^{190}Os(α,2nγ), ^{192}Os(α,4nγ) 2006Le06,1976Cu02,1976Hj01

History

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

Others: 1965La02, 1974Ya03, 1975Fu04, 1975Pi02, 1978Ti02, 1979FuZN, 1981Hj01, 2001Ko41 (26.8 MeV; g-factor).

2006Le06: ^{190}Os(α,2nγ), Eα=27 MeV; 99% enriched ^{190}Os target; measured Eγ, Iγ, g-factors from IPAD using external magnetic field of 2.90 *1* Tesla. see also 2006Le44.

1976Cu02: E(α)=28-50 MeV; osmium targets enriched to 95% in ^{190}Os (for (α,2nγ)), to 98% in ^{192}Os (for (α,4nγ)); measured Eγ, Iγ (Ge(Li), FWHM=2.1 keV at 1332 keV; low-energy photon spectrometer, FWHM=650 eV at 122 keV), prompt and delayed $\gamma\gamma$ coin, three-parameter $\gamma\gamma$(t) coin, $\gamma(\theta)$ (90° to 140° (5 angles)). See also 1975Pi02.

1976Hj01: E(α)=23-27 MeV, osmium targets enriched to 79% in ^{190}Os (for (α,2nγ)); E(α)=43-51 MeV, osmium targets enriched to 98% in ^{192}Os (for (α,4nγ)); measured Eγ, Iγ (Ge(Li), including system with FWHM=550 eV at 100 keV), E(ce), Ice (magnet with Si(Li)), prompt and delayed $\gamma\gamma$ coin, $\gamma(\theta)$, relative γ-ray yields for (α,2nγ) at 27 MeV and (α,4nγ) at 48 MeV (see also 1975Fu04).

The level scheme and all data are from 1976Cu02 and 1976Hj01, except where noted. Additional data are available from 1974Ya03, 1978Ti02, 1979FuZN and 2006Le06. 1981Hj01 report average spin distributions and deexcitation γ multiplicities for quasicontinuum levels excited in ^{192}Os(α,4nγ) at E(α)=51-55 MeV.

^{192}Pt Levels

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$	Comments
0.0[#]	0$^+$	stable	
316.50[#] *5*	2$^+$		
612.45[@] *11*	2$^+$		
784.57[#] *7*	4$^+$		
920.88[@] *14*	3$^+$		
1201.06[@] *16*	4$^+$		
1365.46[#] *13*	6$^+$		
1377.97 *16*	3$^-$		J$^{\pi}$: from 1974Ya03.
1384.00[a] *12*	5$^-$		
1406.2 *4*			
1481.9[@] *4*	5$^+$		
1518.45[a] *13*	7$^-$	1.85 ns *17*	T$_{1/2}$: $\gamma\gamma$(t); weighted average of 2.1 ns *4* (1976Cu02), 2.0 ns *3* (1976Hj01), and 1.65 ns *25* (1978Ti02, beam-Ce(t)). g-factor=+0.48 *12* (2006Le06, 2006Le44) from IPAD, using 134γ, 153γ, 183γ, 599γ (corrected for feeding from 10$^-$ isomer) and 581γ, 468γ, 317γ (corrected for feeding from 10$^-$ and 12$^+$ isomers).
1666.51 *19*			
1746.54[a] *19*	(6)$^-$		
1964.54[a] *16*	8$^-$		
2018.52[#] *19*	8$^+$		
2103.34[a] *17*	9$^-$		
2113.4[@] *6*	7$^+$		
2172.46[b] *17*	10$^-$	280 ns *30*	T$_{1/2}$: $\gamma\gamma$(t); average of 250 ns *30* (1976Cu02) and 310 ns *30* (1976Hj01). g-factor=−0.0012 *10* (2006Le06, 2006Le44) from IPAD, using 208γ, 446γ, 585γ. other: 0.010 *6* (2001Ko41); discrepant but possibly superseded by datum from 2006Le06 (one author common to both 2006Le06 and 2001Ko41).
2313.6 *5*			
2511.9[b] *3*	11$^-$		
2519.14[&] *21*	10$^+$		
2530.3[a] *6*	(10$^-$)		
2583.48 *24*	10$^+$		

Continued on next page (footnotes at end of table)

^{190}Os(α,2nγ), ^{192}Os(α,4nγ) 2006Le06,1976Cu02,1976Hj01 (continued)

