Authors′ values from excitation-function shapes (giving J±1) and multipolarities of transitions (inferred from γ(θ), but most are not reported), except where noted. Multipolarities are assumed to be restricted to E1, E2, and M1 by $T_{1/2}$<5 ns for all levels. 1983Kl06 incorporated (t,α), (t,p), and (d,d′) results in order to deduce their set of Jπ values; there exists the possibility that different reactions excite different levels, however.

\# K=0 g.s. band.

@ K=2 quasi-γ vibration band.

& K=4 band.

a Authors′ assignment, modified to eliminate M2 implication for deexciting transition.

b 1983Kl06 suggest Jπ=0+; however, γ(θ) for 1716γ to 2+ precludes this value.

^{192}Os(n,n′γ) 1983Kl06 (continued)

γ(^{192}Os)

E_γ[†]	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α[a]	Comments
201.42 *7*	11.0 *16*	690.3703	3^+	489.0612	2^+			
205.79430[@] *9*	211 *24*	205.79439	2^+	0.0	0^+	(E2)	0.302	A_2=+0.14 *2*.
218.488[@] *14*	0.43 *11*	1361.96	5^+	1143.47	5^+			
219.24[@] *6*	0.72 *19*	909.595	4^+	690.3703	3^+			
^{x}243.5 *4*	1.1 *4*							
250.59 *3*	4.1 *6*	1591.82	(3)	1341.239	3^-			A_2=+0.27 *10*.
271.584 *13*	12.8 *13*	1341.239	3^-	1069.651	4^+	D+Q		A_2=−0.07 *4*.
283.2668[@] *8*	63 *8*	489.0612	2^+	205.79439	2^+	D+Q		A_2=−0.16 *2*.
292.41 *11*	2.9 *5*	1361.96	5^+	1069.651	4^+	D+Q		A_2=−0.63 *12*; implies D+Q, ΔJ=1 transition.
^{x}297.0 *3*	0.48 *19*							
^{x}322.8 *3*	1.9 *4*							
329.2 *3*	6.9 *8*	909.595	4^+	580.2800	4^+	D(+Q)		A_2=−0.34 *8*.
334.6 *3*	1.0 *3*	1947.77	(2)	1612.87	2^+			
370.46[&] *18*	2.2 *9*	1780.34	(2^+,3,4^+)	1409.86	2^+			
374.4852[@] *8*	49 *5*	580.2800	4^+	205.79439	2^+	(E2)	0.0484	A_2=+0.15 *1*.
379.1 *3*	18 *2*	1069.651	4^+	690.3703	3^+	D+Q		δ: δ=+0.15 *+4−6* or +3.3 *+15−12* (1983Kl06). A_2=−0.38 *4*.
^{x}397.4 *3*	0.23 *16*							
^{x}403.90 *13*	1.3 *2*							
^{x}416.85 *13*	0.82 *12*							
420.530[@] *10*	22 *2*	909.595	4^+	489.0612	2^+	(E2)	0.0354	A_2=+0.18 *2*.
431.4 *4*	4.4 *4*	1341.239	3^-	909.595	4^+			A_2=−0.03 *8*.
437.13 *9*	7.0 *6*	1127.51	2^+	690.3703	3^+	D+Q		A_2=0.00 *3*.
452.2[@] *10*	4.8 *8*	1361.96	5^+	909.595	4^+			
453.10[@] *3*	4.9 *8*	1143.47	5^+	690.3703	3^+			
458.7 *2*	0.33 *11*	1665.09	$(1,2)^+$	1206.29	0^+			
467.47 *3*	6.6 *6*	956.54	0^+	489.0612	2^+			A_2=−0.04 *3*.
^{x}478.2 *2*	1.9 *2*							
484.5751[@] *4*	72 *6*	690.3703	3^+	205.79439	2^+	D+Q		A_2=−0.14 *1*.
489.032 *15*	100 *8*	489.0612	2^+	0.0	0^+	(E2)	0.0241	A_2=+0.12 *1*.
508.97 *7*	5.7 *6*	1089.25	6^+	580.2800	4^+			
540.63 *7*	1.43 *13*	1450.31	(2^+)	909.595	4^+			
555.90 *10*	1.29 *14*	1465.50	6^+	909.595	4^+	(E2)	0.01764	A_2=+0.25 *19*.
^{x}557.8 *2*	0.47 *10*							
563.17 *11*	1.06 *12*	1143.47	5^+	580.2800	4^+			
^{x}575.63 *16*	1.09 *13*							
580.48 *13*	20.3 *14*	1069.651	4^+	489.0612	2^+	(E2)	0.01593	A_2=+0.18 *1*.
^{x}599.46 *18*	0.88 *11*							
^{x}623.4 *4*	0.17 *2*							
638.50 *14*	6.2 *4*	1127.51	2^+	489.0612	2^+	D+Q		A_2=−0.13 *4*.
^{x}641.8 *3*	0.22 *8*							
650.81 *15*	1.68 *15*	1341.239	3^-	690.3703	3^+			A_2=+0.04 *8*.
671.44 *18*	0.74 *10*	1361.96	5^+	690.3703	3^+			A_2=+0.12 *14*. Placed by evaluator (see ^{192}Os IT decay (5.9 s)).
704.03 *14*	1.25 *15*	909.595	4^+	205.79439	2^+	(E2)	0.01031	A_2=+0.26 *17*.
708.2 *3*	0.20 *7*	1665.09	$(1,2)^+$	956.54	0^+			
719.25 *17*	1.98 *14*	1409.86	2^+	690.3703	3^+	D		A_2=−0.03 *8*.
741.04 *12*	2.57 *19*	1868.70	(2,3)	1127.51	2^+	D+Q		A_2=−0.6 *3*.
750.96 *15*	1.33 *18*	956.54	0^+	205.79439	2^+			A_2=−0.11 *13*.

