^{190}Os(n,γ) E=2 keV 1991Bo35,1977Ca19

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia	NDS 195,368 (2024)	1-Dec-2023

1991Bo35: 97.8% enriched ^{190}Os target. E(n)=2 keV, FWHM≈400 eV. Measured Eγ, Iγ for primary γ rays. Detector: germanium pair spectrometer, FWHM=7 keV for Eγ=5000 keV.

1977Ca19: 95.46% enriched ^{190}Os target. Detector: Ge(Li) placed at θ=90° with respect to the neutron beam. FWHM≈8 keV at E=5.6 MeV, which includes the contribution due to the finite spread in capture-state energies.

From results on neighboring nuclei, about ten resonances were expected to be populated by the energy band encompassed in the neutron beam. It was also expected to reduce the Porter-Thomas fluctuations of the primary-transition intensities considerably, making it likely that all final states below ≈1700 keV with J^π=1/2 or 3/2$^-$ will be observed (1977Ca19).

See 1977Ca19 and 1991Bo35 for a discussion on the distribution and fragmentation of Nilsson single-neutron strengths.

^{191}Os Levels

E(level)†	J$^\pi$#
0.0	
74.382 *3*	(1/2$^-$,3/2$^-$)
84.457 *2*	(1/2$^-$,3/2$^-$)
141.935 *2*	(1/2$^-$,3/2$^-$)
417.153 *2*	(1/2$^-$,3/2$^-$)
436.969 *3*	(1/2$^-$,3/2$^-$)
487.612 *3*	(1/2$^-$,3/2$^-$)
508.147 *3*	(1/2$^-$,3/2$^-$)
611.959 *2*	(1/2$^-$,3/2$^-$)
637.618 *3*	(1/2$^-$,3/2$^-$)
693.1?‡ *10*	(1/2$^+$,3/2$^+$)
721.432 *3*	(1/2$^-$,3/2$^-$)
748.344 *4*	(1/2$^-$,3/2$^-$)
794.658 *6*	(1/2$^-$,3/2$^-$)
815.430 *6*	(1/2$^-$,3/2$^-$)
949.2‡ *9*	(1/2$^+$,3/2$^+$)
959.016 *16*	(1/2$^-$,3/2$^-$)
1077.802 *9*	(1/2$^-$,3/2$^-$)
1083.58 *3*	(1/2$^-$,3/2$^-$)
1092.740 *9*	(1/2$^-$,3/2$^-$)@
1143.544 *13*	(1/2$^-$,3/2$^-$)
1202.264 *10*	(1/2$^-$,3/2$^-$)@
1227.86 *3*	(1/2$^-$,3/2$^-$)
1298.45 *2*	(1/2$^-$,3/2$^-$)
1356.8‡ *7*	(1/2$^-$,3/2$^-$)
1376.2‡ *7*	(1/2$^-$,3/2$^-$)
1387.8‡ *16*	(1/2$^+$,3/2$^+$)
1405.0‡ *8*	(1/2$^-$,3/2$^-$)
1466.9‡ *9*	(1/2$^-$,3/2$^-$)
1501.6‡ *8*	(1/2$^-$,3/2$^-$)
1531‡ *3*	(1/2$^-$,3/2$^-$)
1552.0‡ *9*	(1/2$^-$,3/2$^-$)
1570.3‡ *7*	(1/2$^-$,3/2$^-$)
1621.4‡ *10*	(1/2$^-$,3/2$^-$)
1630.3‡ *8*	(1/2$^-$,3/2$^-$)

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^{190}Os(n,γ) E=2 keV 1991Bo35,1977Ca19 (continued)

^{191}Os Levels (continued)

E(level)[†]	J$^{\pi}$[#]	Comments
1763.1[‡] *11*	(1/2$^-$,3/2$^-$)	
(5760.73 *11*)	1/2$^+$[&]	E(level): From S(n)+2 keV, where S(n)=5758.73 *11* (2021Wa16).

