Nuclear Data Sheets xx, 1 (****)

Nuclear Data Sheets for A=182*

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*(Received ****)*

Abstract: Nuclear spectroscopic information for known nuclides of mass number 182 (Lu,Hf,Ta,W,Re,Os,Ir,Pt,Au,Hg,Tl,Pb) with Z=71 to 82 and N=111 to 100 have been evaluated and presented together with adopted energies and Jπ of levels in these nuclei. No excited state data are yet available for ^{182}Lu, while only limited structure information is available for ^{182}Pb and ^{182}Tl. Rotational band structures are known for ^{182}Hg and ^{182}Au but spin-parity assignments remain largely tentative. The decays of ^{182}Lu, ^{182}Hg, ^{182}Au and ^{182}Tl are not well established. The ^{182}Hf isotope is of geophysical and astrophysical interest. This evaluation supersedes previous full evaluations of A=182 published by 1988Fi05 and 1975Sc13, and a selected (mainly high-spin) update of A=182 published by 1995Si04.

Cutoff Date: Literature available up to March 18, 2008, has been consulted.

General Policies and Organization of Material: See the January issue of the *Nuclear Data Sheets* or http:// www.nndc.bnl.gov /nds/NDSPolicies.pdf.

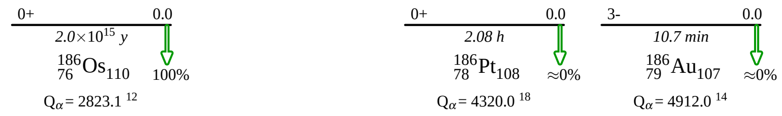
General Comments: The statistical analysis of γ-ray data and deduced level schemes is carried out through computer codes available at NNDC, BNL website: www.nndc.bnl.gov. The direct feedings to excited states in β^- and ε decays have generally been computed from I(γ+ce) intensity balances at each level; the associated log *ft* values are calculated using LOGFT code. The total internal conversion coefficients corresponding to assigned multipolarities and mixing ratios are theoretical values calculated using BrIcc code. A general 1.5% uncertainty is assumed in quoted theoretical internal conversion coefficients. All Q values have been adopted from 2003Au03. The static magnetic and quadrupole moments are from 1989Ra17 and 2005St24 when available. Relevant data for A=186 isotopes which decay by α decay to A=182 isotopes are taken primarily from A=186 NDS (2003Ba44).

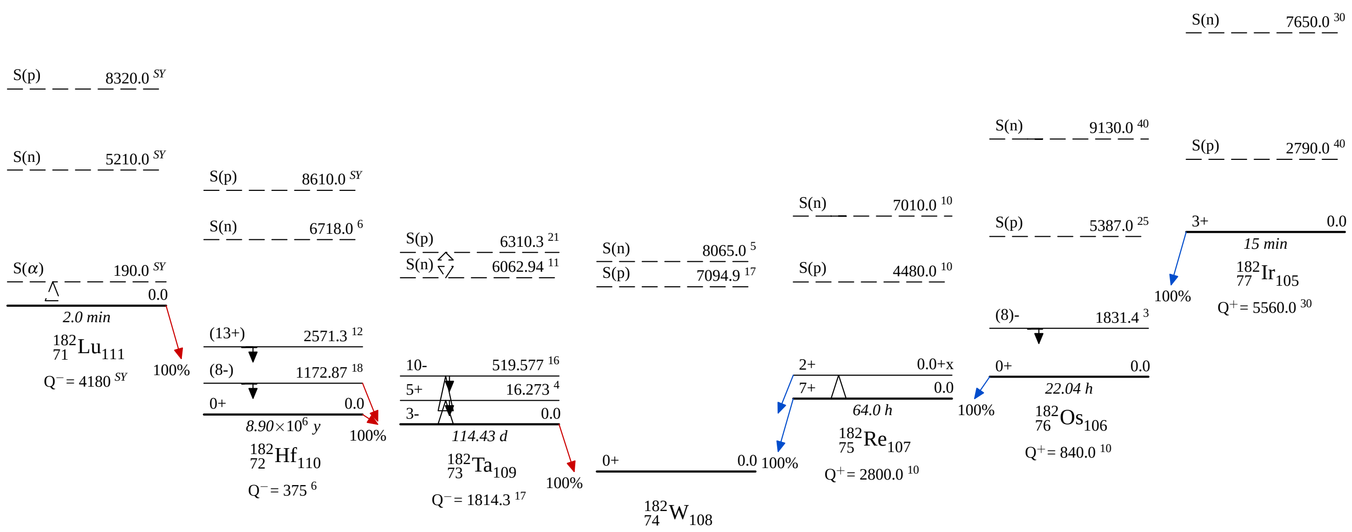
Acknowledgements: The evaluators thank McMaster students Scott Geraedts, Michelle Lee, George Reed and Jordan Chenkin for compilation of several datasets for A=182 nuclides some of which are in the XUNDL database.

*This work was supported by the Natural Sciences and Engineering Research Council (NSERC) of Canada, and by the Office of Nuclear Physics, Office of Science, Department of Energy of the United States.

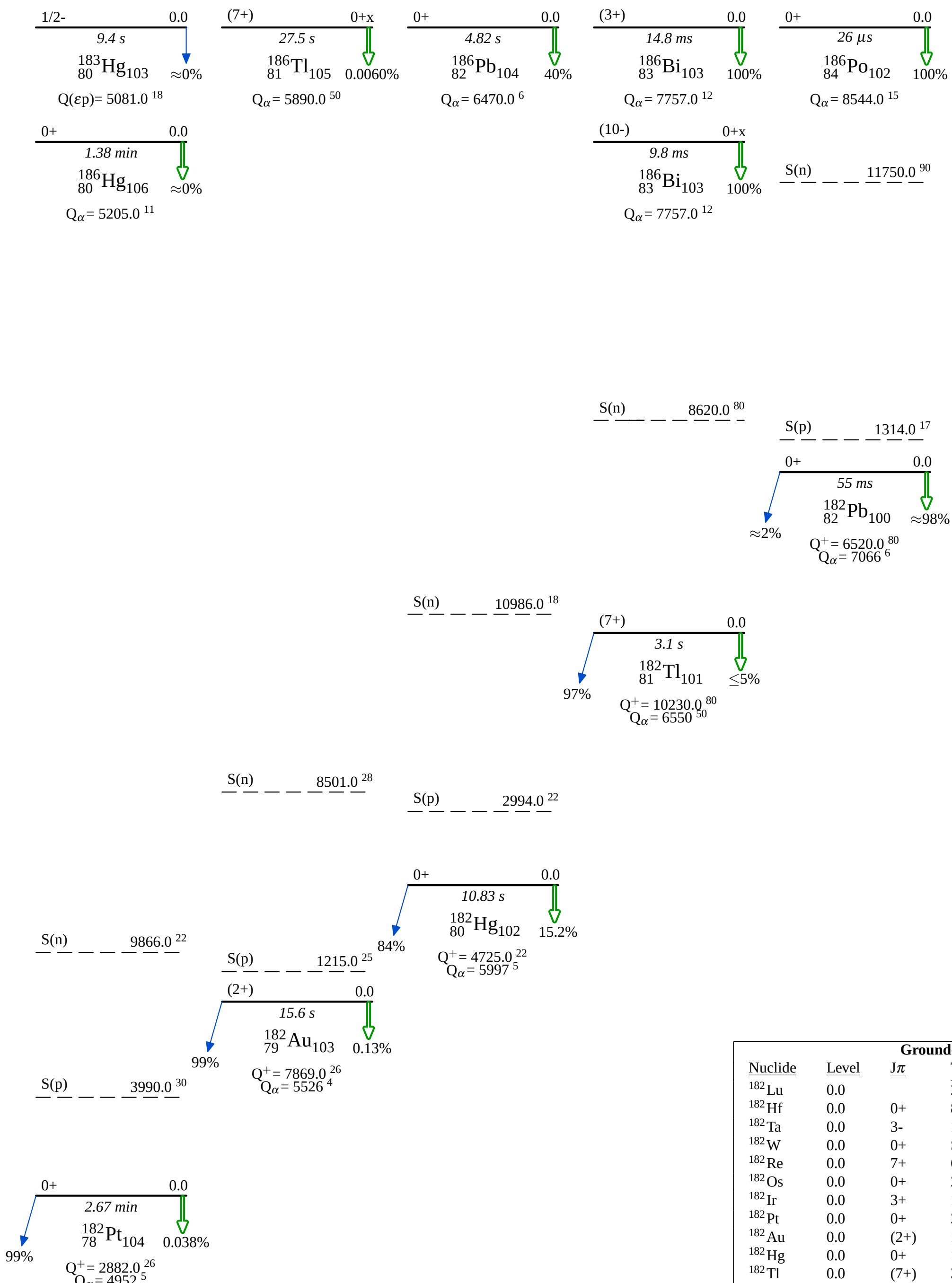
Index for A=182

Skeleton Scheme for A=182





Skeleton Scheme for A=182 (continued)