^{192}Pt Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	Comments
2623.87[&] *23*	12+	2.62 ns *18*	$T_{1/2}$: in-beam direct timing of delayed conversion electrons (1978Ti02). Other values: 3.5 ns *5* (1976Cu02), 2.6 ns *5* (1976Hj01). g-factor=−0.18 *9* (2006Le06, 2006Le44) from IPAD, using 105γ, 501γ, 653γ.
2626.8[b] *3*	12−		
2709.3[a] *3*	11−		
2933.2? *3*	(12+)		
2936.5 *3*	12+		
2946.1 *3*	(11)+		
2950.4? *4*			
2998.38[&] *25*	14+		
3022.4[b] *3*	13−		
3080.3? *3*	(14+)		
3082.4[a] *6*	(12−)		
3225.6 *4*	(13+)		
3357.7[a] *6*	13−		
3400.2? *5*			
3542.2[&] *3*	16+		
3569.5? *5*			
3674.0? *6*			
3695.4[b] *3*	15−		
3883.4 *4*			
3923.7[b] *3*	(17−)		
4160.6[b] *4*			
4204.3[&] *5*	18+		
4320.7? *4*			
4950.8[&] *6*	(20+)		

[†] From least-squares fit to Eγ.
[‡] Authors′ values from γ-ray multipolarities, coincidence data, and band structure (from 1976Hj01, except as noted). See ^{192}Pt Adopted Levels for evaluator′s assignments.
[#] Band(A): K=0 g.s. band.
[@] Band(B): $K^{\pi}=2^+$ quasi-γ vibration band.
[&] Band(C): π=+ band.
[a] Band(D): semidecoupled π=− band. Built on the 5^- two-quasiparticle excitation.
[b] Band(E): π=− band. Built on 2172-keV 10^- isomer; probable configuration=((ν 9/2[505])+(ν 11/2[615])).

γ(^{192}Pt)

See 1976Cu02 and 1976Hj01 for Iγ (other conditions), additional angular distribution coefficients, and coincidence data.

E_γ[†]	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	δ	α[d]	Comments
(40.4)	<9.5×10^{-5}	2623.87	12$^+$	2583.48	10$^+$	[E2]		329	E_γ: 40.4 *3* from level energy difference. I_γ: deduced from Ti(104.7γ)=24.6, Ti(40.4γ)/Ti(104.7γ)<0.0013 (1978Ti02), and α(E2 theory).
69.12[a] *10*	3.7 *3*	2172.46	10$^-$	2103.34	9$^-$	M1		3.47	I_γ: 0.8 *2* In (α,2nγ) At 27 MeV (2006Le06). α(L+...)exp=3.9 *12* from (α,4nγ). Mult.: from α(L+...)exp, deduced from intensity balance at 2172 level.
104.73 *10*	4.8 *4*	2623.87	12$^+$	2519.14	10$^+$	E2		4.05	I_γ: 0.3 *1* In (α,2nγ) At 27 MeV (2006Le06). Mult.: Q from γ(θ), not M2 from $T_{1/2}$ and RUL. A_2=+0.38 *5*, A_4=+0.03 *10* (1976Hj01); A_2=+0.27 *5*, A_4=−0.18 *6* (1976Hj01).
134.46[a] *10*	20.6 *12*	1518.45	7$^-$	1384.00	5$^-$	E2		1.508	I_γ: 11.1 *2* In (α,2nγ) At 27 MeV (2006Le06). α(L)exp=0.078 *24* from (α,2nγ). A_2=+0.22 *2*, A_4=−0.02 *3* (1976Hj01).
147.07[e] *12*	3.0 *3*	3080.3?	(14$^+$)	2933.2?	(12$^+$)	(E2)		1.075	A_2=+0.32 *4*, A_4=−0.05 *8* (1976Hj01); A_2=+0.28 *5*, A_4=−0.18 *7* (1976Cu02).
152.98[a] *12*	3.4 *3*	1518.45	7$^-$	1365.46	6$^+$	(E1)		0.1380	I_γ: 1.8 *2* In (α,2nγ) At 27 MeV (2006Le06). A_2=−0.11 *4*, A_4=+0.03 *6* (1976Hj01). Mult.: favored by intensity balance at 1365 level.
160.10[e] *20*	1.0 *1*	4320.7?		4160.6					
183.04[a] *20*	1.7 *2*	1384.00	5$^-$	1201.06	4$^+$	D+Q			I_γ: 1.2 *2* In (α,2nγ) At 27 MeV (2006Le06). A_2=−0.04 *11*, A_4=−0.03 *18* (1976Hj01).
188.03 *20*	2.2 *2*	3883.4		3695.4	15$^-$	D+Q			A_2=−0.15 *6*, A_4=−0.13 *9* (1976Hj01).
207.93[a] *15*	4.6 *4*	2172.46	10$^-$	1964.54	8$^-$	(E2)		0.315	I_γ: 1.0 *2* In (α,2nγ) At 27 MeV (2006Le06). Mult.: (Q) from γ(θ), not M2 from RUL; E2 favored by intensity balance. A_2=+0.10 *2*, A_4=+0.04 *3* (1976Hj01).
210.3 *6*	0.8 *2*	2313.6		2103.34	9$^-$	D			A_2=−0.25 *6*, A_4=+0.07 *8* (1976Hj01).
228.34 *15*	3.3 *3*	3923.7	(17$^-$)	3695.4	15$^-$	(E2)		0.231	A_2=+0.37 *3*, A_4=−0.07 *6* (1976Hj01).
236.84 *16*	2.3 *2*	4160.6		3923.7	(17$^-$)	D+Q			A_2=−0.01 *5*, A_4=+0.10 *6* (1976Hj01); suggests ΔJ=1 transition.
273.83[e] *18*	1.9 *2*	3674.0?		3400.2?		D+Q			A_2=−0.56 *15*, A_4=+0.06 *19* (1976Hj01).
279.57 *18*	1.9 *2*	3225.6	(13$^+$)	2946.1	(11)$^+$	(E2)		0.1218	A_2=+0.25 *8*, A_4=−0.08 *15* (1976Hj01). Mult.: Q from γ(θ) for intraband G.
288.54[&] *10*		1666.51		1377.97	3$^-$				
295.96 *12*	6.6 *5*	612.45	2$^+$	316.50	2$^+$	M1+E2	+6[b] *2*	0.108 *7*	α(K)exp=0.076 *23*. A_2=+0.08 *3*, A_4=−0.07 *3* (1976Hj01).
308.44 *12*	3.4 *3*	920.88	3$^+$	612.45	2$^+$	M1+E2	+7[b] *2*	0.095 *4*	Mult.: adopted $T_{1/2}$ and RUL exclude Δπ=yes option from

