

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 75,199 (1995)	31-May-1995

Q(β⁻)=-9.86×10³ 4; S(n)=11012 22; S(p)=3.28×10³ 3; Q(α)=5224 7 [2012Wa38](#)

Note: Current evaluation has used the following Q record -9840 syst 10830 syst 2990 syst 5227 10 [1993Au05,1993Au07](#).

Uncertainties: 450 (Q(β⁻)), 370 (S(n)), 400 (S(p)) ([1993Au05, 1993Au07](#)).

Q(εp)=2690 340 (syst [1993Au07](#)).

Nuclear structure calculations (levels, moments etc.): [1995Ch01, 1994Dr04, 1993Ch09, 1991Ba31, 1991Ba04, 1990Ka24, 1988Pa02, 1988Hs01](#).

[Additional information 1](#).

¹⁷²Os Levels

Cross Reference (XREF) Flags

- A ¹⁷²Ir ε decay (4.4 s)
- B ¹⁷²Ir ε decay (2.0 s)
- C ¹⁷⁶Pt α decay (6.33 s)
- D (HL,xnγ)

E(level) [†]	J ^π [‡]	T _{1/2} [#]	XREF	Comments
0.0 [@]	0 ⁺	19.2 s 9	ABCD	%ε+%β ⁺ =99.8 (1971Bo06); %α=0.2 T _{1/2} : from γ(t) (1995Hi02). Other: 19 s 2 (α(t) 1971Bo06).
227.77 [@] 9	2 ⁺	116 ps 7	ABCD	J ^π : E2 γ to 0 ⁺ .
606.17 [@] 11	4 ⁺	7.1 ps 7	AB D	J ^π : ΔJ=2, E2 γ to 2 ⁺ .
702.8? 2	(2 ⁺)		A	
758.27 ^a 14	0 ⁺		B	J ^π : (530γ)(228γ)(θ) gives 0-2-0 cascade.
810.01 ^a 11	2 ⁺		B	J ^π : E0+E2 γ to 2 ⁺ .
918.79 ^b 14	2 ⁺		B	J ^π : E0+E2 γ to 2 ⁺ .
1054.47 [@] 12	6 ⁺	1.8 ps 2	B D	J ^π : ΔJ=2, E2 γ to 4 ⁺ and (448γ)(378γ)(θ) consistent with 6-4-2 cascade.
1107.95 ^b 12	(3 ⁺)		B	J ^π : γ's to 2 ⁺ and 4 ⁺ .
1137.88 ^a 12	4 ⁺		B D	J ^π : E0+E2 γ to 4 ⁺ .
1339.53 ^b 13	(4 ⁺)		B	
1468.8 ^c 2	(3 ⁻)		B	J ^π : from J(J+1) interval rule, the level energy fits well in the (odd J) negative parity band.
1524.95 [@] 14	8 ⁺	1.1 ps +3-2	B D	J ^π : ΔJ=2, E2 γ to 6 ⁺ .
1551.25 ^a 12	6 ⁺		B D	J ^π : E0+E2 γ to 6 ⁺ .
1604.50 ^b 13	(5 ⁺)		B	
1656.43 ^c 15	5 ⁽⁻⁾		B D	J ^π : ΔJ=(1), dipole γ's to 4 ⁺ and 6 ⁺ . ΔJ=2, E2 γ from 7 ⁽⁻⁾ .
1678.6? 4			B	
1727.64 ^d 16	(4 ⁻)		B D	
1806.71? 15			B	
1873.4 4			D	
1884.90 ^b 14	(6 ⁺)		B	
1918.9? 5			B	
1978.45 ^c 14	7 ⁽⁻⁾	6.4 ps 12	B D	J ^π : ΔJ=1 γ's to 6 ⁺ and (8 ⁺); probable band member.
2023.87 [@] 16	10 ⁺	1.2 ps +2-3	B D	J ^π : ΔJ=2, E2 γ to 8 ⁺ .
2061.33 ^d 14	(6 ⁻)		B D	
2093.63 ^a 13	(8 ⁺)		B	
2140.8 4			B	
2257.6 3			B	

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Adopted Levels, Gammas (continued)