Ground-State and Isomeric-Level Properties

Nuclide	Level	Jπ	$T_{1/2}$	Decay Mode
^{182}Lu	0.0		2.0 min *2*	%β-=100
^{182}Hf	0.0	0+	8.90×10^{6} y *9*	%β-=100
^{182}Ta	0.0	3-	114.43 d *3*	%β-=100
^{182}W	0.0	0+	STABLE	
^{182}Re	0.0	7+	64.0 h *5*	%ε+%β+=100
^{182}Os	0.0	0+	22.04 h *20*	%ε=100
^{182}Ir	0.0	3+	15 min *1*	%ε+%β+=100
^{182}Pt	0.0	0+	2.67 min *12*	%ε+%β+=99.962 *2*; %α=0.038 *2*
^{182}Au	0.0	(2+)	15.6 s *4*	%ε+%β+=99.87 *5*; %α=0.13 *5*
^{182}Hg	0.0	0+	10.83 s *6*	%ε+%β+=84.8 *8*; %α=15.2 *8*
^{182}Tl	0.0	(7+)	3.1 s *10*	%ε+%β+=97.5 *25*; %α≤5
^{182}Pb	0.0	0+	55 ms *5*	%ε+%β+=≈2 ; %α≈98
^{186}Os	0.0	0+	2.0×10^{15} y *11*	%α=100 ; %α=100 ; %α=100
^{186}Pt	0.0	0+	2.08 h *5*	%α≈0; %α≈0; %α≈0
^{186}Au	0.0	3-	10.7 min *5*	%α≈0; %α≈0; %α≈0
^{183}Hg	0.0	1/2-	9.4 s *7*	%εp≈0; %εp≈0; %εp≈0
^{186}Hg	0.0	0+	1.38 min *6*	%α≈0; %α≈0; %α≈0
^{186}Tl	0+x	(7+)	27.5 s *10*	%α=0.0060 *6*; %α=0.0060 *6*; %α=0.0060 *6*
^{186}Pb	0.0	0+	4.82 s *3*	%α=40 *8*; %α=40 *8*; %α=40 *8*
^{186}Bi	0.0	(3+)	14.8 ms *8*	%α=100 *10*; %α=100 *10*; %α=100 *10*
^{186}Bi	0+x	(10-)	9.8 ms *4*	%α=100 *10*; %α=100 *10*; %α=100 *10*
^{186}Po	0.0	0+	26 μs *+12-6*	%α=100 *10*; %α=100 *10*; %α=100 *10*

Adopted Levels

Q(β^-)=4180 *SY*; S(n)=5210 *SY*; S(p)=8320 *SY*; Q(α)=-190 *SY* 2003Au03
Estimated uncertainties (2003Au03): ΔQ(β^-)=200, ΔS(n)=360, ΔS(p)=ΔQ(α)=450.
^{182}Lu isotope produced and identified by 1982Ki04 at GSI facility using reactions: W(^{136}Xe,X) and Ta(^{136}Xe,X) E=9 MeV/nucleon, followed by mass separation. Measured $T_{1/2}$, γ and β radiations from ^{182}Lu decay to ^{182}Hf.

^{182}Lu Levels

E(level)	J$^\pi$	$T_{1/2}$	Comments
0.0		2.0 min *2*	%β-=100 . E(level): the 2.0-min activity is assumed to belong to the g.s. $T_{1/2}$: from timing of β rays, K x ray, and two γ rays (1982Ki04). Jπ: $\leq$ 4 from possible β feeding of 2+ state in ^{182}Hf. Shell model configuration (for spherical case): $\pi h_{11/2}\nu i_{13/2}$ suggests negative parity.

Adopted Levels, Gammas

Q(β^-)=375 *6*; S(n)=6718 *6*; S(p)=8610 *SY*; Q(α)=1215 *12* 2003Au03
ΔS(p)=300 (estimated,2003Au03).
^{182}Hf produced in ^{180}Hf(2n,γ) (1961Ar07,1961Hu01,1961Na03, 1961Wi09,1971He13).
Structure calculations: 2001Oi03, 2000Xu03.
^{186}W could, in principle, undergo α decay to ^{182}Hf. Recent studies by 2004Co26, 2003Bi13, 2003Da05, 2003Ce01 and 1997Ge15 have established upper limit for $T_{1/2}(\alpha)$ for ^{186}W as $\geq 8.2 \times 10^{21}$ y (2004Co26) with 90% confidence limit.

^{182}Hf Levels

Cross Reference (XREF) Flags

A	^{182}Lu β^- decay (2.0 min)	D	^{180}Hf(^{136}Xe,^{134}Xeγ)
B	^{182}Hf IT decay (61.5 min)	E	^{180}Hf(^{238}U,^{236}Uγ)
C	^{180}Hf(t,p)		

Nuclear Level Sequences

A g.s. band.
B Kπ=(8-) band. Configuration=π7/2[404]$\otimes\pi$9/2[514].

Seq.	E(level)†	J$^\pi$	$T_{1/2}$	XREF	Comments
A	0.0	0+‡	8.90×10^6 y *9*	ABCDE	%β-=100 . $T_{1/2}$: from 2004Vo16 (also 2005Vo17,specific activity technique using two independent methods). Others: 9×10^6 y 2 (1961Wi09), 8.5×10^6 y (1961Hu01), 8.0×10^6 y 5 (1961Na03). Other: 1961Ar07. $(<r^2>)^{1/2}$=5.348 fm *4* (2004An14, evaluation). $\Delta<r^2>$(^{182}Hf-^{180}Hf)=0.048 fm^2 *4* (1994An14,1994An09).
A	97.79 *9*	2+‡		ABCDE	
A	322.17 *14*	(4+)‡		ABCDE	
A	666.27 *17*	(6+)‡		BCDE	
	818.4 *3*	(1,2+)		A C	Jπ: γ to 0+.
	905.9 *5*			A	Jπ: γ to 2+.
	1022 *3*			C	
	1034 *3*	(0+)		C	Jπ: L(t,p)=(0).
A	1122.07 *18*	(8+)‡		B DE	
B	1172.87 *18*	(8-)#	61.5 min *15*	B DE	%IT=46 *2*. %β-=54 *2*. Jπ: systematics, probable configuration=π7/2[404]π9/2[514]; Kπ=8- (1974Wa14,1999Da09). Theoretical calculations (2000Xu03) predict 8- isomer in ^{182}Hf. $T_{1/2}$: from 1974Wa14. Others: 65 min 5, 68 min 4 (1971Wa09). 2006Av01: cross section measurement in ^{186}W(n,n$'\alpha$) at 14.72-14.88 MeV.
	1265 *3*	(0+)		C	Jπ: L(t,p)=(0).
B	1419.5 *5*	(9-)#		DE	
	1465			C	
	1497 *3*			C	
	≈1590			C	
A	1680.3 *6*	(10+)‡		D	
B	1691.9 *5*	(10-)#		DE	
	1724 *5*			C	
	1829 *5*			C	
	1885 *5*			C	
	1915 *5*			C	
B	1988.4 *5*	(11-)#		DE	
	2214 *5*			C	
	2280 *5*			C	
B	2307.3 *6*	(12-)#		DE	

Continued on next page (footnotes at end of table)

^{182}Hf Levels (continued)

Seq.	E(level)†	Jπ	$T_{1/2}$	XREF	Comments
A	2331.7 *8*	(12+)‡		D	
	2571.3 *12*	(13+)	40 μs *10*	E	%IT=100 . $T_{1/2}$: from γ(t) in ^{180}Hf(^{238}U,^{236}Uγ) (1999Da09). Jπ: configuration=(ν11/2[615]ν1/2[510])(π^2_{8-}); Kπ=(13+). Theoretical calculations (2001Oi03,2000Xu03) predict 13+ isomer in ^{182}Hf.
B	2649.3 *6*	(13-)#		D	
B	3010.0 *7*	(14-)#		D	
A	3065.3 *9*	(14+)‡		D	
A	3869.2 *11*	(16+)‡		D	
A	4733.9 *12*	(18+)‡		D	

† From least-squares fit to Eγ′s for levels populated in γ-ray datasets, others are from (t,p).
‡ g.s. band members, from intensity balance in IT decay, multipolarities of the transitions in the cascade are consistent with E2.
# Possible member of configuration=π7/2[404]⊗π9/2[514], Kπ=(8-).