[†] Level energies for E>1298 keV have been recalculated by evaluator assuming an energy of 417.15 keV for the level populated by 5344.3γ. Level energies for E≤1298 keV are from ^{190}Os(n,γ)E=thermal (1991Bo35).
[‡] Reported in 1977Ca19 only.
[#] All the observed levels have spins of 1/2 or 3/2, based on the assumption that capture γ rays carry one unit of angular momentum. Level parities are based on probable γ-ray multipolarities determined from the energy dependence of the intensities (1991Bo35,1977Ca19).
[@] From 1991Bo35. J^{π}=(1/2$^+$,3/2$^+$) from 1977Ca19.
[&] 2-keV neutron resonances are assumed to have J^{π}=1/2$^+$.

γ(^{191}Os)

E$_\gamma$[†]	I$_\gamma$[@]	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.[a]	α[b]	Comments
3998.3[#] *11*	21[&] *6*	(5760.73)	1/2$^+$	1763.1	(1/2$^-$,3/2$^-$)	(E1)	1.83×10^{-3} *3*	α(K)=0.0001716 *24*; α(L)=2.365×10^{-5} *33*; α(M)=5.32×10^{-6} *7*; α(N)=1.295×10^{-6} *18*; α(O)=2.248×10^{-7} *31*; α(P)=1.749×10^{-8} *24*; α(IPF)=0.001623 *23*
4131.1[#] *8*	38[&] *6*	(5760.73)	1/2$^+$	1630.3	(1/2$^-$,3/2$^-$)	(E1)	1.87×10^{-3} *3*	α(K)=0.0001636 *23*; α(L)=2.253×10^{-5} *32*; α(M)=5.06×10^{-6} *7*; α(N)=1.233×10^{-6} *17*; α(O)=2.141×10^{-7} *30*; α(P)=1.667×10^{-8} *23*; α(IPF)=0.001678 *23*
4140.0[#] *10*	26[&] *5*	(5760.73)	1/2$^+$	1621.4	(1/2$^-$,3/2$^-$)	(E1)	1.87×10^{-3} *3*	α(K)=0.0001631 *23*; α(L)=2.246×10^{-5} *31*; α(M)=5.05×10^{-6} *7*; α(N)=1.229×10^{-6} *17*; α(O)=2.134×10^{-7} *30*; α(P)=1.661×10^{-8} *23*; α(IPF)=0.001682 *24*
4191.1[#] *7*	44[&] *5*	(5760.73)	1/2$^+$	1570.3	(1/2$^-$,3/2$^-$)	(E1)	1.89×10^{-3} *3*	α(K)=0.0001602 *22*; α(L)=2.205×10^{-5} *31*; α(M)=4.96×10^{-6} *7*; α(N)=1.207×10^{-6} *17*; α(O)=2.095×10^{-7} *29*; α(P)=1.632×10^{-8} *23*; α(IPF)=0.001702 *24*
4209.5[#] *9*	27[&] *5*	(5760.73)	1/2$^+$	1552.0	(1/2$^-$,3/2$^-$)	(E1)	1.90×10^{-3} *3*	α(K)=0.0001591 *22*; α(L)=2.191×10^{-5} *31*; α(M)=4.92×10^{-6} *7*; α(N)=1.199×10^{-6} *17*; α(O)=2.082×10^{-7} *29*; α(P)=1.621×10^{-8} *23*; α(IPF)=0.001709 *24*
4230.2[#] *30*	21[&] *9*	(5760.73)	1/2$^+$	1531	(1/2$^-$,3/2$^-$)	(E1)	1.90×10^{-3} *3*	α(K)=0.0001580 *22*; α(L)=2.175×10^{-5} *31*; α(M)=4.89×10^{-6} *7*; α(N)=1.190×10^{-6} *17*; α(O)=2.067×10^{-7} *29*; α(P)=1.610×10^{-8} *23*; α(IPF)=0.001716 *24*
4259.9[#] *8*	33[&] *5*	(5760.73)	1/2$^+$	1501.6	(1/2$^-$,3/2$^-$)	(E1)	1.91×10^{-3} *3*	α(K)=0.0001564 *22*; α(L)=2.153×10^{-5} *30*; α(M)=4.84×10^{-6} *7*; α(N)=1.178×10^{-6} *16*; α(O)=2.045×10^{-7}