^{172}Os Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} [#]	XREF	Comments
2288.1 2			B	
2374.6 ^c 2	9 ⁽⁻⁾	4.1 ps +29-20	B D	J ^π : ΔJ=2, (E2) γ to 7 ⁽⁻⁾ ; γ to 10 ⁺ .
2415.1 ^d 2	(8 ⁻)		B D	
2429.9 3			B	
2439.1 2			B	
2508.3 3			B	
2564.5 [@] 2	12 ⁺	0.76 ps +14-21	D	J ^π : ΔJ=2, E2 γ to 10 ⁺ .
2635.4 ^d 2	(10 ⁻)		D	
2765.8 ^c 2	11 ⁽⁻⁾	6.9 ps 6	D	J ^π : ΔJ=2, E2 γ to 9 ⁽⁻⁾ .
2840.6? 3			D	
2846.0 ^e 2	(10 ⁻)		D	
3004.7 ^d 2	(12 ⁻)		D	J ^π : ΔJ=2, (E2) γ to (10 ⁻), γ to 12 ⁺ .
3098.5 3			B	
3101.2 ^{&} 2	14 ⁺	0.76 ps 28	D	J ^π : ΔJ=2, E2 γ to 12 ⁺ .
3194.4 ^c 2	13 ⁽⁻⁾	3.4 ps +6-5	D	J ^π : ΔJ=2, E2 γ to 11 ⁽⁻⁾ .
3199.4 [@] 2	(14 ⁺)		D	J ^π : ΔJ=2 γ to 12 ⁺ .
3322.1 ^e 2	(12 ⁻)		D	J ^π : ΔJ=(2) γ to (10 ⁻); γ to 13 ⁽⁻⁾ .
3513.0 ^d 2	(14 ⁻)		D	
3589.7 ^{&} 2	16 ⁺	2.5 ps +4-5	D	J ^π : ΔJ=2, E2 γ to 14 ⁺ .
3711.3 ^c 2	(15 ⁻)	1.2 ps +6-7	D	J ^π : ΔJ=2, E2 γ to 13 ⁽⁻⁾ .
3823.3 [@] 2	(16 ⁺)		D	J ^π : ΔJ=(2) γ to 14 ⁺ .
3847.5 ^e 3	(14 ⁻)		D	
4068.1 ^d 3	(16 ⁻)		D	
4176.5 ^{&} 3	(18 ⁺)	1.1 ps +8-4	D	J ^π : ΔJ=(2) γ to (16 ⁺).
4276.9 ^c 3	(17 ⁻)		D	J ^π : ΔJ=(2) γ to (15 ⁻).
4412.4 ^e 4	(16 ⁻)		D	
4510.7 [@] 3	(18 ⁺)		D	
4640.1 ^d 3	(18 ⁻)		D	
4831.6 ^{&} 3	(20 ⁺)	<0.9 ps	D	J ^π : ΔJ=(2) γ to (18 ⁺).
4872.5 ^c 3	(19 ⁻)		D	J ^π : ΔJ=(2) γ to (17 ⁻).
5003.9 ^e 5	(18 ⁻)		D	
5234.6? [@] 4	(20 ⁺)		D	
5245.1 ^d 3	(20 ⁻)		D	
5490.6 ^c 3	(21 ⁻)		D	
5528.2 ^{&} 3	(22 ⁺)		D	J ^π : ΔJ=(2) γ to (20 ⁺).
5633.9 ^e 6	(20 ⁻)		D	
5892.5 ^d 3	(22 ⁻)		D	
5985.6? [@] 11	(22 ⁺)		D	
6103.3 4			D	
6135.1 ^c 4	(23 ⁻)		D	
6258.5 ^{&} 3	(24 ⁺)		D	
6298.5 ^e 7	(22 ⁻)		D	
6584.8 ^d 3	(24 ⁻)		D	
6812.4 4			D	
6819.3 ^c 4	(25 ⁻)		D	
7028.0 ^{&} 4	(26 ⁺)		D	
7326.7 ^d 5	(26 ⁻)		D	
7554.9 5			D	

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Adopted Levels, Gammas (continued)

^{172}Os Levels (continued)

E(level) [†]	J^π [‡]	XREF
7842.6 ^{&} 4	(28 ⁺)	D
8119.2 ^d 6	(28 ⁻)	D
8690.1 ^e 5	(30 ⁺)	D

[†] From least-squares fit to E_γ 's.

[‡] For levels populated in (HI,xn γ), it is assumed that the spins increase as the excitation energy increases. $\Delta J=2$ transitions are assumed as E2 (from RUL for E2 and M2 transitions). When no detailed arguments for J^π are given, it is based on the assignment of a level as a probable band member.

From RDDS in (HI,xn γ) (1994ViZY).

