Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 130, 21 (2015)	15-Jul-2015

$Q(\beta^-)=-8.4\times10^2$ *10*; $S(n)=700\times10^1$ *10*; $S(p)=448\times10^1$ *10*; $Q(\alpha)=2730$ *SY* 2012Wa38
Estimated uncertainty for $Q(\alpha)$=120 (2012Wa38).
S(2n)=15750 *100*, S(2p)=11090 *100* (2012Wa38).
Additional information 1.
First identification of ^{182}Re by 1950Wi14, 1950Dy61, 1950St89.

^{182}Re Levels

Cross Reference (XREF) Flags

A	^{182}Os ε decay (21.84 h)
B	^{176}Yb(^{11}B,5nγ)
C	^{181}Ta(α,3nγ),^{182}W(p,nγ),

E(level)[†]	J^π[‡]	$T_{1/2}$[#]	XREF	Comments
0.0[&]	7$^+$	64.2 h *5*	BC	%ε+%β^+=100 μ=2.83 *6* (1983Sp05,1980Sp01,2014StZZ) Q=+4.1 *3* (1983Ha49,2014StZZ,2013StZZ) J^π: spin from nuclear orientation measurement (1983Sp05). Parity from log $f^{1u}t$=8.3 to 5$^-$. $T_{1/2}$: weighted average of 64.3 *5* (2011Bo01,from 1427.4γ-decay curve, source produced in W(p,xn) reaction), 64.3 h *32* (2014Ma43, same group as 2011Bo11 but source produced in W(d,xn) reaction) and 64.0 h *5* (1950Wi14). Other: 60 h (1958Ga24). μ: from 1983Sp05, 1980Sp01 (NMR/rad. detection). Other: 2.84 *6* from 1981Ha22 (NMR/rad. detection). Q: from 1983Ha49 (NMR-ON).
0.0+x[a]	2$^+$	14.14 h *45*	A C	%ε+%β^+=100 μ=3.26 *10* (1987Oh10,2014StZZ) Q=+1.8 *2* (1981Er01,1985Ha41,2014StZZ,2013StZZ) E(level): 2012Au07 give x=60 *100*, 1984Sl01 estimate it as ≈50 keV based on singlet and triplet coupling of π5/2[402] and ν9/2[624]. $T_{1/2}$: from 470.3γ-decay curve, weighted average of 14.50 h *45* (2014Ma43, source produced in W(d,xn) reaction) and 13.74 h *48* (2011Bo01, source produced in W(p,xn) reaction). Others: 12.7 h *2* (1950Wi14), 14 h (1950Dy61), 13 h (1959Ga15), 12.5 h *5* (1963Ba37). Value of 12.7 h *2* from 1950Wi14 has been adopted for the last 75 years or so, but recent measurements (2014Ma43 and 2011Bo01 report a higher value near 14 h). The value measured by 1963Ba37 from positron spectra recorded with a magnetic spectrometer agreed with that from 1950Wi14. However, the evaluator prefers to adopt a weighted average of the recent values from 2014Ma43 and 2011Bo01, since in 1950Wi14 and also perhaps in 1963Ba37, the value was deduced from a composite exponential decay curve of both the activities of ^{182}Re, whereas in 2011Bo01 and 2014Ma43, $T_{1/2}$ is deduced from decay curve for a 470.3γ ray which is emitted by the decay of the isomeric activity only, thus providing a better selectivity. J^π: spin from atomic-beam magnetic resonance (1975Ru06,1978Ru04); parity from M1 γ from 1$^+$. μ: from 1987Oh10 (nuclear orientation). Other: 3.15 *33* (1980Sp01). Q: from 1981Er01 (nuclear orientation), also 1985Ha41.
55.502+x[a] *10*	(3)$^+$	<0.22 ns	A C	$T_{1/2}$: from 1970Ak02. J^π: E2 γ from 1$^+$; M1+E2 γ to 2$^+$; band assignment.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{182}Re Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	XREF	Comments
131.81+x[a] *10*	(4)$^+$		C	Jπ: γ to (3)$^+$; band assignment.
154.15[@] *8*	(8$^+$)		BC	Jπ: ΔJ=1, (M1+E2) γ to 7$^+$.
227.51+x[a] *14*	(5$^+$)		C	Jπ: ΔJ=1, (M1) γ to (4$^+$).
235.732+x *22*	(2)$^-$	585 ns *30*	A C	μ=+2.15 *8* (1978Be67,2014StZZ) Jπ: E1 γ to (3)$^+$; E1 γ from 1$^+$; (E1+M2) γ to 2$^+$. $T_{1/2}$: average of 570 ns *30* (1973Bu08) and 600 ns *30*(1969An13). μ: from 1978Be67 (TDPAC).
263.278+x *24*	1$^-$	5.1 ns *2*	A C	Jπ: E1+M2 γ from 1$^+$; E1 γ to 2$^+$; log *ft*=6.2 from 0$^+$. $T_{1/2}$: from 1969An13.
268.750+x *25*	(0,1,2)$^-$		A	Jπ: M1(+E2) γ from (1,2)$^-$; (M1) γ to 1$^-$.
339.45[&] *8*	(9$^+$)		BC	Jπ: ΔJ=1, (M1+E2) γ to (8$^+$); ΔJ=(2) γ to 7$^+$.
347.01+x[a] *17*	(6$^+$)		C	L: ΔJ=1, (M1) γ to (5$^+$).
379.22+x *3*	(1,2)$^-$	<0.5 ns	A	Jπ: E1 γ from 1$^+$; E1(+M2) γ to 2$^+$. $T_{1/2}$: from 1970Ak02.
438.28+x *5*	1$^-$		A	Jπ: log *ft*=7.6 from 0$^+$; M1+E2 γ to 1$^-$; M1(+E2) γ to (2)$^-$.
443.15[e] *13*	(9$^-$)	6 ns *2*	BC	Jπ: ΔJ=1, (E1) γ to (8$^+$). $T_{1/2}$: from γγ(t) in ^{181}Ta(α,3nγ),^{182}W(p,nγ) (1984Sl01).
461.3+x[f] *1*	(4$^-$)	0.78 μs *9*	C	Jπ: γ to 2$^+$; long level half-life suggests mult(461γ) is M2 or higher. $T_{1/2}$: from γγ(t) in ^{181}Ta(α,3nγ),^{182}W(p,nγ) 1984Sl01.
483.41+x[a] *20*	(7$^+$)		C	
510.05+x *3*	1$^+$	<0.5 ns	A	Jπ: log *ft*=5.3 from 0$^+$. $T_{1/2}$: from 1970Ak02.
541.10+x[f] *14*	(5$^-$)		C	
549.67+x *5*	(1)$^-$		A	Jπ: M1 γ to 1$^-$; log *ft*=7.1 from 0$^+$. Jπ=0$^-$ is considered as less likely for possible E2 admixture in 111.39γ to 1$^-$.
552.01[@] *9*	(10$^+$)		BC	Jπ: ΔJ=1, (M1+E2) γ to (9$^+$); ΔJ=(2) γ to (10$^-$).
554.57+x *6*	(2)$^+$		A	Jπ: M1+E2 γ from 1$^+$; M1+E2 γ to (3)$^+$.
624.99[d] *15*	(10$^-$)		BC	Jπ: ΔJ=1, (M1+E2) γ to (9$^-$).
644.7+x[a] *3*	(8$^+$)		C	Jπ: ΔJ=1, (M1) γ to (7$^+$).
648.20+x[f] *17*	(6$^-$)		C	Jπ: ΔJ=1, (M1) γ to (5$^-$).
726.97+x *5*	1$^+$		A	Jπ: M1(+E2) γ to 2$^+$; M1 γ to 1$^+$; log *ft*<6.3 from 0$^+$.
779.6+x[f] *2*	(7$^-$)		C	Jπ: ΔJ=1, (M1) γ to (6$^-$).
789.53[&] *10*	(11$^+$)		BC	Jπ: ΔJ=1, (M1+E2) γ to (10$^+$); ΔJ=2 γ to (9$^+$).
819.8+x[a] *3*	(9$^+$)		C	
834.31[e] *15*	(11$^-$)		BC	Jπ: ΔJ=1, (M1+E2) γ to (10$^-$); ΔJ=(2) γ to (9$^-$).
940.0+x[f] *3*	(8$^-$)		C	Jπ: ΔJ=1, (M1+E2) γ to (7$^-$).
1017.0+x[a] *3*	(10$^+$)		C	
1050.41[@] *11*	(12$^+$)		BC	Jπ: ΔJ=1, (M1+E2) γ to (11$^+$); ΔJ=2 γ to (10$^+$).
1069.21[d] *16*	(12$^-$)		BC	Jπ: ΔJ=1, (M1+E2) γ to (11$^-$); γ to (10$^-$).
1119.3+x[f] *3*	(9$^-$)		C	
1227.6+x[a] *3*	(11$^+$)		C	
1328.11[e] *16*	(13$^-$)		BC	Jπ: ΔJ=1,(M1+E2) γ to (12$^-$); γ to (11$^-$).
1332.76[&] *13*	(13$^+$)		BC	Jπ: ΔJ=1, (M1+E2) γ to (12$^+$); ΔJ=(2) γ to (11$^+$).
1336.3+x[f] *3*	(10$^-$)		C	Jπ: ΔJ=1, (M1+E2) γ to (9$^-$).
1457.7+x[a] *5*	(12$^+$)		C	
1557.1+x[f] *3*	(11$^-$)		C	
1609.12[d] *17*	(14$^-$)		BC	Jπ: ΔJ=1 γ to (13$^-$); γ to (12$^-$).
1636.17[@] *13*	(14$^+$)		BC	Jπ: ΔJ=1 γ to (13$^+$); γ to (12$^+$).
1833.1+x[f] *4*	(12$^-$)		C	
1911.94[e] *18*	(15$^-$)		BC	Jπ: ΔJ=1 γ to (14$^-$); γ to (13$^-$).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{182}Re Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	XREF	Comments
1957.28[&] *14*	(15+)		BC	
2233[d]	(16−)		B	
2256.48[g] *19*	(16−)	82 ns *1*	BC	μ=+3.82 *13* (1988Ja02,2014StZZ) g=+0.239 *8* (1988Ja02) g factor measured by in-beam γ(θ,H,t) (TDPAD) technique. Jπ: (E2) γ to (14−); (M1) γ to (15−). Proposed (1988Ja02) as K^π=(16−) 4-quasiparticle state with configuration=π9/2[514]⊗ν[(9/2[624])(7/2[514])(7/2[503])]. $T_{1/2}$: from γγ(t) in (α,3nγ) (1988Ja02). Other: 88 ns *8* (1984Sl01).
2298.92[@] *15*	(16+)		BC	
2524.48[b] *21*	(16+)		BC	L: ΔJ=0 γ to (16−).
2576[e]	(17−)		B	
2614.7[h] *3*	(17−)		BC	Jπ: ΔJ=1 γ to (16−).
2650[&]	(17+)		B	
2804[c]	(17+)		B	
2931[d]	(18−)		B	
2990[g]	(18−)		B	
3025[@]	(18+)		B	
3098[b]	(18+)		B	
3312[e]	(19−)		B	
3382[h]	(19−)		B	
3400[&]	(19+)		B	
3419[c]	(19+)		B	
3694[d]	(20−)		B	
3759?[b]	(20+)		B	
3789[g]	(20−)		B	
3822[@]	(20+)		B	
4112[e]	(21−)		B	
4116?[c]	(21+)		B	
4190[&]	(21+)		B	
4206[h]	(21−)		B	
4507[d]	(22−)		B	
4633?[g]	(22−)		B	
4649[@]	(22+)		B	
4942[e]	(23−)		B	
5013[&]	(23+)		B	
5076?[h]	(23−)		B	
5352[d]	(24−)		B	
5488[@]	(24+)		B	
5530?[g]	(24−)		B	
5858[&]	(25+)		B	

