Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 111,525 (2010)	19-Nov-2009

Q(β^-)=−4.79×10^3 *4*; S(n)=1.098×10^4 *4*; S(p)=3.81×10^3 *4*; Q(α)=−1.42×10^3 *4* 2012Wa38
Note: Current evaluation has used the following Q record −4.79E3 30 *10980* 40 *3810* 40 −1410 *40* 2003Au03.

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Theory, calculations, systematics:
     levels, μ, Q, β(λ):   1989Br29
     Gamow-Teller strength distribution: 2005Ju11
     binding energies: 1995Jo14
     newer atomic mass measurement: 2007HeZV
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^{97}Rh Levels

Cross Reference (XREF) Flags

A	^{97}Rh IT decay	E	^{65}Cu(^{36}S,4nγ)	I	^{96}Ru(^{3}He,pnγ), (d,nγ)
B	^{97}Pd ε decay	F	^{94}Mo(^{6}Li,3nγ)	J	^{96}Ru(α,p2nγ)
C	^{98}Ag εp decay (47.5 s)	G	^{96}Ru(p,γ)		
D	^{60}Ni(^{40}Ca,3pγ)	H	^{96}Ru(p,p) IAR		

E(level)[†]	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0	9/2$^+$[a]	30.7 min *6*	ABCDEFG IJ	%ε+%β^+=100 T$_{1/2}$: weighted average of 30.3 min *9* (1975Pl05), 31.1 min *8* (1974Oh07), 30 min *2* (1971Lo12) and 32 min *2* (1962Ba28).
258.76 *18*	1/2$^-$[a]	46.2 min *16*	AB D G I	%ε+%β^+=94.4 *6*; %IT=5.6 *6* T$_{1/2}$: weighted average of 47.9 min *6* (1975Pl05), 44.3 min *8* (1974Oh07) and 40 min *2* (1971Lo12). %ε+%β^+: from ^{97}Rh IT decay.
265.36 *8*	(7/2$^+$)		B D G I	J$^\pi$: log *ft*=5.7 from (5/2$^+$) ^{97}Pd; (M1+E2) γ to 9/2$^+$ g.s.
475.11 *9*	(5/2$^+$,7/2)		B D I	J$^\pi$: log *ft*=5.76 *19* (log $f^{1u}t$=7.3) from (5/2$^+$) ^{97}Pd; γ to (7/2$^+$) but not to 1/2$^-$ level; 5/2$^+$ from (^{40}Ca,3pγ), ((^{3}He,pnγ),(d,nγ)).
845.3 *3*	(1/2$^+$)		G	J$^\pi$: from (p,γ) dataset based on calculations (2007SeZW).
850.1[&] *4*	(5/2$^-$)[&]		G I	J$^\pi$: (E2) γ to 1/2$^-$ level.
857.71[@] *13*	(13/2$^+$)[@]		DEF IJ	J$^\pi$: (E2) γ to g.s.
863.55 *24*	(9/2)		I	J$^\pi$: ΔJ=0, d(+Q) transition to (9/2$^+$).
1004.5 *4*	(3/2$^-$)		B	J$^\pi$: log *ft*=6.68, log $f^{1u}t$=8.09 from (5/2$^+$) level; γ to 1/2$^-$, not to (7/2$^+$), 9/2$^+$ levels.
1058.04 *11*	(5/2$^+$)		B D G I	J$^\pi$: log *ft*=5.66 from (5/2$^+$) ^{97}Pd; d(+Q) γ to (7/2$^+$) level; γ to 9/2$^+$ g.s.
1199.1 *3*	(5/2$^+$,7/2)		B I	J$^\pi$: log *ft*=5.97, log $f^{1u}t$=7.4 from (5/2$^+$) ^{97}Pd; γ to 9/2$^+$ g.s.
1242.6 *3*	(11/2$^+$)		I	J$^\pi$: (M1+E2) γ to 9/2$^+$ g.s.; (7/2$^+$) excluded from γ from (13/2$^-$), 1928 level.
1375.6[&] *3*	(9/2$^-$)[&]		I	J$^\pi$: (E2) γ to (5/2$^-$); (1/2$^-$) excluded from γ to 9/2$^+$, g.s.
1415.51 *25*	(3/2$^+$,5/2,7/2)		B I	J$^\pi$: log *ft*=5.55 from (5/2$^+$) ^{97}Pd and γ to (7/2$^+$) level.
1463.64[@] *18*	(15/2$^+$)[@]		DEF IJ	J$^\pi$: (M1+E2) γ to (13/2$^+$) level and (M1(+E2)) γ from (17/2$^+$).
1470.6 *7*	(3/2,7/2)		I	J$^\pi$: D(+Q) γ to (5/2$^-$) level.
1528.7 *4*	(3/2,5/2,7/2)		B I	J$^\pi$: log *ft*=5.9, log $f^{1u}t$=7.2 from (5/2$^+$) ^{97}Pd.
1541.8 *3*			I	
1553.15[@] *18*	(17/2$^+$)[@]		DEF IJ	J$^\pi$: (E2) γ to (13/2$^+$) level.
1619.0 *3*	(3/2$^+$,5/2,7/2)		B I	J$^\pi$: log *ft*=6.5, log $f^{1u}t$=7.8 from (5/2$^+$) ^{97}Pd; γ to (7/2$^+$) level.
1635.0 *5*			I	
1759.55 *9*	(5/2$^+$,7/2$^+$)		B I	J$^\pi$: log *ft*=4.97 from (5/2$^+$) ^{97}Pd; γ to 9/2$^+$ g.s.

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Adopted Levels, Gammas (continued)

^{97}Rh Levels (continued)