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^{190}Os(n,γ) E=2 keV 1991Bo35,1977Ca19 (continued)

γ(^{191}Os) (continued)

E_γ[†]	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[a]	α[b]	Comments
								29; α(P)=1.593×10^{-8} *22*; α(IPF)=0.001728 *24*
4294.5[#] *9*	30[&] *6*	(5760.73)	1/2$^+$	1466.9	(1/2$^-$,3/2$^-$)	(E1)	1.92×10^{-3} *3*	α(K)=0.0001546 *22*; α(L)=2.127×10^{-5} *30*; α(M)=4.78×10^{-6} *7* α(N)=1.164×10^{-6} *16*; α(O)=2.021×10^{-7} *28*; α(P)=1.574×10^{-8} *22*; α(IPF)=0.001740 *24*
4356.4[#] *8*	29[&] *5*	(5760.73)	1/2$^+$	1405.0	(1/2$^-$,3/2$^-$)	(E1)	1.94×10^{-3} *3*	α(K)=0.0001514 *21*; α(L)=2.082×10^{-5} *29*; α(M)=4.68×10^{-6} *7* α(N)=1.139×10^{-6} *16*; α(O)=1.979×10^{-7} *28*; α(P)=1.542×10^{-8} *22*; α(IPF)=0.001763 *25*
4373.6[#c] *16*	11[&] *4*	(5760.73)	1/2$^+$	1387.8	(1/2$^+$,3/2$^+$)	(M1)	1.97×10^{-3} *3*	α(K)=0.000263 *4*; α(L)=3.87×10^{-5} *5*; α(M)=8.78×10^{-6} *12* α(N)=2.143×10^{-6} *30*; α(O)=3.72×10^{-7} *5*; α(P)=2.89×10^{-8} *4*; α(IPF)=0.001655 *23*
4385.2[#] *7*	36[&] *5*	(5760.73)	1/2$^+$	1376.2	(1/2$^-$,3/2$^-$)	(E1)	1.95×10^{-3} *3*	α(K)=0.0001499 *21*; α(L)=2.062×10^{-5} *29*; α(M)=4.63×10^{-6} *6* α(N)=1.128×10^{-6} *16*; α(O)=1.960×10^{-7} *27*; α(P)=1.527×10^{-8} *21*; α(IPF)=0.001773 *25*
4404.6[#] *7*	55[&] *6*	(5760.73)	1/2$^+$	1356.8	(1/2$^-$,3/2$^-$)	(E1)	1.96×10^{-3} *3*	α(K)=0.0001490 *21*; α(L)=2.049×10^{-5} *29*; α(M)=4.60×10^{-6} *6* α(N)=1.121×10^{-6} *16*; α(O)=1.947×10^{-7} *27*; α(P)=1.517×10^{-8} *21*; α(IPF)=0.001780 *25*
4462.7 *9*	92 *27*	(5760.73)	1/2$^+$	1298.45	(1/2$^-$,3/2$^-$)	(E1)	1.97×10^{-3} *3*	α(K)=0.0001462 *20*; α(L)=2.010×10^{-5} *28*; α(M)=4.52×10^{-6} *6* α(N)=1.099×10^{-6} *15*; α(O)=1.910×10^{-7} *27*; α(P)=1.488×10^{-8} *21*; α(IPF)=0.001800 *25*
4532.0 *8*	89 *17*	(5760.73)	1/2$^+$	1227.86	(1/2$^-$,3/2$^-$)	(E1)	1.99×10^{-3} *3*	α(K)=0.0001429 *20*; α(L)=1.965×10^{-5} *28*; α(M)=4.41×10^{-6} *6* α(N)=1.075×10^{-6} *15*; α(O)=1.867×10^{-7} *26*; α(P)=1.455×10^{-8} *20*; α(IPF)=0.001824 *26*