Continued on next page (footnotes at end of table)

^{192}Os(n,n′γ) 1983Kl06 (continued)

γ(^{192}Os) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α[a]	Comments
760.85 *10*	0.60 *8*	1450.31	(2+)	690.3703	3+			E_γ: does not fit this placement well.
788.42 *8*	3.12 *18*	1858.07	(2,3)+	1069.651	4+			A_2=−0.01 *5*.
x804.8 *3*	0.36 *12*							
809.28 *10*	1.01 *14*	1878.85	(2+)	1069.651	4+			
820.32 *17*	0.26 *6*	1947.77	(2)	1127.51	2+			
824.23 *16*	0.33 *6*	1733.79	(2+)	909.595	4+			
829.63 *8*	1.21 *10*	1409.86	2+	580.2800	4+	Q		A_2=+0.20 *16*.
852.19 *2*	13.1 *7*	1341.239	3−	489.0612	2+	D		A_2=−0.21 *2*.
x857.30 *14*	1.40 *12*							
x863.36 *14*	0.46 *6*							
870.10 *8*	1.91 *9*	1450.31	(2+)	580.2800	4+			
x897.1 *4*	0.28 *6*							
901.31 *15*	2.67 *18*	1591.82	(3)	690.3703	3+			
916.0 *2*	0.82 *9*	2043.26		1127.51	2+			
920.9 *3*	0.5 *3*	1409.86	2+	489.0612	2+			
921.5 *3*	3.6 *4*	1127.51	2+	205.79439	2+			
948.2 *3*	0.74 *9*	1858.07	(2,3)+	909.595	4+			A_2=+0.8 *3*.
958.3 *4*	0.35 *8*	1867.87	(2+)	909.595	4+			
967.5 *3*	2.21 *14*	1456.6	(4+)	489.0612	2+			A_2=+0.08 *6*.
974.1 *5*	0.39 *9*	1665.09	(1,2)+	690.3703	3+			
980.4 *4*	1.43 *11*	1936.9	(2+)	956.54	0+			A_2=+0.06 *7*.
986.0 *4*	0.94 *6*	1894.93	(3+)	909.595	4+	D		A_2=−0.22 *9*.
1000.1 *4*	3.3 *2*	1206.29	0+	205.79439	2+			A_2=−0.04 *6*.
1011.1 *4*	0.54 *7*	1591.82	(3)	580.2800	4+			
1020.2 *4*	1.25 *12*	2147.15	(0+,1,2)	1127.51	2+			
1028.0 *4*	1.02 *11*	1984.5	(1,2+)	956.54	0+			
1040.5 *4*	0.91 *10*	1996.93	1	956.54	0+			
1043.7 *4*	2.22 *16*	1733.79	(2+)	690.3703	3+			
1089.9 *4*	0.42 *7*	1780.34	(2+,3,4+)	690.3703	3+	D(+Q)		A_2=−0.13 *17*.
1102.7 *3*	2.08 *15*	1591.82	(3)	489.0612	2+			
1117.2 *3*	1.28 *10*	1807.71	(2+)	690.3703	3+	D(+Q)		A_2=−0.40 *18*.
1124.1 *3*	4.1 *2*	1612.87	2+	489.0612	2+			A_2=+0.12 *5*.
1127.6 *3*	0.92 *7*	1127.51	2+	0.0	0+			A_2=−0.10 *22*.
x1131.0 *3*	1.97 *13*							A_2=+0.03 *20*.
1135.5 *3*	3.7 *2*	1341.239	3−	205.79439	2+	D		A_2=−0.34 *4*.
1146.7 *5*	0.40 *8*	1837.40	(1,2)+	690.3703	3+			
x1148.0 *5*	0.85 *17*							
1153.8 *5*	0.42 *8*	1733.79	(2+)	580.2800	4+			
1167.9 *3*	0.85 *10*	1858.07	(2,3)+	690.3703	3+			
1176.4 *3*	2.1 *2*	1665.09	(1,2)+	489.0612	2+			A_2=+0.21 *4*.
1200.1 *2*	0.36 *13*	1780.34	(2+,3,4+)	580.2800	4+			
1204.3 *2*	3.6 *3*	1409.86	2+	205.79439	2+			A_2=+0.06 *4*.
1227.4 *2*	0.75 *7*	1807.71	(2+)	580.2800	4+	Q		A_2=+0.38 *19*.
x1242.3 *2*	1.09 *15*							
1244.8 *3*	1.88 *15*	1450.31	(2+)	205.79439	2+			
1257.3 *2*	1.13 *10*	1947.77	(2)	690.3703	3+	D+Q		A_2=−0.19 *14*.
x1262.5 *4*	0.38 *7*							A_2=+0.16 *6*.
1291.4 *2*	1.05 *9*	1780.34	(2+,3,4+)	489.0612	2+			
1314.51 *18*	1.12 *12*	1894.93	(3+)	580.2800	4+			A_2=+0.41 *12*.
1318.70 *16*	2.83 *18*	1807.71	(2+)	489.0612	2+			A_2=+0.06 *9*.
1337.77 *16*	0.87 *12*	1826.51	1	489.0612	2+	D		A_2=−0.20 *15*.
1341.4[b] *3*	0.34 *7*	1341.239	3−	0.0	0+	[E3]	0.00581 *6*	tentatively placed by evaluator; branch is expected because level is E3-excited In (e,e′) and Coulomb excitation.
1348.59 *17*	1.22 *13*	1837.40	(1,2)+	489.0612	2+	D(+Q)		A_2=−0.30 *14*.

Continued on next page (footnotes at end of table)

^{192}Os(n,n′γ) 1983Kl06 (continued)