γ(^{182}Hf)

E_i^{level}	J_i^π	E_f^{level}	J_f^π	Eγ†	Iγ†	Mult.	α	Comments
97.79	2+	0.0	0+	97.79 *9*	100	E2	3.85	Mult.: from intensity balance arguments in IT decay.
322.17	(4+)	97.79	2+	224.38 *10*	100	[E2]	0.198 *4*	
666.27	(6+)	322.17	(4+)	344.1 *1*	100	[E2]	0.0529	
818.4	(1,2+)	97.79	2+	720.6 *4*	100 *10*			
		0.0	0+	818.4 *4*	100 *25*			
905.9		97.79	2+	808.1 *5*	100			
1122.07	(8+)	666.27	(6+)	455.80 *8*	100	[E2]	0.0245	
1172.87	(8-)	1122.07	(8+)	50.80 *8*	56 *7*	(E1)	0.418 *7*	B(E1)(W.u.)=1.26×10^{-16} *19*. Mult.: from intensity-balance in IT decay.
		666.27	(6+)	506.60 *8*	100 *8*	[M2,E3]	0.10 *5*	B(M2)(W.u.)=4.0×10^{-12} *5*.
1419.5	(9-)	1172.87	(8-)	246.8 *5*	100			
1680.3	(10+)	1122.07	(8+)	558.2 *5*	100			
1691.9	(10-)	1419.5	(9-)	272.3 *5*	100 *8*			
		1172.87	(8-)	518.9 *5*	79 *8*			
1988.4	(11-)	1691.9	(10-)	296.6 *5*	100 *7*			
		1419.5	(9-)	569.1 *5*	98 *7*			
2307.3	(12-)	1988.4	(11-)	319.2 *5*	90 *7*			
		1691.9	(10-)	615.0 *5*	100 *7*			
2331.7	(12+)	1680.3	(10+)	651.4 *5*	100			
2571.3	(13+)	2307.3	(12-)	264		[E1]		Mult.: Weisskopf estimate supports E1.
2649.3	(13-)	2307.3	(12-)	341.6 *5*	100 *8*			
		1988.4	(11-)	661.0 *5*	92 *8*			
3010.0	(14-)	2649.3	(13-)	360.5 *5*	100 *7*			
		2307.3	(12-)	703.0 *5*	78 *6*			
3065.3	(14+)	2331.7	(12+)	733.6 *5*	100			
3869.2	(16+)	3065.3	(14+)	803.9 *5*	100			
4733.9	(18+)	3869.2	(16+)	864.7 *5*	100			

† From weighted averages of values when a level is populated in more than one of the four datasets involving γ-ray studies.

^{182}Lu β^- decay (2.0 min) 1982Ki04

Parent: ^{182}Lu: E=0.0; $T_{1/2}$=2.0 min *2*; Q=4180 *SY*; %β-=100
Q(g.s.): 4180 *200* (syst,2003Au03).
^{182}Lu produced by bombardment of natural tungsten and tantalum targets with ^{136}Xe beam at 9 MeV/nucleon.

^{182}Hf Levels

E(level)	$J^{\pi\dagger}$
0.0	0+
97.77 *20*	2+
321.8 *6*	(4+)
818.4 *4*	(1,2+)
905.9 *6*	

† From Adopted Levels.

$\gamma(^{182}$Hf)

E_γ	E_i^{level}	J_i^π	E_f^{level}	J_f^π	$I_\gamma^\dagger$	Mult.	α	Comments
97.8 *2*	97.77	2+	0.0	0+	50 *10*	E2	3.85 *7*	Mult.: from Adopted Gammas.
224.0 *5*	321.8	(4+)	97.77	2+	15 *7*	[E2]	0.198 *4*	
720.8 *5*	818.4	(1,2+)	97.77	2+	100 *10*			
808.1 *5*	905.9		97.77	2+	50 *15*			
818.2 *5*	818.4	(1,2+)	0.0	0+	100 *25*			

† For absolute intensity per 100 decays, multiply by 0.30 *3*

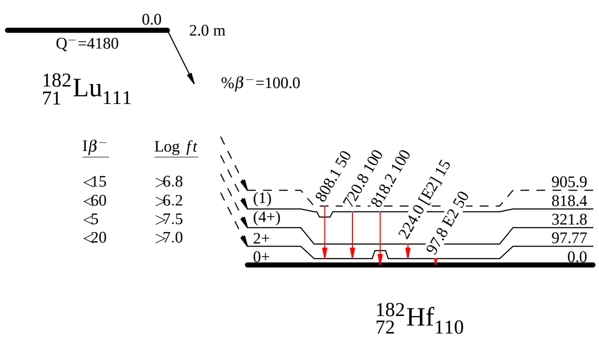
β^- radiations

Eβ^-	E(level)	Iβ^-†	Log *ft*
(3.3E+3)	905.9	<15	>6.8
(3.4E+3)	818.4	<60	>6.2
(3.9E+3)	321.8	<5	>7.5
(4.1E+3)	97.77	<20	>7.0

† Only the upper limits can be deduced since there is no knowledge of β feeding to g.s., and there is a large energy gap of ≈ 3.3 MeV between Q(β^-) and the highest level at 906 keV.

Decay Scheme

Intensities: Relative I_γ



^{182}Hf IT decay (61.5 min) 1974Wa14

1974Wa14 (also 1971Wa09): Sources produced by ^{186}W(p,pα) E=50, 92 MeV. Measured Eγ, Iγ, Eβ, $\gamma\gamma$, $\beta\gamma$ coin, isomer $T_{1/2}$.
Other: 1983Zy02: ^{182}Hf produced in (^{84}Kr,X) and (^{136}Xe,X) on natural tungsten target at 8.5 MeV/nucleon.

^{182}Hf Levels

Nuclear Level Sequence
A g.s. band.

Seq.	E(level)	J$^{\pi}$†	$T_{1/2}$	Comments
A	0.0	0+		
A	97.8 *1*	2+		
A	322.20 *14*	(4+)		
A	666.30 *17*	(6+)		
A	1122.10 *19*	(8+)		
	1172.90 *19*	(8-)	61.5 min *15*	$T_{1/2}$: from timing of γ rays (1974Wa14). Jπ: probable configuration=π7/2[404]π9/2[514].

† From Adopted Levels.

γ(^{182}Hf)

Eγ	E_i^{level}	J_i^{π}	E_f^{level}	J_f^{π}	Iγ†	Mult.‡	α	Comments
50.8 *1*	1172.90	(8-)	1122.10	(8+)	35 *4*	(E1)	0.418 *7*	Mult.: from intensity-balance arguments.
97.8 *1*	97.8	2+	0.0	0+	24.4 *12*[a]	E2	3.85	Mult.: α(exp)=3.9 from intensity balance argument.
224.4 *1*	322.20	(4+)	97.8	2+	100	[E2]	0.197	
344.1 *1*	666.30	(6+)	322.20	(4+)	121 *12*	[E2]	0.0529	
455.8 *1*	1122.10	(8+)	666.30	(6+)	53 *4*	[E2]	0.0245	
506.6 *1*	1172.90	(8-)	666.30	(6+)	62 *5*	[M2,E3]	0.10 *5*	

† For absolute intensity per 100 decays, multiply by 0.38 *3*
‡ The assumed multipolarities are consistent with the intensity balances at each level, with [E2] constrained for 97.8γ.
[a] Another 97.8-keV transition was observed in ^{182}Hf β^- decay. The intensity has been divided by the authors assuming I(γ+ce)(97.9γ)=I(γ+ce)(244γ).

^{180}Hf(t,p) 1983Bu03

E=15 MeV. Magnetic spectrograph, FWHM ≈ 15 keV. Measured cross sections, $\sigma(\theta)$, comparisons with DWBA calculations. Theory: 1995Sh38.

^{182}Hf Levels

Nuclear Level Sequence
A g.s. band.

Seq.	E(level)‡	J^π	L#	$d\sigma/d\Omega$ (μb/sr)†	Comments
A	0	0+@	[0]	287	
A	96 *3*	2+@		31	
A	323 *3*	(4+)@		23	
A	≈667	(6+)@		5	
	818 *3*			19	
	1022 *3*			11	
	≈1034	(0+)	(0)	15	L=0 strength=5, relative to 100 for g.s.
	1265 *3*	(0+)	(0)	8	L=0 strength=3, relative to 100 for g.s.
	1465 *3*			13	
	1497 *3*			51	
	≈1590			6	
	1724 *5*			7	
	1829 *5*			14	
	1885 *5*			10	
	1915 *5*			38	
	2214 *5*			22	
	2280 *5*			32	

† At θ=30°; overall uncertainties are from 15-20%.
‡ Uncertainties are stated by 1983Bu03 as ≈ 3 keV for strongly populated states below 1.5 MeV and ≈ 5 keV for those above 1.5 MeV.
# Identified in comparison with L=0 distribution to assumed L=0 shape for the ground state. The DWBA comparisons give poor agreement with $\sigma(\theta)$ distributions, possibly due to multi-step processes. $\sigma(\theta)$ distributions for all groups are shown by 1983Bu03 in figure 10, but tentative L values are given for only the 1034 and 1265 groups.
@ From Adopted Levels.