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^{190}Os(n,γ) E=2 keV 1991Bo35,1977Ca19 (continued)

γ(^{191}Os) (continued)

E_γ [†]	I_γ [@]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [a]	α [b]	Comments
4558.3 *7*	102 *18*	(5760.73)	1/2+	1202.264	(1/2−,3/2−)			Mult.: (M1) reported by 1991Bo35. Decay scheme requires (E1).
4618.0 *5*	165 *19*	(5760.73)	1/2+	1143.544	(1/2−,3/2−)	(E1)	2.02×10^{-3} *3*	α(K)=0.0001391 *19*; α(L)=1.911×10^{-5} *27*; α(M)=4.29×10^{-6} *6* α(N)=1.046×10^{-6} *15*; α(O)=1.816×10^{-7} *25*; α(P)=1.416×10^{-8} *20*; α(IPF)=0.001854 *26*
4667.2 [‡] *9*	69 *16*	(5760.73)	1/2+	1092.740	(1/2−,3/2−)			Mult.: (M1) reported by 1991Bo35. Decay scheme requires (E1).
4677.1 [‡] *5*	154 *19*	(5760.73)	1/2+	1083.58	(1/2−,3/2−)	(E1)	2.04×10^{-3} *3*	α(K)=0.0001366 *19*; α(L)=1.876×10^{-5} *26*; α(M)=4.22×10^{-6} *6* α(N)=1.026×10^{-6} *14*; α(O)=1.783×10^{-7} *25*; α(P)=1.390×10^{-8} *19*; α(IPF)=0.001875 *26* I_γ: The 10 times greater value in 1991Bo35 published paper seems to be a typo error and was corrected here.
4683.4 [‡] *7*	101 *17*	(5760.73)	1/2+	1077.802	(1/2−,3/2−)			
4801.6 *5*	137 *18*	(5760.73)	1/2+	959.016	(1/2−,3/2−)	(E1)	2.07×10^{-3} *3*	α(K)=0.0001315 *18*; α(L)=1.806×10^{-5} *25*; α(M)=4.06×10^{-6} *6* α(N)=9.88×10^{-7} *14*; α(O)=1.716×10^{-7} *24*; α(P)=1.338×10^{-8} *19*; α(IPF)=0.001919 *27*
4812.2 [#] *9*	20 [&] *5*	(5760.73)	1/2+	949.2	(1/2+,3/2+)	(M1)	2.07×10^{-3} *3*	α(K)=0.0002121 *30*; α(L)=3.11×10^{-5} *4*; α(M)=7.04×10^{-6} *10* α(N)=1.718×10^{-6} *24*; α(O)=2.99×10^{-7} *4*; α(P)=2.318×10^{-8} *32*; α(IPF)=0.001821 *25*
4946.5 *3*	209 *20*	(5760.73)	1/2+	815.430	(1/2−,3/2−)	(E1)	2.12×10^{-3} *3*	α(K)=0.0001260 *18*; α(L)=1.729×10^{-5} *24*; α(M)=3.88×10^{-6} *5* α(N)=9.46×10^{-7} *13*; α(O)=1.643×10^{-7} *23*; α(P)=1.282×10^{-8} *18*; α(IPF)=0.001967 *28*
4966.5 *6*	102 *17*	(5760.73)	1/2+	794.658	(1/2−,3/2−)	(E1)	2.12×10^{-3} *3*	α(K)=0.0001253 *18*; α(L)=1.719×10^{-5} *24*; α(M)=3.86×10^{-6} *5* α(N)=9.40×10^{-7} *13*; α(O)=1.634×10^{-7} *23*; α(P)=1.275×10^{-8} *18*; α(IPF)=0.001973 *28*
5012.7 *3*	268 *21*	(5760.73)	1/2+	748.344	(1/2−,3/2−)	(E1)	2.13×10^{-3} *3*	α(K)=0.0001237 *17*;