@ Band(A): g.s. band ($\alpha=0, \pi=+$).

& Band(B): ($\alpha=0, \pi=+$). Yrast states.

^a Band(C): $K^\pi=0^+$ β band.

^b Band(D): $K^\pi=2^+$ γ band.

^c Band(E): ($\alpha=1, \pi=-$).

^d Band(F): ($\alpha=0, \pi=-$).

^e Band(G): band 1, $\Delta J=2$.

$\gamma(^{172}\text{Os})$

$E_i(\text{level})$	J_i^π	E_γ	I_γ [†]	E_f	J_f^π	Mult. [‡]	α [@]	$I_{(\gamma+ce)}$	Comments
227.77	2 ⁺	227.8 1	100	0.0	0 ⁺	E2	0.218		B(E2)(W.u.)=115 7
606.17	4 ⁺	378.4 1	100	227.77	2 ⁺	E2	0.047		B(E2)(W.u.)=173 17
702.8?	(2 ⁺)	475.0 2	100	227.77	2 ⁺				
758.27	0 ⁺	530.5 1	100 17	227.77	2 ⁺				
		758.3		0.0	0 ⁺	(E0)		2.2 3	Mult.: no γ -ray observed, $\alpha(K)\text{exp}>0.04$ (1994Da02). X(E0/E2)=0.010 3. X(E0/E2)=0.04 1.
810.01	2 ⁺	582.3 1	100 4	227.77	2 ⁺	E0+E2(+M1)	0.06 1		
		809.9 2	31 13	0.0	0 ⁺				
918.79	2 ⁺	312.7 1	60 20	606.17	4 ⁺	[E2]	0.082		
		690.7 2	100 40	227.77	2 ⁺	E0+E2(+M1)	0.17 5		X(E0/E2)=0.28 9.
1054.47	6 ⁺	448.4 1	100	606.17	4 ⁺	E2	0.030		B(E2)(W.u.)=300 40
1107.95	(3 ⁺)	501.7 1	14 6	606.17	4 ⁺	[M1,E2]	0.05 2		
		880.1 1	100 11	227.77	2 ⁺				
1137.88	4 ⁺	327.9 1	23 7	810.01	2 ⁺	[E2]	0.071		
		531.7 1	100 9	606.17	4 ⁺	E0+E2(+M1)	0.17 3		X(E0/E2)=0.09 1.
1339.53	(4 ⁺)	733.3 1	100 20	606.17	4 ⁺				
		1112.1 2	17 4	227.77	2 ⁺				
1468.8	(3 ⁻)	862.4 2	100 10	606.17	4 ⁺				
		1241.4 3	70 20	227.77	2 ⁺				
1524.95	8 ⁺	470.5 1	100	1054.47	6 ⁺	E2 [#]	0.027		B(E2)(W.u.)=380 110
1551.25	6 ⁺	413.4 1	100 22	1137.88	4 ⁺				
		496.8 1	30 6	1054.47	6 ⁺	E0+E2(+M1)	0.16 4		X(E0/E2)=0.06 1.
		945.1 1	63 13	606.17	4 ⁺				
1604.50	(5 ⁺)	496.4 1	100 50	1107.95	(3 ⁺)				
		550.3 1	25 10	1054.47	6 ⁺				
		998.2 1	100 10	606.17	4 ⁺				
1656.43	5 ⁽⁻⁾	601.9 2	100 6	1054.47	6 ⁺				
		1050.2 2	71 5	606.17	4 ⁺				$I_\gamma(1050\gamma)/I_\gamma(602\gamma)=1.86$ from (HI,xn γ) is not used in averaging.

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Adopted Levels, Gammas (continued)