[†] From least-squares fit to Eγ data.

[‡] For high-spin (J>3) states, ascending spins are assumed with the rise in excitation energy, as expected from yrast type of population of levels in in-beam, heavy-ion γ-ray studies. The transitions involving ΔJ=2 from angular distributions are generally treated as E2 from RUL and those with ΔJ=1 and significant D+Q admixtures as M1+E2. In addition to arguments listed under

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{182}Re Levels (continued)

comments, band assignment is implicitly used in cases of long cascades of transitions.

[#] From $\gamma\gamma$(t) in ^{182}Os ε decay, unless otherwise stated.

[@] Band(A): K^π=7$^+$,2−qp band,α=0. Configuration=π5/2[402]⊗ν9/2[624]. E_0=−535.6, A=9.15, B=0.0066.

[&] Band(a): K^π=7$^+$,2−qp band,α=1. Configuration=π5/2[402]⊗ν9/2[624]. E_0=−535.6, A=9.15, B=0.0066.

[a] Band(B): K^π=2$^+$ band. E_0=−55.7, A=9.21, B=0.0079.

[b] Band(C): K^π=(16$^+$),4−qp band,α=0. Configuration=π9/2[514]⊗ν^3(7/2[503],7/2[633],9/2[624]).

[c] Band(c): K^π=(16$^+$),4−qp band,α=1. Configuration=π9/2[514]⊗ν^3(7/2[503],7/2[633],9/2[624]).

[d] Band(D): K^π=(9$^-$),2−qp band,α=0. Configuration=π9/2[514]⊗ν9/2[624]. E_0=−301.9, A=7.57, B=0.0078.

[e] Band(d): K^π=(9$^-$),2−qp band,α=1. Configuration=π9/2[514]⊗ν9/2[624]. E_0=−301.9, A=7.57, B=0.0078.

[f] Band(E): K^π=(4$^-$). E_0=314.8, A=6.75, B=0.028.

[g] Band(F): K^π=(16$^-$),4−qp band,α=0. Configuration=π9/2[514]⊗ν^3(7/2[514],7/2[503],9/2[624]).

[h] Band(f): K^π=(16$^-$),4−qp band,α=1. Configuration=π9/2[514]⊗ν^3(7/2[514],7/2[503],9/2[624]).