E(level)[†]	Jπ	XREF	Comments
1775.1 *4*	(11/2$^+$,13/2,15/2$^+$)	I	Jπ: γ's to (15/2$^+$) and (11/2$^+$) levels.
1906.5 *3*	(3/2,5/2,7/2)	B I	Jπ: log *ft*=5.36 from (5/2$^+$) ^{97}Pd.
1928.3[&] *4*	(13/2$^-$)[&]	I	Jπ: (E2) γ to (9/2$^-$) level; (5/2$^-$) excluded from γ to (13/2$^+$).
1961.98[@] *24*	(19/2$^+$)[@]	DEF IJ	Jπ: (M1+E2) γ to (17/2$^+$) level and D(+Q) γ from (21/2$^+$).
1984.1 *5*	(11/2$^+$,13/2,15/2$^+$)	I	Jπ: γ's to (11/2$^+$) and (15/2$^+$) levels.
1994.2 *3*	(5/2$^+$,7/2$^+$)	B I	Jπ: log *ft*=5.22 from (5/2$^+$) ^{97}Pd; γ to 9/2$^+$ g.s.
2062.1 *5*		I	
2068.0 *4*	(3/2,5/2,7/2)	B I	Jπ: log *ft*=5.55 from (5/2$^+$) ^{97}Pd.
2097.5 *6*		I	
2103.6 *11*		I	
2113.25 *18*	(5/2$^+$,7/2$^+$)	B I	Jπ: log *ft*=4.59 from (5/2$^+$) ^{97}Pd; γ to 9/2$^+$ g.s.
2126.6 *7*		I	
2147.3 *6*		I	
2187.2 *6*	(3/2,5/2,7/2)	B I	Jπ: log *ft*=5.48 from (5/2$^+$) ^{97}Pd.
2225.40[&] *20*	(17/2$^-$)[&]	DEF IJ	Jπ: (17/2) from D(+Q) γ to (15/2)$^+$ level; π=(−) based on non observance of E2 γ from (21/2), 3056, to (17/2$^+$), 1553 (1986Pi04, (^{40}Ca,3pγ)).
2229.6 *3*	(5/2$^+$,7/2$^+$)	B	Jπ: log *ft*=5.18 from (5/2$^+$) ^{97}Pd; γ to (9/2)$^+$ g.s.
2271.1 *7*		I	
2272.5?[‡] *3*		D	
2295.4 *3*	(3/2$^+$,5/2$^+$,7/2$^+$)	B I	Jπ: log *ft*=4.89 from (5/2$^+$) ^{97}Pd.
2297.7 *6*		I	
2353.7 *6*		I	
2372.8 *6*		I	
2617.27[@] *24*	(21/2$^+$)[@]	DEF	Jπ: (E2) γ to (17/2$^+$) level.
2895.8[@] *4*	(23/2$^+$)[@]	J	Jπ: (E2) γ to (19/2$^+$) level.
2903.58 *25*	(5/2$^+$,7/2$^+$)	B I	Jπ: log *ft*=4.56 from (5/2$^+$) ^{97}Pd; γ to 9/2$^+$ g.s.
2950.1 *7*	(5/2$^+$,7/2$^+$)	B	Jπ: log *ft*=4.92 from (5/2$^+$) ^{97}Pd; γ to 9/2$^+$ g.s.
3055.7[&] *3*	(21/2$^-$)[&]	DEF J	Jπ: (E2) to (17/2$^-$) level.
3091.2 *4*	(3/2$^+$,5/2$^+$,7/2$^+$)	B	Jπ: log *ft*=4.66 from (5/2$^+$) ^{97}Pd.
3095.9 *4*	(21/2)	DE	Jπ: D(+Q) γ to (19/2$^+$).
3240.0 *5*	(5/2$^+$,7/2$^+$)	B	Jπ: log *ft*=4.46 from (5/2$^+$) ^{97}Pd; γ to 9/2$^+$ g.s.
3259.7 *3*	(23/2$^+$)	DEF J	Jπ: (E2) to (19/2$^+$) level and D(+Q) γ to (21/2$^+$).
3345.4?[#] *4*	(23/2)	DE	Jπ: D(+Q) γ to (21/2$^-$) and D(+Q) γ from (25/2$^-$).
3551.3[@] *3*	(25/2$^+$)[@]	DEF J	Jπ: (E2) γ to (21/2$^+$) level.
3607.1 *5*	(3/2$^+$,5/2$^+$,7/2$^+$)	B	Jπ: log *ft*=4.4 from (5/2$^+$) ^{97}Pd.
4015.5[@] *3*	(27/2$^+$)[@]	DE	Jπ: (E2) γ to (23/2$^+$).
4074.4[&] *4*	(25/2$^-$)[&]	DE	Jπ: (E2) γ to (21/2$^-$) level.
4275.1[@] *3*	(29/2$^+$)[@]	DE	Jπ: (E2) γ to (25/2$^+$) level.
4824.4[@] *4*	(31/2$^+$)[@]	D	Jπ: (E2) γ to (27/2$^+$) level.
5159.4[&] *4*	(29/2$^-$)[&]	DE	Jπ: (E2) γ to (25/2$^-$) level.
5516.2[@] *4*	(33/2$^+$)[@]	DE	Jπ: (E2) γ to (29/2$^+$) level.
5965.1 *11*		E	
5973.8[&] *5*	(31/2$^-$)[&]	DE	Jπ: D(+Q) γ to (29/2$^-$) level; π=(−) based only on continuation of negative parity yrast states.
6191.6[@] *6*	(35/2$^+$)[@]	DE	Jπ: (E2) γ to (31/2$^+$) level.
6441.2 *5*	(33/2$^-$)	DE	Jπ: D(+Q) γ to (31/2$^-$) level; π=(−) based only on continuation of negative parity yrast states.
6472.5 *6*	(33/2)	E	Jπ: D(+Q) γ to (31/2$^-$) level.
6502.5 *7*		E	
6774.1[@] *7*	(37/2$^+$)[@]	DE	Jπ: based only on continuation of positive parity yrast states.

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Adopted Levels, Gammas (continued)

^{97}Rh Levels (continued)

E(level)[†]	J^π	XREF	Comments
6912.1 *6*	(35/2)	E	J^π: D(+Q) γ to (33/2$^+$) level.
6973.2 *6*		E	
7079.2 *11*		E	
7327.6 *8*		E	
7584.2 *11*		E	
7687.2 *11*		E	
7699.2[&] *7*	(35/2$^-$)[&]	E	J^π: based only on continuation of negative parity yrast states.
7954.1 *8*		E	
8003.6 *12*		E	
8282.1 *12*		E	
8364.1 *12*	(39/2)	E	J^π: D(+Q) γ to (37/2$^+$) level.
8492.2 *8*		E	
8510 *40*	(5/2$^+$)	H	Isobaric analog to ^{97}Ru 5/2$^+$ g.s. J^π: from L=(2) in (p,p) IAR.
8594.1 *12*		E	
9078.6? *15*		E	
9204.2 *12*		E	
9242.2 *12*		E	
9400 *40*	(1/2$^+$)	H	Isobaric analog to ^{97}Ru 1/2$^+$ 908.28-keV level. J^π: from L=(0) in (p,p) IAR.

[†] From least squares fit to Eγ.

[‡] The ordering of the 310.5- and 823.3-keV transitions has not been determined; therefore, this level could be either at 2272.8 or at 2785.9 keV.

[#] The ordering of the 289.6- and 728.9-keV transitions has not been determined; therefore, this level could be either at 3345.4 or at 3784.7 keV.

[@] Yrast state, established by cascading γ's (^{40}Ca,3pγ) and (^{36}S,4nγ) (also (^{6}Li,3nγ), and/or ((^{3}He,pnγ),(p,nγ)), and/or (α,p2nγ) for levels with J≤25/2$^+$); increasing spins with increasing excitation energies of levels were tacitly assumed.

[&] Negative parity yrast state, established by cascading γ's (from ((^{3}He,pnγ),(d,nγ)) for J≤13/2 and from (^{40}Ca,3pγ) and (^{36}S,4nγ) for J≥17/2); increasing spins with increasing excitation energies of levels were tacitly assumed.

[a] log *ft*=5.184 from g.s. to 7/2$^+$ 421.54-keV level in ^{97}Ru, J^π(g.s.)=5/2$^+$,7/2$^+$,9/2$^+$. M4 transition from 258.85 level to g.s. gives J^π(258.85)=1/2$^-$,13/2$^-$,15/2$^-$,17/2$^-$. log *ft*=6.77 from 258.85 level to L=0 *908*.30 level in ^{97}Ru rules out high spins. Possible E3 admixture >20% in M4 transition ruled out by α(K)exp(258γ).

Adopted Levels, Gammas (continued)

γ(^{97}Rh)

For unplaced γ's see ^{97}Pd ε decay, ^{60}Ni(^{40}Ca,3pγ), and ^{96}Ru(α,p2nγ).