γ(^{192}Os) (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [#]	Comments
1357.4 *2*	0.45 *9*	2047.40	(1$^+$,2)	690.3703	3$^+$		
1361.51 *14*	1.52 *12*	2051.83	(2,3)	690.3703	3$^+$	D+Q	A_2=−0.10 *10*.
1378.80 *12*	1.60 *13*	1867.87	(2$^+$)	489.0612	2$^+$	D+Q	A_2=−0.15 *7*.
^{x}1386.24 *19*	0.40 *7*						
1389.68 *11*	4.8 *3*	1878.85	(2$^+$)	489.0612	2$^+$		A_2=−0.03 *4*.
1399 *2*	0.34 *6*	2308.6	(2$^+$,3,4)	909.595	4$^+$		
1406.92 *12*	2.07 *15*	1612.87	2$^+$	205.79439	2$^+$		
1409.5 *2*	0.67 *10*	1409.86	2$^+$	0.0	0$^+$		
1413.75 *15*	1.29 *12*	1902.68	(1,2)$^+$	489.0612	2$^+$		A_2=−0.03 *19*.
1432.5 *3*	0.50 *9*	1921.68		489.0612	2$^+$		
1450.40 *16*	0.62 *9*	1450.31	(2$^+$)	0.0	0$^+$		
1459.33 *10*	1.73 *12*	1665.09	(1,2)$^+$	205.79439	2$^+$	D	A_2=−0.31 *8*.
^{x}1463.77 *15*	0.49 *7*						
^{x}1469.3 *4*	0.14 *3*						
1527.84 *18*	0.70 *10*	1733.79	(2$^+$)	205.79439	2$^+$		A_2=+0.3 *3*.
1532.9 *12*	0.08 *4*	2223.48		690.3703	3$^+$		
1553.2 *4*	0.36 *5*	2043.26		489.0612	2$^+$		
1558.16 *9*	2.10 *13*	2047.40	(1$^+$,2)	489.0612	2$^+$		A_2=+0.22 *11*.
1562.68 *18*	1.29 *17*	2051.83	(2,3)	489.0612	2$^+$		A_2=+1.5 *3*; apparent typographical error in A_2.
1567.8 *2*	1.30 *16*	2258.18		690.3703	3$^+$		
^{x}1573.8 *6*	0.16 *2*						
1574.3 *3*	0.25 *6*	1780.34	(2$^+$,3,4$^+$)	205.79439	2$^+$		
1584.95 *9*	1.39 *6*	2275.32	(3,4$^+$)	690.3703	3$^+$		
^{x}1591.67 *11*	0.20 *7*						
1601.9 *3*	0.40 *5*	1807.71	(2$^+$)	205.79439	2$^+$	D+Q	A_2=−0.9 *4*.
1607.00 *9*	2.0 *3*	2187.26	(2$^+$,3)	580.2800	4$^+$		A_2=+0.01 *9*.
1613.0 *2*	0.55 *9*	1612.87	2$^+$	0.0	0$^+$		
1620.95 *12*	1.7 *2*	1826.51	1	205.79439	2$^+$	D	A_2=−0.30 *8*.