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γ(^{192}Pt) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	δ	α[d]	Comments
									γ(θ). A_2=+0.28 3, A_4=−0.01 6 (1976Hj01).
316.50[a] 5	100	316.50	2^+	0.0	0^+	E2		0.0841	I_γ: 100 In (α,2nγ) At 27 MeV (2006Le06). K:L:M=100:50:18; α(L)exp=0.027 8. A_2=+0.25 2, A_4=−0.03 3 (1976Hj01).
319.9[e] 4	≈2.5	3400.2?		3080.3?	(14^+)				A_2=+0.36 (1976Hj01).
339.37 20	7.5 8	2511.9	11^-	2172.46	10^-	M1+E2	−0.4[c] 1	0.198 10	α(K)exp=0.13 4, mean value from (α,2nγ) and (α,4nγ); K/L=4.9 from (α,2nγ). A_2=−0.82 6, A_4=+0.14 6 (1976Hj01).
353.00 12	3.8 3	2936.5	12^+	2583.48	10^+	E2		0.0616	α(K)exp=0.034 11 from (α,4nγ). A_2=+0.34 5, A_4=−0.12 8 (1976Hj01).
362.54 15	2.4 2	1746.54	$(6)^-$	1384.00	5^-	M1+E2	+0.4[c] 1	0.166 9	α(K)exp=0.12 4 from (α,2nγ). A_2=+0.40 4, A_4=−0.12 7 (1976Hj01).
374.51 12	12.8 10	2998.38	14^+	2623.87	12^+	E2		0.0523	α(K)exp≈0.05 from (α,4nγ). A_2=+0.28 4, A_4=−0.16 5 (1976Hj01).
381.5 3	0.8 3	3923.7	(17^-)	3542.2	16^+				
[x]388.4[&] 3									
395.64 20	2.1 3	3022.4	13^-	2626.8	12^-	(M1+E2)		0.09 5	A_2=−0.80 23, A_4=+0.33 22 (1976Hj01). Mult.: D+Q, ΔJ=1 from γ(θ) for intraband G.
[x]398.73 23	2.0 3								
[x]407.0[@]									Assignment to ^{192}Pt uncertain (1976Hj01); Eγ=407.23 10 in 1974Ya03.
411.03 20	2.7 3	2583.48	10^+	2172.46	10^-				A_2=+0.40 6, A_4=+0.05 12 (1976Hj01).
414.04[e] 16	5.4 5	2933.2?	(12^+)	2519.14	10^+	E2		0.0399	α(K)exp=0.025 8 from (α,4nγ). A_2=+0.27 3, A_4=−0.07 5 (1976Hj01).
416.8 5	1.1 4	1201.06	4^+	784.57	4^+	M1+E2[b]	+6[b] 2	0.042 3	Mult.: δ unreasonably large for Δπ=yes.
426.91 18	4.0 4	2946.1	$(11)^+$	2519.14	10^+	M1+E2	+0.5[c] 1	0.102 6	α(K)exp=0.12 4 from (α,4nγ). A_2=+0.52 3, A_4=+0.03 8 (1976Hj01).
438.5[e] 3	0.7 2	2950.4?		2511.9	11^-				
446.10[a] 10	14.1 11	1964.54	8^-	1518.45	7^-	M1+E2	+0.5[c] 1	0.091 5	I_γ: 8.6 2 In (α,2nγ) At 27 MeV (2006Le06). α(K)exp=0.089 27; K:L:M=76:10:5 from (α,2nγ). A_2=+0.35 2, A_4=+0.04 2 (1976Hj01).
454.32 25	7.9 8	2626.8	12^-	2172.46	10^-	E2		0.0314	α(K)exp<0.03 from (α,4nγ); this allows mult=E2 or E1. A_2=+0.17 3, A_4=−0.08 4 (1976Hj01).
468.06[a] 5	96 6	784.57	4^+	316.50	2^+	E2		0.0291	I_γ: 74.0 4 In (α,2nγ) At 27 MeV (2006Le06). α(K)exp=0.021 7; K:L:M=48:10:2.7. A_2=+0.27 2, A_4=−0.04 3 (1976Hj01).
[x]470.93 20	2.1 4								A_2=+0.42 11 (1976Hj01).
485.3 3	1.0 2	1406.2		920.88	3^+				A_2=+0.22 11 (1976Hj01).
489.2[e] 3	≈4.0	3569.5?		3080.3?	(14^+)	D+Q			A_2=−0.72 (1976Hj01), −0.85 15 (1976Cu02).
500.62 10	32.9 23	2519.14	10^+	2018.52	8^+	E2		0.0247	I_γ: 3.4 2 In (α,2nγ) At 27 MeV (2006Le06).