Adopted Levels, Gammas (continued)

γ(^{182}Re)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡	δ‡	α@	$I_{(\gamma+ce)}$	Comments
55.502+x	(3)$^+$	55.50 1	100	0.0+x	2$^+$	M1+E2	0.047 8	5.07 9		B(M1)(W.u.)>0.91; B(E2)(W.u.)>22 α(L)=3.91 7; α(M)=0.897 15 α(N)=0.217 4; α(O)=0.0364 6; α(P)=0.00260 4
131.81+x	(4)$^+$	76.3 1	100	55.502+x	(3)$^+$	[M1]		11.21		α(K)=9.25 14; α(L)=1.511 22; α(M)=0.345 5 α(N)=0.0838 13; α(O)=0.01407 21; α(P)=0.001027 15
154.15	(8$^+$)	154.15 8	100	0.0	7$^+$	(M1+E2)	+0.32 3	1.439 24		α(K)=1.162 23; α(L)=0.213 4; α(M)=0.0496 10 α(N)=0.01198 24; α(O)=0.00197 4; α(P)=0.0001259 25
227.51+x	(5$^+$)	95.7 1	100	131.81+x	(4)$^+$	(M1)		5.86		α(K)=4.85 7; α(L)=0.783 12; α(M)=0.179 3 α(N)=0.0434 7; α(O)=0.00729 11; α(P)=0.000532 8
235.732+x	(2)$^-$	180.20 3	100 6	55.502+x	(3)$^+$	E1		0.0840		B(E1)(W.u.)=5.6×10^{-8} 5 α(K)=0.0694 10; α(L)=0.01132 16; α(M)=0.00258 4 α(N)=0.000618 9; α(O)=9.94×10^{-5} 14; α(P)=5.77×10^{-6} 8
		235.75 6	1.0 3	0.0+x	2$^+$	(E1+M2)	0.2 1	0.122 92		B(E1)(W.u.)≈2.4×10^{-10}; B(M2)(W.u.)≈0.0008 α(K)=0.096 70; α(L)=0.020 17; α(M)=0.0047 40 α(N)=0.00114 96; α(O)=1.9×10^{-4} 16; α(P)=1.2×10^{-5} 11
263.278+x	1$^-$	27.53 2	9.3 19	235.732+x	(2)$^-$	M1		39.2		B(M1)(W.u.)=0.039 11 α(L)=30.3 5; α(M)=6.94 10 α(N)=1.682 24; α(O)=0.282 4; α(P)=0.0206 3
		207.80& 6	<0.4	55.502+x	(3)$^+$					
		263.29 5	100 3	0.0+x	2$^+$	E1		0.0325		B(E1)(W.u.)=4.5×10^{-7} 8; B(M2)(W.u.)≈0.07 α(K)=0.0270 4; α(L)=0.00425 6; α(M)=0.000967 14 α(N)=0.000232 4; α(O)=3.78×10^{-5} 6; α(P)=2.35×10^{-6} 4
268.750+x	(0,1,2)$^-$	5.47 1		263.278+x	1$^-$	(M1)		1096	≈100	ce(M)/(γ+ce)=0.776 8 ce(N)/(γ+ce)=0.189 4; ce(O)/(γ+ce)=0.0316 7; ce(P)/(γ+ce)=0.00230 5 α(M)=852 13 α(N)=207 4; α(O)=34.7 6; α(P)=2.52 4
		268.8& 5	<1	0.0+x	2$^+$					
339.45	(9$^+$)	185.30 7	100 6	154.15	(8$^+$)	(M1+E2)	+0.39 5	0.834 19		α(K)=0.673 19; α(L)=0.1238 21; α(M)=0.0288 6 α(N)=0.00695 13; α(O)=0.001141 18; α(P)=7.26×10^{-5} 22
		339.45 8	39 3	0.0	7$^+$	(Q)				

$^{182}_{75}$Re$_{107}$-5

γ(^{182}Re) (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡	δ‡	α@	Comments
347.01+x	(6$^+$)	119.5 1	100	227.51+x	(5$^+$)	(M1)		3.10	α(K)=2.57 4; α(L)=0.413 6; α(M)=0.0944 14 α(N)=0.0229 4; α(O)=0.00384 6; α(P)=0.000281 4
379.22+x	(1,2)$^-$	110.46 2	31 5	268.750+x	(0,1,2)$^-$	M1(+E2)	<0.65	3.72 18	B(M1)(W.u.)>0.0014 α(K)=2.8 4; α(L)=0.67 16; α(M)=0.160 42 α(N)=0.0385 98; α(O)=0.0061 13; α(P)=0.00031 5
		115.92 5	89 9	263.278+x	1$^-$	M1(+E2)	<1.4	3.0 4	B(M1)(W.u.)>0.0036 α(K)=2.09 72; α(L)=0.72 27; α(M)=0.174 72 α(N)=0.042 17; α(O)=0.0064 22; α(P)=2.23×10^{-4} 84
		143.50 4	11.3 21	235.732+x	(2)$^-$	M1+E2	≈1	≈1.436	B(M1)(W.u.)>0.00024 α(K)≈0.962; α(L)≈0.361; α(M)≈0.0884 α(N)≈0.0212; α(O)≈0.00321; α(P)≈9.97×10^{-5}
		379.22 7	100 9	0.0+x	2$^+$	E1(+M2)	<0.12	0.017 3	B(E1)(W.u.)>1.1×10^{-6}; B(M2)(W.u.)>1.4 α(K)=0.0138 24; α(L)=0.0022 5; α(M)=0.00051 12 α(N)=0.00012 3; α(O)=2.0×10^{-5} 5; α(P)=1.4×10^{-6} 4
438.28+x	1$^-$	174.98 7	100 19	263.278+x	1$^-$	M1+E2	0.9 4	0.81 14	α(K)=0.59 16; α(L)=0.167 16; α(M)=0.040 5 α(N)=0.0097 11; α(O)=0.00150 12; α(P)=6.2×10^{-5} 19
		202.51 10	21 4	235.732+x	(2)$^-$	M1(+E2)	<1	0.60 10	α(K)=0.48 11; α(L)=0.096 5; α(M)=0.0226 16 α(N)=0.0055 4; α(O)=0.000883 25; α(P)=5.1×10^{-5} 13
		438.46 15	29 13	0.0+x	2$^+$				
443.15	(9$^-$)	289.0 1	100	154.15	(8$^+$)	(E1)		0.0259	B(E1)(W.u.)=1.4×10^{-6} 5 α(K)=0.0215 3; α(L)=0.00336 5; α(M)=0.000765 11 α(N)=0.000184 3; α(O)=3.00×10^{-5} 5; α(P)=1.90×10^{-6} 3
461.3+x	(4$^-$)	461.3 1	100	0.0+x	2$^+$	[M2]		0.239	B(M2)(W.u.)=0.048 6 α(K)=0.191 3; α(L)=0.0368 6; α(M)=0.00864 13 α(N)=0.00210 3; α(O)=0.000350 5; α(P)=2.44×10^{-5} 4
483.41+x	(7$^+$)	136.4 1	100	347.01+x	(6$^+$)				
510.05+x	1$^+$	130.80 3	6.3 3	379.22+x	(1,2)$^-$	E1		0.192	B(E1)(W.u.)>9.8×10^{-6} α(K)=0.1572 22; α(L)=0.0267 4; α(M)=0.00610 9 α(N)=0.001456 21; α(O)=0.000231 4; α(P)=1.250×10^{-5} 18
		241.31 6	1.75 10	268.750+x	(0,1,2)$^-$	(E1)		0.0402	B(E1)(W.u.)>4.2×10^{-7}; B(M2)(W.u.)>1.3 α(K)=0.0334 5; α(L)=0.00530 8; α(M)=0.001207 17 α(N)=0.000290 4; α(O)=4.70×10^{-5} 7; α(P)=2.88×10^{-6} 4
		246.77 6	1.15 9	263.278+x	1$^-$	E1+M2	0.14 3	0.072 16	B(E1)(W.u.)>1.8×10^{-7}; B(M2)(W.u.)>6.6 α(K)=0.058 13; α(L)=0.0110 28; α(M)=0.00259 67 α(N)=6.3×10^{-4} 17; α(O)=1.03×10^{-4} 27; α(P)=6.6×10^{-6} 18
		274.33 5	3.48 14	235.732+x	(2)$^-$	E1		0.0294	B(E1)(W.u.)>5.9×10^{-7} α(K)=0.0244 4; α(L)=0.00383 6; α(M)=0.000871 13 α(N)=0.000209 3; α(O)=3.41×10^{-5} 5; α(P)=2.14×10^{-6} 3
		454.60 7	0.56 4	55.502+x	(3)$^+$	E2		0.0278	B(E2)(W.u.)>0.0043 α(K)=0.0207 3; α(L)=0.00545 8; α(M)=0.001307 19 α(N)=0.000314 5; α(O)=4.89×10^{-5} 7; α(P)=2.03×10^{-6} 3
		510.04 7	100	0.0+x	2$^+$	M1		0.0581	B(M1)(W.u.)>0.00027