1663.05 *12*	1.05 *11*	1868.70	(2,3)	205.79439	2$^+$		
1668.5 *2*	0.66 *15*	2358.88		690.3703	3$^+$		
^{x}1695.9 *3*	0.7 *3*						
1697.46 *16*	1.2 *2*	1902.68	(1,2)$^+$	205.79439	2$^+$		
1715.92 *17*	0.90 *11*	1921.68		205.79439	2$^+$	D+Q	A_2=−0.89 *21*; implies ΔJ=1 transition.
1735.00 *16*	4.7 *3*	1940.80	(0$^+$,1,2)	205.79439	2$^+$		A_2=+0.10 *3*.
1742.00 *10*	3.0 *2*	1947.77	(2)	205.79439	2$^+$		A_2=+0.07 *6*.
1746.08 *15*	0.93 *13*	1951.54	(1,2$^+$)	205.79439	2$^+$		A_2=−0.2 *4*.
^{x}1807.73 *12*	0.51 *4*						
1826.36 *7*	3.08 *18*	1826.51	1	0.0	0$^+$	D	A_2=−0.13 *6*.
1837.22 *15*	0.81 *11*	1837.40	(1,2)$^+$	0.0	0$^+$		
1841.66 *7*	1.21 *12*	2047.40	(1$^+$,2)	205.79439	2$^+$		
1875.52 *15*	0.80 *9*	2081.17	(1,2$^+$)	205.79439	2$^+$		
1893.20 *10*	3.2 *2*	2099.00	(2$^+$)	205.79439	2$^+$	D	A_2=−0.32 *6*.
1902.02 *15*	0.89 *12*	1902.68	(1,2)$^+$	0.0	0$^+$		A_2=+0.13 *19*.
1922.12 *17*	0.66 *10*	2127.92		205.79439	2$^+$		
1941.32 *9*	1.89 *11*	2147.15	(0$^+$,1,2)	205.79439	2$^+$		
1951.43 *8*	1.4 *3*	1951.54	(1,2$^+$)	0.0	0$^+$		A_2=+0.01 *10*.
1967.26 *13*	1.29 *12*	2173.02	(1,2$^+$)	205.79439	2$^+$		
1981.38 *16*	0.48 *6*	2187.26	(2$^+$,3)	205.79439	2$^+$		
1996.91 *10*	3.0 *2*	1996.93	1	0.0	0$^+$	D	A_2=−0.27 *4*.
2002.55 *14*	1.52 *14*	2208.36		205.79439	2$^+$		A_2=+0.21 *14*.
2017.68 *9*	1.80 *6*	2223.48		205.79439	2$^+$		A_2=+0.03 *17*.
2069.48 *14*	0.79 *9*	2275.32	(3,4$^+$)	205.79439	2$^+$		
2080.91 *19*	0.55 *4*	2081.17	(1,2$^+$)	0.0	0$^+$		
2131.51 *8*	2.40 *17*	2337.32	(1,2)	205.79439	2$^+$	D+Q	A_2=−0.12 *9*.
2172.9 *2*	0.57 *6*	2173.02	(1,2$^+$)	0.0	0$^+$		