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γ(^{192}Pt) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α[d]	Comments
								α(K)exp=0.018 *6*, K/L>3 from (α,4nγ). A_2=+0.32 *3*, A_4=−0.07 *4* (1976Hj01).
510.4 *5*	7.8 *20*	3022.4	13⁻	2511.9	11⁻			
[x]531.5 *3*	1.2 *2*							
543.85 *20*	4.5 *4*	3542.2	16⁺	2998.38	14⁺	E2	0.0202	α(K)exp<0.03; K/L≈10 from (α,4nγ). A_2=+0.49 *3*, A_4=−0.08 *7* (1976Hj01).
[x]548.8 *3*	1.1 *2*							
552.1 *3*	2.2 *3*	3082.4	(12⁻)	2530.3	(10⁻)	Q		A_2=+0.49 *10*, A_4=−0.02 *13* (1976Hj01).
561.0 *3*	2.0 *3*	1481.9	5⁺	920.88	3⁺	E2	0.0188	α(K)exp=0.018 *6* from (α,4nγ). A_2=+0.35 *7*, A_4=+0.01 *13* (1976Hj01).
564.9 *4*	3.7 *11*	2583.48	10⁺	2018.52	8⁺	(E2)	0.0185	α(K)exp<0.03 for 564.9γ and 565.8γ combined (from (α,4nγ)). A_2=+0.37 *3*, A_4=−0.06 *6* (1976Hj01) for doublet.
565.8 *5*	2.8 *9*	2530.3	(10⁻)	1964.54	8⁻	(E2)	0.0184	α(K)exp<0.03 for 564.9γ and 565.8γ combined (from (α,4nγ)). A_2=+0.37 *3*, A_4=−0.06 *6* (1976Hj01) for doublet.
580.88[a] *12*	45 *3*	1365.46	6⁺	784.57	4⁺	E2	0.01734	I_γ: 15.5 *2* In (α,2nγ) At 27 MeV (2006Le06). α(K)exp=0.013 *4*; K/L=3.4. A_2=+0.33 *3*, A_4=−0.05 *4* (1976Hj01).
584.89[a] *12*	26.7 *19*	2103.34	9⁻	1518.45	7⁻	E2	0.01707	I_γ: 9.0 *2* In (α,2nγ) At 27 MeV (2006Le06). α(K)exp=0.012 *4*; K/L≈4.
588.67 *20*	2.8 *3*	1201.06	4⁺	612.45	2⁺	(E2)[b]	0.01682	A_2=+0.23 *9*, A_4=−0.01 *15* (1976Hj01).
[x]595.0[@]								A_2=+0.13 *8* (1976Hj01). Assignment to ^{192}Pt uncertain (1976Hj01).
599.40[a] *12*	50 *4*	1384.00	5⁻	784.57	4⁺	E1		I_γ: 42.5 *3* In (α,2nγ) At 27 MeV (2006Le06). α(K)exp=0.0048 *14*, K/L=8.2 from (α,4nγ); α(K)exp=0.0055 *17* from (α,2nγ). A_2=−0.07 *2*, A_4=+0.04 *3* (1976Hj01).
604.34[&] *20*		920.88	3⁺	316.50	2⁺			E_γ: 604.4 (uncertainty≤0.3) in 1976Hj01.
605.92 *25*	3.3 *4*	2709.3	11⁻	2103.34	9⁻	E2	0.01574	α(K)exp=0.011 *3* from (α,4nγ). A_2=+0.39 *10*, A_4=−0.02 *15* (1976Hj01).
612.6 *3*	0.9 *2*	612.45	2⁺	0.0	0⁺	E2[b]	0.01535	Mult.: adopted $T_{1/2}$ and RUL exclude Δπ=yes option from γ(θ).
[x]615.8 *3*	1.4 *3*							
631.5 *4*	1.2 *3*	2113.4	7⁺	1481.9	5⁺			α(K)exp<0.015 from (α,2nγ), so mult=E2 or E1. A_2=+0.26 *9*, A_4=+0.08 *15* (1976Hj01).
648.4 *5*	1.5 *3*	3357.7	13⁻	2709.3	11⁻			A_2=+0.29 *18* (1976Hj01).
653.05 *16*	39 *3*	2018.52	8⁺	1365.46	6⁺	E2	0.01330	α(K)exp=0.010 *3*; K:L:M=37:10:1.5 from (α,4nγ). A_2=+0.36 *3*, A_4=−0.07 *5* (1976Hj01).
662.1 *3*	2.0 *3*	4204.3	18⁺	3542.2	16⁺	E2	0.01291	α(K)exp=0.013 *4* from (α,4nγ). A_2=+0.22 *8*, A_4=−0.12 *13* (1976Hj01).
[x]669.3[@]						D+Q		A_2=−0.15 *10*, A_4=+0.14 *14* (1976Hj01). Eγ=669.4 *3* in 1974Ya03. May deexcite a known (2)⁺ 2048 level.
673.01 *25*	7.0 *7*	3695.4	15⁻	3022.4	13⁻	E2	0.01245	α(K)exp=0.012 *4* from (α,4nγ). A_2=+0.29 *4*, A_4=−0.02 *6* (1976Hj01).
697.0 *3*	4.0 *5*	3695.4	15⁻	2998.38	14⁺	E1		α(K)exp<0.005 from (α,4nγ). A_2=−0.31 *12*, A_4=+0.08 *15* (1976Hj01).