$\gamma(^{182}$Re) (continued)

E$_i$(level)	J$^\pi_i$	E$_\gamma$[†]	I$_\gamma$[†]	E$_f$	J$^\pi_f$	Mult.[‡]	δ[‡]	α[@]	Comments
									α(K)=0.0484 7; α(L)=0.00752 11; α(M)=0.001714 24 α(N)=0.000416 6; α(O)=7.00×10^{-5} 10; α(P)=5.17×10^{-6} 8
541.10+x	(5$^-$)	79.8 1	100	461.3+x	(4$^-$)	[M1]		9.87	α(K)=8.16 12; α(L)=1.326 20; α(M)=0.303 5 α(N)=0.0735 11; α(O)=0.01235 18; α(P)=0.000901 13
549.67+x	(1)$^-$	111.39 3	18 5	438.28+x	1$^-$	M1(+E2)	<0.7	3.61 19	α(K)=2.7 4; α(L)=0.67 17; α(M)=0.159 44 α(N)=0.038 11; α(O)=0.0061 14; α(P)=0.00030 5
		170.44 7	100 15	379.22+x	(1,2)$^-$	[M1+E2]		0.84 29	α(K)=0.60 35; α(L)=0.19 4; α(M)=0.045 12 α(N)=0.011 3; α(O)=0.0017 3; α(P)=6.2×10^{-5} 41
		286.39 10	30 10	263.278+x	1$^-$	M1		0.270	α(K)=0.224 4; α(L)=0.0355 5; α(M)=0.00809 12 α(N)=0.00196 3; α(O)=0.000330 5; α(P)=2.42×10^{-5} 4
552.01	(10$^+$)	212.56 7	100 9	339.45	(9$^+$)	(M1+E2)	+0.40 6	0.564 16	α(K)=0.458 15; α(L)=0.0819 12; α(M)=0.0190 3 α(N)=0.00459 7; α(O)=0.000756 11; α(P)=4.93×10^{-5} 17
		397.86 8	74 4	154.15	(8$^+$)	(Q)			
554.57+x	(2)$^+$	499.08 8	100 26	55.502+x	(3)$^+$	M1+E2	0.7 5	0.048 12	α(K)=0.040 10; α(L)=0.0067 12; α(M)=0.00154 25 α(N)=0.00037 6; α(O)=6.2×10^{-5} 11; α(P)=4.2×10^{-6} 12
		554.68 20	98 11	0.0+x	2$^+$	M1		0.0467	α(K)=0.0389 6; α(L)=0.00603 9; α(M)=0.001374 20 α(N)=0.000333 5; α(O)=5.61×10^{-5} 8; α(P)=4.15×10^{-6} 6
624.99	(10$^-$)	181.84 8	100	443.15	(9$^-$)	(M1+E2)	+0.23 2	0.921 14	α(K)=0.756 12; α(L)=0.1274 19; α(M)=0.0293 5 α(N)=0.00710 11; α(O)=0.001182 17; α(P)=8.19×10^{-5} 13
644.7+x	(8$^+$)	161.3 2	100	483.41+x	(7$^+$)	(M1)		1.325	α(K)=1.098 16; α(L)=0.176 3; α(M)=0.0401 6 α(N)=0.00973 14; α(O)=0.001635 24; α(P)=0.0001196 18
648.20+x	(6$^-$)	107.1 1	100	541.10+x	(5$^-$)	(M1)		4.25	α(K)=3.51 5; α(L)=0.565 8; α(M)=0.1293 19 α(N)=0.0314 5; α(O)=0.00527 8; α(P)=0.000385 6
726.97+x	1$^+$	172.41 7	46 7	554.57+x	(2)$^+$	M1+E2	0.9 3	0.85 11	α(K)=0.61 13; α(L)=0.176 13; α(M)=0.042 4 α(N)=0.0102 9; α(O)=0.00158 10; α(P)=6.4×10^{-5} 15
		216.91 5	100 7	510.05+x	1$^+$	M1		0.579	α(K)=0.480 7; α(L)=0.0764 11; α(M)=0.01745 25 α(N)=0.00423 6; α(O)=0.000711 10; α(P)=5.21×10^{-5} 8
		458.28[&] 10	<3.5	268.750+x	(0,1,2)$^-$				
		726.98 20	17.7 21	0.0+x	2$^+$	M1(+E2)	<0.8	0.021 3	α(K)=0.0171 24; α(L)=0.0027 3; α(M)=0.00061 7 α(N)=0.000148 17; α(O)=2.5×10^{-5} 3; α(P)=1.8×10^{-6} 3
779.6+x	(7$^-$)	131.4 1	100	648.20+x	(6$^-$)	(M1)		2.37	α(K)=1.96 3; α(L)=0.314 5; α(M)=0.0719 11 α(N)=0.01744 25; α(O)=0.00293 5; α(P)=0.000214 3
789.53	(11$^+$)	237.52 7	89 6	552.01	(10$^+$)	(M1+E2)	+0.49 7	0.399 14	α(K)=0.322 13; α(L)=0.0588 9; α(M)=0.01365 20 α(N)=0.00330 5; α(O)=0.000542 8; α(P)=3.45×10^{-5} 15
		450.08 8	100 6	339.45	(9$^+$)	Q			
819.8+x	(9$^+$)	175.1 1	100	644.7+x	(8$^+$)	[M1]		1.052	α(K)=0.872 13; α(L)=0.1392 20; α(M)=0.0318 5 α(N)=0.00772 11; α(O)=0.001296 19; α(P)=9.48×10^{-5} 14
834.31	(11$^-$)	209.32 7	100 5	624.99	(10$^-$)	(M1+E2)	+0.32 3	0.605 11	α(K)=0.495 10; α(L)=0.0853 12; α(M)=0.0197 3 α(N)=0.00476 7; α(O)=0.000789 11; α(P)=5.34×10^{-5} 11
		391.16 8	13.8 8	443.15	(9$^-$)	(Q)			
940.0+x	(8$^-$)	160.4 2	100	779.6+x	(7$^-$)	(M1+E2)		1.02 33	α(K)=0.71 41; α(L)=0.24 6; α(M)=0.057 17 α(N)=0.0137 39; α(O)=0.0021 5; α(P)=7.3×10^{-5} 49