Continued on next page (footnotes at end of table)

^{192}Os(n,n′γ) 1983Kl06 (continued)

γ(^{192}Os) (continued)

† Measured at E(n)=2.5 MeV, except where noted; unplaced transitions which first appear at E(n)>2.0 MeV are not listed by authors.

‡ For E(n)=2.5 MeV, relative to Iγ(489.0γ)=100 *8*; quoted uncertainties reflect both the statistical uncertainties and those introduced by efficiency (5%) and absorption (0-10%) corrections.

Inferred by evaluator from A_2 of $\gamma(\theta)$ in 1983Kl06. (E2) assignments are based on mult=(Q) from $\gamma(\theta)$, with M2 ruled out by RUL for level $T_{1/2}$<5 ns.

@ From Adopted Gammas. 1983Kl06 do not provide a value from their experiment for this transition′s Eγ.

& Measured at E(n)=2.0 MeV.

[a] 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.

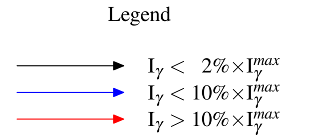
[b] Placement of transition in the level scheme is uncertain.

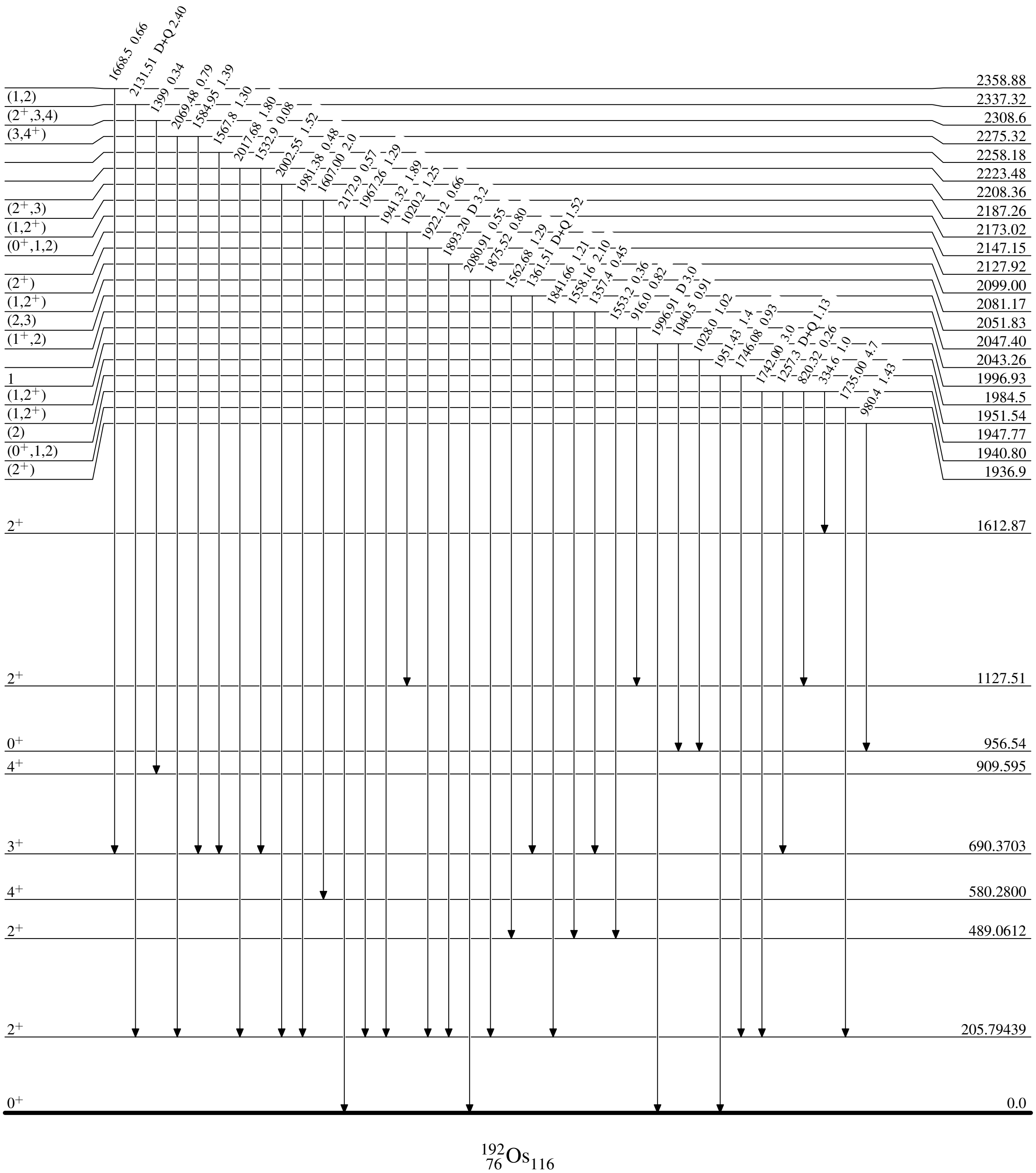
[x] γ ray not placed in level scheme.

