Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	T. D. Johnson, Balraj Singh	NDS 142, 1 (2017)	15-Apr-2017

Q(β^-)=−537 *13*; S(n)=5920.8 *4*; S(p)=7258.9 *5*; Q(α)=1976.1 *9* 2017Wa10
S(2n)=13910.4 *5*, S(2p)=13660.7 *12* (2017Wa10).
^{189}Os isotope discovered by F.W. Aston: Nature 127, 233 (1931) from mass spectrography (see 2012Ro36 compilation).

^{189}Os Levels

Band assignments suggested by 1983Jh01.
Resonance levels above the neutron separation energy can be found in the ^{188}Os(n,γ):Resonances dataset (2010Fu04) and (n,γ) with E_n = 2,24 keV resonances (1992Br17).

Cross Reference (XREF) Flags

A	^{189}Re β^- decay (24.3 h)	F	^{188}Os(n,γ):resonances	K	^{189}Os(d,d′)
B	^{189}Os IT decay (5.81 h)	G	^{188}Os(d,p),^{190}Os(d,t)	L	Coulomb excitation
C	^{189}Ir ε decay (13.2 d)	H	^{189}Os(γ,γ):Mossbauer	M	^{190}Os(^{3}He,α)
D	^{188}Os(n,γ) E=thermal	I	^{189}Os(γ,γ')		
E	^{188}Os(n,γ) E=2,24 keV	J	^{189}Os(e,e′)		

E(level)[†]	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0[a]	3/2$^-$	stable	ABCDE GHIJKL	μ=+0.659933 *4* (1954Lo36,2014StZZ) Q=+0.86 *3* (1972Wa24,2016St14) RMS charge radius <r^2>$^{1/2}$=5.4016 fm *12* (2013An02 evaluation). μ: NMR (1954Lo36, subject to correction for chemical effects). Other: +0.6565 *3* (1968Sc03). Q: Mossbauer effect (1972Wa24). Other: +0.98 *6* (2002Kr01) for 5d^{6}6s^2, and 0.97 *9* for 5d^{7}6s from laser induced fluorescence spectroscopy, +0.8 *2* from optical spectroscopy includes polarization correction (1962Mu04), +0.91 *10* from optical spectroscopy (1968Hi04). J$^\pi$: spin from optical spectroscopy (1954Lo36) and NMR (1952Mu40); parity from L(d,p)=1 from 0$^+$ target.
30.82[b] *2*	9/2$^-$	5.81 h *10*	ABCD G IJ L	%IT=100 J$^\pi$: M3+E4 γ to 3/2$^-$; L=5 in (d,p), (d,t). T$_{1/2}$: weighted average of 5.65 h *15* (2000Ah03), 6.0 h *1* (1963Pr12) and 5.7 h *1* (1958Sc30). Others: 5.7 h (1973Ot01), 6 h (1950Ch11).
36.20[&] *2*	1/2$^-$	0.52 ns *3*	A CDE HI L	μ=+0.23 *3* (1969Wa02,2014StZZ) μ: Mossbauer effect (1969Wa02). J$^\pi$: M1+E2 to 3/2$^-$, $\gamma\gamma(\theta)$ isotropic. T$_{1/2}$: weighted average of 0.53 ns *3* from delayed coincidence in ^{189}Ir ε decay (1970Ma37) and 0.50 ns *3* from Mossbauer (1969Wa02).
69.54[a] *2*	5/2$^-$	1.62 ns *4*	A CDE GHIJKL	μ=+0.988 *6* (1972Wa24,2014StZZ) Q=−0.63 *2* (1972Wa24,2016St14) J$^\pi$: E2 to 1/2$^-$, L=3 in (d,p), (d,t). T$_{1/2}$: weighted average of delayed coincidence measurements 1.59 ns *8* (1970Ma37), 1.63 ns *4* (1969Gr10), and 1.7 ns *1* (1969An17) in ^{189}Ir ε decay. Others: Mossbauer 1.8 ns *2* (1968Pe09); Coulomb excitation 1.5 ns *3*; delayed coincidence 2.12 ns *10* (1971Be71). μ: Mossbauer effect (1972Wa24, does not include polarization correction). Others: +0.82 *23* from IPAC (1968Pe09), 1971Be23. Q: Mossbauer effect (1972Wa24), deduced from the $Q_{5/2-}/Q_{3/2-}$ ratio of −0.735 *12*. Other value: −0.67 *7* (1972Wa24, if the value for $Q_{3/2-}$ of +0.91

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Adopted Levels, Gammas (continued)

^{189}Os Levels (continued)

E(level)[†]	J$^{\pi}$	T$_{1/2}$	XREF	Comments
				10 used in this reference is taken).
95.27[&] *1*	3/2$^-$	0.23 ns *3*	A CDE GH KL	μ=−0.32 *5* (1971Be23,2014StZZ) XREF: G(95.35). J$^{\pi}$: M1+E2 to 1/2$^-$ and 5/2$^-$. T$_{1/2}$: from delayed coincidence in ^{189}Ir ε decay (1970Ma37). Other: 0.10 ns *2* from Coulomb excitation. μ: IPAC (1971Be71).
97.35 *3*	11/2$^+$		D	J$^{\pi}$: E1 to 9/2$^-$. Not populated in ^{189}Re β^- decay from 5/2$^+$.
216.67[c] *2*	7/2$^-$	0.41 ns *2*	A CD g I KL	J$^{\pi}$: M1+E2 to 9/2$^-$, E2 to 3/2$^-$. T$_{1/2}$: from B(E2) in Coulomb excitation. Others: 77 ps *10* from (γ,γ') Res. Fluorescence (1995La15); <0.3 ns from delayed coincidence in^{189}Ir ε decay (1970Ma37).
219.39[a] *2*	7/2$^-$	0.260 ns *11*	A CD g I KL	J$^{\pi}$: M1+E2 to 9/2$^-$, E2 to 3/2$^-$. T$_{1/2}$: from B(E2) in Coulomb excitation. Other: 0.19 ns *3* from Coulomb excitation (1967Hr01); < 0.3 ns from (d,d′) (1975Mo29).
233.58[&] *2*	5/2$^-$	0.27 ns *+7−4*	A CDE KL	J$^{\pi}$: M1+E2 to 3/2$^-$ and 5/2$^-$, band assignment. T$_{1/2}$: from B(E2) in Coulomb excitation. Others: 0.28 ns *13* from Coulomb excitation; ≈0.1 ns from (d,d′) (1975Mo29).
275.92 *3*	5/2$^-$	0.17 ns *3*	A CDE G I L	J$^{\pi}$: M1+E2 to 3/2$^-$, M1 to 7/2$^-$. T$_{1/2}$: weighted average of 0.16 ns *4* from B(E2) in Coulomb excitation and 0.17 ns *3* from delayed coincidence in ^{189}Ir ε decay (1970Ma37).
288 *3*	(13/2$^+$)[‡]		G M	
350.0[a] *4*	(9/2$^-$)		KL	J$^{\pi}$: excited in Coulomb excitation, band assignment.
365.78[&] *3*	(7/2)$^-$		A D G KL	J$^{\pi}$: L=3 in (d,p) and (d,t); band member favors 7/2.
427.93 *4*	5/2$^-$,7/2$^-$	>4.4 ps	A I K	J$^{\pi}$: E2(+M1) to 7/2$^-$, γ to 3/2$^-$ and 9/2$^-$. T$_{1/2}$: from (γ,γ'): Res. Fluorescence (1995La16).
438.73 *3*	1/2$^-$,3/2$^-$		A CDE G	J$^{\pi}$: L=1 in (d,p), (d,t).
444.23 *3*	7/2$^+$		D G	XREF: G(?). J$^{\pi}$: E2 γ to 11/2$^+$, γs to 5/2$^-$ and 7/2$^-$. A 446 *4* level in (d,p) with L=1 (implying J$^{\pi}$=1/2$^-$,3/2$^-$) is given by 1975Mo29 but not confirmed by 1976Be50.
498.79 *3*	1/2$^-$,3/2$^-$		A DE L	J$^{\pi}$: M1 to 1/2$^-$.
505.86 *3*	1/2$^-$,3/2$^-$		DE G K	J$^{\pi}$: L=1 in (d,p), (d,t).
531.55 *3*	5/2$^-$	>0.26 ps	DE G I KL	J$^{\pi}$: L=3 in (d,p),(d,t), strong γ to 3/2$^-$. T$_{1/2}$: from (γ,γ'): Resonance fluorescence (1995La16).
550.04 *3*	3/2$^-$	>0.039 ps	A DE I	J$^{\pi}$: M1 to 5/2$^-$, fed by primary γ in (n,γ) (1976Be50). T$_{1/2}$: from (γ,γ'): Res. Fluorescence (1995La16).
557.36 *3*	3/2$^-$		DE g KL	J$^{\pi}$: L=2 in (d,d′); primary γ from ^{188}Os(n,γ) E=2,24 keV res: av. Additional information 1.
562.70 *5*			D	
594.9[a] *3*	(11/2$^-$)		KL	J$^{\pi}$: populated in Coulomb excitation, band assignment.
599.63 *3*	3/2$^-$		A De g i k	J$^{\pi}$: M1 γ rays to 1/2$^-$ and 5/2$^-$.
622.02 *3*	(3/2$^-$,5/2$^-$)		A D G K	J$^{\pi}$: γ rays to 1/2$^-$, 5/2$^-$ and 7/2$^-$. However, L>3 in (d,p),(d,t) indicating J=(7/2$^+$,9/2$^-$); possibly doublet,
630.6[&] *3*	(9/2$^-$)		L	J$^{\pi}$: populated in Coulomb excitation, band assignment.
634.2 *5*			L	
667.4 *4*			L	
672.14 *3*	5/2$^-$		A D K	J$^{\pi}$: from (n,γ), E=thermal (1992Br17); L=2 in (d,d′).
673.2 *11*	5/2		E	J$^{\pi}$: primary γ from (n,γ) E=24 keV res: av.
679.90 *3*	3/2$^-$		DE G	J$^{\pi}$: γ to 7/2$^-$, primary γ from (n,γ) E=2,24 keV res: av. However, L>3 in (d,p),(d,t) J$^{\pi}$ assignments conflict.