$\gamma(^{172}\text{Os})$ (continued)								
$E_i(\text{level})$	J_i^π	E_γ	I_γ^\dagger	E_f	J_f^π	Mult. [‡]	$\alpha^{\text{@}}$	Comments
1678.6?		868.6 & 3	100	810.01	2 ⁺			
1727.64	(4 ⁻)	1121.9 2	100	606.17	4 ⁺			
1806.71?		996.7 & 1	100	810.01	2 ⁺			
1873.4		1267.2	100	606.17	4 ⁺			
1884.90	(6 ⁺)	545.4 1	100 67	1339.53	(4 ⁺)			
		830.4 1	27 7	1054.47	6 ⁺			
1918.9?		1108.9 & 4	100	810.01	2 ⁺			
1978.45	7 ⁽⁻⁾	322.0 1	100 3	1656.43	5 ⁽⁻⁾	E2 [#]	0.075	B(E2)(W.u.)=190 40
		427.6 &	18 5	1551.25	6 ⁺	[E1]		B(E1)(W.u.)=3.4×10 ⁻⁵ 12
		453.5 1	73 10	1524.95	8 ⁺	[E1]		B(E1)(W.u.)=1.2×10 ⁻⁴ 3
								I_γ : value from ^{172}Ir ϵ decay is not used since it seems large by a factor of ≈ 3 .
		924.1 2	34 2	1054.47	6 ⁺	[E1]		B(E1)(W.u.)=6.3×10 ⁻⁶ 13
2023.87	10 ⁺	498.9 1	100	1524.95	8 ⁺	E2 [#]	0.023	B(E2)(W.u.)=260 50
2061.33	(6 ⁻)	333.8 1	23 11	1727.64	(4 ⁻)	[E2]	0.067	I_γ : from (HI,xn γ). $I_\gamma=59$ 30 in ^{172}Ir ϵ decay (2.0 s).
		405.0 & 3		1656.43	5 ⁽⁻⁾			E_γ, I_γ : reported in (HI,xn γ) only ($I_\gamma=67$ 14).
		1006.7 1	100 2	1054.47	6 ⁺			
2093.63	(8 ⁺)	542.4 1	100 12	1551.25	6 ⁺			
		568.7 1	38 12	1524.95	8 ⁺			
		1039.1 1	56 12	1054.47	6 ⁺			
2140.8		1086.3 3	100	1054.47	6 ⁺			
2257.6		1203.1 2	100	1054.47	6 ⁺			
2288.1		1233.6 1	100	1054.47	6 ⁺			
2374.6	9 ⁽⁻⁾	350.8 2	6.3 25	2023.87	10 ⁺	[E1]		B(E1)(W.u.)=7.0×10 ⁻⁵ +65-30
		396.2 1	100 3	1978.45	7 ⁽⁻⁾	(E2) [#]	0.042	B(E2)(W.u.)=230 +220-95
2415.1	(8 ⁻)	353.7 1	100 11	2061.33	(6 ⁻)	[E2]	0.057	
		890.2 2	31 11	1524.95	8 ⁺			
2429.9		1375.4 2	100	1054.47	6 ⁺			
2439.1		1384.6 1	100	1054.47	6 ⁺			
2508.3		983.4 2	100	1524.95	8 ⁺			
2564.5	12 ⁺	540.6 1	100	2023.87	10 ⁺	E2 [#]	0.019	B(E2)(W.u.)=280 +105-45
2635.4	(10 ⁻)	220.3 1	100 3	2415.1	(8 ⁻)			
		261.2 3	47 10	2374.6	9 ⁽⁻⁾			
		611.6 3	53 16	2023.87	10 ⁺			
2765.8	11 ⁽⁻⁾	391.2 1	100	2374.6	9 ⁽⁻⁾	E2 [#]	0.043	B(E2)(W.u.)=151 14
2840.6?		276.0 &	43 11	2564.5	12 ⁺			
		816.8 &	100 18	2023.87	10 ⁺			
2846.0	(10 ⁻)	471.2 2	100	2374.6	9 ⁽⁻⁾			
3004.7	(12 ⁻)	369.4 1	100 6	2635.4	(10 ⁻)	(E2) [#]		
		439.8 3	11 6	2564.5	12 ⁺			
3098.5		1074.6 2	100	2023.87	10 ⁺			
3101.2	14 ⁺	536.7 1	100	2564.5	12 ⁺	E2 [#]	0.019	B(E2)(W.u.)=290 +170-80
3194.4	13 ⁽⁻⁾	428.7 1	100	2765.8	11 ⁽⁻⁾	E2 [#]	0.034	B(E2)(W.u.)=200 40
3199.4	(14 ⁺)	634.9 1	100	2564.5	12 ⁺			
3322.1	(12 ⁻)	128.0 3	29 15	3194.4	13 ⁽⁻⁾			
		476.1 1	100 12	2846.0	(10 ⁻)			
		556.3 3	47 13	2765.8	11 ⁽⁻⁾			
3513.0	(14 ⁻)	508.3 1	100	3004.7	(12 ⁻)			
3589.7	16 ⁺	488.5 1	100	3101.2	14 ⁺	E2 [#]	0.024	B(E2)(W.u.)=140 23

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Adopted Levels, Gammas (continued)