$^{192}Os(n,n'\gamma)$ 1983Kl06

Level Scheme

Intensities: Relative Iγ for E(n)=2.5 MeV

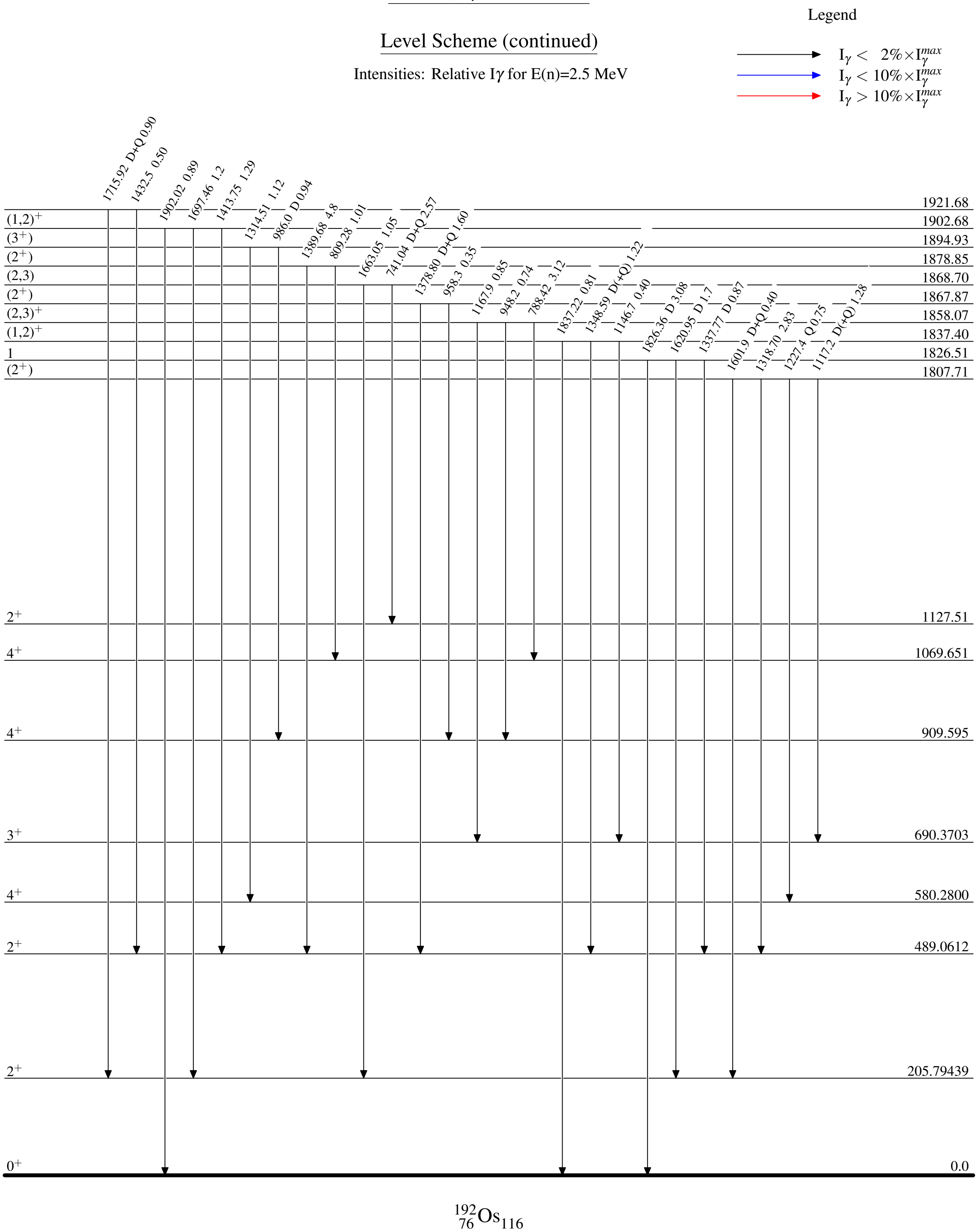




^{192}Os(n,n′γ) 1983Kl06