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[c]	Comments
258.76	1/2⁻	258.76 *18*	100	0.0	9/2⁺	M4	2.57	B(M4)(W.u.)=24 *3* α(K)=2.03 *3*; α(L)=0.440 *7*; α(M)=0.0862 *13*; α(N+..)=0.01439 *21* α(N)=0.01388 *20*; α(O)=0.000508 *8* E_γ,Mult.: from ^{97}Rh IT decay.
265.36	(7/2⁺)	265.26 *9*	100	0.0	9/2⁺	(M1+E2)	0.034 *9*	α(K)=0.029 *8*; α(L)=0.0039 *13*; α(M)=0.00072 *25*; α(N+..)=0.00012 *4* α(N)=0.00012 *4*; α(O)=5.0×10⁻⁶ *11* Mult.,δ: from γ(θ), δ<0.2 ((^{3}He,pnγ),(d,nγ)).
475.11	(5/2⁺,7/2)	209.5 *3*	3.8 *13*	265.36	(7/2⁺)			
		475.2 *1*	100 *3*	0.0	9/2⁺	[E2]	0.00657	α(K)=0.00570 *8*; α(L)=0.000718 *10*; α(M)=0.0001336 *19*; α(N+..)=2.29×10⁻⁵ *4* α(N)=2.19×10⁻⁵ *3*; α(O)=9.95×10⁻⁷ *14*
845.3	(1/2⁺)	586.5 *2*	100	258.76	1/2⁻			
850.1	(5/2⁻)	591.1 *5*	100	258.76	1/2⁻	(E2)	0.00352	α(K)=0.00306 *5*; α(L)=0.000375 *6*; α(M)=6.96×10⁻⁵ *10*; α(N+..)=1.199×10⁻⁵ *17* α(N)=1.145×10⁻⁵ *17*; α(O)=5.41×10⁻⁷ *8* E_γ: from (^{3}He,pnγ),(d,nγ) (also observed in (p,γ)). Mult.: from γ(θ) ((^{3}He,pnγ),(d,nγ)).
857.71	(13/2⁺)	857.69 *13*	100	0.0	9/2⁺	E2	1.35×10⁻³	α(K)=0.001180 *17*; α(L)=0.0001393 *20*; α(M)=2.58×10⁻⁵ *4*; α(N+..)=4.48×10⁻⁶ *7* α(N)=4.27×10⁻⁶ *6*; α(O)=2.11×10⁻⁷ *3* Mult.: from γ(θ) (^{40}Ca,3pγ), (^{6}Li,3nγ), (α,p2nγ).
863.55	(9/2)	597.7[@] *5*	<4[@]	265.36	(7/2⁺)			
		863.1[@] *5*	100[@] *5*	0.0	9/2⁺	D(+Q)		Mult.: ΔJ=0 transition suggested by γ(θ) ((^{3}He,pnγ),(d,nγ)).
1004.5	(3/2⁻)	745.7[#] *5*	100	258.76	1/2⁻			
1058.04	(5/2⁺)	583.0 *3*	14.6 *7*	475.11	(5/2⁺,7/2)			
		792.70 *9*	100 *4*	265.36	(7/2⁺)	D(+Q)		Mult.: from γ(θ) ((^{3}He,pnγ),(d,nγ)).
		1058.5 *4*	18.6 *8*	0.0	9/2⁺			
1199.1	(5/2⁺,7/2)	933.7 *4*	100 *5*	265.36	(7/2⁺)			
		1199.2 *4*	53 *12*	0.0	9/2⁺			
1242.6	(11/2⁺)	977.5[@] *5*	17[@] *2*	265.36	(7/2⁺)	[E2]	9.94×10⁻⁴	α(K)=0.000870 *13*; α(L)=0.0001018 *15*; α(M)=1.89×10⁻⁵ *3*; α(N+..)=3.28×10⁻⁶ *5* α(N)=3.12×10⁻⁶ *5*; α(O)=1.560×10⁻⁷ *22*
		1242.7[@] *5*	100[@] *5*	0.0	9/2⁺	(M1+E2)	≈6.56×10⁻⁴	α(K)≈0.000566; α(L)≈6.45×10⁻⁵; α(M)≈1.194×10⁻⁵;

$^{97}_{45}Rh_{52}$-4

Adopted Levels, Gammas (continued)

γ(^{97}Rh) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	δ	α[c]	Comments
									α(N+..)≈1.390×10^{-5} α(N)≈1.99×10^{-6}; α(O)≈1.032×10^{-7}; α(IPF)≈1.181×10^{-5} Mult.,δ: from γ(θ) ((^{3}He,pnγ),(d,nγ)).
1375.6	(9/2$^-$)	525.3[@] *5*	100[@] *5*	850.1	(5/2$^-$)	(E2)		0.00490	α(K)=0.00426 *6*; α(L)=0.000529 *8*; α(M)=9.84×10^{-5} *14*; α(N+..)=1.689×10^{-5} *25* α(N)=1.614×10^{-5} *23*; α(O)=7.48×10^{-7} *11* Mult.: from γ(θ) ((^{3}He,pnγ),(d,nγ)).
		1109.9[@] *5*	12.7[@] *6*	265.36	(7/2$^+$)	[E1]		3.38×10^{-4}	α(K)=0.000292 *4*; α(L)=3.29×10^{-5} *5*; α(M)=6.08×10^{-6} *9*; α(N+..)=7.12×10^{-6} *13* α(N)=1.009×10^{-6} *15*; α(O)=5.19×10^{-8} *8*; α(IPF)=6.06×10^{-6} *12*
		1376.4[@] *5*	10.8[@] *5*	0.0	9/2$^+$	[E1]		3.74×10^{-4}	α(K)=0.000199 *3*; α(L)=2.23×10^{-5} *4*; α(M)=4.13×10^{-6} *6*; α(N+..)=0.0001485 *21* α(N)=6.86×10^{-7} *10*; α(O)=3.55×10^{-8} *5*; α(IPF)=0.0001478 *21*
1415.51	(3/2$^+$,5/2,7/2)	940.3 *3*	100 *6*	475.11	(5/2$^+$,7/2)				
		1150.3 *4*	29.4 *14*	265.36	(7/2$^+$)				
1463.64	(15/2$^+$)	599.7[@] *5*	<9[@]	863.55	(9/2)				
		605.81 *17*	100	857.71	(13/2$^+$)	(M1+E2)	+0.27 *5*	0.00324	α(K)=0.00284 *4*; α(L)=0.000330 *5*; α(M)=6.11×10^{-5} *9*; α(N+..)=1.068×10^{-5} *15* α(N)=1.016×10^{-5} *15*; α(O)=5.20×10^{-7} *8* Mult.: from γ(θ) (^{40}Ca,3pγ), (^{6}Li,3nγ). δ: from γ(θ) (^{40}Ca,3pγ).
1470.6	(3/2,7/2)	620.5[@] *5*	100	850.1	(5/2$^-$)	D(+Q)			Mult.: from γ(θ) ((^{3}He,pnγ),(d,nγ)).
1528.7	(3/2,5/2,7/2)	1053.6 *4*	100	475.11	(5/2$^+$,7/2)				
1541.8		678.5[@] *5*	100[@] *5*	863.55	(9/2)				
		1276.5[d@] *5*	<65[@]	265.36	(7/2$^+$)				
		1541.4[@] *5*	15[@] *7*	0.0	9/2$^+$				
1553.15	(17/2$^+$)	89.27 *24*	8.3 *7*	1463.64	(15/2$^+$)	(M1(+E2))		1.2 *8*	α(K)=1.0 *6*; α(L)=0.22 *17*; α(M)=0.04 *4*; α(N+..)=0.007 *5*

Adopted Levels, Gammas (continued)

γ(^{97}Rh) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	δ	α[c]	Comments
									α(N)=0.006 *5*; α(O)=0.00015 *8* I_γ: from (α,p2nγ); (^{40}Ca,3pγ) gives I(γ+ce)=15 *3* (Iγ=10.2 *20*); (^{36}S,4nγ) gives Iγ=14.3 *14*. Mult.: D γ from γ(θ) (α,p2nγ) or D(+Q) γ from DCO (^{36}S,4nγ); Δπ=no from level scheme.
1553.15	(17/2$^+$)	695.53 *15*	100 *1*	857.71	(13/2$^+$)	(E2)		0.00227	α(K)=0.00198 *3*; α(L)=0.000239 *4*; α(M)=4.43×10^{-5} *7*; α(N+..)=7.66×10^{-6} *11* α(N)=7.31×10^{-6} *11*; α(O)=3.53×10^{-7} *5* Mult.: from γ(θ) (^{40}Ca,3pγ), (^{6}Li,3nγ), (α,p,2nγ).
1619.0	(3/2$^+$,5/2,7/2)	614.4[#] *5*	36[#] *2*	1004.5	(3/2$^-$)				
		1354.1 *4*	100 *10*	265.36	(7/2$^+$)				
1635.0		1159.9[@] *5*	100	475.11	(5/2$^+$,7/2)				
1759.55	(5/2$^+$,7/2$^+$)	230.1[@e] *5*	12[@] *4*	1528.7	(3/2,5/2,7/2)				
		895.2[@] *5*	48[@] *5*	863.55	(9/2)				
		1494.2 *2*	90 *5*	265.36	(7/2$^+$)				
		1759.60 *10*	100 *7*	0.0	9/2$^+$				
1775.1	(11/2$^+$,13/2,15/2$^+$)	311.4[@] *5*	<63[@]	1463.64	(15/2$^+$)				
		532.6[@] *5*	100[@] *10*	1242.6	(11/2$^+$)				
		912.6[@e] *5*	<240[@]	863.55	(9/2)				
1906.5	(3/2,5/2,7/2)	1641.1 *3*	100	265.36	(7/2$^+$)				
1928.3	(13/2$^-$)	552.8[@] *5*	100[@] *5*	1375.6	(9/2$^-$)	(E2)		0.00424	α(K)=0.00368 *6*; α(L)=0.000455 *7*; α(M)=8.46×10^{-5} *12*; α(N+..)=1.454×10^{-5} *21* α(N)=1.389×10^{-5} *20*; α(O)=6.49×10^{-7} *10* Mult.: from γ(θ) ((^{3}He,pnγ),(d,nγ)).
		685.7[@] *5*	50[@] *3*	1242.6	(11/2$^+$)				
		1070.4[@] *5*	41[@] *4*	857.71	(13/2$^+$)	[E1]		3.55×10^{-4}	α(K)=0.000312 *5*; α(L)=3.52×10^{-5} *5*; α(M)=6.50×10^{-6} *10*; α(N+..)=1.136×10^{-6} *16* α(N)=1.080×10^{-6} *16*; α(O)=5.55×10^{-8} *8*