$\gamma(^{172}\text{Os})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ	I_γ^\dagger	E_f	J_f^π	Mult. [‡]	$\alpha^{\text{@}}$	Comments
3711.3	(15 ⁻)	516.9 1	100	3194.4	13 ⁽⁻⁾	E2 [#]	0.021	B(E2)(W.u.)=220 +325-70
3823.3	(16 ⁺)	623.9 1	100	3199.4	(14 ⁺)			
3847.5	(14 ⁻)	525.4 1	100	3322.1	(12 ⁻)			
4068.1	(16 ⁻)	555.1 1	100	3513.0	(14 ⁻)			
4176.5	(18 ⁺)	586.8 1	100	3589.7	16 ⁺	[E2]	0.016	B(E2)(W.u.)=130 +75-55
4276.9	(17 ⁻)	565.6 1	100	3711.3	(15 ⁻)			
4412.4	(16 ⁻)	564.9 2	100	3847.5	(14 ⁻)			
4510.7	(18 ⁺)	687.4 1	100	3823.3	(16 ⁺)			
4640.1	(18 ⁻)	572.0 1	100	4068.1	(16 ⁻)			
4831.6	(20 ⁺)	655.1 1	100	4176.5	(18 ⁺)	[E2]	0.012	B(E2)(W.u.)>91
4872.5	(19 ⁻)	595.6 1	100	4276.9	(17 ⁻)			
5003.9	(18 ⁻)	591.5 3	100	4412.4	(16 ⁻)			
5234.6?	(20 ⁺)	723.9 ^{&} 3	100	4510.7	(18 ⁺)			
5245.1	(20 ⁻)	605.0 1	100	4640.1	(18 ⁻)			
5490.6	(21 ⁻)	618.1 1	100	4872.5	(19 ⁻)			
5528.2	(22 ⁺)	696.6 1	100	4831.6	(20 ⁺)			
5633.9	(20 ⁻)	630.0 3	100	5003.9	(18 ⁻)			
5892.5	(22 ⁻)	647.4 1	100	5245.1	(20 ⁻)			
5985.6?	(22 ⁺)	751.0 ^{&} 10	100	5234.6?	(20 ⁺)			
6103.3		612.6 2	100	5490.6	(21 ⁻)			
6135.1	(23 ⁻)	644.4 2	100	5490.6	(21 ⁻)			
6258.5	(24 ⁺)	730.3 1	100	5528.2	(22 ⁺)			
6298.5	(22 ⁻)	664.6 3	100	5633.9	(20 ⁻)			
6584.8	(24 ⁻)	692.3 1	100	5892.5	(22 ⁻)			
6812.4		709.1 2	100	6103.3				
6819.3	(25 ⁻)	684.2 2	100	6135.1	(23 ⁻)			
7028.0	(26 ⁺)	769.5 1	100	6258.5	(24 ⁺)			
7326.7	(26 ⁻)	741.8 3	100	6584.8	(24 ⁻)			
7554.9		742.5 3	100	6812.4				
7842.6	(28 ⁺)	814.6 2	100	7028.0	(26 ⁺)			
8119.2?	(28 ⁻)	792.5 ^{&} 3	100	7326.7	(26 ⁻)			
8690.1?	(30 ⁺)	847.5 3	100	7842.6	(28 ⁺)			

[†] Weighted averages taken when values are available from more than one type of study.

[‡] From ce data in ^{172}Ir ϵ decay, unless otherwise stated.

[#] $\gamma(\theta)$ and/or $\gamma\gamma(\theta)$ (DCO) gives $\Delta J=2$. Observation in prompt $\gamma\gamma$ spectrum gives E2 from RUL (for E2 and M2).

[@] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ -ray energies, assigned multiplicities, and mixing ratios, unless otherwise specified.