^{180}Hf(^{136}Xe,^{134}Xeγ) 2007Ng03

E(^{136}Xe)=750 MeV. Enriched (>94%) target. Measured Eγ, Iγ, γγ using GAMMASPHERE array with 100 Compton-suppressed HPGe detectors and position-sensitive parallel-plate avalanche counter (CHICO). Coincidence requirement was at least two γ rays in γ-ray detectors and two correlated particles in CHICO detector.
Two-neutron transfer reaction.

^{182}Hf Levels

Nuclear Level Sequences

A g.s. band.
B Kπ=8- band. Configuration=π7/2[404]⊗π9/2[514].

Seq.	E(level)†	Jπ‡	$T_{1/2}$	Comments
A	0.0	0+		
A	98.3 *5*	2+		
A	322.4 *7*	4+		
A	666.1 *9*	6+		
A	1121.6 *10*	8+		
B	1173.1 *10*	8-	61.5 min *15*	$T_{1/2}$: from Adopted Levels.
B	1419.8 *11*	9-		
A	1679.8 *11*	10+		
B	1692.2 *11*	10-		
B	1988.6 *11*	11-		
B	2307.6 *11*	12-		
A	2331.2 *12*	12+		
B	2649.5 *12*	13-		
B	3010.3 *12*	14-		
A	3064.8 *13*	14+		
A	3868.7 *14*	16+		
A	4733.4 *15*	18+		

† From least-squares fit to Eγ's.
‡ As proposed by 2007Ng03 based on band assignments. The assignments in Adopted Levels are the same except that all assignments above 100-keV level are in parentheses there due to lack of strong arguments.

γ(^{182}Hf)

E_i^{level}	J_i^π	E_f^{level}	J_f^π	Eγ	Iγ
98.3	2+	0.0	0+	98.3 *5*	
322.4	4+	98.3	2+	224.1 *5*	100 *3*
666.1	6+	322.4	4+	343.7 *5*	70 *3*
1121.6	8+	666.1	6+	455.4 *5*	35.5 *19*
1173.1	8-	1121.6	8+	51.5 *5*	
		666.1	6+	507.1 *5*	12.3 *11*
1419.8	9-	1173.1	8-	246.8 *5*	20.1 *14*
1679.8	10+	1121.6	8+	558.2 *5*	24.9 *16*
1692.2	10-	1419.8	9-	272.3 *5*	14.3 *12*
		1173.1	8-	518.9 *5*	11.3 *11*
1988.6	11-	1692.2	10-	296.6 *5*	18.2 *13*
		1419.8	9-	569.1 *5*	17.8 *13*
2307.6	12-	1988.6	11-	319.2 *5*	18.4 *14*
		1692.2	10-	615.0 *5*	20.5 *14*
2331.2	12+	1679.8	10+	651.4 *5*	18.2 *13*
2649.5	13-	2307.6	12-	341.6 *5*	15.5 *12*
		1988.6	11-	661.0 *5*	14.3 *12*
3010.3	14-	2649.5	13-	360.5 *5*	19.3 *14*
		2307.6	12-	703.0 *5*	15.0 *12*
3064.8	14+	2331.2	12+	733.6 *5*	14.0 *12*
3868.7	16+	3064.8	14+	803.9 *5*	11.8 *11*
4733.4	18+	3868.7	16+	864.7 *5*	8.7 *9*

^{180}Hf(^{238}U,^{236}Uγ) 1999Da09

1999Da09 (also 2001Ch89,2001Ch10,1999Ch48): Isomer produced and identified in ^{180}Hf(^{238}U,^{236}Uγ) E=1.6 GeV and ^{180}Hf(^{208}Pb,^{206}Pbγ) E=1.3 GeV. Also natural Hf target used. Both reactions involve 2-neutron transfer.

Pulsed beam. Measured γ, $\gamma\gamma$, $T_{1/2}$ using an array of 12 Compton-suppressed Ge detectors for ^{238}U beam and GAMMASPHERE array for ^{208}Pb beam.

^{182}Hf Levels

Nuclear Level Sequences

A g.s. band.
B 8- band.

Seq.	E(level)†	J^{π}‡	$T_{1/2}$	Comments
A	0	0+		
A	98.0 *10*	2+		
A	323.0 *15*	4+		
A	667.0 *18*	6+		
A	1123.0 *20*	8+		
B	1174.0 *20*	8-	61.5 min *15*	$T_{1/2}$: from Adopted Levels. Configuration=π7/2[404]π9/2[514]; Kπ=8-.
B	1421.1 *21*	(9-)		
B	1692.9 *21*	(10-)		
B	1989.4 *22*	(11-)		
B	2308.1 *22*	(12-)		
	2572.1 *25*	(13+)	40 μs *10*	$T_{1/2}$: from γ(t) (1999Da09). Configuration=(ν11/2[615]ν1/2[510])(π^2_{8-}); Kπ=(13+).

† From least-squares fit to Eγ's; Δ(Eγ)=1 keV assumed for each transition.

‡ As given by 1999Da09, based on (13+) assignment for the 40-μs isomer. The assignments in Adopted Levels are the same except that all assignments above 100-keV level are in parentheses there due to lack of strong arguments.

γ(^{182}Hf)

γ rays from ^{182}Hf were identified from coincidences between ^{182}Hf γ rays and ^{236}U γ rays (260-303-341-375 cascade in ^{236}U).

E_i^{level}	J_i^{π}	E_f^{level}	J_f^{π}	E_γ	Mult.	Comments
98.0	2+	0	0+	98		
323.0	4+	98.0	2+	225		
667.0	6+	323.0	4+	344		
1123.0	8+	667.0	6+	456		
1174.0	8-	1123.0	8+	51		
		667.0	6+	507		
1421.1	(9-)	1174.0	8-	247		
1692.9	(10-)	1421.1	(9-)	272		
		1174.0	8-	519		
1989.4	(11-)	1692.9	(10-)	297		
		1421.1	(9-)	568		
2308.1	(12-)	1989.4	(11-)	319		
		1692.9	(10-)	615		
2572.1	(13+)	2308.1	(12-)	264	[E1]	Mult.: Weisskopf estimate supports E1.

Adopted Levels, Gammas

Q(β^-)=-2.80×10^3 *10*; S(n)=8065 *5*; S(p)=7094.9 *17*; Q(α)=1771.8 *22* 2003Au03

Other reactions:.

^{9}Be(^{208}Pb,X) E=1 GeV/nucleon: 2002Pf01: Measured fragment yield, (fragment)γ coin, deduced isomer (at 2230 keV) half-life and isomer production ratio of 10% *2*.

Mass measurements: 1977Sh04, 1970Mc03, 1961De21, 1960Bh02.

Structure calculations (levels, moments, transition probabilities, high-K isomers, etc.): 2003Jo10, 1998Sh01, 1996Na08, 1996Na12, 1994Be21, 1994Mo07, 1993Be25, 1991Gr14, 1990Ch50, 1990Ve01, 1989Sa19, 1989Ta06. Only selected references are given here, consult NSR database at www.nndc.bnl.gov website for more detailed bibliography for theoretical studies on ^{182}W nuclide.

^{182}W Levels

Details of the measurements of Half-life (in ns) of the 100.1, 2+ state:.

1. Deduced from BE2 values in Coulomb excitation: 1.44 *7* (1961Ha21), 1.26 *11* (1963Gr04), 1.340 *30* (1968St13), 1.368 *29* (1973Be40, earlier value from the same lab is 1.31 *15*, 1958Mc02), 1.15 *12* (1989Ku04), 1.53 *7* (1991Wu05, earlier value is 1.41 *9* in 1989Wu04).

2. Delayed coincidence method in Coulomb excitation: 1.366 *14* (1961Ke07), 1.43 *4* (1962Bi05, earlier value from the same group is 1.55 *14*,1959Bi10).

3. Pulsed beam: (p,p′γ): 1.372 *14* (1964Sc21).

4. Deduced from BE2 in Muonic atom: 1.343 *40* (1970Hi03).

5. Deduced from BE2 in (e,e′): 1.391 *21* (1987PeZV,1988PeZW).

6. Delayed coincidence in ^{182}Ta β^- decay: 1.27 *10* (1955Su64,1954Su10), 1.55 *11* (1963Ba24), 1.26 *4* (1963Fo02), 1.41 *6* (1963Ko02), 1.47 *9* (1964Ro19), 1.4 *1* (1964Be36), 1.39 *3* (1965Do02), 1.37 *3* (1965Me08), 1.45 *4* (1966Bl08), 1.35 *7* (1966Fu03), 1.43 *5* (1966Ra04), 1.48 *3* (1970Ab14), 1.380 *20* (1971Ho14), 1.55 *5* (1973GrXX), 1.380 *30* (1983El02),.