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^{190}Os(n,γ) E=2 keV 1991Bo35,1977Ca19 (continued)

γ(^{191}Os) (continued)

E_γ[†]	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[a]	α[b]	Comments
								α(L)=1.696×10^{-5} *24*; α(M)=3.81×10^{-6} *5* α(N)=9.28×10^{-7} *13*; α(O)=1.612×10^{-7} *23*; α(P)=1.258×10^{-8} *18*; α(IPF)=0.001988 *28*
5039.1 *4*	175 *19*	(5760.73)	1/2$^+$	721.432	(1/2$^-$,3/2$^-$)	(E1)	2.14×10^{-3} *3*	α(K)=0.0001227 *17*; α(L)=1.684×10^{-5} *24*; α(M)=3.78×10^{-6} *5* α(N)=9.21×10^{-7} *13*; α(O)=1.600×10^{-7} *22*; α(P)=1.249×10^{-8} *17*; α(IPF)=0.001996 *28*
5068.3[#c] *10*	21[&] *8*	(5760.73)	1/2$^+$	693.1?	(1/2$^+$,3/2$^+$)	(M1)	2.14×10^{-3} *3*	α(K)=0.0001889 *26*; α(L)=2.76×10^{-5} *4*; α(M)=6.26×10^{-6} *9* α(N)=1.527×10^{-6} *21*; α(O)=2.65×10^{-7} *4*; α(P)=2.061×10^{-8} *29*; α(IPF)=0.001917 *27*
5123.4 *4*	154 *18*	(5760.73)	1/2$^+$	637.618	(1/2$^-$,3/2$^-$)	(E1)	2.16×10^{-3} *3*	α(K)=0.0001199 *17*; α(L)=1.644×10^{-5} *23*; α(M)=3.69×10^{-6} *5* α(N)=8.99×10^{-7} *13*; α(O)=1.562×10^{-7} *22*; α(P)=1.219×10^{-8} *17*; α(IPF)=0.002021 *28*
5148.53 *20*	460 *26*	(5760.73)	1/2$^+$	611.959	(1/2$^-$,3/2$^-$)	(E1)	2.17×10^{-3} *3*	α(K)=0.0001190 *17*; α(L)=1.632×10^{-5} *23*; α(M)=3.67×10^{-6} *5* α(N)=8.93×10^{-7} *12*; α(O)=1.551×10^{-7} *22*; α(P)=1.211×10^{-8} *17*; α(IPF)=0.002029 *28*
5252.3 *3*	203 *19*	(5760.73)	1/2$^+$	508.147	(1/2$^-$,3/2$^-$)	(E1)	2.20×10^{-3} *3*	α(K)=0.0001157 *16*; α(L)=1.586×10^{-5} *22*; α(M)=3.56×10^{-6} *5* α(N)=8.67×10^{-7} *12*; α(O)=1.507×10^{-7} *21*; α(P)=1.177×10^{-8} *16*; α(IPF)=0.002060 *29*
5272.9 *3*	270 *21*	(5760.73)	1/2$^+$	487.612	(1/2$^-$,3/2$^-$)	(E1)	2.20×10^{-3} *3*	α(K)=0.0001151 *16*; α(L)=1.577×10^{-5} *22*; α(M)=3.54×10^{-6} *5* α(N)=8.62×10^{-7} *12*; α(O)=1.498×10^{-7} *21*; α(P)=1.170×10^{-8} *16*; α(IPF)=0.002066 *29*
5325.97 *20*	466 *25*	(5760.73)	1/2$^+$	436.969	(1/2$^-$,3/2$^-$)	(E1)	2.22×10^{-3} *3*	α(K)=0.0001135 *16*;