γ(^{192}Pt) (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Comments
746.5 *4*	1.2 *3*	4950.8	(20$^+$)	4204.3	18$^+$	A_2=+0.0 *5* (1976Hj01).
884.5	0.23 *8*	1201.06	4$^+$	316.50	2$^+$	I_γ: deduced from Iγ(416.8γ):Iγ(588.7γ):Iγ(884.5γ)=18.0 *11*:100:7.1 *15* (1979FuZN).
[x]886 [@]						Deexcites E(level)>5000 (1976Hj01).
1061.46 [&] *15*		1377.97	3$^-$	316.50	2$^+$	

[†] From 1976Cu02, except where noted (^{192}Os(α,4nγ), E(α)=45.5 MeV, θ=125°).

[‡] Iγ from ^{192}Os(α,4nγ), E(α)=45.5 MeV, θ=125° (1976Cu02), except where noted; values are relative to I(316.5γ)=100. Iγ data for (α,2nγ) At E=27 MeV (2006Le06) are given In comments.

[#] From ce data (1976Hj01) and/or γ-ray angular distributions, except where noted; the photon and ce intensity scales were normalized through α(K)(316.5γ)=0.0535 (E2 theory). Stretched Q assignments from γ(θ) are based on large positive A_2 and small negative A_4.

[@] From 1976Hj01 (^{192}Os(α,4nγ), E(α)=46 MeV, θ=125°); uncertainties range from 0.1 to 0.3 keV.

[&] From 1974Ya03 (^{190}Os(α,2nγ), E(α)=24 MeV).

[a] γ-ray associated with>3−ns delay (1976Hj01).

[b] From γ-ray angular distributions in 1979FuZN.

[c] From ce data and γ-ray angular distributions in 1976Hj01.