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Adopted Levels, Gammas (continued)

^{189}Os Levels (continued)

E(level)[†]	J^π	XREF	Comments
688.43 *3*	$1/2^-,3/2^-,5/2^-$	DE G	J^π: L=1,3 in (d,t); γs to $1/2^-$ and $3/2^-$.
716.89 *4*	$5/2^-$	A g	J^π: M1 to $3/2^-$, L=3 in (d,p), (d,t).
717.01 *4*	$5/2^-,7/2^-$	D g	J^π: from (n,γ), E=thermal.
735.5 *5*	$1/2^-,3/2^-$	G KL	J^π: L=1 in (d,p),(d,t).
786 *3*		G	
792.10 *5*	5/2	D k	J^π: L>2 in (d,d′), γs to $1/2^-$, $3/2^-$ and $7/2^-$.
794.3 *4*		kL	
817.0 *10*	$5/2^-,7/2^-$	G KL	J^π: L=3 in (d,p), (d,t).
849.73 *6*	$1/2^-,3/2^-$[#]	DE G	
877 *3*	$(13/2^+)$[‡]	G M	
898.2 *18*		G	
908.03 *4*	$1/2^-,3/2^-$[#]	DE G	J^π: L=1,3 in (d,p).
939.66 *4*	$3/2^+$	DE	J^π: γ to $3/2^-$ and $7/2^+$; primary γ from (n,γ) E=24 keV res: av.
957.3 *24*		G	
990.15 *4*	$7/2^+$	D	J^π: $\gamma\gamma(\theta)$ in (n,γ) thermal; γ rays to $5/2^-$ and $11/2^+$.
994.627 *25*	$1/2^-,3/2^-$	DE G	J^π: L=1 in (d,p), (d,t); primary γ from (n,γ) E=2,24 keV res: av.
996.4 *4*	$1/2^+,3/2^+$	E	J^π: populated by primary γ in (n,γ) E=24 keV res: av.
1019 *2*	$(13/2^+)$[‡]	G M	J^π: L=6 in (t,α).
1028 *3*		G	
1036.74 *7*	$(5/2^-,7/2,9/2^-)$	D	J^π: γ to $5/2^-$ and $9/2^-$.
1056.02 *4*	$(3/2)^-$[#]	DE G	J^π: from (n,γ) resonance, E(n)=24 keV, p-wave capture; γ to $(7/2)^-$.
1076.92 *7*		D	
1107.8 *18*		G	
1140.0 *4*	$1/2^-,3/2^-$[#@]	E	
1149.38 *7*	$1/2^+,3/2^+$[@]	DE	J^π: primary γ from (n,γ) E=24 keV res: av.
1159.94 *4*	$3/2^-$	DE	J^π: γ to 1/2, 3/2, and $7/2^-$; primary γ from (n,γ) E=2,24 keV res: av.
1163 *4*		G	
1188.9 *18*	$1/2^-,3/2^-$	E g	J^π: primary γ from (n,γ) E=2,24 keV res: av.; L=1 in (d,p),(d,t).
1190.42 *9*	$1/2^-,3/2^-$	D g	J^π: from (n,γ), E=thermal.
1196.9 *9*	$1/2^+,3/2^+$[#]	E	
1206.71 *7*		D G	
1220.27 *7*	$1/2^-,3/2^-$[#@]	DE G	
1226.35 *8*	$1/2^+,3/2^+$[#@]	DE	
1235.3 *2*	$1/2^-,3/2^-$[#@]	E	
1242.8 *43*		G	
1254.83 *5*	$1/2^-,3/2^-$[#@]	DE	
1267.36 *6*	$3/2,1/2^{(-)}$	D	J^π: from (n,γ), E=thermal.
1268.4 *11*	$1/2^+,3/2^+$[@]	E	J^π: primary γ from (n,γ) E=24 keV res: av.
1269 *1*		G	
1277.67 *6*		D	
1297.27 *4*	$3/2^-$	DE	J^π: γ to $1/2^-$, $3/2^-$ and $7/2^-$; primary γ from (n,γ) E=2,24 keV res: av.
1311.73 *9*	$1/2^-,3/2^-$[#]	DE	
1333.47 *6*	$3/2^+$	DE	J^π: γ to $7/2^+$; primary γ observed in (n,γ) E=2,24 keV res: av.
1361.2 *3*	$1/2^-,3/2^-$[#]	E	
1370.09 *5*	$1/2^-,3/2^-$[#]	DE	
1376.72 *4*	$3/2^-$	DE G	J^π: γ to $7/2^-$; primary γ observed in (n,γ) E=2,24 keV res: av.
1394.6 *4*	$1/2^-,3/2^-$[#]	DE G	
1398.2 *4*	$1/2^-,3/2^-$[#]	E	
1407.54 *5*	$3/2^-$[#]	DE	J^π: γ to $7/2^-$.
1411.3 *20*	$1/2^-,3/2^-$	G	J^π: L=1 in (d,p).
1435.3 *3*	$1/2^-,3/2^-$[#]	E	

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Adopted Levels, Gammas (continued)

^{189}Os Levels (continued)

E(level)†	J^π	XREF	Comments
1445.5 *20*	$1/2^-,3/2^-$	G	J^π: L=1 in (d,p).
1451.38 *8*	$1/2^+,3/2^+$	DE	J^π: primary γ from (n,γ) E=24 keV res: av.
1472.27 *6*	$1/2^-,3/2^-$#	DE	J^π: from (n,γ), E=thermal; (n,γ) E=2,24 keV res: av.
1475.0 *9*	$1/2^-,3/2^-$	E G	J^π: L=1 in (d,p).
1554.6 *25*	$1/2^-,3/2^-$	G	J^π: L=1 in (d,p).
1633.7 *23*		G	
1699.6 *20*	$(5/2^-)$	D G	J^π: from (n,γ), E=thermal; L=3 in (d,p).
1724.8 *21*	$5/2^-,7/2^-$	G	J^π: L=3 in (d,p).
1816 *1*	$(1/2$ to $7/2)^-$	G	J^π: L(d,p)=1,3.
1895 *5*	(1/2,3/2)	D	J^π: primary γ from $1/2^+$.
1941 *5*	(1/2,3/2)	D	J^π: primary γ from $1/2^+$.
(5921 *1*)	$1/2^+$	D	E(level): S(n)=5920.8 *4* (2017Wa10).
(5922.5 *5*)	$1/2^+$	E	E(level): S(n)+E(n), where S(n)=5920.8 *4* (2017Wa10), E(n)=2 keV.
(5944.5 *5*)	$1/2,3/2^-$	E	E(level): S(n)+E(n), where S(n)=5920.8 *4* (2017Wa10), E(n)=2 keV.

† From least-squares fit to Eγ values.
‡ L=6 in (t,α) favors $13/2^+$, however, $11/2^+$ cannot be excluded.
# Primary γ observed in (n,γ) E=2,24 keV res: av.
@ Additional support for parity assignments from intensity ratios at different neutron energies in (n,γ), E=2,24 keV using the average resonance capture (ARC) technique.
& Band(A): ν1/2[510] band.
a Band(B): ν3/2[512] band.
b Band(C): ν9/2[505] band.
c Band(D): ν7/2[503] band.

γ(^{189}Os)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[#]	δ[@]	α[m]	Comments
30.82	9/2⁻	30.81[&] *4*	100	0.0	3/2⁻	M3+E4	0.04 *2*	3.12×10^{5} *10*	α(L)=2.21×10^{5} *6*; α(M)=7.1×10^{4} *4* α(N)=1.78×10^{4} *9*; α(O)=2.66×10^{3} *10*; α(P)=47.5 *8* B(M3)(W.u.)=0.000356 *14*; B(E4)(W.u.)=0.5 *+6−4*
36.20	1/2⁻	36.17[e] *4*	100	0.0	3/2⁻	M1+E2	0.046 *5*	20.2 *4*	α(L)=15.6 *3*; α(M)=3.60 *7* α(N)=0.877 *17*; α(O)=0.150 *3*; α(P)=0.01065 *16* B(M1)(W.u.)=0.042 *3*; B(E2)(W.u.)=27 *7*
69.54	5/2⁻	33.31[e] *4*	0.19 *2*	36.20	1/2⁻	E2		723	α(L)=546 *9*; α(M)=138.5 *21* α(N)=33.0 *5*; α(O)=4.83 *8*; α(P)=0.00382 *6* B(E2)(W.u.)=24 *3*
		69.53 *3*	100 *4*	0.0	3/2⁻	M1+E2	+0.683 *25*	8.2 *3*	α(L)=6.25 *23*; α(M)=1.56 *6*; α(N)=0.375 *14*; α(O)=0.0572 *20*; α(P)=0.00113 *3* B(M1)(W.u.)=0.0026 *2*; B(E2)(W.u.)=100 *10*
95.27	3/2⁻	25.65[e] *10*	1.9 *2*	69.54	5/2⁻	M1+E2	0.11 *+5−3*	84 *34*	α(L)=64 *26*; α(M)=15.3 *65* α(N)=3.7 *16*; α(O)=0.60 *23*; α(P)=0.0293 *6* B(M1)(W.u.)=0.011 *7*; B(E2)(W.u.)=80 *+90−40*
		59.06[b] *2*	100 *6*	36.20	1/2⁻	M1+E2	0.085 *10*	4.82 *10*	α(L)=3.72 *8*; α(M)=0.859 *18* α(N)=0.209 *5*; α(O)=0.0358 *7*; α(P)=0.00250 *4* B(M1)(W.u.)=0.048 *8*; B(E2)(W.u.)=27 *16*
		95.27[b] *1*	30.5 *15*	0.0	3/2⁻	M1+E2	+0.32 *2*	6.36	α(K)=4.92 *9*; α(L)=1.10 *3*; α(M)=0.261 *8* α(N)=0.0634 *19*; α(O)=0.0105 *3*; α(P)=0.000577 *10* B(M1)(W.u.)=0.0032 *6*; B(E2)(W.u.)=14 *3*
97.35	11/2⁺	66.55[g] *4*	100	30.82	9/2⁻	E1		0.227	α(L)=0.1749 *25*; α(M)=0.0404 *6* α(N)=0.00963 *14*; α(O)=0.001513 *22*; α(P)=6.73×10^{-5} *10*
216.67	7/2⁻	121.39[f] *5*	0.53 *6*	95.27	3/2⁻	[E2]		2.02	α(K)=0.567 *8*; α(L)=1.098 *16*; α(M)=0.280 *4* α(N)=0.0672 *10*; α(O)=0.00996 *14*; α(P)=5.30×10^{-5} *8* B(E2)(W.u.)=1.75 *22*
		147.11[c] *4*	22.3 *5*	69.54	5/2⁻	M1+E2	−1.0 *+4−3*	1.43 *21*	α(K)=0.96 *28*; α(L)=0.36 *5*; α(M)=0.087 *15* α(N)=0.021 *4*; α(O)=0.0033 *5*; α(P)=1.07×10^{-4} *35* B(M1)(W.u.)=0.0008 *4*; B(E2)(W.u.)=14 *6*
		185.85[a] *1*	34.3 *7*	30.82	9/2⁻	M1(+E2)	<0.5	0.91 *6*	α(K)=0.74 *6*; α(L)=0.133 *5*; α(M)=0.0309 *14* α(N)=0.0075 *4*; α(O)=0.00128 *4*; α(P)=8.6×10^{-5} *8* B(M1)(W.u.)=0.00105 *17*; B(E2)(W.u.)<2.2
		216.66 *4*	100.0 *21*	0.0	3/2⁻	E2		0.254	α(K)=0.1377 *20*; α(L)=0.0882 *13*; α(M)=0.0221 *4* α(N)=0.00533 *8*; α(O)=0.000810 *12*; α(P)=1.307×10^{-5} *19* B(E2)(W.u.)=18.2 *11*
219.39	7/2⁻	124.18[c] *6*	0.7 *4*	95.27	3/2⁻	[E2]		1.85	α(K)=0.541 *8*; α(L)=0.990 *14*; α(M)=0.253 *4* α(N)=0.0606 *9*; α(O)=0.00899 *13*; α(P)=5.02×10^{-5} *7* B(E2)(W.u.)=5 *3*
		149.86 *4*	17.0 *3*	69.54	5/2⁻	E2		0.916	α(K)=0.352 *5*; α(L)=0.426 *6*; α(M)=0.1083 *16* α(N)=0.0260 *4*; α(O)=0.00388 *6*; α(P)=3.20×10^{-5} *5* B(E2)(W.u.)=43 *2*