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$^{190}Os(n,\gamma)$ E=2 keV 1991Bo35,1977Ca19 (continued)

$\gamma(^{191}Os)$ (continued)

E_γ [†]	I_γ [@]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [a]	α [b]	Comments
								$\alpha(L)=1.555\times10^{-5}$ *22*; $\alpha(M)=3.49\times10^{-6}$ *5* $\alpha(N)=8.50\times10^{-7}$ *12*; $\alpha(O)=1.477\times10^{-7}$ *21*; $\alpha(P)=1.154\times10^{-8}$ *16*; $\alpha(IPF)=0.002082$ *29*
5343.91 *21*	439 *24*	(5760.73)	$1/2^+$	417.153	$(1/2^-,3/2^-)$	(E1)	2.22×10^{-3} *3*	$\alpha(K)=0.0001129$ *16*; $\alpha(L)=1.547\times10^{-5}$ *22*; $\alpha(M)=3.48\times10^{-6}$ *5* $\alpha(N)=8.46\times10^{-7}$ *12*; $\alpha(O)=1.470\times10^{-7}$ *21*; $\alpha(P)=1.148\times10^{-8}$ *16*; $\alpha(IPF)=0.002087$ *29*
5618.97 *20*	427 *24*	(5760.73)	$1/2^+$	141.935	$(1/2^-,3/2^-)$	(E1)	2.29×10^{-3} *3*	$\alpha(K)=0.0001052$ *15*; $\alpha(L)=1.440\times10^{-5}$ *20*; $\alpha(M)=3.23\times10^{-6}$ *5* $\alpha(N)=7.88\times10^{-7}$ *11*; $\alpha(O)=1.368\times10^{-7}$ *19*; $\alpha(P)=1.069\times10^{-8}$ *15*; $\alpha(IPF)=0.002170$ *30*
5676.26 *25*	389 *23*	(5760.73)	$1/2^+$	84.457	$(1/2^-,3/2^-)$	(E1)	2.31×10^{-3} *3*	$\alpha(K)=0.0001037$ *15*; $\alpha(L)=1.420\times10^{-5}$ *20*; $\alpha(M)=3.19\times10^{-6}$ *4* $\alpha(N)=7.76\times10^{-7}$ *11*; $\alpha(O)=1.349\times10^{-7}$ *19*; $\alpha(P)=1.054\times10^{-8}$ *15*; $\alpha(IPF)=0.002187$ *31*
5686.16 *24*	383 *23*	(5760.73)	$1/2^+$	74.382	$(1/2^-,3/2^-)$	(E1)	2.31×10^{-3} *3*	$\alpha(K)=0.0001035$ *14*; $\alpha(L)=1.416\times10^{-5}$ *20*; $\alpha(M)=3.18\times10^{-6}$ *4* $\alpha(N)=7.74\times10^{-7}$ *11*; $\alpha(O)=1.345\times10^{-7}$ *19*; $\alpha(P)=1.051\times10^{-8}$ *15*; $\alpha(IPF)=0.002190$ *31*

[†] From 1991Bo35, unless otherwise specified.

[‡] Possible multiplet.

[#] Reported by 1977Ca19 only. Uncertainties in the energies are statistical. In addition, there is an uncertainty of ≈1 keV on the overall energy scale.

[@] Relative intensities from 1991Bo35, unless otherwise specified. Relative intensities of 1977Ca19 have been renormalized to Iγ(5149)=460 of 1991Bo35 from Iγ(5149)=100 (1977Ca19).

[&] From 1977Ca19.

[a] Based on the energy dependence of the primary transitions for the "reduced" intensities $I_R=I\gamma/E^5_\gamma$.

[b] Additional information 1.