Level Scheme (continued)

Intensities: Relative Iγ for E(n)=2.5 MeV



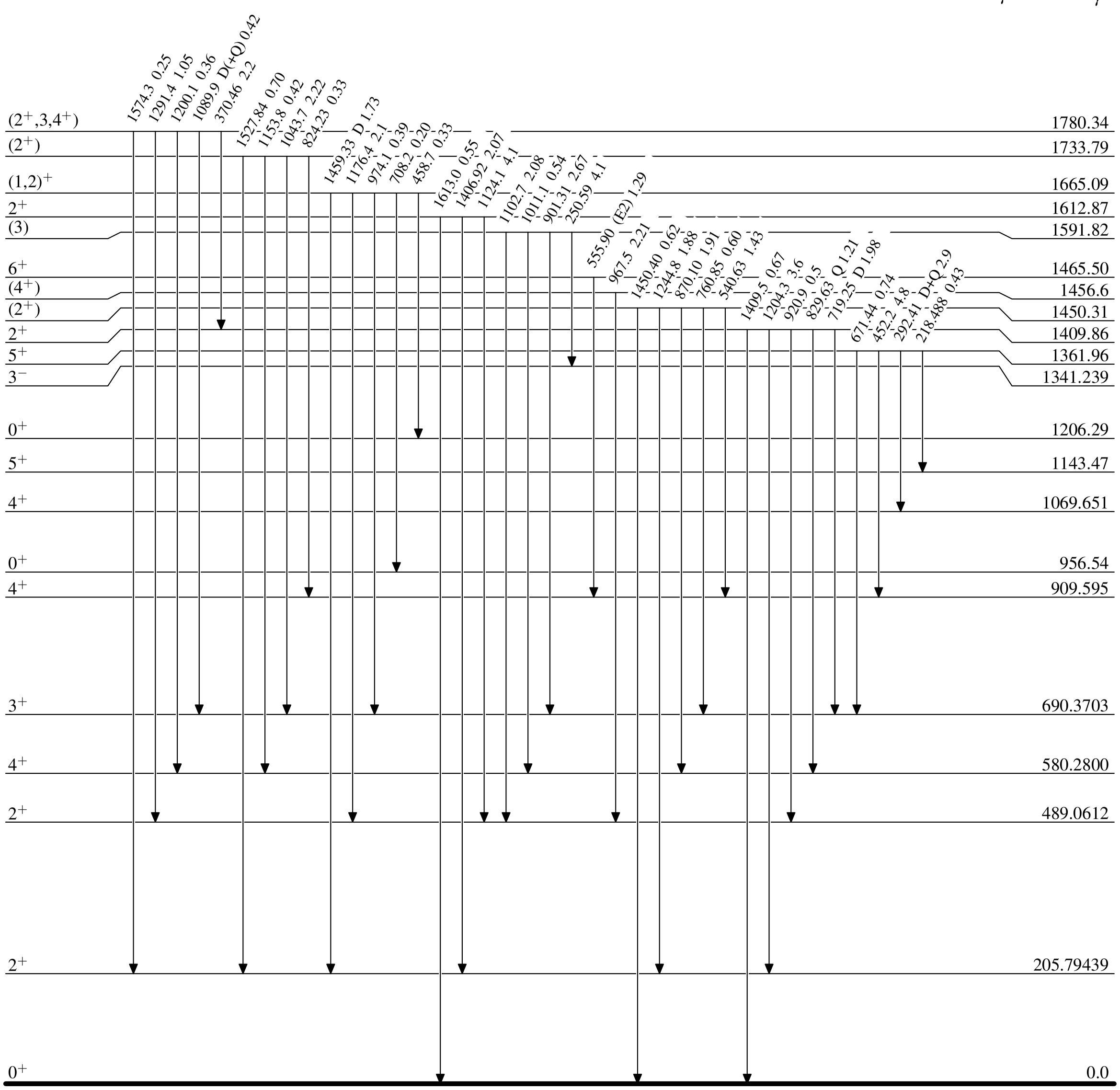
^{192}Os(n,n′γ) 1983Kl06

Level Scheme (continued)