Adopted Levels, Gammas (continued)

γ(^{189}Os) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[#]	δ[@]	α[m]	Comments
219.39	7/2⁻	188.55 5	10.88 21	30.82	9/2⁻	M1+E2	1.5 +10−4	0.57 9	α(K)=0.374 98; α(L)=0.147 6; α(M)=0.0363 20 α(N)=0.0088 5; α(O)=0.00137 5; α(P)=4.0×10^{-5} 12 B(M1)(W.u.)=0.00025 +11−14; B(E2)(W.u.)=6 +2−1
		219.39 4	100.0 19	0.0	3/2⁻	E2		0.244	α(K)=0.1332 19; α(L)=0.0837 12; α(M)=0.0210 3 α(N)=0.00506 7; α(O)=0.000769 11; α(P)=1.268×10^{-5} 18 B(E2)(W.u.)=38 2
233.58	5/2⁻	138.28 4	23[i] 2	95.27	3/2⁻	M1+E2	−0.8 2	1.84 13	α(K)=1.29 18; α(L)=0.42 4; α(M)=0.102 11 α(N)=0.025 3; α(O)=0.0039 4; α(P)=0.000146 23 B(M1)(W.u.)=0.0012 +4−5; B(E2)(W.u.)=17 +6−7 I_γ: Weighted average from ^{189}Ir ε and (n,γ) thermal.
		164.02 4	22[i] 3	69.54	5/2⁻	M1(+E2)	<1.7	1.1 3	α(K)=0.82 32; α(L)=0.22 4; α(M)=0.053 12 α(N)=0.013 3; α(O)=0.0021 4; α(P)=9.3×10^{-5} 40 B(M1)(W.u.)=0.00087 63; B(E2)(W.u.)<16
		197.36 4	80[i] 9	36.20	1/2⁻	E2		0.347	α(K)=0.1756 25; α(L)=0.1299 19; α(M)=0.0327 5 α(N)=0.00787 11; α(O)=0.001190 17; α(P)=1.642×10^{-5} 23 B(E2)(W.u.)=25 +5−8
		233.58 4	100[i] 4	0.0	3/2⁻	M1+E2	1.7 +6−3	0.28 4	α(K)=0.19 3; α(L)=0.0658 10; α(M)=0.01610 24 α(N)=0.00389 6; α(O)=0.000613 11; α(P)=2.1×10^{-5} 4 B(M1)(W.u.)=0.0005 +3−4; B(E2)(W.u.)=10 +3−4
275.92	5/2⁻	56.50[&] 4	1.99 18	219.39	7/2⁻	M1		5.17	α(L)=3.99 6; α(M)=0.916 13 α(N)=0.224 4; α(O)=0.0386 6; α(P)=0.00287 4 B(M1)(W.u.)=0.0099 21
		59.1 1	≈0.8	216.67	7/2⁻	(M1+E2)	≈0.9	≈22.0	α(L)≈16.6; α(M)≈4.20 α(N)≈1.007; α(O)≈0.1504; α(P)≈0.001543 E_γ: γ not confirmed in (n,γ) from $\gamma\gamma$-coin, but its presence seems established in β^- and ε decays.
		180.64[&] 7	0.51 4	95.27	3/2⁻	E2(+M1)	>0.2	0.75 28	α(K)=0.53 31; α(L)=0.165 24; α(M)=0.040 8 α(N)=0.0097 18; α(O)=0.00155 19; α(P)=5.9×10^{-5} 39 B(M1)(W.u.)<7.0×10^{-5}; B(E2)(W.u.)=0.53 50
		206.35[&] 5	1.35 5	69.54	5/2⁻	M1+E2	>1.9	0.34 5	α(K)=0.20 5; α(L)=0.1066 20; α(M)=0.0266 7 α(N)=0.00640 16; α(O)=0.000983 16; α(P)=2.07×10^{-5} 60 B(M1)(W.u.)<3.3×10^{-5}; B(E2)(W.u.)=1.05 33
		239.83[c] 16	1.3 7	36.20	1/2⁻	[E2]		0.183	α(K)=0.1055 15; α(L)=0.0584 9; α(M)=0.01461 21 α(N)=0.00352 5; α(O)=0.000538 8; α(P)=1.020×10^{-5} 15 B(E2)(W.u.)=0.6 4 I_γ: the relative intensity of this transition varies widely in ^{189}Re β^- decay and (n,γ). The adopted intensity represents the unweighted average.
		245.09 4	100 6	30.82	9/2⁻	E2		0.1704	α(K)=0.0997 14; α(L)=0.0536 8; α(M)=0.01338 19 α(N)=0.00322 5; α(O)=0.000493 7; α(P)=9.67×10^{-6} 14 B(E2)(W.u.)=41 8
		275.85 8	8.8 3	0.0	3/2⁻	M1+E2	1.8 2	0.167 10	α(K)=0.119 9; α(L)=0.0359 7; α(M)=0.00873 14

$^{189}_{76}Os_{113}$-6

γ(^{189}Os) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[#]	δ[@]	α[m]	Comments
									α(N)=0.00211 *4*; α(O)=0.000336 *7*; α(P)=1.29×10^{-5} *11* B(M1)(W.u.)=8.9×10^{-5} *23*; B(E2)(W.u.)=1.5 *3*
350.0	(9/2$^-$)	280.8 *5*	100	69.54	5/2$^-$				
365.78	(7/2)$^-$	132.22[c] *6*	22 *3*	233.58	5/2$^-$				
		270.53[d] *6*	35 *3*	95.27	3/2$^-$				
		296.18[d] *6*	100 *8*	69.54	5/2$^-$				
		365		0.0	3/2$^-$				E_γ: only in Coulomb excitation from 1997Br18.
427.93	5/2$^-$,7/2$^-$	152.03[f] *5*	25 *2*	275.92	5/2$^-$				
		211.26[f] *5*	13 *2*	216.67	7/2$^-$	E2(+M1)	>1	0.38 *10*	α(K)=0.25 *11*; α(L)=0.0959 *24*; α(M)=0.0236 *11* α(N)=0.00570 *23*; α(O)=0.000892 *14*; α(P)=2.7×10^{-5} *13* B(M1)(W.u.)<0.018; B(E2)(W.u.)<330
		397.0[f] *1*	100 *10*	30.82	9/2$^-$				
		428.5[f] *5*	46 *10*	0.0	3/2$^-$				
438.73	1/2$^-$,3/2$^-$	162.74[g] *9*	1.1 *3*	275.92	5/2$^-$				
		343.44[b] *6*	100 *5*	95.27	3/2$^-$				
		402.65[b] *8*	9.6 *16*	36.20	1/2$^-$				
		438.5[&] *1*	6.7 *17*	0.0	3/2$^-$				
444.23	7/2$^+$	224.82 *6*	5.9 *7*	219.39	7/2$^-$				
		227.60 *5*	11.8 *12*	216.67	7/2$^-$				
		346.88 *3*	100 *7*	97.35	11/2$^+$	E2		0.0599	α(K)=0.0409 *6*; α(L)=0.01446 *21*; α(M)=0.00355 *5* α(N)=0.000856 *12*; α(O)=0.0001345 *19*; α(P)=4.20×10^{-6} *6*
		413.14[n] *21*	4.7[n] *15*	30.82	9/2$^-$				
498.79	1/2$^-$,3/2$^-$	222.84 *8*	6.0 *13*	275.92	5/2$^-$				γ from (n,γ) E=thermal only.
		265.22[j] *5*	17[k] *4*	233.58	5/2$^-$				
		403.53[j] *5*	65[k] *12*	95.27	3/2$^-$				
		429.22[j] *4*	43 *7*	69.54	5/2$^-$				I_γ: from ^{189}Re β$^-$. Other: 40 *3* from (n,γ) E=thermal, if 498.94-keV γ ray in (n,γ) is assigned from this level.
		462.6 *1*	100.0 *23*	36.20	1/2$^-$	M1		0.0813	α(K)=0.0675 *10*; α(L)=0.01065 *15*; α(M)=0.00244 *4* α(N)=0.000595 *9*; α(O)=0.0001029 *15*; α(P)=7.73×10^{-6} *11* E_γ,I_γ: from ^{189}Re β$^-$. Other: Eγ=462.48 *6*, a strong γ ray was unplaced in (n,γ) E=thermal (1992Br17), but tentatively assigned by evaluators from the 499 level, based on results from ^{189}Re β$^-$ data.
		498.8 *1*	50 *5*	0.0	3/2$^-$	M1		0.0667	α(K)=0.0554 *8*; α(L)=0.00872 *13*; α(M)=0.00199 *3* α(N)=0.000487 *7*; α(O)=8.42×10^{-5} *12*; α(P)=6.33×10^{-6} *9* E_γ,I_γ: from ^{189}Re β$^-$. Other: Eγ=498.94 *4*, Iγ=79 *11* relative to 100 for Eγ=462.48 *6* in (n,γ) E=thermal, both unplaced in 1992Br17, but tentatively assigned by evaluators from the 499 level, based on results from ^{189}Re β$^-$ data.
505.86	1/2$^-$,3/2$^-$	272.4 *5*		233.58	5/2$^-$				

Adopted Levels, Gammas (continued)

γ(^{189}Os) (continued)