$^{97}_{45}Rh_{52}$-6

Adopted Levels, Gammas (continued)

γ(^{97}Rh) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	δ	α[c]	Comments
1961.98	(19/2$^+$)	408.79 *20*	100	1553.15	(17/2$^+$)	(M1+E2)	−0.04 *4*	0.00831	α(K)=0.00727 *11*; α(L)=0.000853 *12*; α(M)=0.0001583 *23*; α(N+..)=2.76×10^{-5} *4* α(N)=2.63×10^{-5} *4*; α(O)=1.344×10^{-6} *19* Mult.,δ: from γ(θ) (^{40}Ca,3pγ).
1984.1	(11/2$^+$,13/2,15/2$^+$)	519[@]		1463.64	(15/2$^+$)				
		741.9[@] *5*		1242.6	(11/2$^+$)				
1994.2	(5/2$^+$,7/2$^+$)	1519.8 *5*	100 *5*	475.11	(5/2$^+$,7/2)				
		1729.1[#] *5*	19[#] *2*	265.36	(7/2$^+$)				
		1993.6 *4*	53 *5*	0.0	9/2$^+$				
2062.1		1796.7[@e] *5*	100	265.36	(7/2$^+$)				
2068.0	(3/2,5/2,7/2)	1592.9 *4*	100	475.11	(5/2$^+$,7/2)				
2097.5		721.9[@] *5*	100	1375.6	(9/2$^-$)				
2103.6		640[@]	100	1463.64	(15/2$^+$)				
2113.25	(5/2$^+$,7/2$^+$)	354.4 *4*	21.2 *15*	1759.55	(5/2$^+$,7/2$^+$)				
		571[@]		1541.8					
		1055.4 *4*	100 *7*	1058.04	(5/2$^+$)				
		1638.7 *4*	66 *4*	475.11	(5/2$^+$,7/2)				
		1846.8 *3*	50 *4*	265.36	(7/2$^+$)				
		2111.4[#] *10*	7.1[#] *6*	0.0	9/2$^+$				
2126.6		1276.5[d@] *5*	100	850.1	(5/2$^-$)				
2147.3		904.7[@] *5*	100	1242.6	(11/2$^+$)				
2187.2	(3/2,5/2,7/2)	658.5 *4*	100	1528.7	(3/2,5/2,7/2)				
2225.40	(17/2$^-$)	672.23 *18*	20 *3*	1553.15	(17/2$^+$)	[E1]		9.08×10^{-4}	α(K)=0.000798 *12*; α(L)=9.09×10^{-5} *13*; α(M)=1.680×10^{-5} *24*; α(N+..)=2.93×10^{-6} *5* α(N)=2.79×10^{-6} *4*; α(O)=1.412×10^{-7} *20*
		761.76 *15*	100 *4*	1463.64	(15/2$^+$)	D(+Q)			Mult.: D(+Q) from γ(θ) (^{40}Ca,3pγ), ((^{3}He,pnγ),(d,nγ)).
2229.6	(5/2$^+$,7/2$^+$)	1171.8[#] *3*	100[#] *12*	1058.04	(5/2$^+$)				
		2231.3[#] *10*	15.3[#] *8*	0.0	9/2$^+$				
2271.1		1421.0[@] *5*	100	850.1	(5/2$^-$)				
2272.5?		310.53[a] *20*	100	1961.98	(19/2$^+$)				
2295.4	(3/2$^+$,5/2$^+$,7/2$^+$)	1237.8 *4*	81 *10*	1058.04	(5/2$^+$)				
		2029.5 *4*	100 *5*	265.36	(7/2$^+$)				

$^{97}_{45}Rh_{52}$-7

Adopted Levels, Gammas (continued)

γ(^{97}Rh) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[c]	Comments
2297.7		922.1[@] *5*	100	1375.6	(9/2$^-$)			
2353.7		425.4[@] *5*	100	1928.3	(13/2$^-$)			
2372.8		1515.1[@e] *5*	100	857.71	(13/2$^+$)			
2617.27	(21/2$^+$)	655.23 *14*	100 *3*	1961.98	(19/2$^+$)	D(+Q)		Mult.: from DCO (^{36}S,4nγ).
		1064.16 *22*	43 *4*	1553.15	(17/2$^+$)	(E2)	8.21×10^{-4}	α(K)=0.000719 *10*; α(L)=8.37×10^{-5} *12*; α(M)=1.550×10^{-5} *22*; α(N+..)=2.70×10^{-6} *4* α(N)=2.57×10^{-6} *4*; α(O)=1.291×10^{-7} *18* Mult.: from γ(θ) (^{40}Ca,3pγ) and from DCO (^{36}S,4nγ).
2895.8	(23/2$^+$)	933.8[&] *3*	100	1961.98	(19/2$^+$)	E2	1.10×10^{-3}	α(K)=0.000966 *14*; α(L)=0.0001134 *16*; α(M)=2.10×10^{-5} *3*; α(N+..)=3.65×10^{-6} *6* α(N)=3.48×10^{-6} *5*; α(O)=1.731×10^{-7} *25* Mult.: from γ(θ) (α,p2nγ).
2903.58	(5/2$^+$,7/2$^+$)	1285.0 *4*	100 *5*	1619.0	(3/2$^+$,5/2,7/2)			
		2428.4 *4*	89 *4*	475.11	(5/2$^+$,7/2)			
		2637.1[#] *10*	37[#] *7*	265.36	(7/2$^+$)			
		2903.3 *4*	47 *9*	0.0	9/2$^+$			
2950.1	(5/2$^+$,7/2$^+$)	2684.4[#] *10*	100[#] *8*	265.36	(7/2$^+$)			
		2950.3[#] *10*	29.5[#] *14*	0.0	9/2$^+$			
3055.7	(21/2$^-$)	830.33 *18*	100	2225.40	(17/2$^-$)	(E2)	1.46×10^{-3}	α(K)=0.001275 *18*; α(L)=0.0001510 *22*; α(M)=2.80×10^{-5} *4*; α(N+..)=4.86×10^{-6} *7* α(N)=4.63×10^{-6} *7*; α(O)=2.28×10^{-7} *4* Mult.: (E2) from γ(θ) (α,p2nγ) and DCO (^{36}S,4nγ).
3091.2	(3/2$^+$,5/2$^+$,7/2$^+$)	862.7[#] *5*	100[#] *17*	2229.6	(5/2$^+$,7/2$^+$)			
		976.7[#] *5*	53[#] *11*	2113.25	(5/2$^+$,7/2$^+$)			
		2826.3[#] *10*	68[#] *9*	265.36	(7/2$^+$)			
3095.9	(21/2)	823.3[a] *4*	64[a] *7*	2272.5?				
		1134.0 *3*	100 *14*	1961.98	(19/2$^+$)	D(+Q)		E_γ,I_γ: from (^{40}Ca,3pγ) (also observed in (^{36}S,4nγ)). Mult.: from DCO (^{36}S,4nγ).
3240.0	(5/2$^+$,7/2$^+$)	1480.5[#] *5*	100[#] *4*	1759.55	(5/2$^+$,7/2$^+$)			
		2974.6[#] *10*	90[#] *14*	265.36	(7/2$^+$)			
		3239.8[#] *10*	36[#] *5*	0.0	9/2$^+$			
3259.7	(23/2$^+$)	163.8 *4*	4 *3*	3095.9	(21/2)			E_γ,I_γ: from (^{40}Ca,3pγ) (also observed in (^{36}S,4nγ)).
		642.29 *25*	15 *6*	2617.27	(21/2$^+$)	D(+Q)		E_γ,I_γ: from (^{40}Ca,3pγ) (also observed in (^{36}S,4nγ)). Mult.: from DCO (^{36}S,4nγ).
		1297.79 *23*	100 *3*	1961.98	(19/2$^+$)	(E2)	5.62×10^{-4}	α(K)=0.000471 *7*; α(L)=5.42×10^{-5} *8*; α(M)=1.003×10^{-5}