Cross Reference (XREF) Flags

A	^{182}Ta β^- decay (114.43 d)	I	^{180}W(t,p)	Q	Coulomb excitation
B	Muonic atom	J	^{182}W(γ,γ):Mossbauer	R	^{183}W(d,t)
C	^{182}Re ε decay (64.0$\hbar$)	K	^{182}W(γ,γ')	S	^{183}W(^{3}He,α)
D	^{182}Re ε decay (12.7$\hbar$)	L	^{182}W(e,e′)	T	^{184}W(p,t)
E	^{186}Os α decay	M	^{182}W(n,n′γ)	U	^{186}W(n,5nγ)
F	^{176}Yb(^{9}Be,3nγ)	N	^{182}W(n,n′)		
G	^{176}Yb(^{13}C,α3nγ)	O	^{182}W(p,p′),(pol p,p′),(α,α')		
H	^{180}Hf(α,2nγ)	P	^{182}W(d,d′)		

Nuclear Level Sequences

A	Kπ=0+, g.s. band. Backbending at $\hbar\omega \approx$ 0.38 MeV.
B	Kπ=0+ β band.
C	Kπ=2+ γ band.
D	Kπ=2- octupole band.
E	ν9/2[624]⊗ν11/2[615]], Kπ=10+. (g_K-g_R)=0.34 *4* (1994Re03), g_K(exp)=-0.15 *2*.
F	4-quasiparticle band, Kπ=(16+). ν^2(8-): ν9/2[624]⊗ν7/2[503]; π^2(8-): π9/2[514]⊗π7/2[404]. (g_K-g_R)=0.21 *19* (1994Re03), g_K(exp)=+0.36 *6*. Configuration=(ν9/2+[624])(ν11/2+[615])10+)+(π7/2+[404]) (π5/2+[402])6+ is also proposed by 1994Re03.
G	4-quasiparticle band, Kπ=(17-). ν^2(10+):ν9/2[624]⊗ν11/2[615]]; π^2(7-):π9/2[514]⊗π5/2[402]. (g_K-g_R)=0.30 *7*, 0.18 *7* (1994Re03), g_K(exp)=+0.46 *3*.
H	ν9/2[624]⊗ν1/2[510], Kπ=4-. g_K(exp)=+0.05 *4*.
I	π5/2[402]⊗π7/2[404], Kπ=6+. g_K(exp)=+1.11 *5*.
J	ν9/2[624]⊗ν1/2[510], Kπ=5-.
K	ν9/2[624]⊗ν3/2[512], Kπ=6-. g_K(exp)=+0.01 *1*.
L	π9/2[514]⊗π5/2[402], Kπ=7-. g_K(exp)=+1.17 *7*.
M	ν9/2[624]⊗ν7/2[503], Kπ=8-. g_K(exp)=-0.21 *5*.
N	4-quasiparticle band, Kπ=15+. ν^2(8-): ν9/2[624]⊗ν7/2[503]; π^2(7-): π9/2[514]⊗π5/2[402]. g_K(exp)=+0.52 *4*.
O	$\nu^2_{(10+)}\otimes\pi^2_{(8-)}$, K$\pi$=18-. ν^2(10+):ν9/2[624]⊗ν11/2[615]]; π^2(8-):π9/2[514]⊗π7/2[404]. g_K(exp) $\approx$ +0.32.
P	K=(12) band.

Seq.	E(level)†	J^{π}‡	$T_{1/2}$	XREF	Comments
A	0.0	0+	STABLE	ABCDEFGHIJKLMNOPQR TU	$T_{1/2}$: $T_{1/2}$(α decay) measured limits: $\geq 7.7\times10^{21}$ y (2004Co26) with 90% confidence limit. Others: $\geq 1.7\times10^{2}0$ y (2003Da05,2003Bi13,1997Ge15, 1995Ge17), $\geq 2.5\times10^{1}9$ y (2003Ce01), 1960Be13. $(<r^2>)^{1/2}$=5.3566 fm *17* (2004An14, evaluation). $\Delta<r^2>$(^{182}W-^{180}W)=0.068 fm^2 4 (1994Ji02). $\Delta<r^2>$(^{183}W-^{182}W)=0.052 fm^2 3 (1994Ji02). $\Delta<r^2>$(^{184}W-^{182}W)=0.099 fm^2 5 (1994Ji02).
A	100.10597 *7*	2+	1.381 ns *10*	ABCD FGHIJKLMNOPQRSTU	μ=+0.521 *16* (1968Pe06,1989Ra17). Q=-2.13 *35* (1977RuZV,1989Ra17). B(E2)=4.17 *6*. μ: mossbauer effect (1968Pe06). Other: +0.528 *12* (CEAD,1972Ca12). See also 2005St24 compilation. Q: cER (1977RuZV). See also 2005St24 compilation. $T_{1/2}$: from several weighted averaging methods (weighted average, limitation of statistical weights method (LWM), normalized residuals method (NRM) and Rajeval′s technique (RT)) using 26 independent measurements (from 1954 to 1991) of lifetimes from Coulomb excitation, delayed coincidence methods, pulsed beam, (e,e′) and muonic atom. The value of χ^2 is ≈2.1 for different methods as compared to critical χ^2 of 1.7. All the values used in the averaging procedure are listed above in the header comment. 2001Ra27 evaluation (of 27 measurements from 1954 to 1988) gives nearly the same adopted B(E2)(up)=4.20 *8* and mean lifetime (τ)=1990 ps 20 ($T_{1/2}$=1.379 ns 14). Jπ: E2 γ to 0+.
A	329.4268 *6*	4+	62 ps *3*	A CD FGHI LMNOPQRSTU	μ=+0.88 *17* (1972Be94,1989Ra17). μ: iPAC (1972Be94). See also 2005St24 compilation. $T_{1/2}$: from RDM in Coul. ex.. Jπ: ΔJ=2, E2 γ to 2+.
A	680.40 *6*	6+	8.2 ps *9*	A C FGH LMNOPQR TU	$T_{1/2}$: from RDM in Coul. ex.. Jπ: stretched E2 γ to 4+.
B	1135.82 *10*	0+		A I MN P R T	Jπ: E0 transition to 0+.
A	1144.30 *12*	8+	2.01 ps *17*	FGH LM Q U	$T_{1/2}$: from RDM in Coulomb excitation. Jπ: ΔJ=2, E2 γ to 6+; band assignment.
C	1221.4017 *10*	2+	0.434 ps *11*	A CD HI MNOPQR T	Jπ: E2 γ to 0+. $T_{1/2}$: from B(E2) in Coulomb excitation. B(E2)(IS)(↑)=0.146 *11* ((pol p,p′) 1987Ic04). This gives B(E2)(W.u.)=4.8 *4* compared to 3.4 from Coul. ex..
B	1257.4144 *11*	2+	1.71 ps *13*	A CD HI MN PQR T	Jπ: E2 γ to 0+. $T_{1/2}$: from B(E2) in Coulomb excitation.
D	1289.1515 *10*	2-	1.12 ns *4*	A CD GH M QR	μ=+1.74 *24* (1973Se14,1989Ra17). μ: iPAC (1973Se14). See also 2005St24 compilation. Jπ: M2 γ to 0+. $T_{1/2}$: from (β)(ce)(t) and $\beta\gamma$(t) in ^{182}Ta β^- decay. Weighted averaging method (normalized residuals) used.
C	1331.1170 *11*	3+	<0.6 ns	A CD H MN QRS	Jπ: M1+E2 γ′s to 2+ and 4+. $T_{1/2}$: from $\gamma\gamma$(t) in ^{182}Ta β^- decay. Ref: N: 1309.
D	1373.8317 *10*	3-	78 ps *10*	A CD GH MNOPQ T	μ=0.96 *27* (1972He10,1989Ra17). μ: iPAC (1972He10). Other: 2.21 *34* (IPAC,1973Se14). See also 2005St24 compilation. Jπ: E3 γ to 0+. $T_{1/2}$: from (ce)(ce)(t) in ^{182}Ta β^- decay.