E_i(level)	J^{π}_i	E_γ[†]	I_γ[‡]	E_f	J^{π}_f	Mult.[#]	α[m]	Comments
505.86	1/2⁻,3/2⁻	410.60 4	70 5	95.27	3/2⁻			
		469.65 4	100 7	36.20	1/2⁻			
		505.86 5	59 4	0.0	3/2⁻			
531.55	5/2⁻	297.83[g] 9	32 6	233.58	5/2⁻			
		312.17[g] 4	8 3	219.39	7/2⁻			
		314.91[g] 4	19 1	216.67	7/2⁻			
		531.44[h] 10	100 10	0.0	3/2⁻			
550.04	3/2⁻	273.6[f] 5	5[f] 1	275.92	5/2⁻	[M1]	0.332	α(K)=0.275 4; α(L)=0.0440 7; α(M)=0.01009 15 α(N)=0.00246 4; α(O)=0.000426 7; α(P)=3.18×10⁻⁵ 5 B(M1)(W.u.)<0.79
		316.52[g] 6	1.5[g] 1	233.58	5/2⁻			
		454.75[c] 3	100 7	95.27	3/2⁻			
		480.53[g] 5	42[g] 3	69.54	5/2⁻			
		550.0[f] 3	24[f] 2	0.0	3/2⁻	M1	0.0517	α(K)=0.0430 6; α(L)=0.00674 10; α(M)=0.001542 22 α(N)=0.000376 6; α(O)=6.51×10⁻⁵ 10; α(P)=4.90×10⁻⁶ 7 B(M1)(W.u.)<0.47
557.36	3/2⁻	281.74[g] 16	9[g] 3	275.92	5/2⁻			
		323.72[h] 4	64[g] 10	233.58	5/2⁻			
		487.87[g] 4	55[g] 5	69.54	5/2⁻			
		521.20[g] 4	100[g] 7	36.20	1/2⁻			
562.70		118.50 9	42 9	444.23	7/2⁺			
		465.28 18	100 27	97.35	11/2⁺			
594.9	(11/2⁻)	245.0 5	≈86	350.0	(9/2⁻)			
		375.3 5	100	219.39	7/2⁻			
		378.3 5	67	216.67	7/2⁻			
599.63	3/2⁻	101.1[l] 5	0.7[l] 4	498.79	1/2⁻,3/2⁻	M1	5.45 11	α(K)=4.50 9; α(L)=0.733 15; α(M)=0.168 4 α(N)=0.0411 9; α(O)=0.00709 15; α(P)=0.000527 11
		160.93[l] 5	5.7[l] 7	438.73	1/2⁻,3/2⁻	M1	1.451	α(K)=1.199 17; α(L)=0.194 3; α(M)=0.0445 7 α(N)=0.01086 16; α(O)=0.00188 3; α(P)=0.0001396 20
		323.7[l] 1	2.0[l] 7	275.92	5/2⁻	[M1]	0.211	α(K)=0.1745 25; α(L)=0.0278 4; α(M)=0.00637 9 α(N)=0.001556 22; α(O)=0.000269 4; α(P)=2.01×10⁻⁵ 3 Note that a strong 323.72 4 γ is placed from a 557 level in (n,γ) E=thermal.
		366.09[j] 10	10.1[k] 19	233.58	5/2⁻			
		380.0 2	4.7 4	219.39	7/2⁻	[E2]	0.0464	α(K)=0.0326 5; α(L)=0.01050 15; α(M)=0.00256 4 α(N)=0.000619 9; α(O)=9.79×10⁻⁵ 14; α(P)=3.38×10⁻⁶ 5 Eγ unweighted average and Iγ weighted average from β⁻ and (n,γ).
		382.95[j] 8	5.5[k] 13	216.67	7/2⁻	[E2]	0.0455	α(K)=0.0321 5; α(L)=0.01024 15; α(M)=0.00250 4 α(N)=0.000604 9; α(O)=9.56×10⁻⁵ 14; α(P)=3.33×10⁻⁶ 5
		504.33[j] 16	44[k] 6	95.27	3/2⁻	M1	0.0648	α(K)=0.0539 8; α(L)=0.00847 12; α(M)=0.00194 3 α(N)=0.000473 7; α(O)=8.18×10⁻⁵ 12; α(P)=6.15×10⁻⁶ 9

$^{189}_{76}Os_{113}$-8

$\gamma(^{189}Os)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.[#]	δ[@]	α[m]	Comments
599.63	3/2⁻	530.3[l] *3*	11.7[l] *7*	69.54	5/2⁻	M1		0.0569	α(K)=0.0473 *7*; α(L)=0.00742 *11*; α(M)=0.001697 *24* α(N)=0.000414 *6*; α(O)=7.17×10⁻⁵ *10*; α(P)=5.39×10⁻⁶ *8*
		563.41[j] *10*	100 *6*	36.20	1/2⁻	M1		0.0486	α(K)=0.0404 *6*; α(L)=0.00633 *9*; α(M)=0.001447 *21* α(N)=0.000353 *5*; α(O)=6.11×10⁻⁵ *9*; α(P)=4.60×10⁻⁶ *7*
		599.62[j] *4*	56[k] *5*	0.0	3/2⁻	M1		0.0413	α(K)=0.0344 *5*; α(L)=0.00538 *8*; α(M)=0.001229 *18* α(N)=0.000300 *5*; α(O)=5.19×10⁻⁵ *8*; α(P)=3.91×10⁻⁶ *6*
622.02	(3/2⁻,5/2⁻)	256.22[c] *4*	96[g] *8*	365.78	(7/2)⁻	[M1+E2]		0.27 *13*	
		388.40[c] *4*	100[g] *7*	233.58	5/2⁻	[M1+E2]		0.09 *5*	
		405.5[g] *5*	58[g] *43*	216.67	7/2⁻				
		586.03[g] *9*	27[g] *2*	36.20	1/2⁻				
630.6	(9/2⁻)	280.8 *5*	≈58	350.0	(9/2⁻)				
		397.2 *5*	100	233.58	5/2⁻				
		410.9 *5*	87	219.39	7/2⁻				
634.2		634.2 *5*	100	0.0	3/2⁻				
667.4		597.9 *5*	14	69.54	5/2⁻				
		667.4 *5*	100	0.0	3/2⁻				
672.14	5/2⁻	306.37[c] *5*	13[g] *1*	365.78	(7/2)⁻	[M1+E2]		0.17 *8*	
		438.58[c] *3*	100[g] *8*	233.58	5/2⁻	[M1+E2]		0.06 *3*	
		452.91[g] *10*	69[g] *8*	219.39	7/2⁻	[M1+E2]		0.06 *3*	
679.90	3/2⁻	122.47 *6*	6.2 *9*	557.36	3/2⁻				
		181.06 *5*	17.3 *21*	498.79	1/2⁻,3/2⁻				
		241.22 *6*	16.7 *24*	438.73	1/2⁻,3/2⁻				
		460.64 *6*	95 *8*	219.39	7/2⁻				
		463.20 *6*	100 *10*	216.67	7/2⁻				
		584.60 *5*	36 *3*	95.27	3/2⁻				
		610.75 *17*	6.2 *11*	69.54	5/2⁻				
		643.69 *4*	51 *4*	36.20	1/2⁻				
		679.97 *20*	7 *3*	0.0	3/2⁻				
688.43	1/2⁻,3/2⁻,5/2⁻	593.18 *4*	100 *7*	95.27	3/2⁻				
		652.16 *5*	17.8 *14*	36.20	1/2⁻				
		688.50 *5*	68 *5*	0.0	3/2⁻				
716.89	5/2⁻	117.27[f] *5*	8[f] *3*	599.63	3/2⁻	M1		3.56	α(K)=2.94 *5*; α(L)=0.478 *7*; α(M)=0.1097 *16* α(N)=0.0268 *4*; α(O)=0.00463 *7*; α(P)=0.000344 *5*
		166.95[f] *5*	6.1[f] *13*	550.04	3/2⁻	E2(+M1)	>2	0.69 *7*	α(K)=0.35 *9*; α(L)=0.256 *10*; α(M)=0.065 *3* α(N)=0.0155 *7*; α(O)=0.00235 *8*; α(P)=3.5×10⁻⁵ *11*
		218[f] *1*	26[f] *13*	498.79	1/2⁻,3/2⁻	[M1]		0.621 *12*	α(K)=0.514 *10*; α(L)=0.0826 *16*; α(M)=0.0189 *4* α(N)=0.00463 *9*; α(O)=0.000799 *16*; α(P)=5.96×10⁻⁵ *12*
		351.08[c] *10*	26[f] *13*	365.78	(7/2)⁻	[M1]		0.1692	α(K)=0.1403 *20*; α(L)=0.0223 *4*; α(M)=0.00511 *8* α(N)=0.001248 *18*; α(O)=0.000216 *3*; α(P)=1.615×10⁻⁵ *23*
		440.80[c] *14*	18[f] *9*	275.92	5/2⁻				

$^{189}_{76}Os_{113}$-9

$\gamma(^{189}Os)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	α[m]	Comments
716.89	5/2⁻	483.2[f] *1*	30[f] *8*	233.58	5/2⁻	[M1]	0.0725	α(K)=0.0602 *9*; α(L)=0.00949 *14*; α(M)=0.00217 *3* α(N)=0.000530 *8*; α(O)=9.16×10⁻⁵ *13*; α(P)=6.89×10⁻⁶ *10*
		497.3[f] *1*	100[f] *26*	219.39	7/2⁻			
717.01	5/2⁻,7/2⁻	272.77[n] *7*	36[n] *5*	444.23	7/2⁺			
		351.06 *10*	7 *1*	365.78	(7/2)⁻			
		440.77 *14*	9 *2*	275.92	5/2⁻			
		621.83 *5*	100 *7*	95.27	3/2⁻			
		647.41 *10*	10 *1*	69.54	5/2⁻			
		717.09 *8*	20 *2*	0.0	3/2⁻			
735.5	1/2⁻,3/2⁻	735.5 *5*	100	0.0	3/2⁻			
792.10	5/2	293.18 *11*	32 *5*	498.79	1/2⁻,3/2⁻			
		572.83 *10*	43 *7*	219.39	7/2⁻			
		575.40 *6*	100 *8*	216.67	7/2⁻			
794.3		163.8 *5*		630.6	(9/2⁻)			
		428.5 *5*	100	365.78	(7/2)⁻			
		575 *1*	17	219.39	7/2⁻			
817.0	5/2⁻,7/2⁻	817 *1*	100	0.0	3/2⁻			
849.73	1/2⁻,3/2⁻	849.70 *6*	100	0.0	3/2⁻			
908.03	1/2⁻,3/2⁻	308.41 *4*	100 *7*	599.63	3/2⁻			
		908.00 *6*	90 *7*	0.0	3/2⁻			
939.66	3/2⁺	339.91 *8*	14.6 *18*	599.63	3/2⁻			
		495.49 *4*	100 *7*	444.23	7/2⁺			
990.15	7/2⁺	427.44 *4*	100 *7*	562.70				
		545.86 *6*	87 *8*	444.23	7/2⁺			
		770.81[n] *7*	14.5[n] *10*	219.39	7/2⁻			
		892.92 *14*	16 *2*	97.35	11/2⁺			
		920.72 *12*	14 *2*	69.54	5/2⁻			
		959.37 *12*	15 *2*	30.82	9/2⁻			
994.627	1/2⁻,3/2⁻	277.79 *15*	12 *4*	717.01	5/2⁻,7/2⁻			
		372.55 *6*	32 *3*	622.02	(3/2⁻,5/2⁻)			
		394.99 *5*	33 *3*	599.63	3/2⁻			
		444.59 *5*	9 *1*	550.04	3/2⁻			
		761.08 *5*	100 *7*	233.58	5/2⁻			
		899.39 *5*	57 *4*	95.27	3/2⁻			
1036.74	(5/2⁻,7/2,9/2⁻)	817.59 *16*	85 *14*	219.39	7/2⁻			
		819.82 *14*	100 *15*	216.67	7/2⁻			
		967.17 *9*	26 *4*	69.54	5/2⁻			
		1006.11 *15*	25 *3*	30.82	9/2⁻			
1056.02	(3/2)⁻	550.11 *4*	100 *7*	505.86	1/2⁻,3/2⁻			
		690.30 *8*	20.1 *18*	365.78	(7/2)⁻			
		1019.98 *8*	15.0 *12*	36.20	1/2⁻			
1076.92		801.00 *6*	100	275.92	5/2⁻			
1149.38	1/2⁺,3/2⁺	710.62 *6*	100 *9*	438.73	1/2⁻,3/2⁻			

$^{189}_{76}Os_{113}$-10

γ(^{189}Os) (continued)