$^{97}_{45}Rh_{52}$-8

Adopted Levels, Gammas (continued)

γ(^{97}Rh) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	δ	α[c]	Comments
									14; α(N+..)=2.63×10^{-5} *4* α(N)=1.665×10^{-6} *24*; α(O)=8.47×10^{-8} *12*; α(IPF)=2.45×10^{-5} *4* Mult.: from γ(θ) (^{40}Ca,3pγ), (α,p2nγ), and DCO (^{36}S,4nγ).
3345.4?	(23/2)	289.58 *25*	100	3055.7	(21/2$^-$)	D(+Q)			E_γ,I_γ: from (^{40}Ca,3pγ) (also observed in (^{36}S,4nγ)). Mult.: from DCO (^{36}S,4nγ).
3551.3	(25/2$^+$)	291.61 *21*	57 *9*	3259.7	(23/2$^+$)	(M1+E2)	+0.05 *8*	0.0194 *4*	α(K)=0.0169 *3*; α(L)=0.00201 *4*; α(M)=0.000373 *7*; α(N+..)=6.51×10^{-5} *12* α(N)=6.19×10^{-5} *12*; α(O)=3.14×10^{-6} *5* Mult.,δ: γ(θ) (^{40}Ca,3pγ).
		655.5[&] *3*	78[&] *14*	2895.8	(23/2$^+$)	(M1)		0.00269	α(K)=0.00236 *4*; α(L)=0.000273 *4*; α(M)=5.05×10^{-5} *7*; α(N+..)=8.84×10^{-6} *13* α(N)=8.41×10^{-6} *12*; α(O)=4.33×10^{-7} *6* Mult.: D γ from γ(θ) (α,p2nγ); Δπ=no from level scheme.
		934.1 *4*	100 *3*	2617.27	(21/2$^+$)	(E2)		1.10×10^{-3}	α(K)=0.000965 *14*; α(L)=0.0001133 *16*; α(M)=2.10×10^{-5} *3*; α(N+..)=3.65×10^{-6} *6* α(N)=3.48×10^{-6} *5*; α(O)=1.730×10^{-7} *25* Mult.: from γ(θ) (^{40}Ca,3pγ).
3607.1	(3/2$^+$,5/2$^+$,7/2$^+$)	1377.4[#] *5*	57[#] *8*	2229.6	(5/2$^+$,7/2$^+$)				
		2408.0[#] *10*	100[#] *11*	1199.1	(5/2$^+$,7/2)				
		3342.1[#] *10*	100[#] *18*	265.36	(7/2$^+$)				
4015.5	(27/2$^+$)	464.18 *20*	99 *2*	3551.3	(25/2$^+$)	(M1+E2)	>+0.09	0.0066 *5*	α(K)=0.0057 *4*; α(L)=0.00070 *8*; α(M)=0.000130 *14*; α(N+..)=2.24×10^{-5} *22* α(N)=2.14×10^{-5} *22*; α(O)=1.03×10^{-6} *5* E_γ,I_γ: from (^{40}Ca,3pγ) (also observed in (^{36}S,4nγ)). Mult.,δ: from γ(θ) (^{40}Ca,3pγ).
		755.71 *15*	100 *10*	3259.7	(23/2$^+$)	(E2)		0.00184	α(K)=0.001607 *23*; α(L)=0.000192 *3*; α(M)=3.56×10^{-5} *5*;

Adopted Levels, Gammas (continued)

γ(^{97}Rh) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[c]	Comments
								α(K)=0.001607 *23*; α(L)=0.000192 *3*; α(M)=3.56×10^{-5} *5*; α(N+..)=6.16×10^{-6} *9* α(N)=5.88×10^{-6} *9*; α(O)=2.86×10^{-7} *4* E_γ,I_γ: from (^{40}Ca,3pγ) (also observed in (^{36}S,4nγ)). Mult.: from DCO (^{40}Ca,3pγ).
4074.4	(25/2$^-$)	728.93 *20*	100 *8*	3345.4?	(23/2)	D(+Q)		E_γ,I_γ: from (^{40}Ca,3pγ) (also observed in (^{36}S,4nγ)). Mult.: from DCO (^{36}S,4nγ).
		1018.78 *20*	43 *6*	3055.7	(21/2$^-$)	(E2)	9.05×10^{-4}	α(K)=0.000793 *12*; α(L)=9.24×10^{-5} *13*; α(M)=1.713×10^{-5} *24*; α(N+..)=2.98×10^{-6} *5* α(N)=2.84×10^{-6} *4*; α(O)=1.422×10^{-7} *20* E_γ,I_γ: from (^{40}Ca,3pγ) (also observed in (^{36}S,4nγ)). Mult.: from γ(θ) (^{40}Ca,3pγ) and DCO (^{36}S,4nγ).
4275.1	(29/2$^+$)	259.62 *15*	100 *8*	4015.5	(27/2$^+$)	D(+Q)		E_γ,I_γ: from (^{40}Ca,3pγ) (also observed in (^{36}S,4nγ)). Mult.: from DCO (^{36}S,4nγ).
		723.91 *15*	93 *9*	3551.3	(25/2$^+$)	(E2)	0.00205	α(K)=0.00179 *3*; α(L)=0.000215 *3*; α(M)=3.99×10^{-5} *6*; α(N+..)=6.89×10^{-6} *10* α(N)=6.57×10^{-6} *10*; α(O)=3.19×10^{-7} *5* E_γ,I_γ: from (^{40}Ca,3pγ) (also observed in (^{36}S,4nγ)). Mult.: from DCO (^{36}S,4nγ).
4824.4	(31/2$^+$)	808.89[a] *20*	100	4015.5	(27/2$^+$)	(E2)	1.55×10^{-3}	α(K)=0.001358 *19*; α(L)=0.0001612 *23*; α(M)=2.99×10^{-5} *5*; α(N+..)=5.18×10^{-6} *8* α(N)=4.94×10^{-6} *7*; α(O)=2.43×10^{-7} *4* E_γ,I_γ: from (^{40}Ca,3pγ) (also observed in (^{36}S,4nγ)). Mult.: from γ(θ) (^{40}Ca,3pγ), DCO (^{36}S,4nγ).
5159.4	(29/2$^-$)	1084.92 *22*	100	4074.4	(25/2$^-$)	(E2)	7.87×10^{-4}	α(K)=0.000690 *10*; α(L)=8.01×10^{-5} *12*; α(M)=1.484×10^{-5} *21*; α(N+..)=2.58×10^{-6} *4* α(N)=2.46×10^{-6} *4*; α(O)=1.238×10^{-7} *18* E_γ,I_γ: from (^{40}Ca,3pγ) (also observed in (^{36}S,4nγ)). Mult.: from γ(θ) (^{40}Ca,3pγ), DCO (^{36}S,4nγ).
5516.2	(33/2$^+$)	1241.04 *25*	100	4275.1	(29/2$^+$)	(E2)	6.03×10^{-4}	α(K)=0.000517 *8*; α(L)=5.96×10^{-5} *9*; α(M)=1.103×10^{-5} *16*; α(N+..)=1.561×10^{-5} *23* α(N)=1.83×10^{-6} *3*; α(O)=9.29×10^{-8} *13*; α(IPF)=1.369×10^{-5} *20* E_γ,I_γ: from (^{40}Ca,3pγ) (also observed in (^{36}S,4nγ)). Mult.: from DCO (^{36}S,4nγ).
5965.1		1690[b] *1*	100	4275.1	(29/2$^+$)			
5973.8	(31/2$^-$)	814.41 *20*	100	5159.4	(29/2$^-$)	D(+Q)		E_γ,I_γ: from (^{40}Ca,3pγ) (also observed in (^{36}S,4nγ)). Mult.: from DCO (^{36}S,4nγ).