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^{182}W Levels (continued)

Seq.	E(level)†	Jπ‡	$T_{1/2}$	XREF	Comments
					Ref: N: 1357.
C	1442.832 *6*	4+	0.32 ps *3*	A CD HI MN PQR T	Jπ: M1+E2 γ to 4+; E2 γ to 2+; (E1) γ from 5-; band assignment. $T_{1/2}$: from B(E2) in Coul. ex.. B(E4)(IS)(↑)=0.0122 *25* ((pol p,p′) 1987Ic04) which gives B(E4)(W.u.)=2.0 *4*.
D	1487.5035 *10*	4-	<49 ps	A CD GH MN	Jπ: M2+E3 γ to 2+; M1+E2 γ from 5-. $T_{1/2}$: from (ce)(ce)(t) in ^{182}Ta β^- decay. Ref: N: 1492.
B	1510.22 *5*	4+		A C H M R	Jπ: E2 γ to 2+; E2+M1 γ to 4+; γ from 5-.
H	1553.2256 *10*	4-	1.27 ns *4*	A CD GH MN R	$T_{1/2}$: from γγ(t) in ^{182}Ta β^- decay. Jπ: M2+E3 γ to 2+; M1+E2 γ from 5-.
D	1621.283 *22*	5-		C GH Mn p r t	Jπ: M1 γ from 6-; E1 γ to 4+.
C	1623.51 *4*	(5)+		C H Mn pQr t	Jπ: E1 γ from 6-; band assignment.
H	1660.383 *21*	5-		C GH MN P R T	Jπ: E1+M2 γ to 4+; M1+E2 γ to 5-; M1 γ from 6-. Ref: N: 1678.
A	1711.97 *15*	10+	0.76 ps *7*	FGH Q U	$T_{1/2}$: from RDM in Coulomb excitation. Jπ: ΔJ=2, E2 γ to 8+; band assignment.
I	1756.75 *4*	6+		C GH MN	Jπ: log *ft*=7.4 from 7+, E2 γ to 4+. Ref: N: 1745.
	1765.54 *12*			M p r t	
H	1768.943 *23*	6-		C GH M p rSt	Jπ: E1+M2 γ to 6+; E2 γ′s to 4-; band assignment.
C	1769.5 *7*	(6+)		Q	E(level): level is suspect since the two γ rays at 1089 and 1440 are associated with the decay of 1769, (6)- level. Jπ: γ to 6+; possible band assignment.
J	1809.64 *7*	5-		C GH N R t	Jπ: M1 γ to 4-; M1 γ from 6-; L(d,t)=4 from 1/2-. Ref: N: *1792.
D	1810.85 *4*	(6)-		C GH N t	Jπ: log *ft*=8.8 from 7+; M1+E2 γ to 5-; band assignment. Ref: N: *1792.
	1813.4 *3*			MN r t	Ref: N: *1792.
K	1829.53 *3*	6-		C GH rSt	Jπ: log *ft*=7.4 from 7+; E2 γ to 4-.
	1833.1 *6*			M r t	
	1856.06 *5*	(2+)		D Mn p r t	Jπ: γ′s to 0+ and 4+. Ref: M: 1856.2.
	1856.9 *5*	1		Mn p r t	Jπ: γ′s to 0+ and 2+; γ(θ) in (n,n′γ). Ref: M: 1856.9.
	1871.17 *15*	1-		D M	Jπ: E1 γ to 0+.
	1887.84 *21*			M P T	
H	1917.05 *5*	7-		C GH n RS	Jπ: ΔJ=2, E2 γ to 5-; γ to (6)-; band assignment. Ref: R: 1916.
	1918.6 *4*	(2+ to 4+)		Mn R	Jπ: γ to 2+. Ref: R: 1923.
	1959.34 *16*	(2+)		M p R t	Jπ: ΔJ=(2) γ to 4+; γ to 0+. Ref: R: 1957.
K	1960.30 *3*	(7)-		C GH p t	Jπ: log *ft*=7.1 from 7+; ΔJ=2, E2 γ′s to 5-.
J	1960.78 *7*	6-		C G M p RSt	Jπ: M1 γ to 5-; log *ft*=7.9 from 7+; possible band assignment.
I	1971.04 *7*	(7)+		C GH R	Jπ: log *ft*=8.2 from 7+; M1+E2 γ to 6+; band assignment. Ref: R: 1966.
L	1978.35 *4*	(7)-		C GH n R	Jπ: log *ft*=7.0 from 7+; M1+E2 γ to (6)-; band assignment. Ref: R: *1985.
	1981.82 *25*			Mn R	Ref: R: *1985.
D	1993.68 *10*	(7-)		GH n R	Jπ: ΔJ=2 γ to 5-; band assignment. Ref: R: *1985.
	2016.8 *8*	(2,3,4)+		M R	Jπ: L(d,t)=1,3 from 1/2-; possible γ′s to 2+ and 4+.

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^{182}W Levels (continued)

Seq.	E(level)†	Jπ‡	$T_{1/2}$	XREF	Comments
	2023.57 *3*	3-		D M	E(level): 2023 *7* level in (d,t) is probably not 2023.57, 3- level. Jπ: M1+E2 γ's to 2- and 4-.
	2057.39 *5*	1+		D M R	Jπ: ΔJ=1 γ to 0+; L(d,t)=1,3 from 1/2- target. Ref: R: 2057.
H	2087.43 *7*	8-		GH R T	Jπ: ΔJ=2 γ to (6-); band assignment. Ref: R: 2086.
	2109.96 *20*	(2-,3-)		D M R T	Jπ: (E2) γ to 4-; (E1+M2) γ to 2+. Ref: T: *2117.
K	2114.35 *5*	(8)-		C GH T	Jπ: E2 γ to (6)-; log *ft*=8.2 from 7+; band assignment. Ref: T: *2117.
	2116.4 *3*			D M T	Jπ: 0+ to 4+ from γ to 2+. Ref: T: *2117.
M	2120.25 *7*	(8-)		C GH T	Jπ: (M1) γ to (7)-; probable quasiparticle structure. Ref: T: *2117.
J	2131.3 *3*	(7-)		GH RS	Jπ: γ to (6)-; possible band assignment.
	2143.0 *10*			M P R t	
	2147.95 *17*	(3-)		D M P R t	Jπ: (E1) γ to 4+; (E1+M2) γ to 2+.
	2173.5 *3*	(0+ to 4+)		D M P R T	Jπ: γ to 2+. Ref: T: *2175.
C	2180.4 *8*	(8+)		Q	Jπ: γ's to 8+ and 6+; band assignment
	2184.04 *4*	(2-,3-)		D M T	Jπ: (M1) γ's to 2- and 3-. Ref: T: *2175.
L	2204.54 *6*	(8)-		C GH p R t	Jπ: M1+E2 γ to (7)-, log *ft*=7.5 from 7+. Ref: R: *2204.
	2207.21 *16*	(3-)		D M R t	Jπ: (E3) γ to 0+ and (E1+M2) γ to 4+. Ref: R: *2204.
	2209.07 *17*	3-		D M R t	Jπ: E1 γ to 4+, log *ft*=7.9 from 2+. Ref: R: *2204.
I	2212.49 *11*	(8+)		GH p R t	Jπ: ΔJ=1 γ to (7)+; band assignment. Ref: R: *2217.
D	2225.35 *11*	(8-)		GH R	Jπ: ΔJ=2 γ to (6)-, band assignment. Ref: R: *2217.
E	2230.63 *15*	(10+)	1.3 μs *1*	FGH T	Jπ: (M1) γ to 10+; γ to 8+; probable quasiparticle structure. $T_{1/2}$: from γ(t); average of 1.2 μs 1 in ^{9}Be(^{208}Pb,X) and 1.4 μs 1 in (α,2nγ).
	2240.83 *15*	(3+)		D M R	Jπ: (M1) γ's to 2+ and 4+.
H	2273.87 *8*	9-		GH R t	Jπ: ΔJ=2 γ to (7)-; γ to (8-); band assignment. Ref: R: *2270.
	2274.63 *4*	(3)-		D M R t	Jπ: E1 γ to 2+; (M1) γ to 4-. Ref: R: *2270.
	2283.5 *6*	1		M R t	Jπ: 2283γ(θ) in (n,n′γ). Ref: R: 2284.
K	2301.56 *8*	(9-)		G	Jπ: γ's to (7)- and (8)-; band assignment.
	2316.1 *22*	(1,2+)		D T	Jπ: γ to 0+. Ref: T: 2311.
J	2323.85 *21*	(8-)		GH P r T	Jπ: γ to (7)-; possible band assignment. Ref: P: *2328. Ref: T: *2331.
M	2327.91 *10*	(9-)		H P r T	Jπ: ΔJ=1, (M1+E2) γ to (8-); band assignment. Ref: P: *2328. Ref: T: *2331.
	2334.25 *21*			H P t	Jπ: (7,8,9) from γ to (7)-. Ref: P: 2335.
A	2372.57 *18*	12+	0.38 ps *2*	FGH QR TU	Jπ: ΔJ=2, E2 γ to 10+; band assignment. $T_{1/2}$: from B(E2) in Coulomb excitation. Ref: R: 2376.