E_i(level)	J^π_i	E_γ†	I_γ‡	E_f	J^π_f
1149.38	$1/2^+,3/2^+$	1054.36 18	26 4	95.27	$3/2^-$
1159.94	$3/2^-$	602.64 8	100 11	557.36	$3/2^-$
		721.16 8	39 4	438.73	$1/2^-,3/2^-$
		795.0[n] 4	6[n] 2	365.78	$(7/2)^-$
		940.41 11	24 3	219.39	$7/2^-$
		943.25 16	14 2	216.67	$7/2^-$
		1064.74 7	29 3	95.27	$3/2^-$
1190.42	$1/2^-,3/2^-$	751.69 8	100	438.73	$1/2^-,3/2^-$
1206.71		930.78 7	100 8	275.92	$5/2^-$
		1109.38 13	29 4	97.35	$11/2^+$
1220.27	$1/2^-,3/2^-$	280.71 9	100 16	939.66	$3/2^+$
		663.03 15	49 7	557.36	$3/2^-$
		781.39 9	40 3	438.73	$1/2^-,3/2^-$
1226.35	$1/2^+,3/2^+$	727.55 7	100	498.79	$1/2^-,3/2^-$
1254.83	$1/2^-,3/2^-$	582.97 9	45 4	672.14	$5/2^-$
		704.66 6	100 8	550.04	$3/2^-$
		756.05 12	23 8	498.79	$1/2^-,3/2^-$
1267.36	$3/2,1/2^{(-)}$	272.77[n] 7	207[n] 29	994.627	$1/2^-,3/2^-$
		735.78 7	100 9	531.55	$5/2^-$
1277.67		678.33 21	60 11	599.63	$3/2^-$
		838.92 5	100 8	438.73	$1/2^-,3/2^-$
1297.27	$3/2^-$	608.84 10	56 7	688.43	$1/2^-,3/2^-,5/2^-$
		739.99 7	73 7	557.36	$3/2^-$
		791.38 16	29 4	505.86	$1/2^-,3/2^-$
		1078.03 13	43 4	219.39	$7/2^-$
		1080.50 6	100 7	216.67	$7/2^-$
1311.73	$1/2^-,3/2^-$	873.00 8	100	438.73	$1/2^-,3/2^-$
1333.47	$3/2^+$	770.81[n] 7	38[n] 3	562.70	
		827.58 8	100 13	505.86	$1/2^-,3/2^-$
		889.19 11	35 8	444.23	$7/2^+$
1370.09	$1/2^-,3/2^-$	812.74 5	100 8	557.36	$3/2^-$
		864.13 12	15 2	505.86	$1/2^-,3/2^-$
1376.72	$3/2^-$	696.66 10	24 3	679.90	$3/2^-$
		871.02 6	100 8	505.86	$1/2^-,3/2^-$
		937.99 5	49 4	438.73	$1/2^-,3/2^-$
		1010.96 7	24 5	365.78	$(7/2)^-$
		1100.71 12	67 6	275.92	$5/2^-$
		1156.95 11	50 5	219.39	$7/2^-$
1394.6	$1/2^-,3/2^-$	795.0[n] 4	100[n]	599.63	$3/2^-$
1407.54	$3/2^-$	413.14[n] 21	81[n] 26	994.627	$1/2^-,3/2^-$
		719.11 9	79 7	688.43	$1/2^-,3/2^-,5/2^-$
		901.64 7	100 8	505.86	$1/2^-,3/2^-$
		1131.52 7	60 9	275.92	$5/2^-$
1407.54	$3/2^-$	1191.14 12	96 12	216.67	$7/2^-$
1451.38	$1/2^+,3/2^+$	291.83 20	16 4	1159.94	$3/2^-$
		659.24 6	100 8	792.10	5/2
1472.27	$1/2^-,3/2^-$	532.65 16	70 13	939.66	$3/2^+$
		914.90 5	100 7	557.36	$3/2^-$
(5921)	$1/2^+$	3980 4	13 6	1941	(1/2,3/2)
		4026 4	12 6	1895	(1/2,3/2)
		4221 3	45 12	1699.6	$(5/2^-)$
		4449 4	11 6	1472.27	$1/2^-,3/2^-$
		4527 3	18 6	1394.6	$1/2^-,3/2^-$
		4546 3	38 8	1376.72	$3/2^-$
		4928 3	37 13	994.627	$1/2^-,3/2^-$
		5363 3	10 4	557.36	$3/2^-$
		5370 3	31 7	550.04	$3/2^-$
		5415 2	100 21	505.86	$1/2^-,3/2^-$
		5482 2	38 9	438.73	$1/2^-,3/2^-$
		5884 2	44 9	36.20	$1/2^-$
(5922.5)	$1/2^+$	4447.5 9	34 14	1475.0	$1/2^-,3/2^-$
		4450.8 4	76 14	1472.27	$1/2^-,3/2^-$
		4471.7 9	15 4	1451.38	$1/2^+,3/2^+$
		4487.3 3	57 7	1435.3	$1/2^-,3/2^-$
		4515.0 4	39 6	1407.54	$3/2^-$
		4524.4 3	77 9	1398.2	$1/2^-,3/2^-$
		4528.7 5	39 8	1394.6	$1/2^-,3/2^-$
		4546.1 4	63 7	1376.72	$3/2^-$
		4552.8 4	38 6	1370.09	$1/2^-,3/2^-$
		4561.4 3	73 7	1361.2	$1/2^-,3/2^-$
		4589.3 7	15 4	1333.47	$3/2^+$
		4610.4 3	63 6	1311.73	$1/2^-,3/2^-$
		4625.4 3	49 5	1297.27	$3/2^-$
		4667.9 4	23 4	1254.83	$1/2^-,3/2^-$
		4687.4 2	77 6	1235.3	$1/2^-,3/2^-$
		4696.2 8	14 3	1226.35	$1/2^+,3/2^+$
		4702.8 4	31 5	1220.27	$1/2^-,3/2^-$
		4725.7 9	10 3	1196.9	$1/2^+,3/2^+$
		4733.7 4	35 4	1188.9	$1/2^-,3/2^-$
		4763.1 3	36 5	1159.94	$3/2^-$
		4772.9 5	10 3	1149.38	$1/2^+,3/2^+$
		4782.5 3	55 5	1140.0	$1/2^-,3/2^-$
		4865.9 3	35 5	1056.02	$(3/2)^-$
		4928.2 3	73 5	994.627	$1/2^-,3/2^-$
		5014.6 3	42 4	908.03	$1/2^-,3/2^-$
		5073.6 3	74 5	849.73	$1/2^-,3/2^-$

Adopted Levels, Gammas (continued)

$\gamma(^{189}Os)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ‡	E_f	J^π_f
(5922.5)	$1/2^+$	5234.1 3	52 4	688.43	$1/2^-,3/2^-,5/2^-$
		5243.0 3	56 4	679.90	$3/2^-$
		5323.0 3	63 4	599.63	$3/2^-$
		5365.6 3	86 6	557.36	$3/2^-$
		5372.7 3	43 4	550.04	$3/2^-$
		5416.9 3	88 5	505.86	$1/2^-,3/2^-$
		5423.9 3	29 3	498.79	$1/2^-,3/2^-$
		5483.7 3	53 4	438.73	$1/2^-,3/2^-$
		5827.4 2	152 8	95.27	$3/2^-$
		5886.4 2	100 5	36.20	$1/2^-$
		5922.3 3	34 3	0.0	$3/2^-$
(5944.5)	$1/2,3/2^-$	4469.6	259 41	1475.0	$1/2^-,3/2^-$
		4472.9	93 39	1472.27	$1/2^-,3/2^-$
		4493.7	84 12	1451.38	$1/2^+,3/2^+$
		4509.3	94 13	1435.3	$1/2^-,3/2^-$
		4537.0	36 12	1407.54	$3/2^-$
		4546.4	118 16	1398.2	$1/2^-,3/2^-$
		4550.8	122 17	1394.6	$1/2^-,3/2^-$
		4568.2	36 14	1376.72	$3/2^-$
		4574.9	70 13	1370.09	$1/2^-,3/2^-$
		4583.4	123 13	1361.2	$1/2^-,3/2^-$
		4611.3	73 12	1333.47	$3/2^+$
		4632.5	119 13	1311.73	$1/2^-,3/2^-$
		4647.5	53 11	1297.27	$3/2^-$
		4676.3	53 10	1268.4	$1/2^+,3/2^+$
		4690.0	69 13	1254.83	$1/2^-,3/2^-$
		4709.4	68 9	1235.3	$1/2^-,3/2^-$
		4718.2	74 9	1226.35	$1/2^+,3/2^+$
(5944.5)	$1/2,3/2^-$	4724.6	83 9	1220.27	$1/2^-,3/2^-$
		4747.7	75 10	1196.9	$1/2^+,3/2^+$
		4755.7	51 9	1188.9	$1/2^-,3/2^-$
		4785.2	72 9	1159.94	$3/2^-$
		4795.0	83 8	1149.38	$1/2^+,3/2^+$
		4804.6	87 9	1140.0	$1/2^-,3/2^-$
		4888.0	71 8	1056.02	$(3/2)^-$
		4948.2	124 14	996.4	$1/2^+,3/2^+$
		4950.3	131 14	994.627	$1/2^-,3/2^-$
		5004.8	66 8	939.66	$3/2^+$
		5036.7	97 8	908.03	$1/2^-,3/2^-$
		5095.7	140 10	849.73	$1/2^-,3/2^-$
		5256.2	144 9	688.43	$1/2^-,3/2^-,5/2^-$
		5265.0	84 7	679.90	$3/2^-$
		5271.5	33 5	673.2	5/2
		5345.1	106 7	599.63	$3/2^-$
		5387.6	160 10	557.36	$3/2^-$
		5394.7	160 10	550.04	$3/2^-$
		5412.0	24 5	531.55	$5/2^-$
		5439.0	116 8	505.86	$1/2^-,3/2^-$
		5446.0	98 8	498.79	$1/2^-,3/2^-$
		5505.8	141 8	438.73	$1/2^-,3/2^-$
		5669.3	16 3	275.92	$5/2^-$
		5709.8	16 3	233.58	$5/2^-$
		5849.4	219 12	95.27	$3/2^-$
		5875.0	15 3	69.54	$5/2^-$
		5908.4	100 6	36.20	$1/2^-$
		5944.4	93 6	0.0	$3/2^-$

† Weighted average of γ-ray energies from ^{189}Re β^- decay, ^{189}Ir ε decay, Coulomb excitation, and (n,γ), E=thermal, when possible. Exceptions are noted. For levels 849 keV and higher γ energies are from (n,γ), E=thermal.

‡ Weighted average of branching ratios from ^{189}Re β^- decay, ^{189}Ir ε decay, Coulomb excitation, and (n,γ), E=thermal.

From conversion electron measurements in ^{189}Re β^- decay (1970Ma37), ^{189}Ir ε decay (1973Ho27) and (n,γ) E=thermal.

@ Sign from $\gamma\gamma(\theta)$ in ^{189}Ir ε decay. Magnitude from weighted average of values from ^{189}Re β^- decay, ^{189}Ir ε decay and (n,γ) E=thermal, when values of comparable precision are available from more than one dataset. For 69.5γ from a 69.5 level, δ(E2/M1) from (γ,γ):Mossbauer is also included in the averaging.

& Weighted average from ^{189}Re β^- decay and ^{189}Ir ε decay.

[a] Weighted average from ^{189}Re β^- decay, ^{189}Ir ε decay, and Coulomb excitation.

[b] Weighted average from ^{189}Re β^- decay, ^{189}Ir ε decay, and (n,γ), E=thermal.

[c] Weighted average from ^{189}Re β^- decay and (n,γ), E=thermal.