$^{182}_{75}$Re$_{107}$-7

γ(^{182}Re) (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡	δ‡	α@	Comments
1017.0+x	(10+)	197.2 1	100	819.8+x	(9+)				
1050.41	(12+)	260.88 7	42.4 24	789.53	(11+)	(M1+E2)	+0.53 11	0.302 16	α(K)=0.244 15; α(L)=0.0443 8; α(M)=0.01028 16 α(N)=0.00249 4; α(O)=0.000408 9; α(P)=2.61×10^{-5} 18
		498.40 8	100 5	552.01	(10+)	Q			
1069.21	(12−)	234.89 7	100 4	834.31	(11−)	(M1+E2)	+0.35 5	0.435 10	α(K)=0.355 10; α(L)=0.0610 9; α(M)=0.01406 20 α(N)=0.00340 5; α(O)=0.000565 8; α(P)=3.83×10^{-5} 11
		444.22 8	40 3	624.99	(10−)				
1119.3+x	(9−)	179.3 1	100	940.0+x	(8−)				
1227.6+x	(11+)	210.6 1	100	1017.0+x	(10+)				
1328.11	(13−)	258.90 7	100 7	1069.21	(12−)	(M1+E2)	+0.30 7	0.338 10	α(K)=0.278 9; α(L)=0.0462 7; α(M)=0.01062 16 α(N)=0.00257 4; α(O)=0.000429 7; α(P)=3.00×10^{-5} 10
		493.79 8	73 7	834.31	(11−)				
1332.76	(13+)	282.35 9	46 8	1050.41	(12+)	(M1+E2)	+0.50 11	0.246 13	α(K)=0.200 12; α(L)=0.0352 8; α(M)=0.00815 15 α(N)=0.00197 4; α(O)=0.000325 8; α(P)=2.14×10^{-5} 14
		543.23 8	100 8	789.53	(11+)	(Q)			
1336.3+x	(10−)	217.0 1	100	1119.3+x	(9−)	(M1+E2)		0.41 17	α(K)=0.31 18; α(L)=0.079 3; α(M)=0.0189 15 α(N)=0.0045 4; α(O)=0.000712 11; α(P)=3.2×10^{-5} 20
1457.7+x	(12+)	230.1 3	100	1227.6+x	(11+)				
1557.1+x	(11−)	220.8 1	100	1336.3+x	(10−)				
1609.12	(14−)	281.01 9	100	1328.11	(13−)	(M1+E2)	+0.42 11	0.258 13	α(K)=0.211 12; α(L)=0.0361 8; α(M)=0.00833 15 α(N)=0.00202 4; α(O)=0.000334 8; α(P)=2.26×10^{-5} 14
		539.91 8	76 5	1069.21	(12−)				
1636.17	(14+)	303.40 9	31 8	1332.76	(13+)	[M1+E2]	0.47# 6	0.205 7	α(K)=0.167 6; α(L)=0.0288 6; α(M)=0.00664 11 α(N)=0.00161 3; α(O)=0.000266 5; α(P)=1.79×10^{-5} 7
		585.76 8	100 6	1050.41	(12+)				
1833.1+x	(12−)	276.0 1	100	1557.1+x	(11−)				
1911.94	(15−)	302.82 8	87 14	1609.12	(14−)	[M1+E2]	0.36# 4	0.215 5	α(K)=0.177 4; α(L)=0.0295 5; α(M)=0.00677 11 α(N)=0.001641 25; α(O)=0.000273 5; α(P)=1.90×10^{-5} 5
		583.84 8	100 7	1328.11	(13−)				
1957.28	(15+)	321.11 9	47 3	1636.17	(14+)				
		624.52 8	100 11	1332.76	(13+)				
2233	(16−)	321		1911.94	(15−)				
		624		1609.12	(14−)				
2256.48	(16−)	344.54 8	69 6	1911.94	(15−)	(M1)		0.1640	B(M1)(W.u.)=2.5×10^{-6} 3 α(K)=0.1362 19; α(L)=0.0214 3; α(M)=0.00489 7 α(N)=0.001186 17; α(O)=0.000200 3; α(P)=1.468×10^{-5} 21
		647.36 8	100 8	1609.12	(14−)	(E2)		0.01188	B(E2)(W.u.)=0.00054 6 α(K)=0.00936 14; α(L)=0.00193 3; α(M)=0.000455 7 α(N)=0.0001095 16; α(O)=1.754×10^{-5} 25; α(P)=9.37×10^{-7} 14
2298.92	(16+)	341.64 8	50 6	1957.28	(15+)				
		662.76 8	100 8	1636.17	(14+)				
2524.48	(16+)	268.0 1	100	2256.48	(16−)	D			Mult.: ΔJ=0 γ.

$^{182}_{75}Re_{107}$-8

Adopted Levels, Gammas (continued)

$\gamma(^{182}Re)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡
2576	(17^-)	343		2233	(16^-)	
		664		1911.94	(15^-)	
2614.7	(17^-)	358.2 *2*	100	2256.48	(16^-)	D+Q
2650	(17^+)	354		2298.92	(16^+)	
		695		1957.28	(15^+)	
2804	(17^+)	280		2524.48	(16^+)	
2931	(18^-)	355		2576	(17^-)	
		698		2233	(16^-)	
2990	(18^-)	376		2614.7	(17^-)	
		734		2256.48	(16^-)	
3025	(18^+)	375		2650	(17^+)	
		730		2298.92	(16^+)	
3098	(18^+)	294		2804	(17^+)	
		574		2524.48	(16^+)	
3312	(19^-)	382		2931	(18^-)	
		737		2576	(17^-)	
3382	(19^-)	392		2990	(18^-)	
		768		2614.7	(17^-)	
3400	(19^+)	375		3025	(18^+)	
		750		2650	(17^+)	
3419	(19^+)	321		3098	(18^+)	
		615		2804	(17^+)	
3694	(20^-)	382		3312	(19^-)	

E_i(level)	J^π_i	E_γ†	E_f	J^π_f
3694	(20^-)	763	2931	(18^-)
3759?	(20^+)	661&	3098	(18^+)
3789	(20^-)	407	3382	(19^-)
		798	2990	(18^-)
3822	(20^+)	797	3025	(18^+)
4112	(21^-)	418	3694	(20^-)
		800	3312	(19^-)
4116?	(21^+)	697&	3419	(19^+)
4190	(21^+)	790	3400	(19^+)
4206	(21^-)	418	3789	(20^-)
		824	3382	(19^-)
4507	(22^-)	395	4112	(21^-)
		813	3694	(20^-)
4633?	(22^-)	844&	3789	(20^-)
4649	(22^+)	827	3822	(20^+)
4942	(23^-)	830	4112	(21^-)
5013	(23^+)	823	4190	(21^+)
5076?	(23^-)	870&	4206	(21^-)
5352	(24^-)	845	4507	(22^-)
5488	(24^+)	839	4649	(22^+)
5530?	(24^-)	898&	4633?	(22^-)
5858	(25^+)	845	5013	(23^+)

† Values are from ^{182}Os ε decay for transitions from low-spin (J<4) states and from $^{181}Ta(\alpha,3n\gamma)$ for high-spin (J>3) states. Above 2614 level, values are available only from $^{176}Yb(^{11}B,5n\gamma)$.