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

$^{190}Os(n,\gamma)$ E=2 keV 1991Bo35,1977Ca19

Legend

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

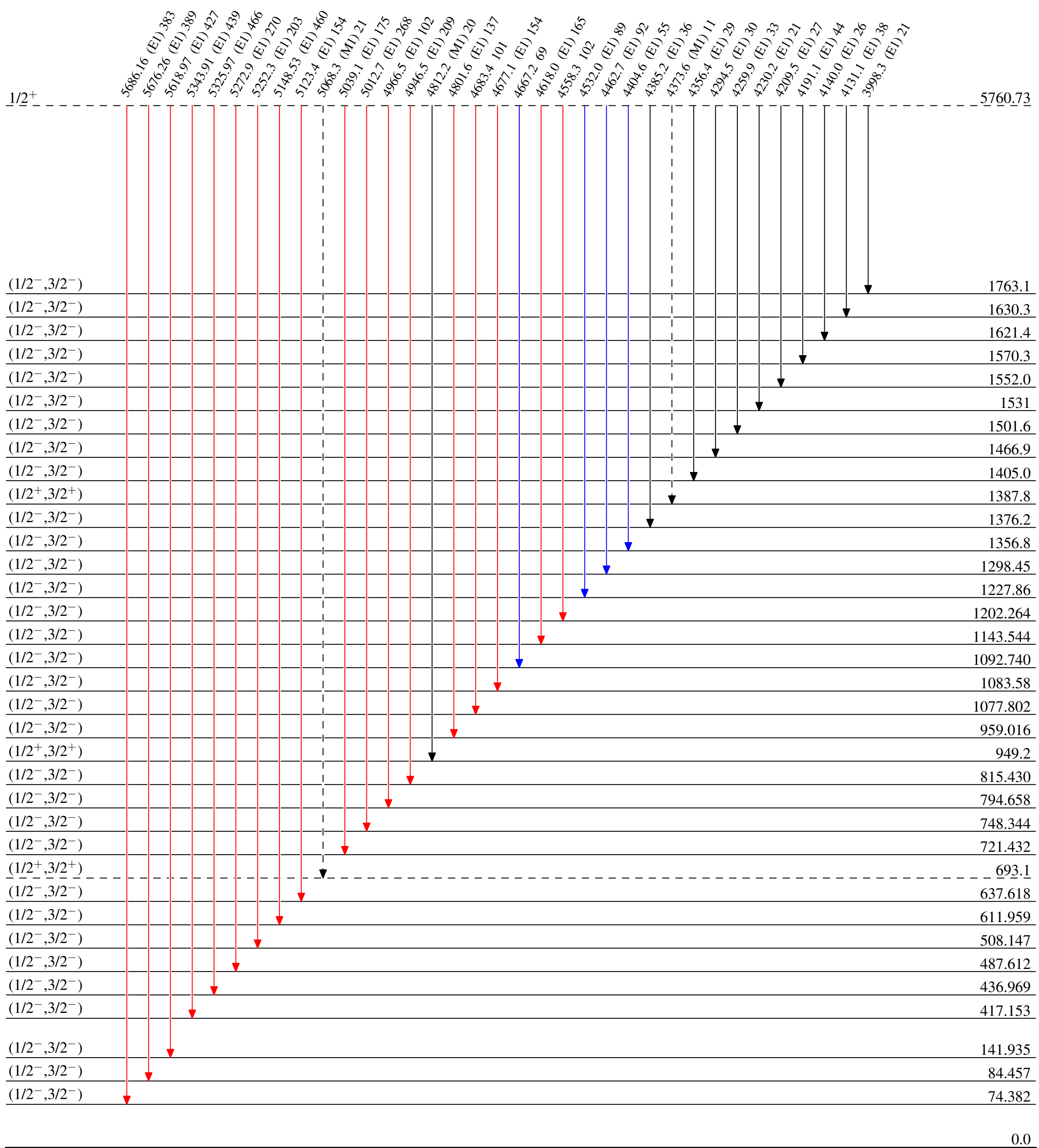
$I_\gamma < 10\% \times I_\gamma^{max}$

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

γ Decay (Uncertain)

Level Scheme

Intensities: Relative I_γ



$^{191}_{76}Os_{115}$