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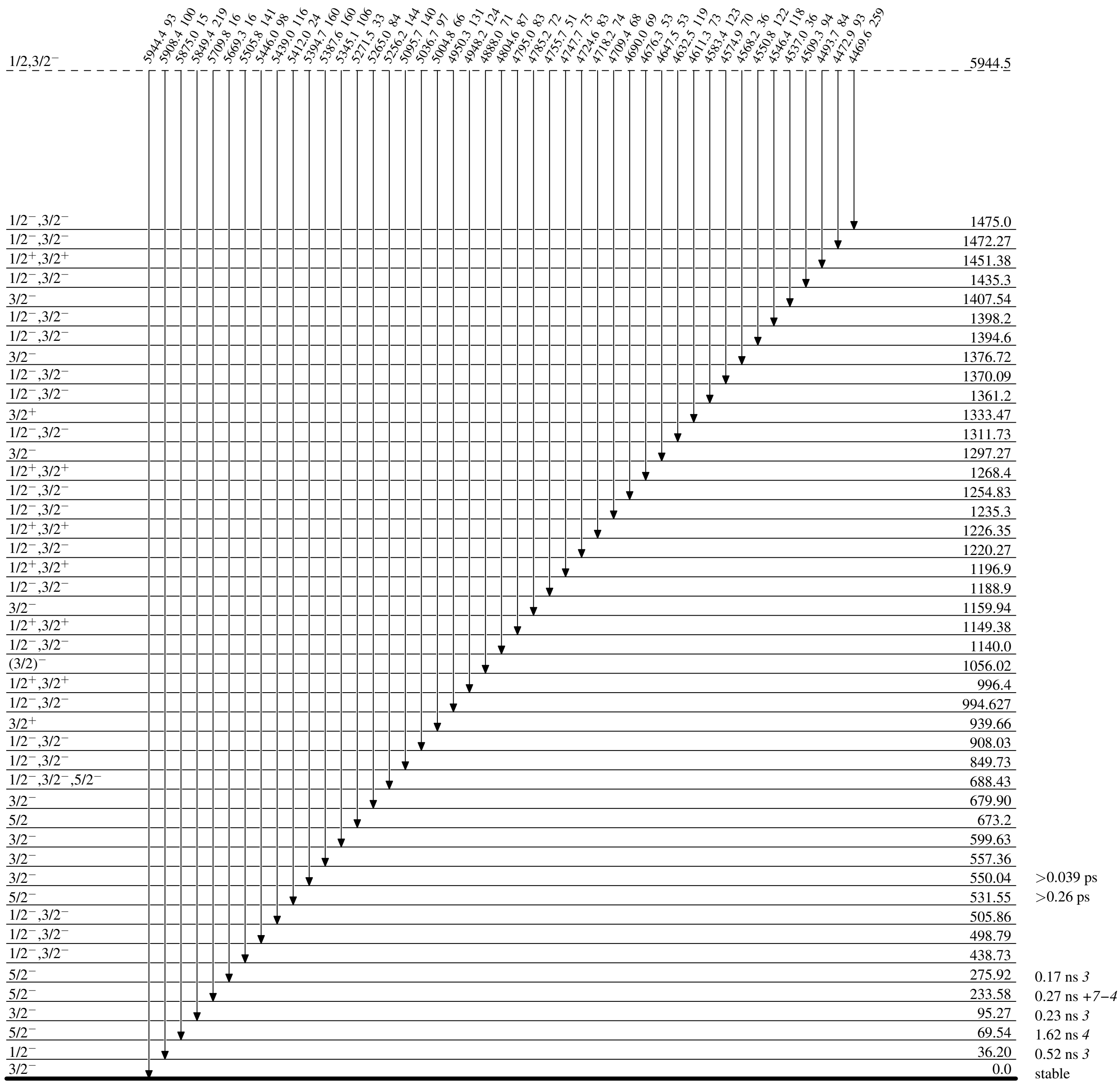
$\gamma(^{189}Os)$ (continued)

[d] Weighted average from ^{189}Re β^- decay, Coulomb excitation and (n,γ) E=thermal.
[e] From ^{189}Ir ε decay.
[f] From ^{189}Re β^- decay.
[g] From (n,γ) E=thermal.
[h] Weighted average from (n,γ) and Coulomb excitation.
[i] Weighted average from ^{189}Ir ε decay and (n,γ) E=thermal, since the value for the strongest transition depopulating the 233.57 level in ^{189}Re β^- decay is not in agreement with that in ^{189}Ir ε decay or (n,γ). Note that Iγ for the 197.36γ is an unweighted average.
[j] From weighted average of values in ^{189}Re β^- and (n,γ) E=thermal.
[k] From unweighted average of values from ^{189}Re β^- and (n,γ) E=thermal, normalized to the intensity of the 429γ, which is reported in both the experiments.
[l] γ only from ^{189}Re β^- decay.
[m] From BrIcc v2.3b (16-Dec-2014) 2008Ki07, “Frozen Orbitals” appr.
[n] Multiply placed with undivided intensity.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



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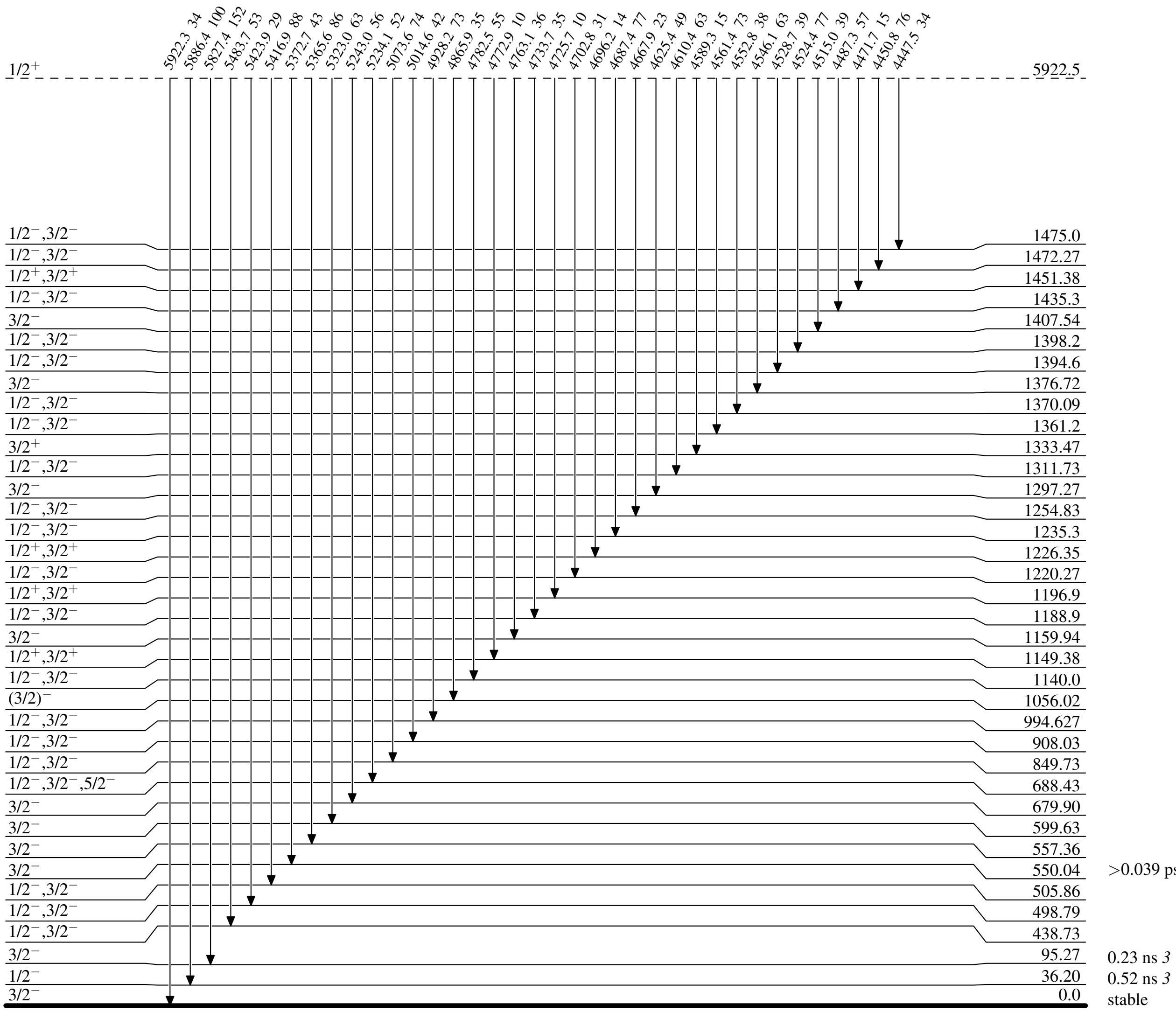
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



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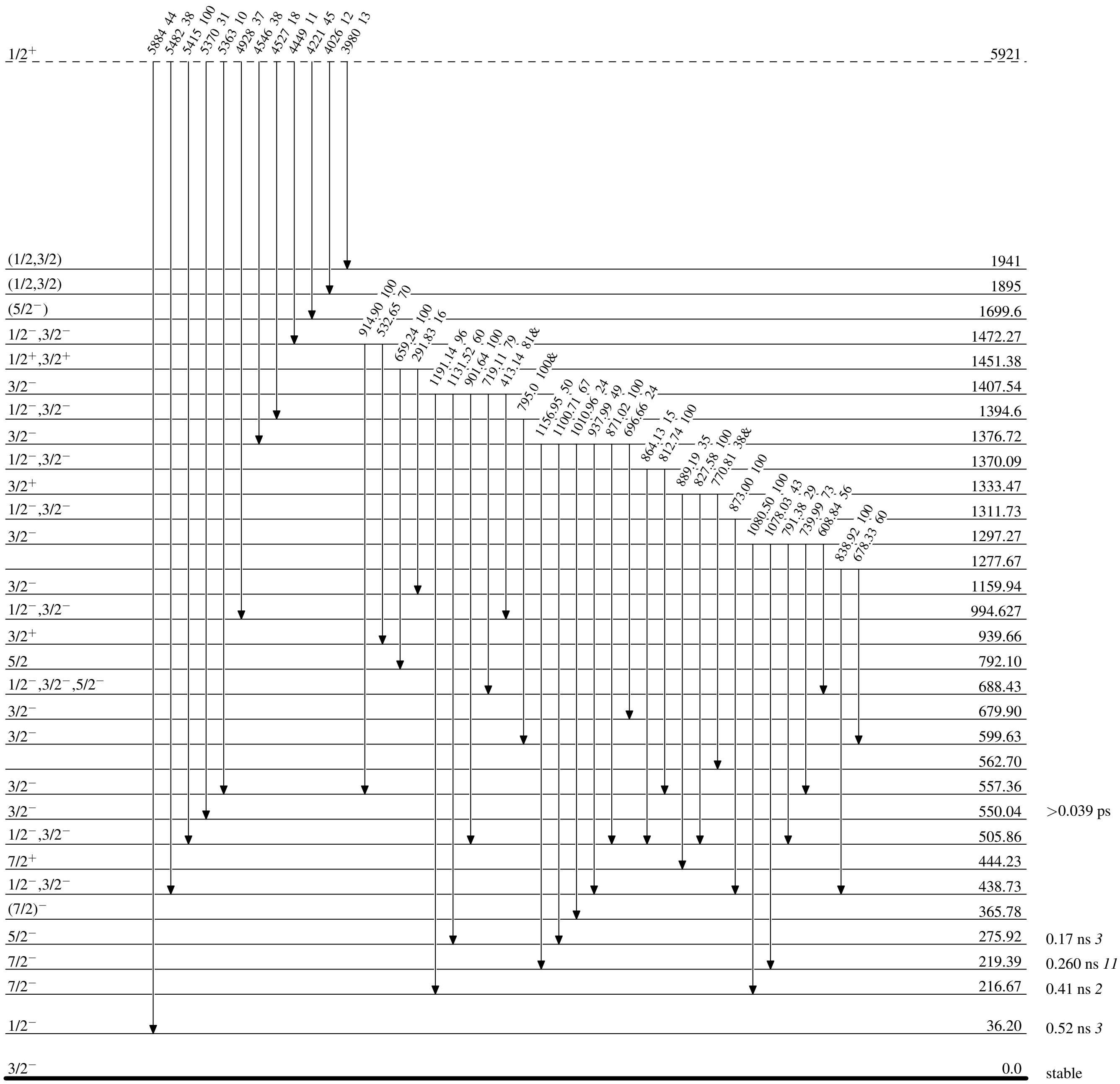
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