[d] 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.

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

[x] γ ray not placed in level scheme.

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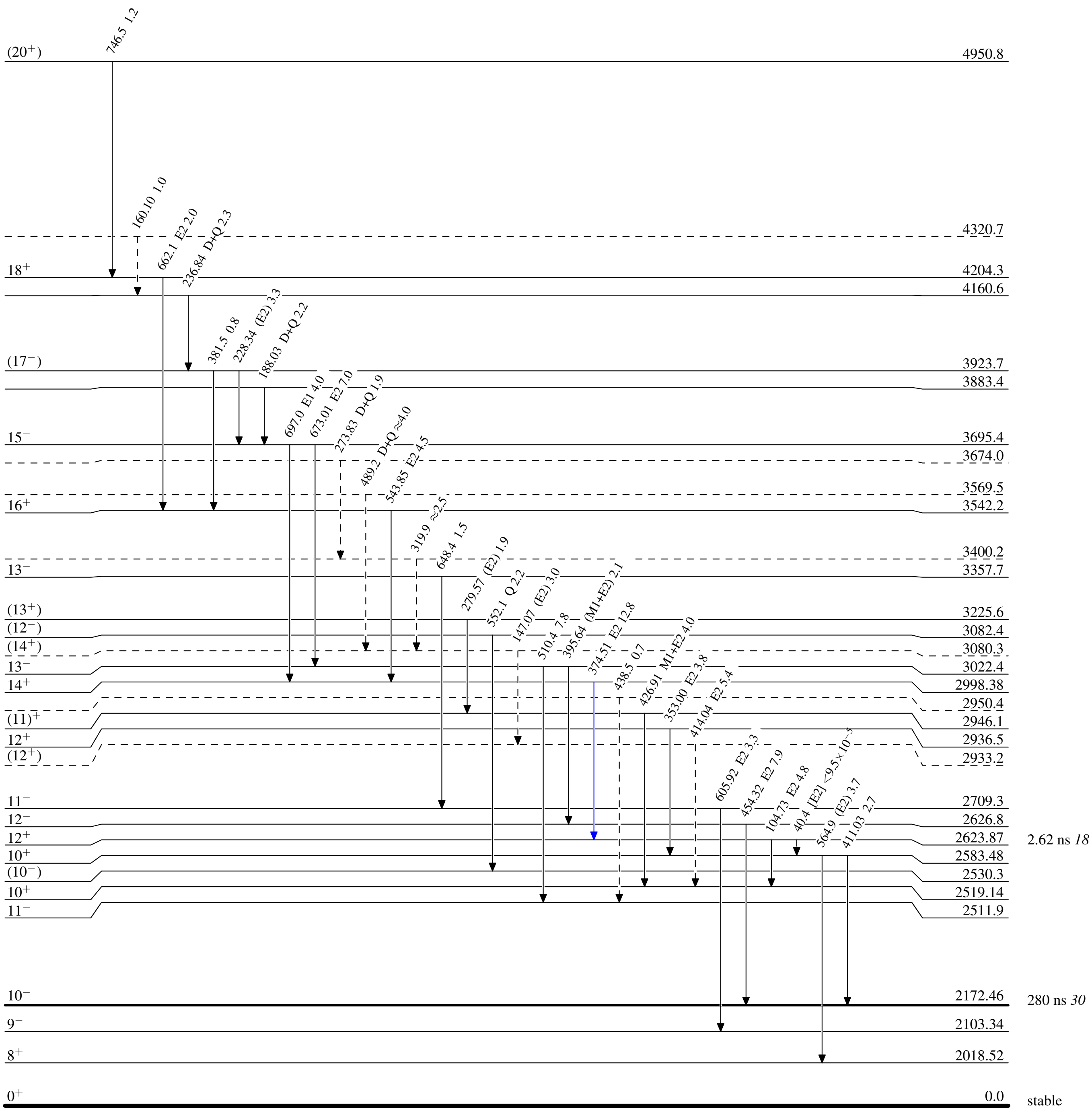
^{190}Os(α,2nγ), ^{192}Os(α,4nγ) 2006Le06,1976Cu02,1976Hj01

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 Iγ for ^{192}Os(α,4nγ), E(α)=45.5 MeV, θ=125°