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^{182}W Levels (continued)

Seq.	E(level)[†]	J^{π}[‡]	$T_{1/2}$	XREF	Comments
	2382.1 *7*	1	7.9 fs *11*[#]	K	Jπ: from γγ(θ) B(M1)(↑)=0.46 *6*. B(E1)(↑)=5.0×10^{-5}*7*.
D	2445.98 *15*	(9-)		GH R	Jπ: ΔJ=2 γ to (7-), band assignment. Ref: R: *2453.
L	2455.74 *12*	(9-)		GH R	Jπ: ΔJ=1 γ to (8)-; γ to (7)-; band assignment. Ref: R: *2453.
	2474.1 *7*	1[@]	15 fs *2*[#]	K	Jπ: from γγ(θ) B(M1)(↑)=0.31 *5*. B(E1)(↑)=3.5×10^{-5}*5*.
I	2479.83 *13*	(9+)		GH R	Jπ: ΔJ=1 γ to (8+); γ to (7)+; band assignment. Ref: R: 2471.
H	2486.89 *10*	10-		GH r	Jπ: ΔJ=2 γ to (8-); γ to (9-); band assignment.
E	2492.76 *17*	(11+)		FGH r	Jπ: ΔJ=1 γ to (10+); band assignment.
K	2507.48 *9*	(10-)		G	Jπ: γ′s to (8)- and (9-); band assignment.
	2520 *10*	0+		T	Jπ: L(p,t)=0. Ref: T: 2520.
	2552 *10*	0+		T	Jπ: L(p,t)=0. Ref: T: 2552.
M	2563.94 *12*	(10-)		GH	Jπ: γ to (9-); band assignment.
H	2710.93 *11*	11-		GH	Jπ: ΔJ=2 γ to (9-); γ to (10-); band assignment.
	2725 *10*	0+		P T	Jπ: L(p,t)=0. Ref: T: 2725.
L	2730.85 *16*	(10-)		GH	Jπ: ΔJ=1 γ to (9-); band assignment.
D	2739.15 *15*	(10-)		GH	Jπ: ΔJ=2 γ to (8-); band assignment.
K	2741.66 *12*	(11-)		G	Jπ: ΔJ=2 γ to (9-); band assignment.
I	2769.26 *16*	(10+)		GH T	Jπ: ΔJ=1 γ to (11+); γ to (10+); band assignment.
E	2775.63 *18*	(12+)		FGH T	Jπ: ΔJ=2 γ to (10+); ΔJ=1 γ to (11+); band assignment.
M	2823.93 *16*	(11-)		GH T	Jπ: ΔJ=1 γ to (10-); γ to (9-); band assignment.
	2884.1 *7*	1[@]	16 fs *2*[#]	K	Jπ: from γγ(θ) B(M1)(↑)=0.22 *3*. B(E1)(↑)=2.4×10^{-5}*3*.
	2892.1 *7*	(1)	27 fs *17*[#]	K	Jπ: from γγ(θ) B(M1)(↑)=0.07 *4*. B(E1)(↑)=0.8×10^{-5}*5*.
	2941.0 *20*	(1,2+)		K	Jπ: γ to 0+.
H	2972.49 *13*	12-		G	Jπ: ΔJ=2 γ to (10-); γ to (11-); band assignment.
D	2980.58 *18*	(11-)		GH	Jπ: ΔJ=2 γ to (9-); band assignment.
K	2981.33 *12*	(12-)		G	Jπ: γ to (10-); band assignment.
	2996.1 *7*	1	6.7 fs *13*[#]	K	Jπ: from γγ(θ). Possible K=(0) assigned by 1993He15. B(M1)(↑)=0.25 *5*. B(E1)(↑)=2.7×10^{-5}*5*.
L	3027.96 *19*	(11-)		GH	Jπ: ΔJ=(1) γ to (10-); γ to (9-); band assignment.
E	3078.23 *19*	(13+)		FGH	Jπ: ΔJ=1 γ to (12+); ΔJ=2 γ to (11+); band assignment.
	3080.1 *7*	1[@]	17 fs *3*[#]	K	Jπ: from γγ(θ) B(M1)(↑)=0.15 *3*. B(E1)(↑)=1.6×10^{-5}*3*.
M	3106.72 *18*	(12-)		GH	Jπ: ΔJ=(1) γ to (11-); γ to (10-); band assignment.
A	3112.87 *20*	14+	0.24 ps *4*	FGH Q	Jπ: ΔJ=2, (E2) γ to 12+; band assignment. $T_{1/2}$: from B(E2) in Coul. ex..
	3163.1 *7*	1[@]	10.3 fs *14*[#]	K	Jπ: from γγ(θ) B(M1)(↑)=0.24 *3*. B(E1)(↑)=2.6×10^{-5}*4*.
	3198.1 *7*	(1,2+)[@]	16 fs *3*[#]	K	Jπ: (γ,γ′) excitation from 0+. B(M1)(↑)=0.14 *3*. B(E1)(↑)=1.5×10^{-5}*3*.
H	3224.53 *15*	13-		G	Jπ: ΔJ=2 γ to (11-); band assignment.
K	3269.56 *16*	(13-)		G	Jπ: ΔJ=2 γ to (11-); band assignment.
D	3319.7 *5*	(12-)		G	Jπ: γ to (10-); band assignment.
L	3343.06 *21*	(12-)		G	Jπ: ΔJ=(1) γ to (11-); γ to (10-); band assignment.
	3365.1 *7*	1[@]	11.1 fs *23*[#]	K	Jπ: from γγ(θ) B(M1)(↑)=0.17 *4*. B(E1)(↑)=1.9×10^{-5}*4*.

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^{182}W Levels (continued)

Seq.	E(level)†	J^{π}‡	$T_{1/2}$	XREF	Comments
E	3398.33 *20*	(14+)		FGH	Jπ: ΔJ=2 γ to (12+); ΔJ=1 γ to (13+); band assignment.
M	3410.54 *20*	(13-)		G	Jπ: γ's to (11-) and (12-); band assignment.
P	3415.90 *20*	(12)		G	Jπ: ΔJ=1 γ to (11+); band assignment.
	3422.1 *7*	(1,2+)@	10.3 fs *20*#	K	Jπ: (γ,γ′) excitation from 0+. B(M1)(↑)=0.19 *3*. B(E1)(↑)=2.1×10^{-5}4.
K	3518.04 *15*	(14-)		G	Jπ: γ to (12-); band assignment.
H	3549.99 *17*	14-		G	Jπ: ΔJ=2 γ to (12-); band assignment.
D	3567.8 *4*	(13-)		G	Jπ: ΔJ=(2) γ to (11-); band assignment.
	3601.1 *7*	1@	6.2 fs *12*#	K	Jπ: from γγ(θ) B(M1)(↑)=0.23 *4*. B(E1)(↑)=2.5×10^{-5}5.
	3640.0 *20*	(1,2+)		K	Jπ: γ to 0+.
P	3677.13 *22*	(13)		G	Jπ: γ to (12+); band assignment.
	3727.1 *15*	(1,2+)		K	Jπ: γ to 0+.
M	3733.85 *23*	(14-)		G	Jπ: γ's to (12-) and (13-); band assignment.
E	3736.38 *21*	(15+)		FGH	Jπ: γ's to (13+) and (14+); band assignment.
N	3754.87 *21*	(15+)	37 ns *2*	FG	Jπ: ΔJ=2, (E2) γ to (13+); ΔJ=1 γ to (14+); bandhead of configuration=((ν 9/2+[624])(ν 7/2-[503])8-)+((π 9/2-[514])(π 5/2+[402])7-). Other possible configuration from coupling of Kπ=10+ neutrons to Kπ=5+ protons: π9/2[514]+π1/2[541] is less likely. $T_{1/2}$: from γγ(t) in (^{13}C,α3nγ). Other: 54 ns *10* in (^{9}Be,3nγ).
H	3807.63 *18*	15-		G	Jπ: ΔJ=2 γ to (13-); band assignment.
K	3880.06 *19*	(15-)		G	Jπ: ΔJ=2 γ to (13-); band assignment.
	3882.0 *20*	(1,2+)		K	Jπ: γ to 0+.
F	3893.67 *24*	(16+)	≤7 ns	FG	Jπ: (M1) γ to (15+); probable quasiparticle structure. $T_{1/2}$: from γγ(t) in (^{9}Be,3nγ).
A	3910.07 *23*	16+	0.14 ps *3*	FG Q	$T_{1/2}$: from B(E2) in Coul. ex.. Jπ: ΔJ=2, E2 γ to 14+; band assignment.
	3920.0 *20*	1		K	Jπ: from γγ(θ)
P	3966.23 *24*	(14)		G	Jπ: γ's to (12) and (13); band assignment.
G	4040.6 *3*	(17-)	20 ns *1*	FG	Jπ: (E1) γ to (16+); probable quasiparticle structure. $T_{1/2}$: from γγ(t) in (^{13}C,α3nγ). Other: 17 ns *7* in (^{9}Be,3nγ).
M	4074.8 *3*	(15-)		G	Jπ: γ's to (13-) and (14-); band assignment.
N	4078.87 *24*	(16+)		G	Jπ: γ to (15+); band assignment.
E	4081.5 *3*	(16+)		G	Jπ: γ's to (14+) and (15+); band assignment.
K	4116.9 *3*	(16-)		G	Jπ: γ to (14-); band assignment.
D	4197.1 *4*	(15-)		G	Jπ: γ's to (13-); band assignment.
H	4211.1 *3*	16-		G	Jπ: ΔJ=2 γ to (14-); band assignment.
	4218.1 *5*	(17+)		F	Jπ: γ to (16+).
P	4280.2 *3*	(15)		G	Jπ: γ's to (13) and (14); band assignment.
F	4293.1 *3*	(17+)		G	Jπ: γ to (16+); band assignment.
G	4421.5 *3*	(18-)		FG	Jπ: γ to (17-); band assignment.
N	4430.5 *3*	(17+)		G	Jπ: γ's to (15+) and (16+); band assignment.
E	4453.2 *8*	(17+)		G	Jπ: γ's to (15+) and (16+); band assignment.
H	4456.2 *3*	17-		G	Jπ: ΔJ=2 γ to (15-); band assignment.
	4569.7 *6*	(18+)		F	Jπ: γ's to (16+) and (17+); band assignment.
K	4570.9 *4*	(17-)		G	Jπ: γ to (15-); band assignment.
A	4690.87 *25*	18+		G	Jπ: ΔJ=2 γ to 16+; band assignment.
F	4711.9 *3*	(18+)		G	Jπ: γ's to (16+) and (17+); band assignment.
	4748.0 *10*	(18+)	0.088 ps *+22-17*	F Q	E(level): this level also seems connected with g.s. band. $T_{1/2}$: from B(E2) in Coul. ex.. Jπ: γ to (16+); Coulomb excited.
K	4779.6 *4*	(18-)		G	Jπ: γ to (16-); band assignment.