‡ From ce data in ^{182}Os ε decay for low-spin (J<4) states, from $\gamma(\theta)$ in $^{181}Ta(\alpha,3n\gamma)$ for transitions from high-spin (J>3) states. All ΔJ=2, quadrupole transitions are treated as E2 and most ΔJ=1, dipole or dipole+quadrupole transitions as M1 or M1+E2, respectively from band structure arguments. Intensity-balance arguments are also used in some cases for tentative assignment of multipolarities.

Deduced by 1984Sl01 from cascade/crossover γ-ray intensity ratio in the band and rotational model, assuming M1+E2 for cascading transition and E2 for crossover transition.

@ From BrIcc v2.3b (16-Dec-2014) 2008Ki07, "Frozen Orbitals" appr. δ(E2/M1)=1 assumed when not given.

& Placement of transition in the level scheme is uncertain.

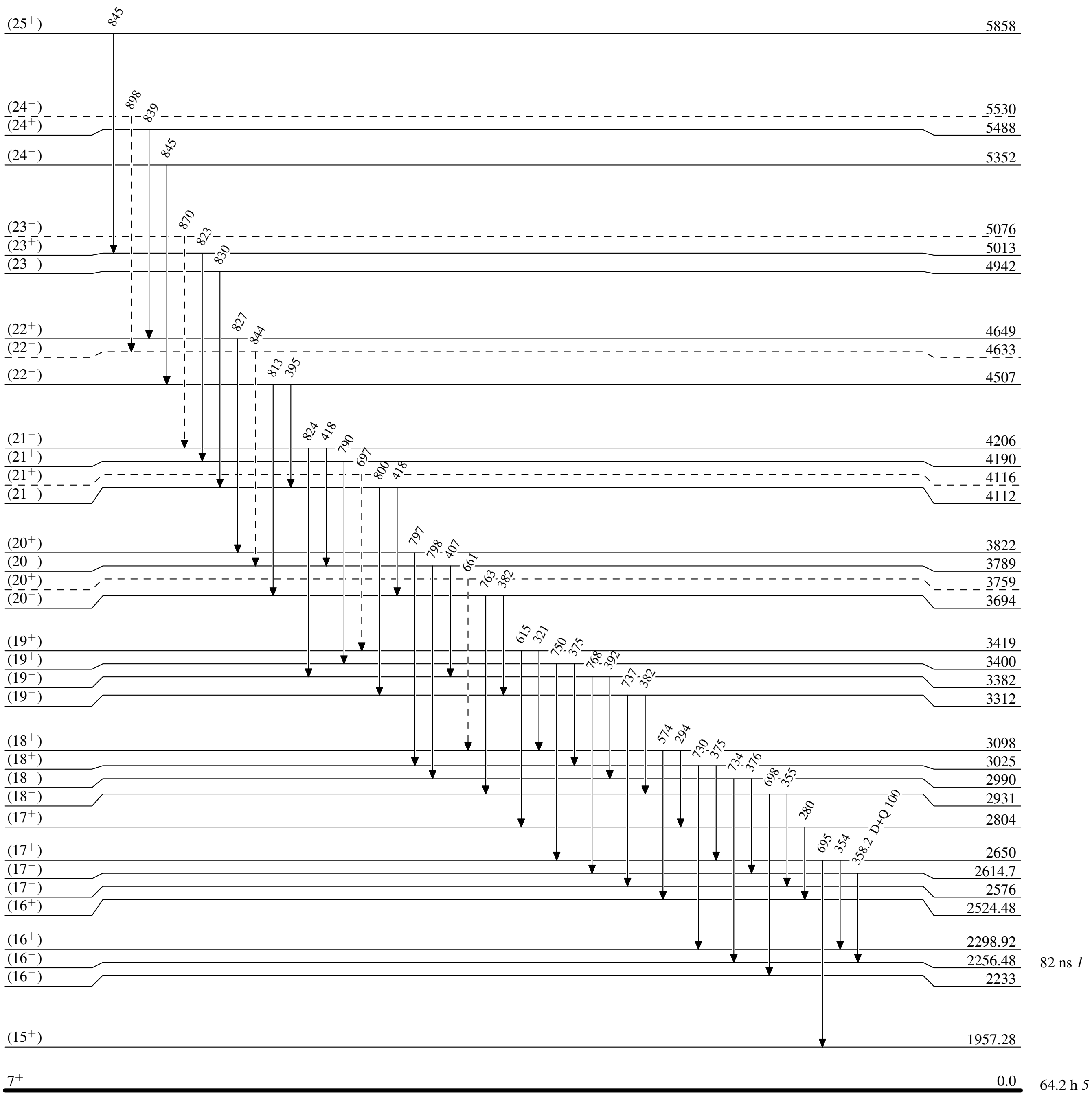
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