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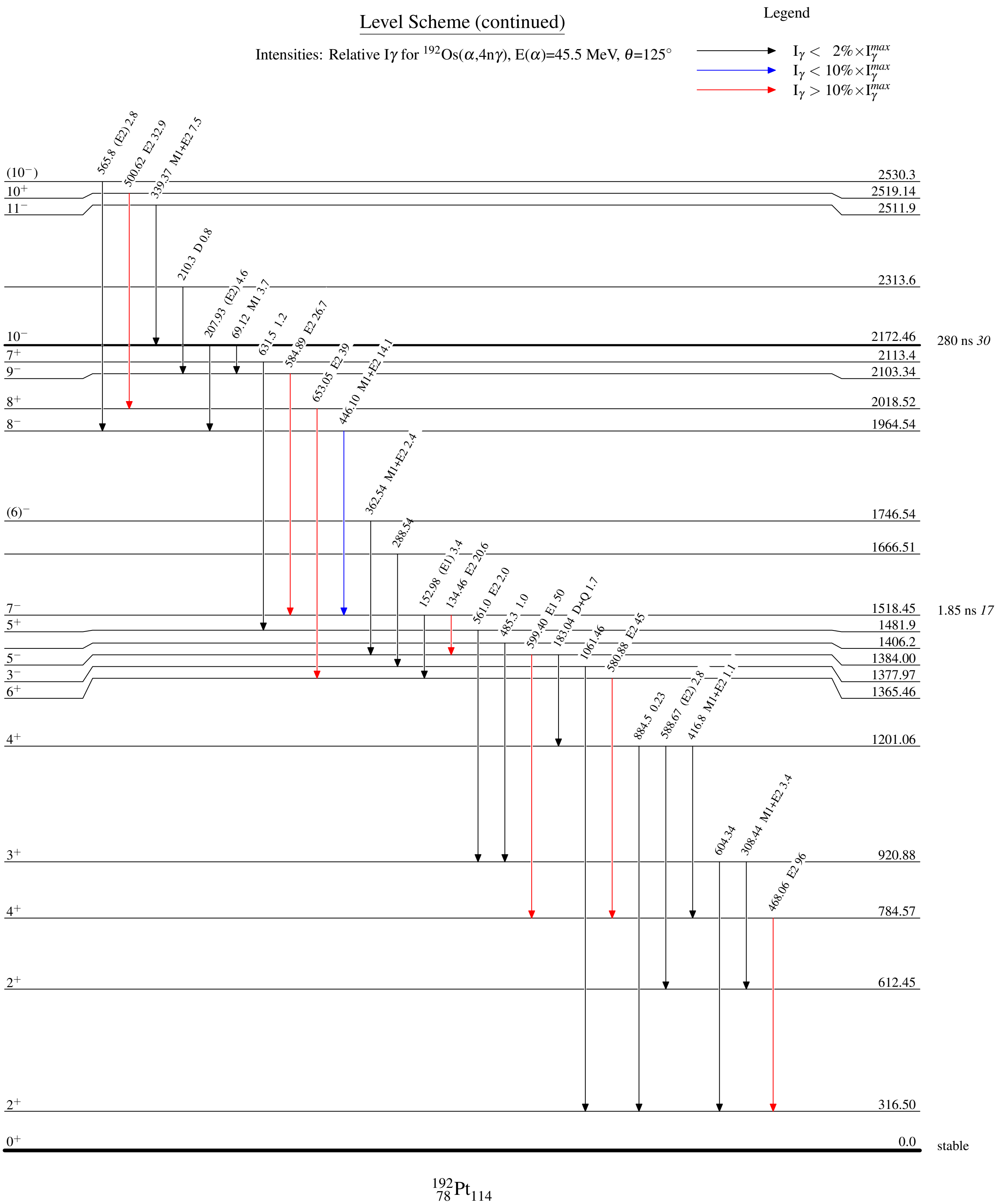
^{190}Os(α,2nγ), ^{192}Os(α,4nγ) 2006Le06,1976Cu02,1976Hj01

Level Scheme (continued)

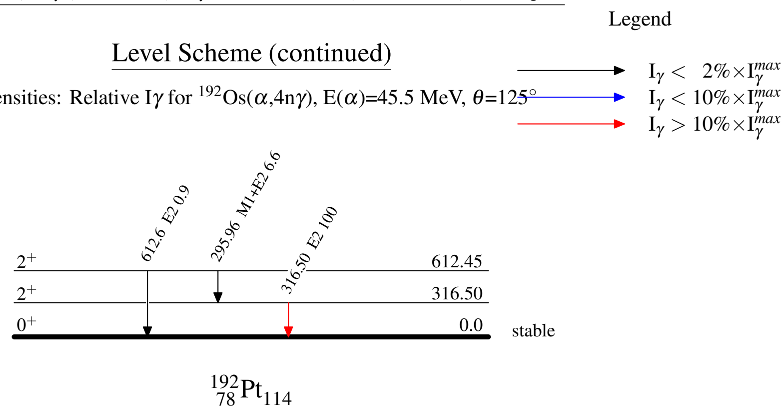
Intensities: Relative Iγ for ^{192}Os(α,4nγ), E(α)=45.5 MeV, θ=125°