$^{97}_{45}Rh_{52}$-10

Adopted Levels, Gammas (continued)

γ(^{97}Rh) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[c]	Comments
6191.6	(35/2$^+$)	674.4[be] *4*	<4[b]	5516.2	(33/2$^+$)			
		1367.2 *4*	100 *12*	4824.4	(31/2$^+$)	(E2)	5.24×10^{-4}	α(K)=0.000424 *6*; α(L)=4.86×10^{-5} *7*; α(M)=8.99×10^{-6} *13*; α(N+..)=4.26×10^{-5} *6* α(N)=1.493×10^{-6} *21*; α(O)=7.62×10^{-8} *11*; α(IPF)=4.10×10^{-5} *6* E_γ,I_γ: from (^{36}S,4nγ) (also observed in (^{40}Ca,3pγ)). Mult.: from DCO (^{36}S,4nγ).
6441.2	(33/2$^-$)	467.47 *20*	100	5973.8	(31/2$^-$)	D(+Q)		E_γ,I_γ: from (^{40}Ca,3pγ) (also observed in (^{36}S,4nγ)). Mult.: from DCO (^{36}S,4nγ).
6472.5	(33/2)	498.7[b] *4*	100	5973.8	(31/2$^-$)	D(+Q)		Mult.: from DCO (^{36}S,4nγ).
6502.5		310.9[b] *4*	100	6191.6	(35/2$^+$)			
6774.1	(37/2$^+$)	1257.9 *5*	100	5516.2	(33/2$^+$)			E_γ,I_γ: from (^{40}Ca,3pγ) (also observed in (^{36}S,4nγ)).
6912.1	(35/2)	1395.9[b] *4*	100	5516.2	(33/2$^+$)	D(+Q)		Mult.: from DCO (^{36}S,4nγ).
6973.2		1457.0[b] *4*		5516.2	(33/2$^+$)			
7079.2		1563[b] *1*	100	5516.2	(33/2$^+$)			
7327.6		825.1[b] *4*	100	6502.5				
7584.2		2068[b] *1*	100	5516.2	(33/2$^+$)			
7687.2		2171[b] *1*	100	5516.2	(33/2$^+$)			
7699.2	(35/2$^-$)	1257.9[b] *4*	100	6441.2	(33/2$^-$)			
7954.1		1180.0[b] *4*	100	6774.1	(37/2$^+$)			
8003.6		1812[b] *1*	100	6191.6	(35/2$^+$)			
8282.1		1508[b] *1*	100	6774.1	(37/2$^+$)			
8364.1	(39/2)	1590[b] *1*	100	6774.1	(37/2$^+$)	D(+Q)		Mult.: from DCO (^{36}S,4nγ).
8492.2		793.0[b] *4*	100	7699.2	(35/2$^-$)			
8594.1		1820[b] *1*	100	6774.1	(37/2$^+$)			
9078.6?		1075.0[be] *4*	100	8003.6				
9204.2		1505[b] *1*	100	7699.2	(35/2$^-$)			
9242.2		1543[b] *1*	100	7699.2	(35/2$^-$)			

† Weighted average of measurements in ^{97}Pd ε decay, (^{40}Ca,3pγ), (^{6}Li,3nγ), (^{3}He,pnγ) and (α,p2nγ) where available. Gammas only observed in one data set are so indicated.

‡ Multipolarities determined from reaction γ(θ) or DCO as Q or D+Q (with a measured δ) are assumed to be E2 and M1+E2, respectively. Unless mentioned otherwise, all the transitions are stretched (see respective datasets).

Seen only in ^{97}Pd ε decay.

@ Seen only in ((^{3}He,pnγ),(d,nγ)) experiment.

$^{97}_{45}Rh_{52}$-11

Adopted Levels, Gammas (continued)

$\gamma(^{97}Rh)$ (continued)

& Seen only in (α,p2nγ) experiment.
[a] Seen only in (^{40}Ca,3pγ) experiment.
[b] Seen only in (^{36}S,4nγ) experiment.
[c] 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.
[d] Multiply placed.
[e] Placement of transition in the level scheme is uncertain.

$^{97}_{45}Rh_{52}$-12

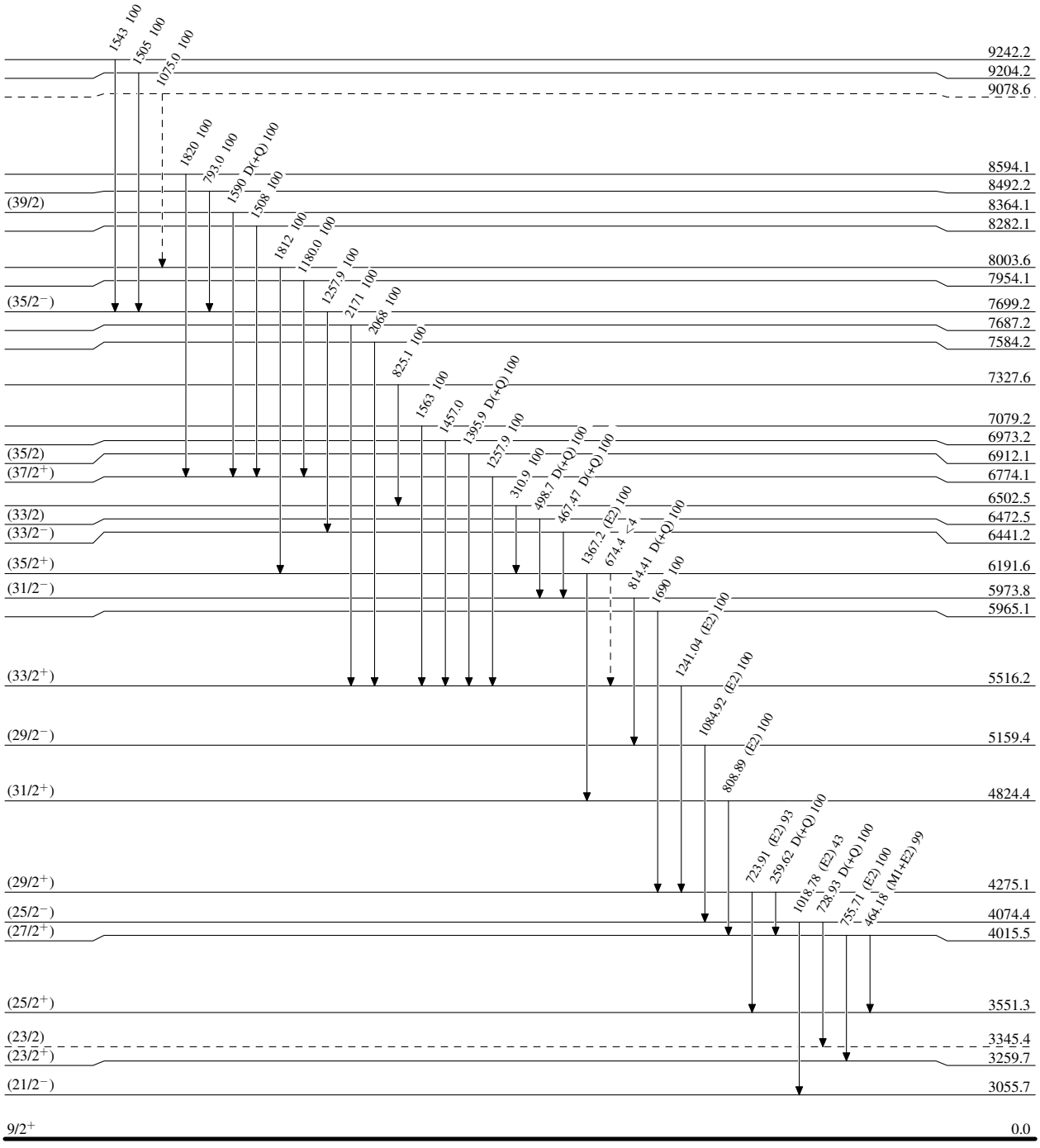
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{97}_{45}Rh_{52}$