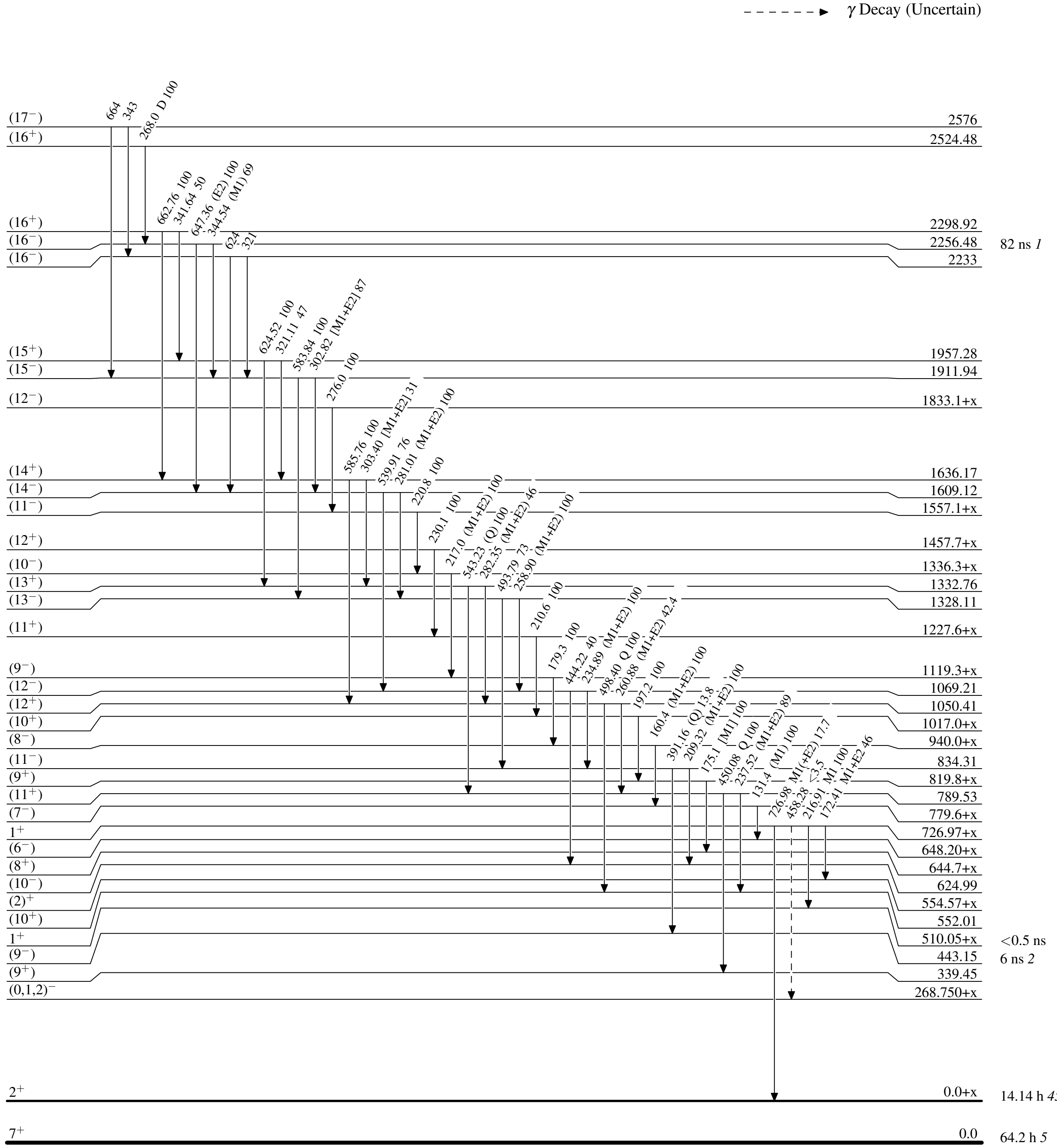


$^{182}_{75}Re_{107}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{182}_{75}Re_{107}$

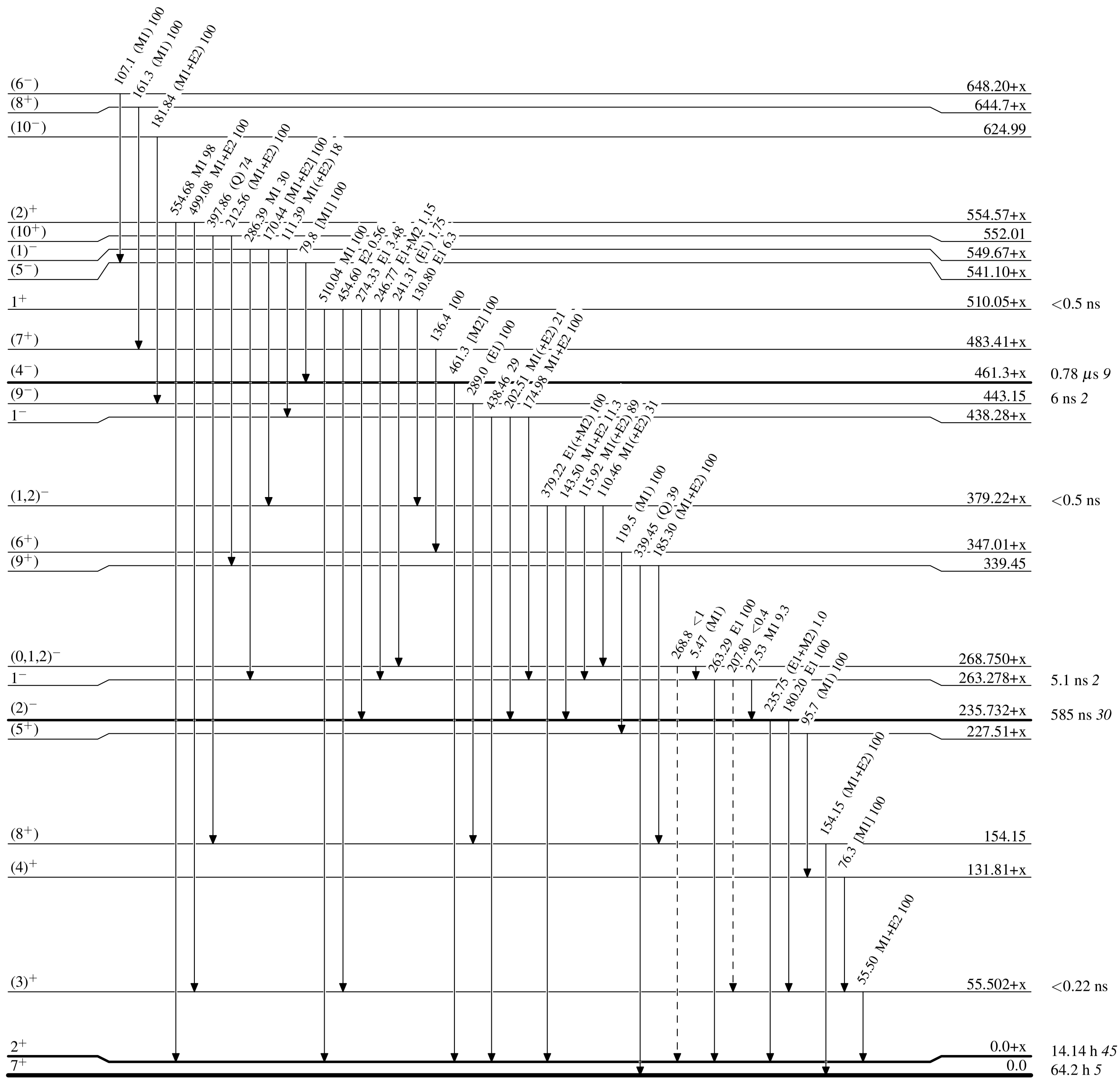
Adopted Levels, Gammas

Legend

Level Scheme (continued)