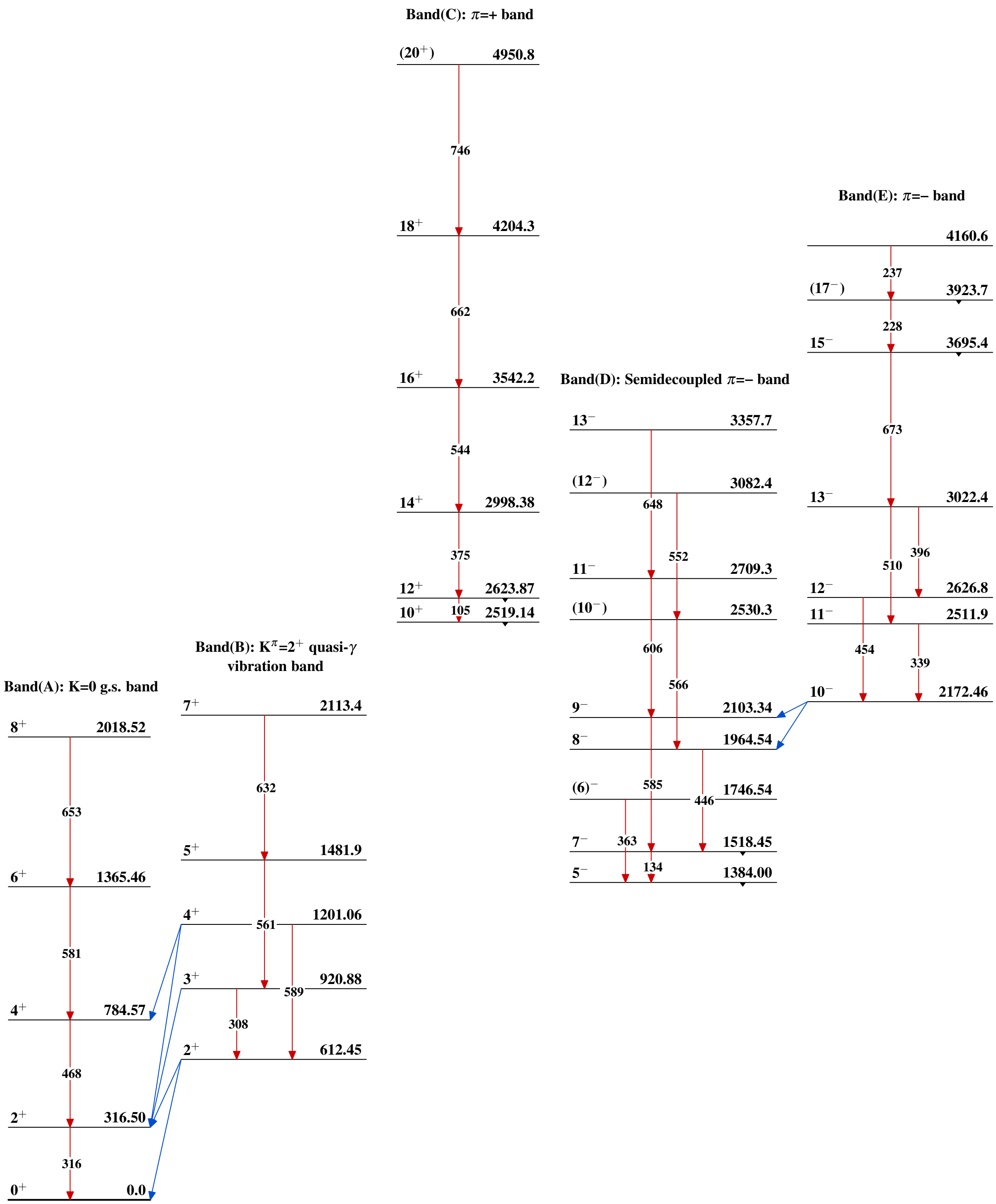
^{190}Os(α,2nγ), ^{192}Os(α,4nγ) 2006Le06,1976Cu02,1976Hj01

Level Scheme (continued)

Intensities: Relative Iγ for ^{192}Os(α,4nγ), E(α)=45.5 MeV, θ=125°



^{190}Os(α,2nγ), ^{192}Os(α,4nγ) 2006Le06,1976Cu02,1976Hj01



$^{192}_{78}Pt_{114}$