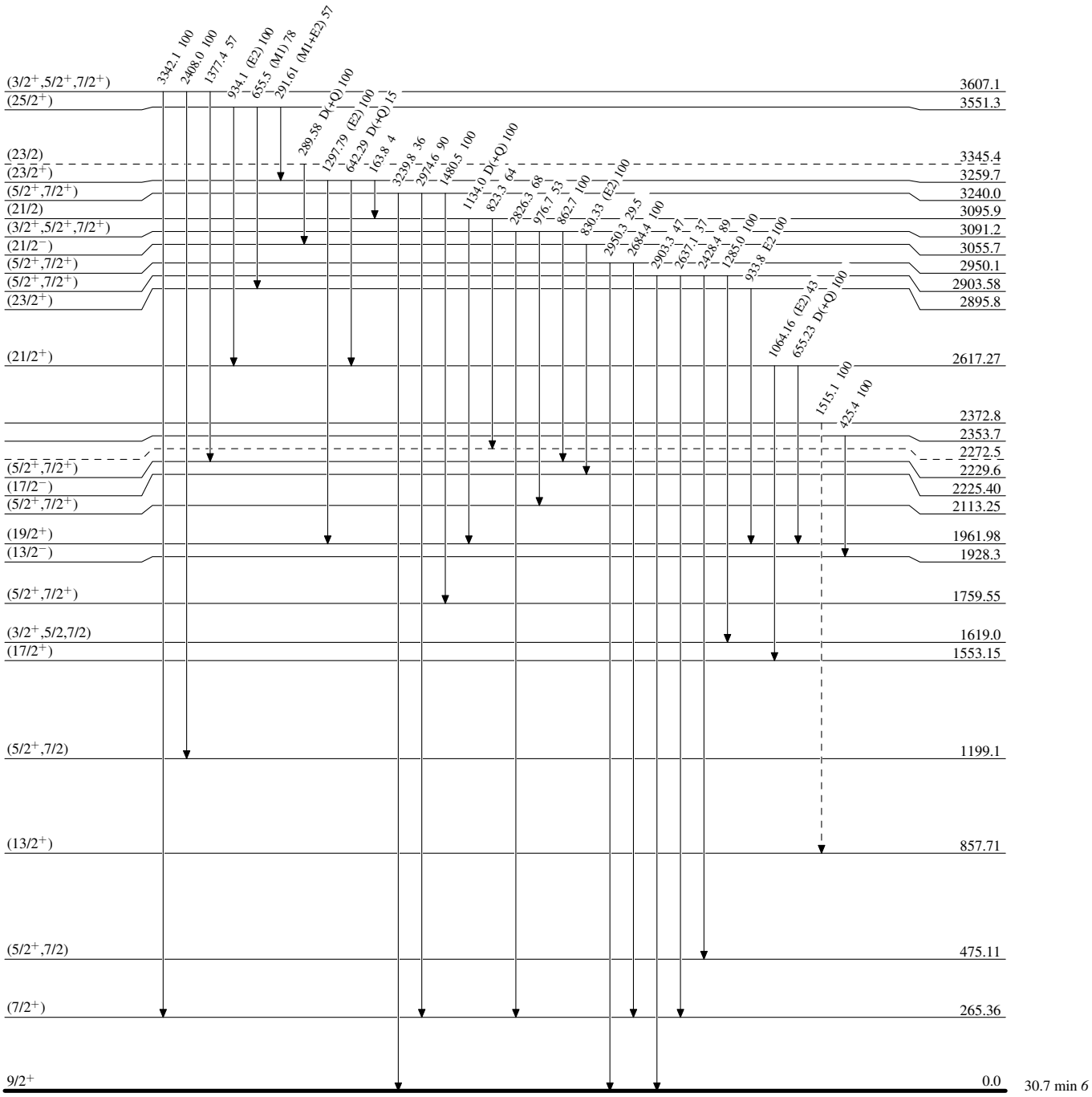
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