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

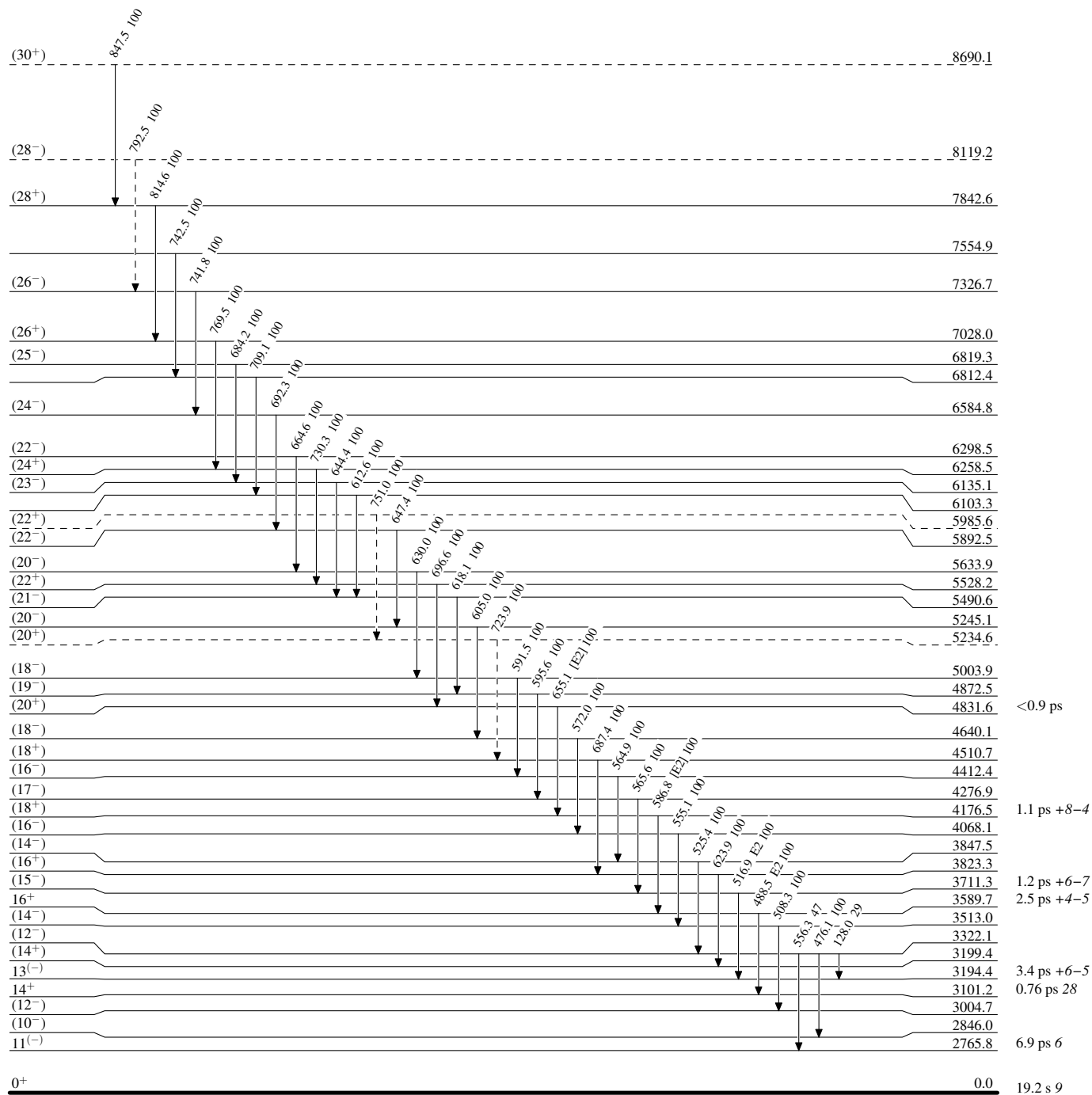
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

-----▶ γ Decay (Uncertain)