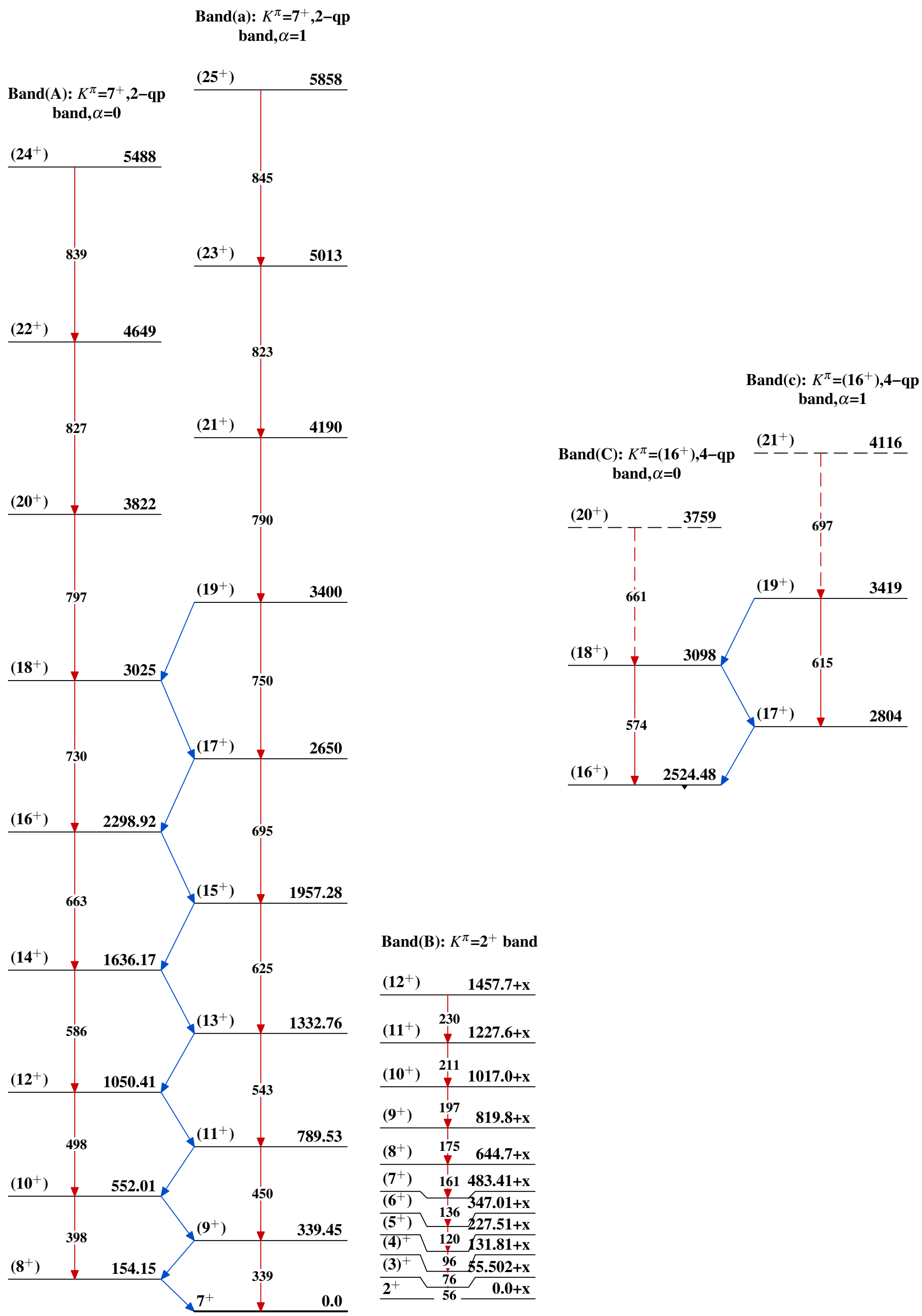
Intensities: Relative photon branching from each level

γ Decay (Uncertain)



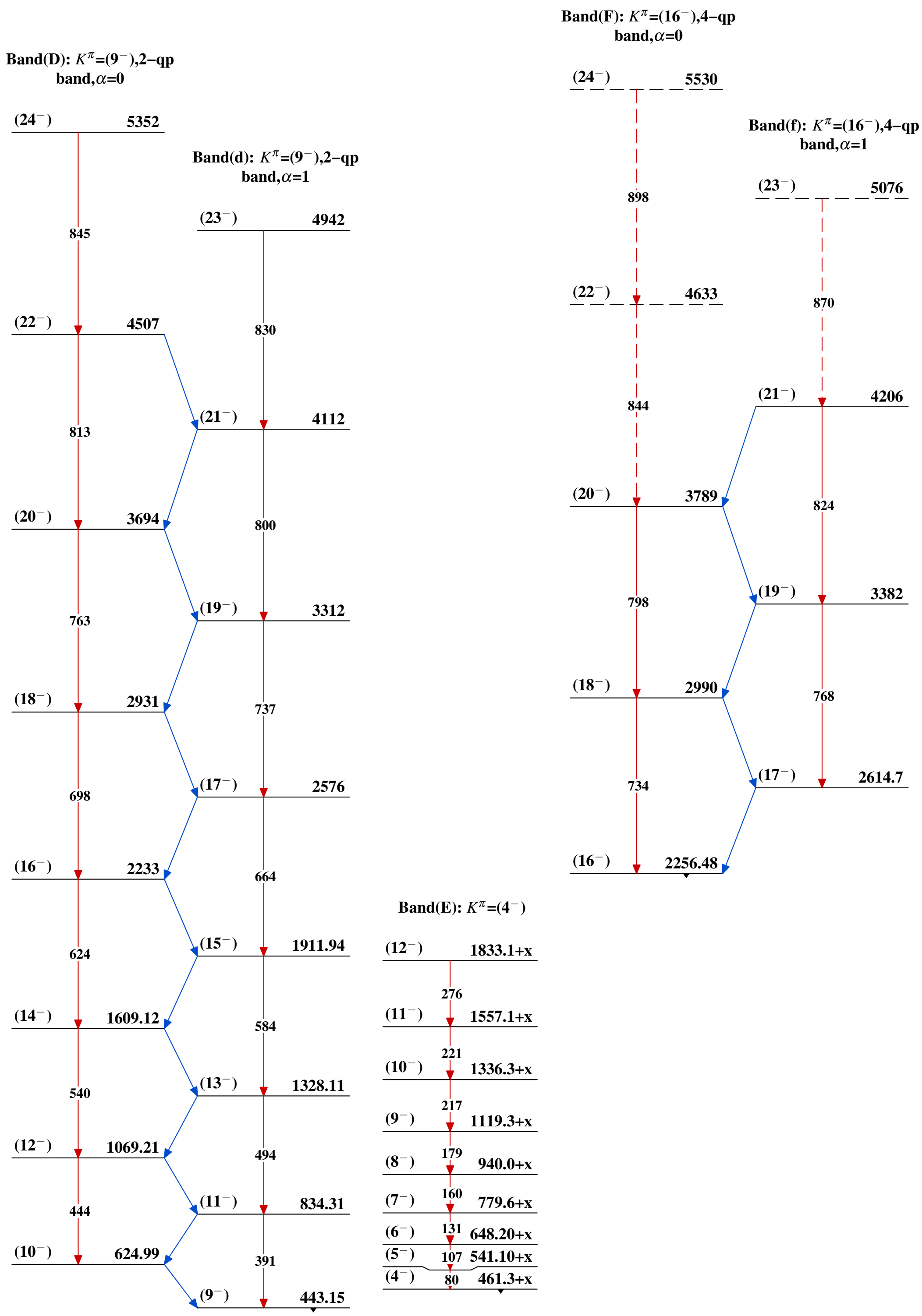
$^{182}_{75}Re_{107}$

Adopted Levels, Gammas



$^{182}_{75}Re_{107}$

Adopted Levels, Gammas (continued)



$^{182}_{75}Re_{107}$