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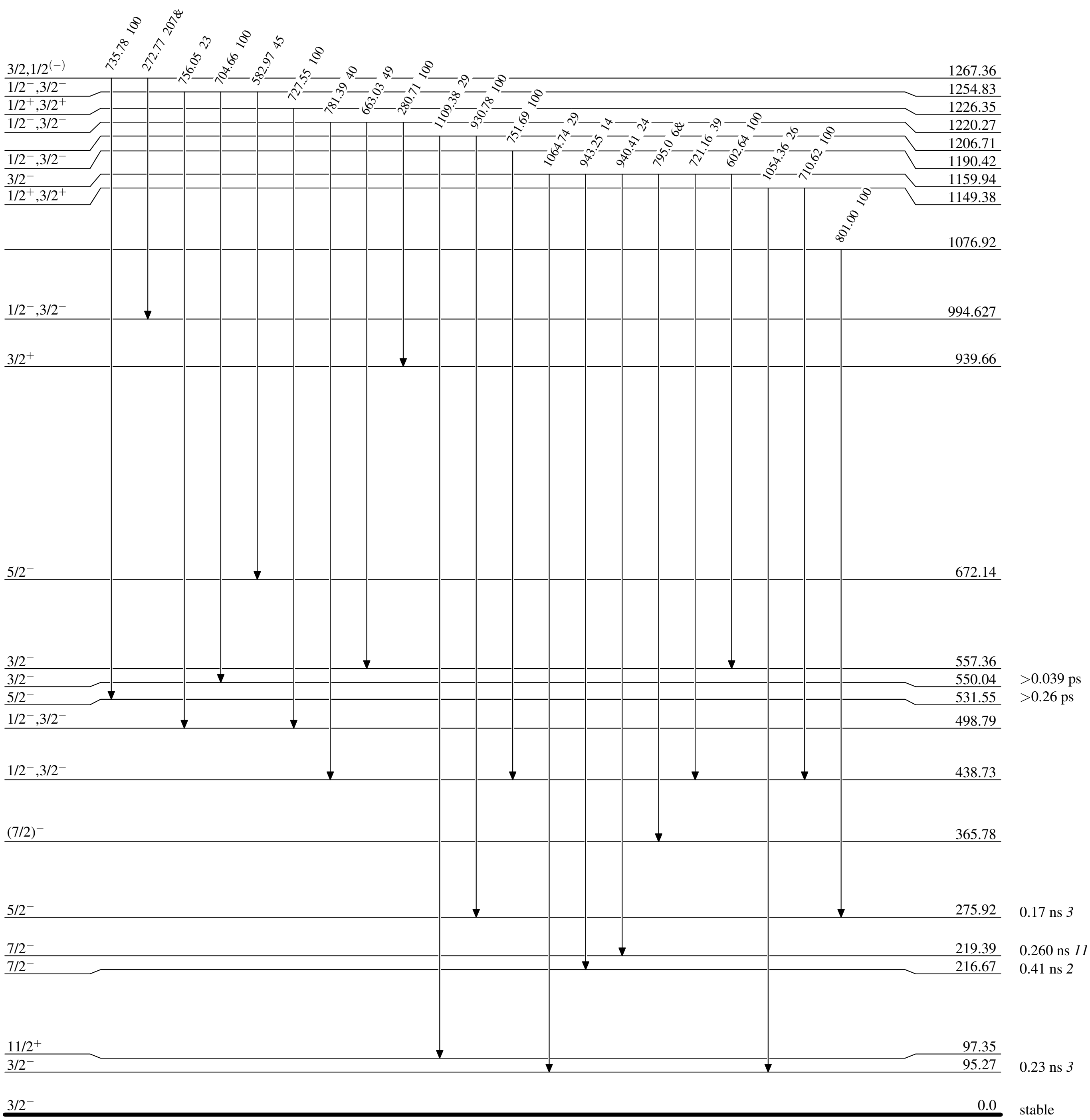
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



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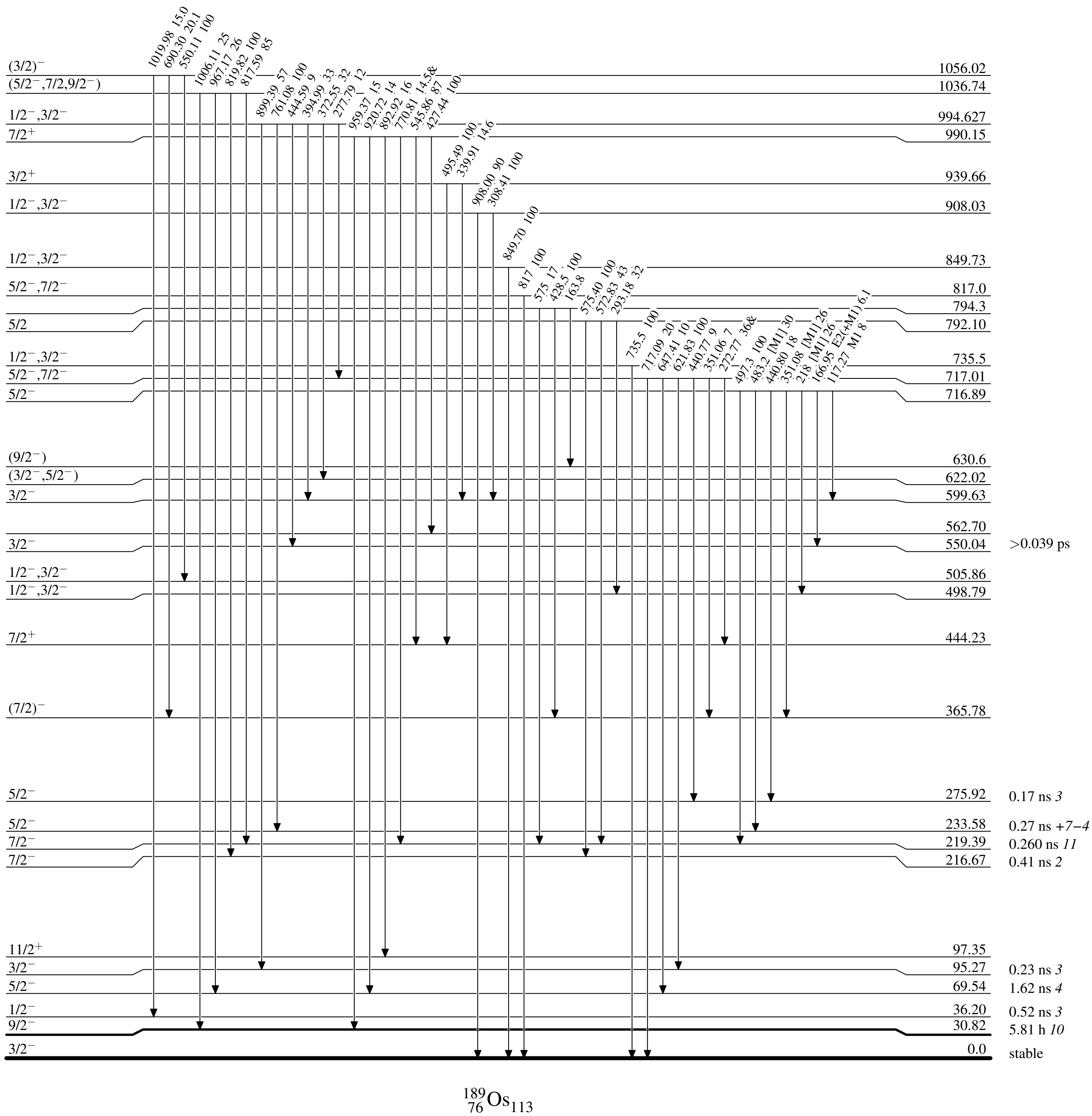
Adopted Levels, Gammas

Level Scheme (continued)

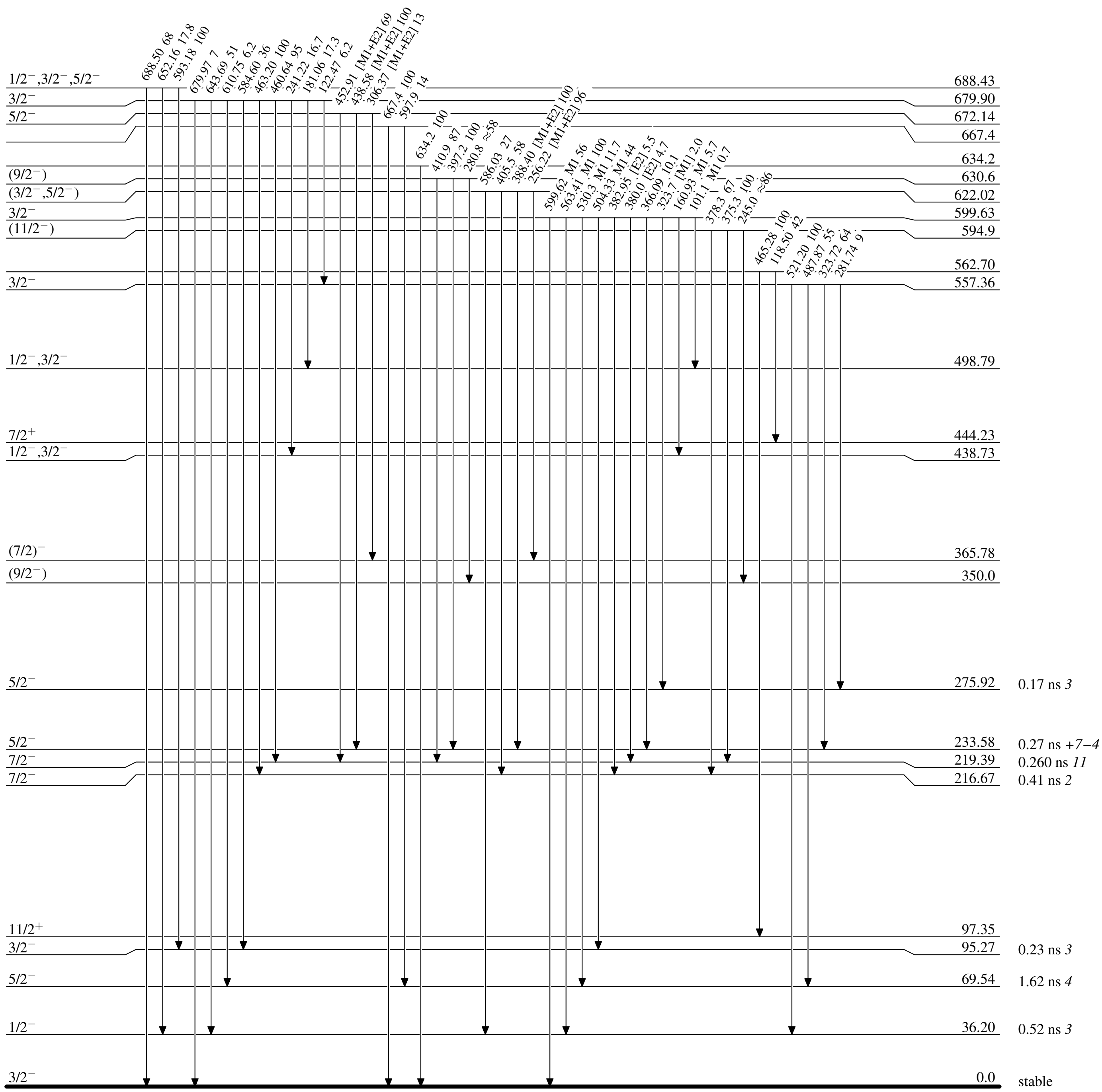
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