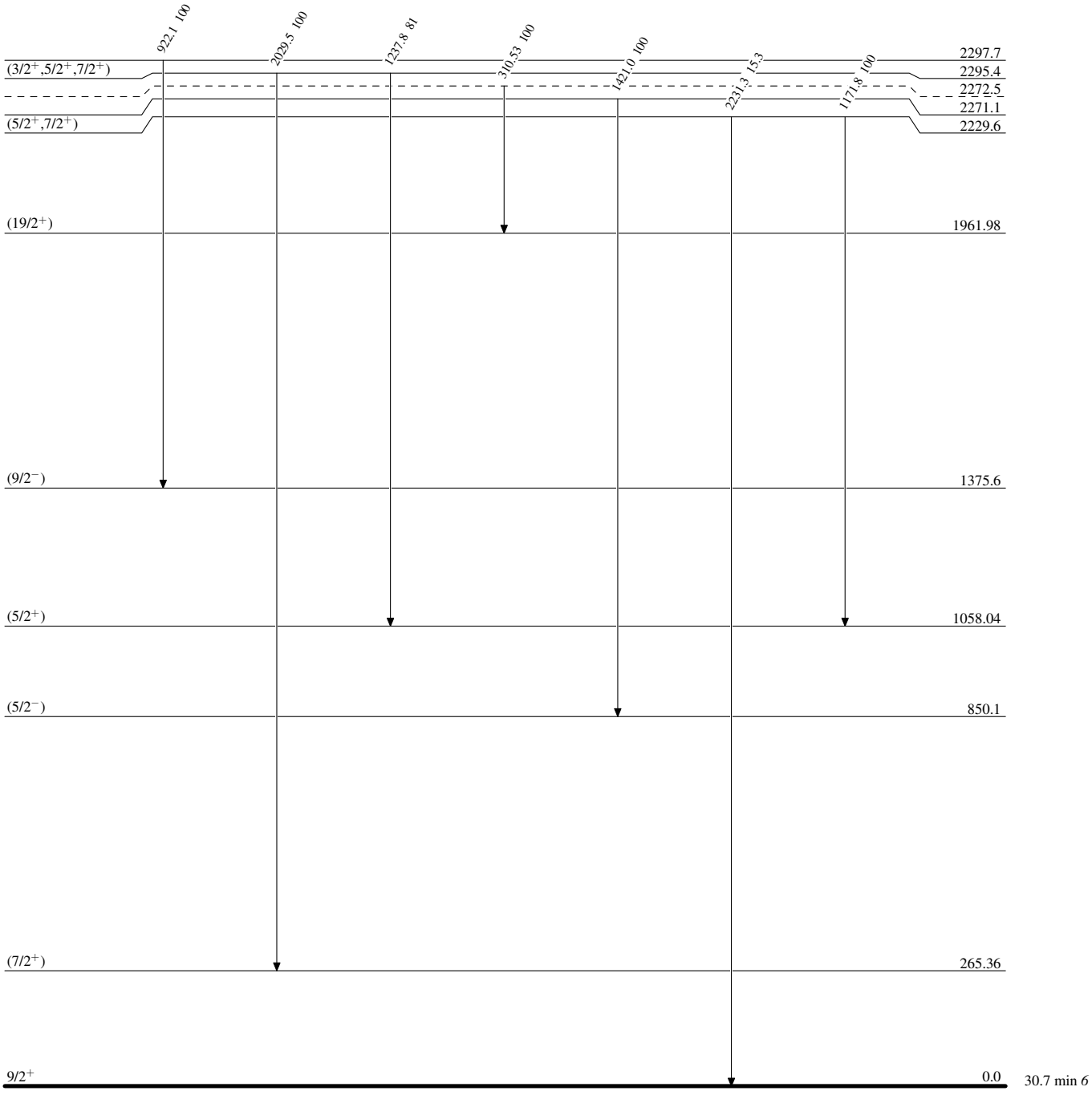


$^{97}_{45}Rh_{52}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

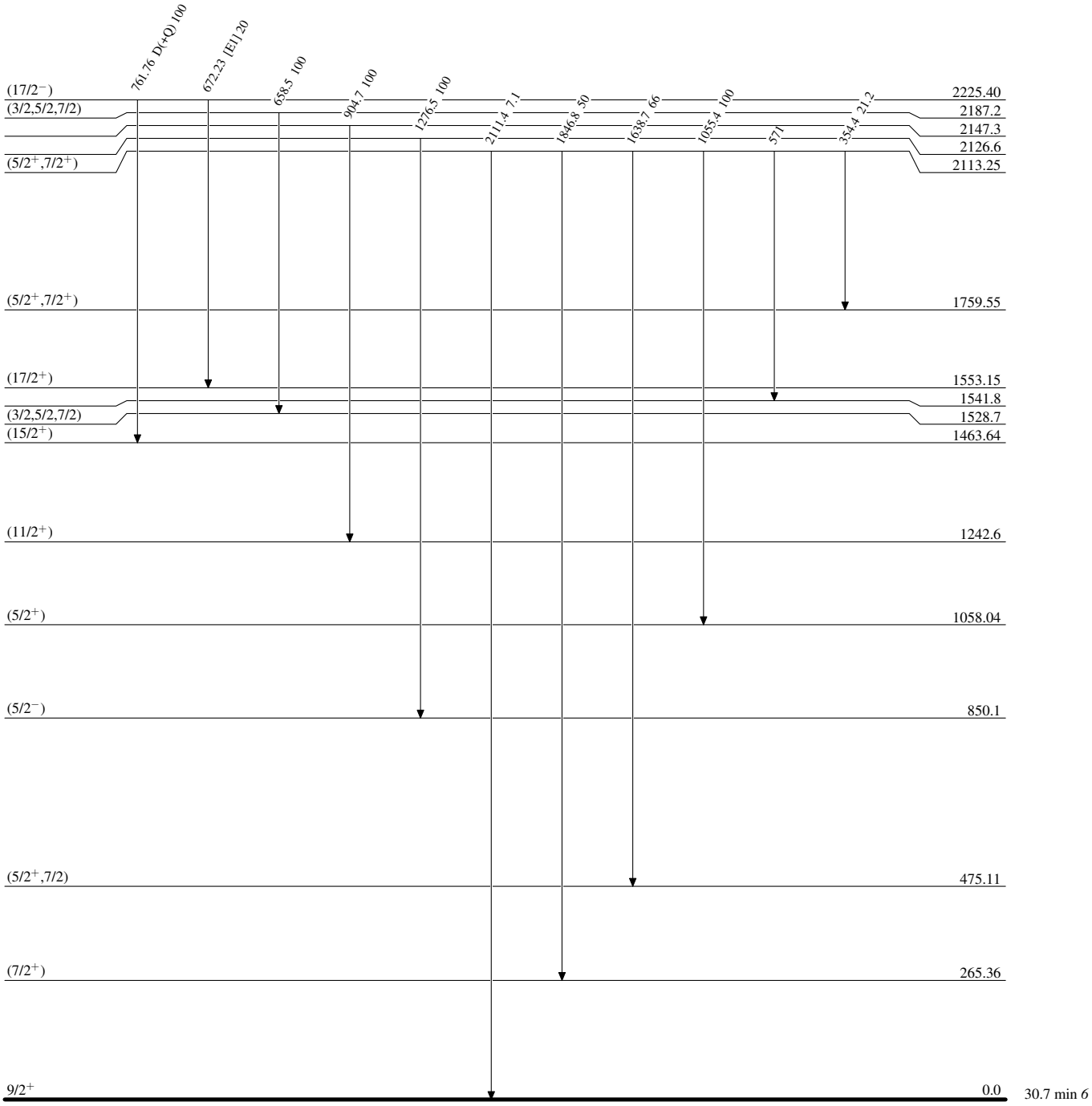


$^{97}_{45}Rh_{52}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{97}_{45}Rh_{52}$

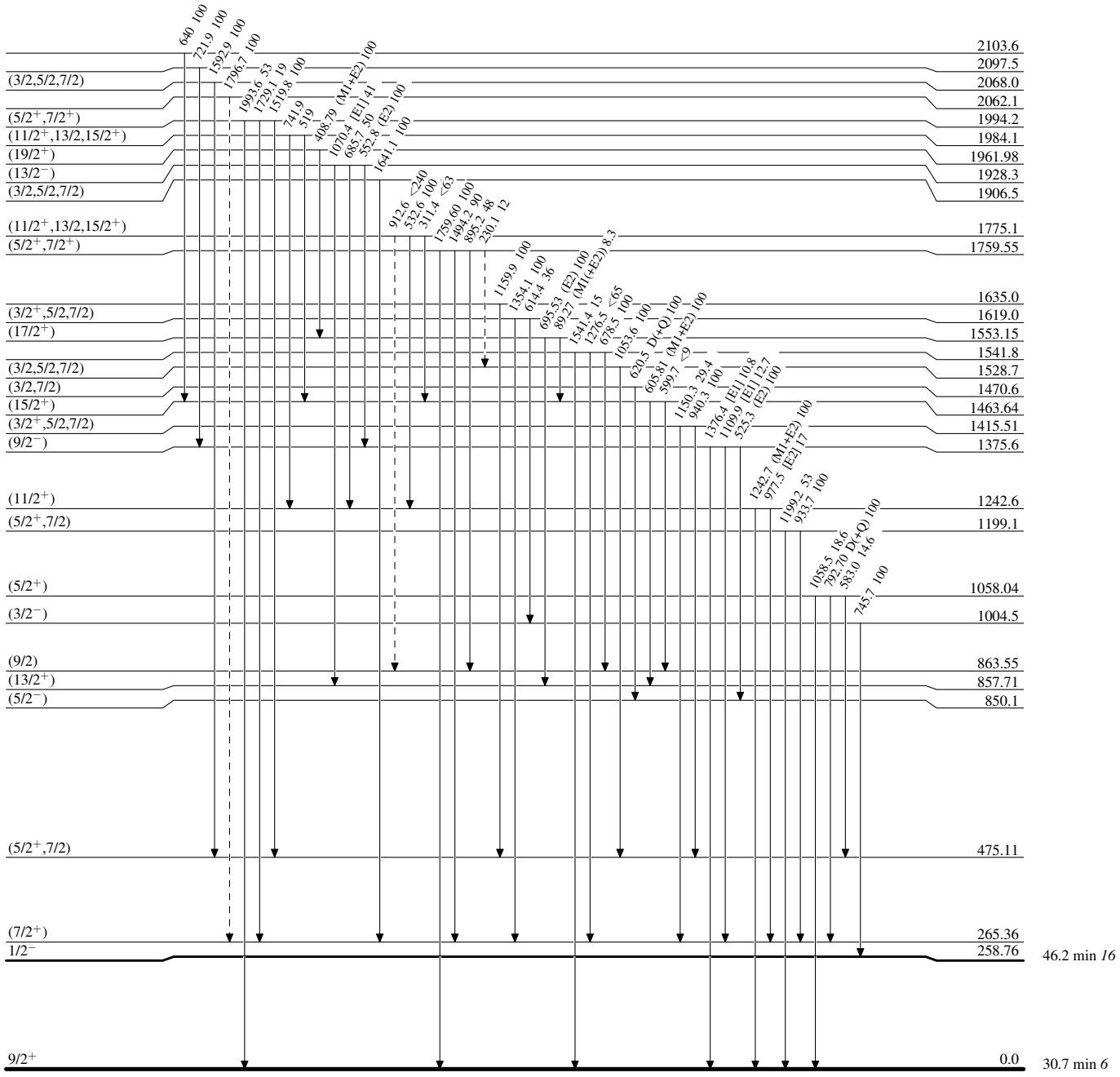
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

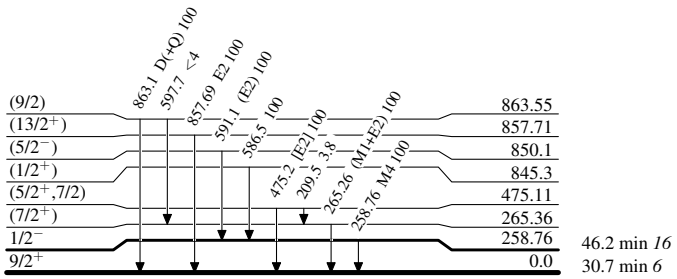


$^{97}_{45}Rh_{52}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{97}_{45}Rh_{52}$