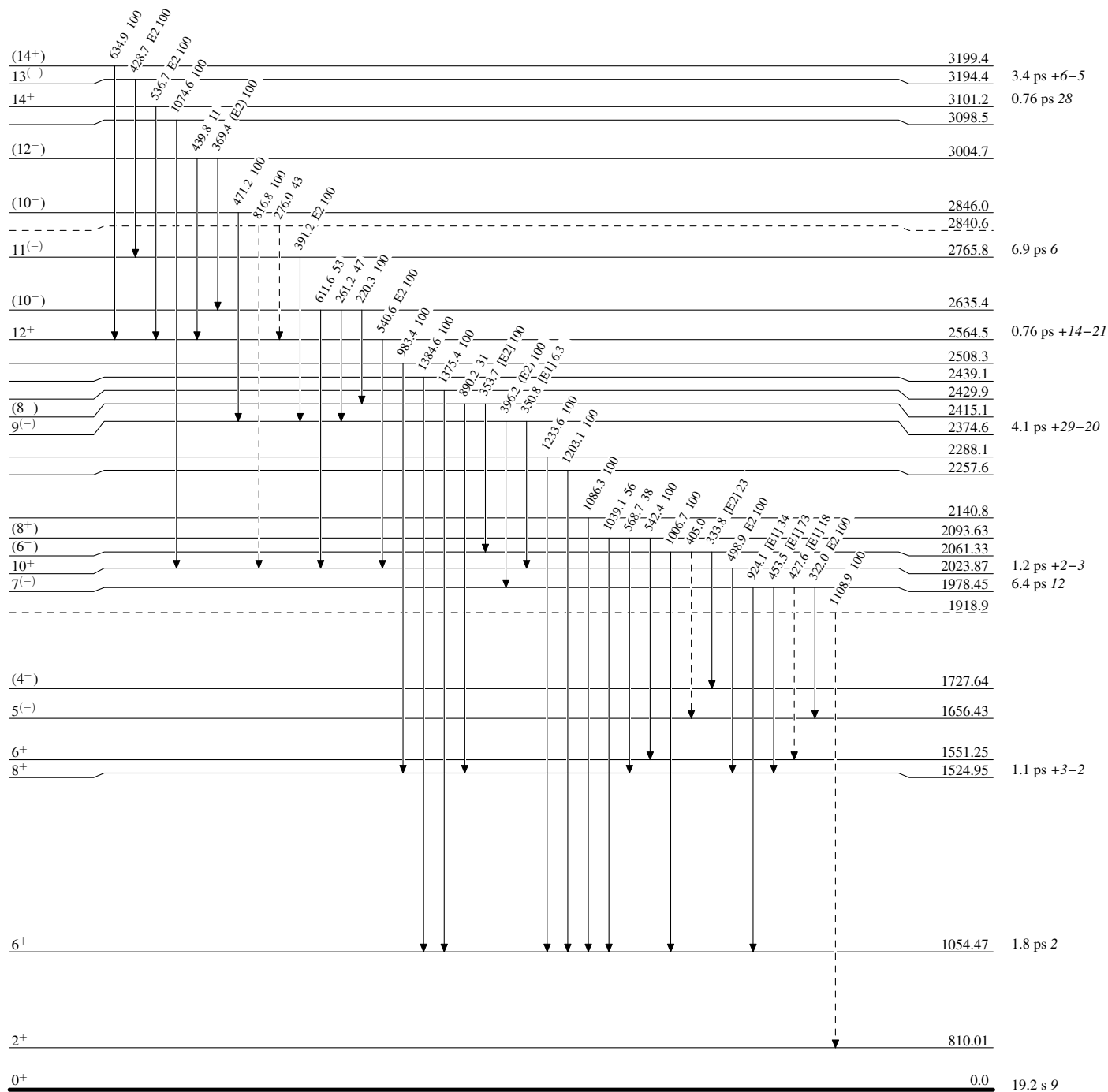


Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

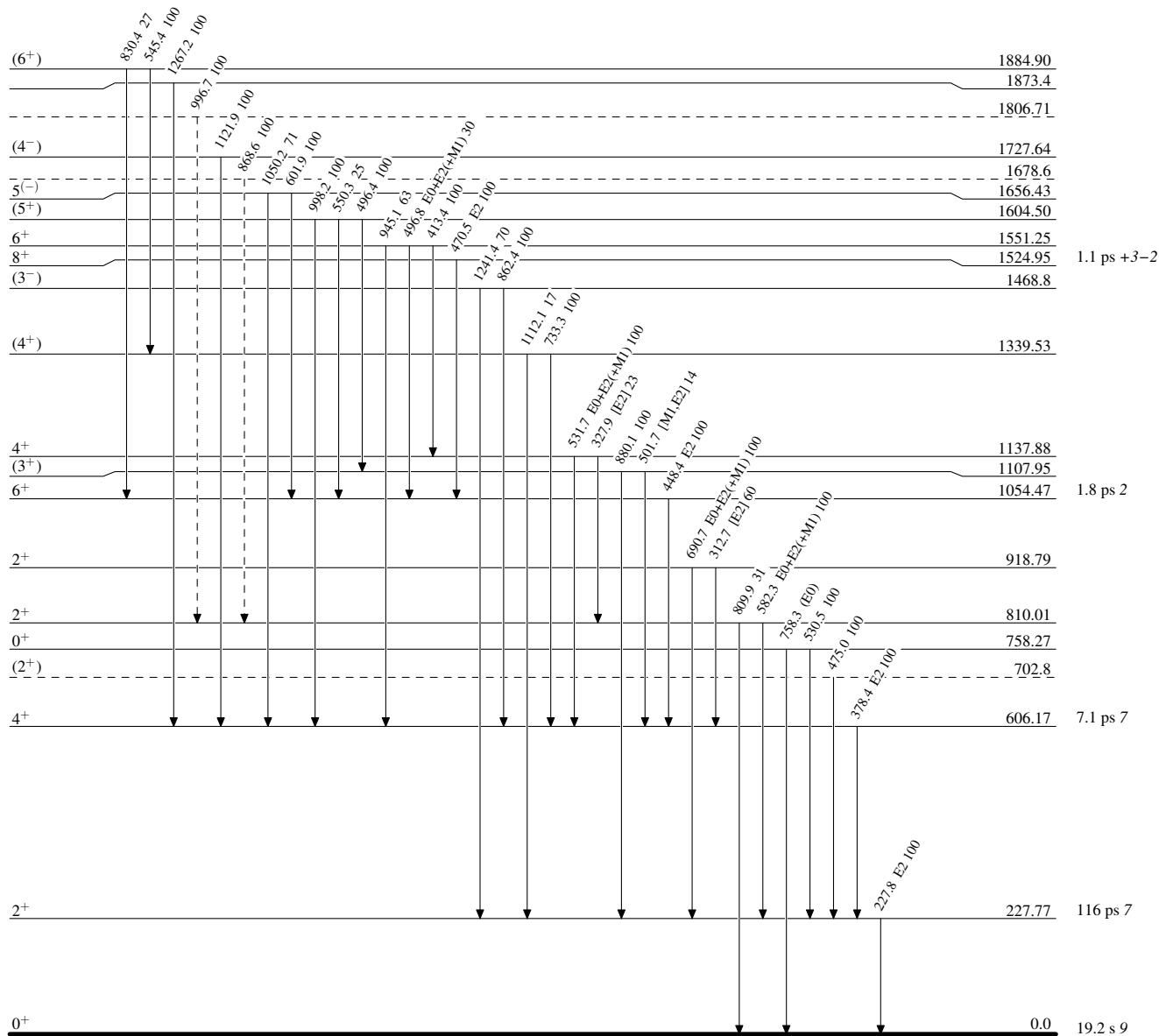
-----▶ γ Decay (Uncertain)