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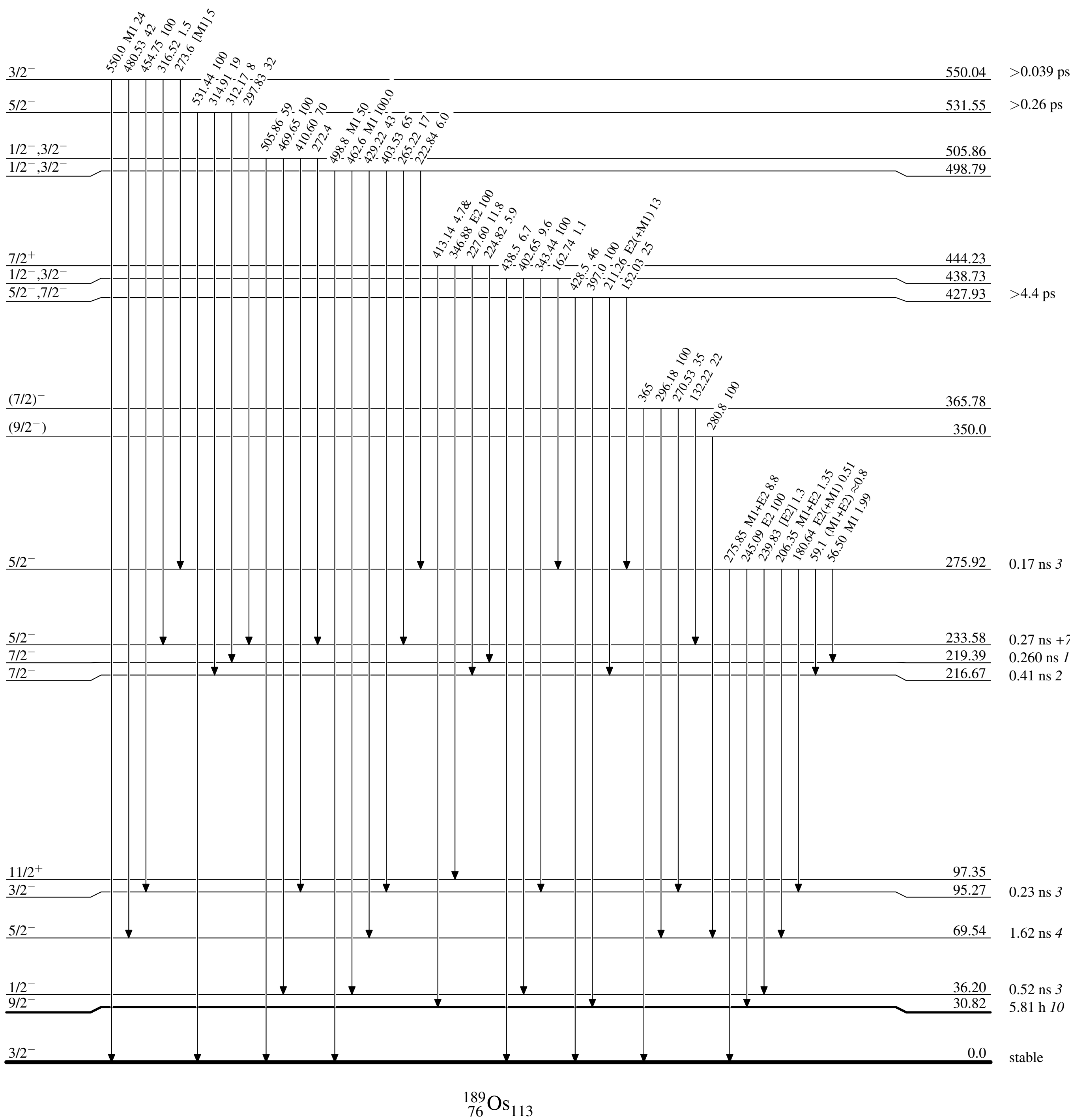
Adopted Levels, Gammas

Level Scheme (continued)

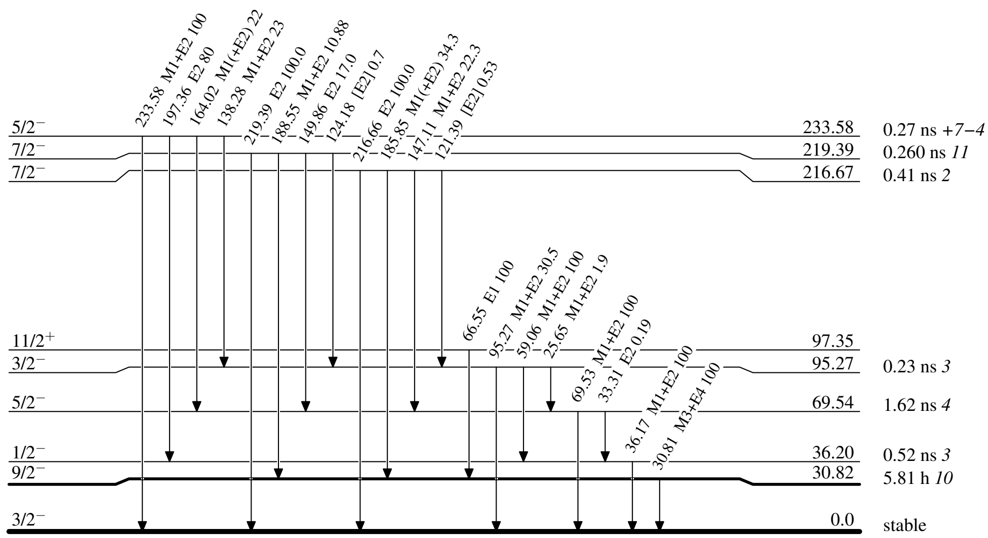
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



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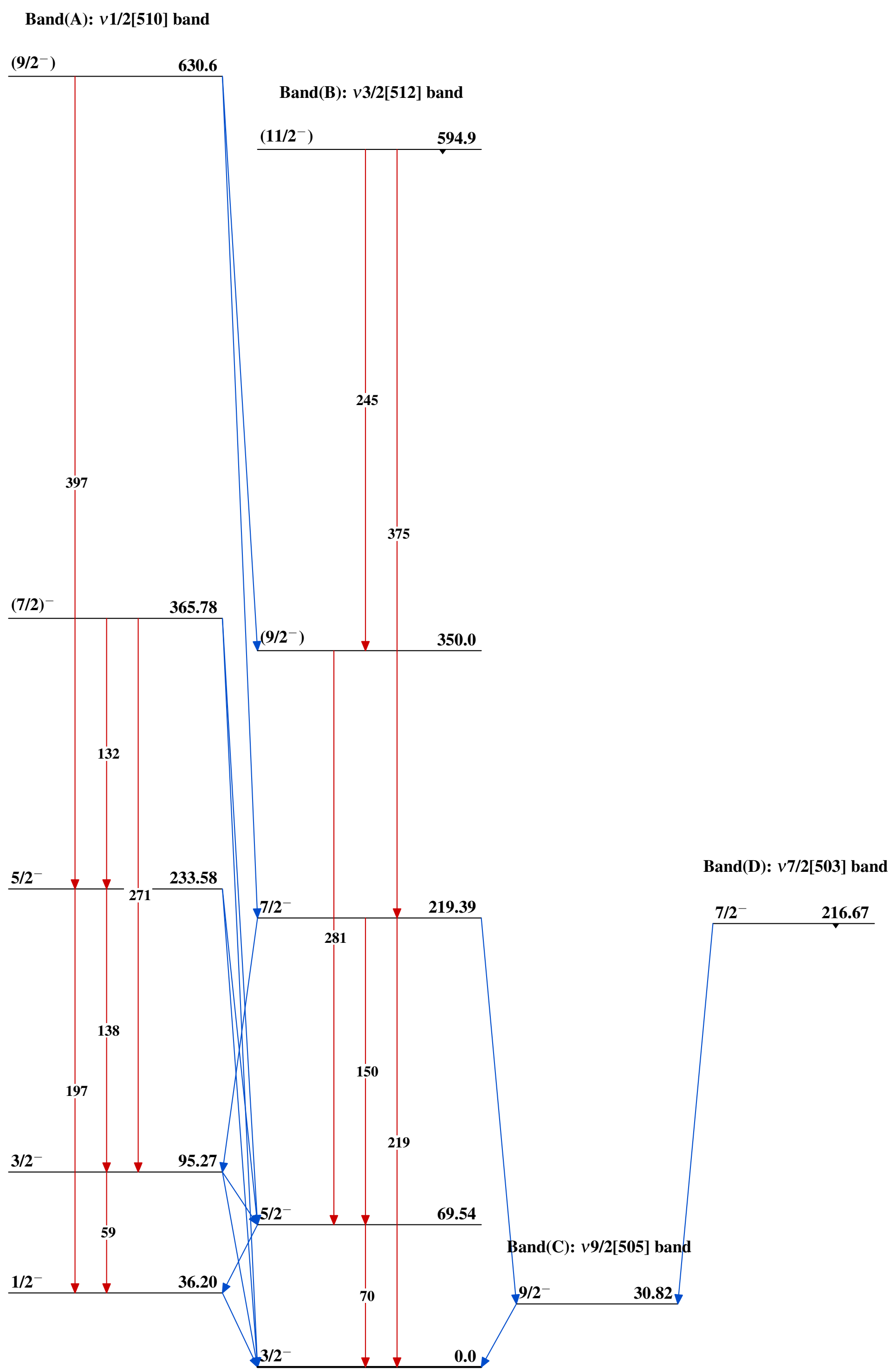
Adopted Levels, Gammas



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