Intensities: Relative Iγ for E(n)=2.5 MeV

Legend

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

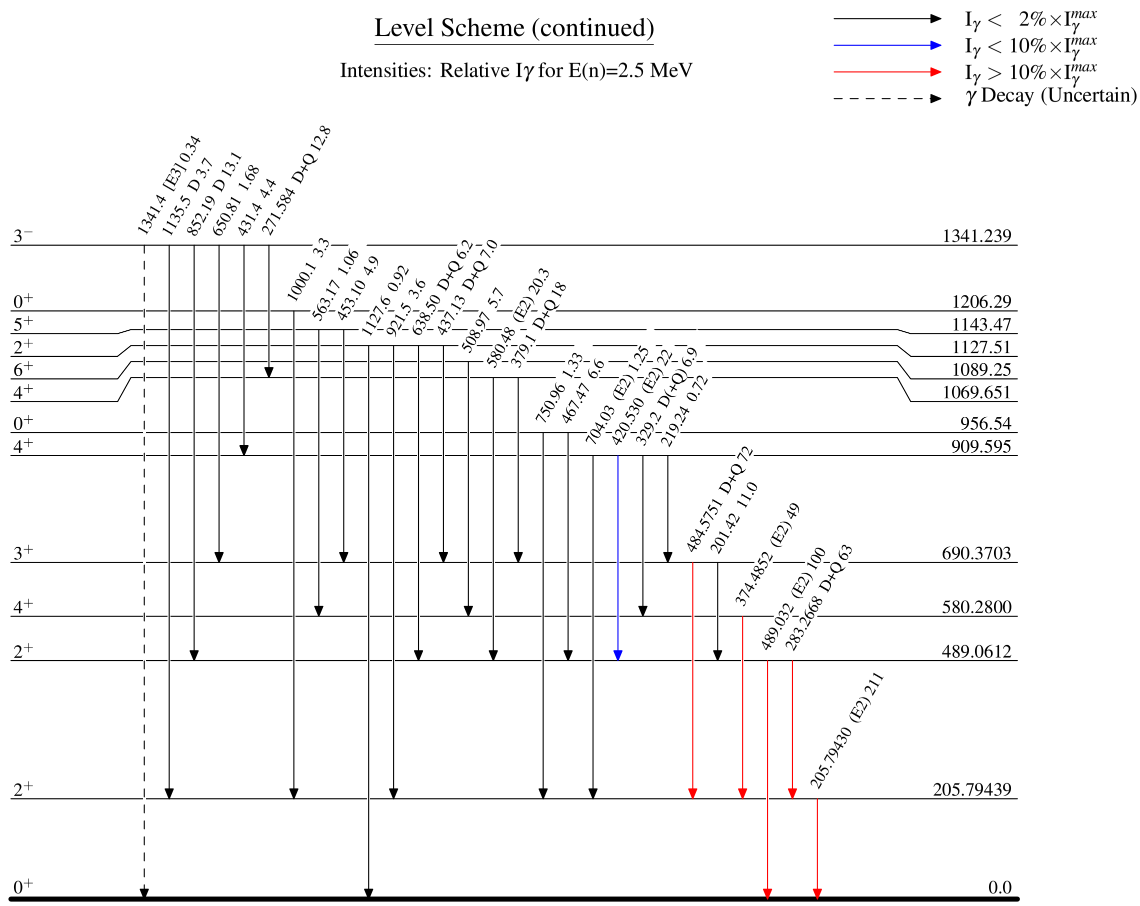


$^{192}_{76}Os_{116}$

^{192}Os(n,n′γ) 1983Kl06

Level Scheme (continued)

Intensities: Relative Iγ for E(n)=2.5 MeV



$^{192}_{76}Os_{116}$