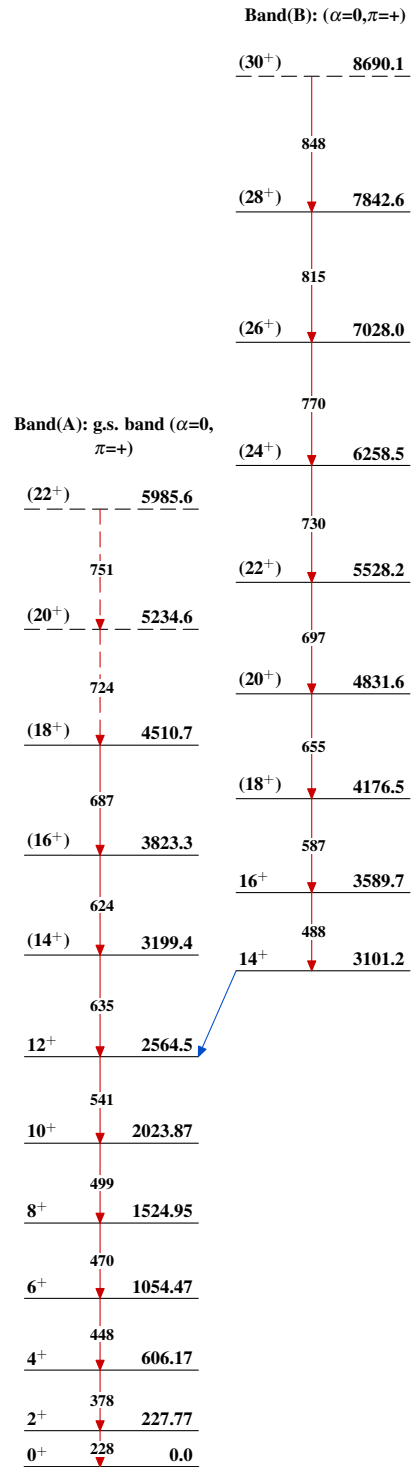
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain) $^{172}_{76}\text{Os}_{96}$

Adopted Levels, Gammas

Adopted Levels, Gammas (continued)