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^{182}W Levels (continued)

Seq.	E(level)†	Jπ‡	$T_{1/2}$	XREF	Comments
O	4780.4 *4*	(18)		FG	Jπ: γ to (17-); possible configuration=((ν 9/2+[624])(ν 11/2+[615])10+)+ ((π 9/2-[514])(π 7/2+[404]))8-.
N	4804.9 *3*	(18+)		G	Jπ: γ′s to (16+) and (17+); band assignment.
G	4820.1 *3*	(19-)		FG	Jπ: γ′s to (17-) and (18-); band assignment.
E	4847.4 *8*	(18+)		G	Jπ: γ to 16+; band assignment.
H	4954.8 *11*	18-		G	Jπ: γ to (16-); band assignment.
F	5148.6 *5*	(19+)		G	Jπ: γ′s to (17+) and (18+); band assignment.
	5170.8 *4*	19-		G P	Jπ: γ to (17-); band assignment.
O	5191.8 *4*	(19)		G	Jπ: γ to (18); band assignment.
N	5199.6 *4*	(19+)		G	Jπ: γ to (18+); band assignment.
E	5225.3 *13*	(19+)		G	Jπ: γ to (17+); band assignment.
G	5235.8 *4*	(20-)		FG	Jπ: γ′s to (18-) and (19-); band assignment.
K	5338.6 *11*	(19-)		G	Jπ: γ to (17-); band assignment.
A	5428.6 *4*	20+		G	Jπ: γ to 18+; band assignment.
O	5618.5 *4*	(20)		G	Jπ: γ′s to (18) and (19); band assignment.
G	5666.9 *8*	(21-)		G	Jπ: γ′s to (19-) and (20-); band assignment.

† From least-squares fit to Eγ′s.

‡ For high-spin (J>6) 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.

\# Deduced from $\Gamma_{\gamma 0}$ and branching ratio given by 1993He15.

@ K=1 assigned by 1993He15 from comparison of reduced transition probabilities with Alaga′s rules.

γ(^{182}W)

E_i^{level}	J_i^π	Eγ†	Iγ†	Mult.‡	δ‡	Comments
100.10597	2+	100.10595 *7*[a]	100	E2		B(E2)(W.u.)=135 *2*. α: 3.89. α: 3.89.
329.4268	4+	229.3207 *6*[a]	100	E2		B(E2)(W.u.)=196 *10*. α: 0.196. α: 0.196.
680.40	6+	351.01 *8*	100	E2		B(E2)(W.u.)=200 *22*. α: 0.0538. α: 0.0538.
1135.82	0+	1035.65 *12*	100 *33*	E2		α: 0.00420. α: 0.00420.
		1135.9 *2*		E0		q_K^2(E0/E2)=1.8 *7*, X(E0/E2)=0.09 *4* (2005Ki02 evaluation). $I_{(\gamma+ce)}$: 0.81 *19*.
1144.30	8+	463.9 *1*	100	E2		B(E2)(W.u.)=209 *18*. α: 0.0254. α: 0.0254.
1221.4017	2+	891.73 *14*	0.16 *1*	E2		B(E2)(W.u.)=0.0339 *19*. α: 0.00569. α: 0.00569.
		1121.290 *3*	100.0 *3*	M1+E2+E0	+30 *+6-4*	B(E2)(W.u.)=6.74 *18*. B(M1)(W.u.)=2.2×10^{-5} *9*. Mult.: E0 component suggested by ce data in ^{182}Ta β^- (1990Ka35). δ: 17 +4-3 (1990Ka35). α: 0.00360. α: 0.00360.
		1221.395 *3*	77.80 *20*	E2		B(E2)(W.u.)=3.40 *9*. α: 0.00305.

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

E_i^{level}	J_i^π	E_γ†	I_γ†	Mult.‡	δ‡	Comments
						α: 0.00305.
1257.4144	2+	121.5 *2*	0.18 *5*	[E2]		B(E2)(W.u.)=2.0×10^2 *6*. α: 1.83. α: 1.83.
		927.98 *7*	41.3 *15*	E2		B(E2)(W.u.)=1.73 *14*. δ(M3/E2)=+0.04 *14* ($\gamma\gamma(\theta)$ in ^{182}Ta β^-, 1992Ch26). α: 0.00524. α: 0.00524.
		1157.3 *1*	35 *4*	M1+E2	-9 *+3-6*	B(E2)(W.u.)=0.63 *8*. B(M1)(W.u.)=2.5×10^{-5} *17*. E_γ: from ^{182}Re decay (64.0 h). Value of 1157.52 *6* from ^{182}Ta decay fits poorly. I_γ: from ^{182}Re decay (64.0 h). Weighted average from all datasets is 48 *5* with $\chi^2\approx$10. α: 0.00342 *7*. α: 0.00342 *7*.
		1257.407 *3*	100.00 *23*	E2		B(E2)(W.u.)=0.91 *8*. α: 0.00289. α: 0.00289.
1289.1515	2-	31.737 *1*[a]	1.16 *23*	E1		B(E1)(W.u.)=4.13×10^{-5} *16*. α: 1.628. α: 1.628.
		67.74970 *10*[a]	100.0 *15*	E1(+M2)	<0.02	B(E1)(W.u.)=0.00035 . B(M2)(W.u.)=1.5×10^2 . α: 0.215 *14*. α: 0.215 *14*.
		959.75 *4*	0.86 *4*	M2+E3	-5.5 *+19-10*	B(E3)(W.u.)=3.58 *13*. B(M2)(W.u.)=0.00017 *12*. δ: other: -4.6 +36-Inf ($\gamma\gamma(\theta)$ in ^{182}Ta β^-, 1992Ch26). α: 0.0116 *7*. α: 0.0116 *7*.
		1189.040 *3*	41.2 *3*	E1+M2+E3		B(E1)(W.u.)=1.67×10^{-8} *10*. B(E3)(W.u.)=9.1 *9*. B(M2)(W.u.)=0.011 *2*. α: 0.008 *7*. α: 0.008 *7*.
		1289.145 *3*	3.42 *4*	M2		B(M2)(W.u.)=0.00472 *17*. α: 0.01231. α: 0.01231.
1331.1170	3+	1001.72 *3*	18.02 *16*	M1+E2	-8.9 *+18-21*	B(E2)(W.u.)=0.0023 . B(M1)(W.u.)=4.2×10^{-8} . δ: other: -8.2 *+22-42* ($\gamma\gamma(\theta)$ in ^{182}Ta β^-, 1992Ch26). α: 0.00455 *8*. α: 0.00455 *8*.
		1231.004 *3*	100.0 *6*	M1+E2	-33 *+6-9*	B(E2)(W.u.)=0.0046 . B(M1)(W.u.)=9.7×10^{-9} . δ: other: +11 *+6-3* ($\gamma\gamma(\theta)$ in ^{182}Ta β^-, 1992Ch26). α: 0.00301. α: 0.00301.
1373.8317	3-	42.72 *3*[a]	4.19 *13*	E1		B(E1)(W.u.)=0.00028 *4*. α: 0.720. α: 0.720.
		84.6802 *3*[a]	37.0 *13*	M1+E2	+0.345 *11*	B(E2)(W.u.)=230 *40*. B(M1)(W.u.)=0.033 *5*. α: 7.66. α: 7.66.

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

E_i^{level}	J_i^π	E_γ†	I_γ†	Mult.‡	δ‡	Comments
		116.4179 *6*[a]	6.31 *5*	E1		B(E1)(W.u.)=2.2×10^{-5} *3*. α: 0.253. α: 0.253.
		152.4299 *3*[a]	100.0 *10*	E1		B(E1)(W.u.)=0.000156 *21*. δ(M2/E1)=+0.069 *17* (1967Ni03, positive sign from 1963El02) from $\gamma(\theta)$ in ^{182}Re ε decay; +0.014 *13* (1975Qu01); -0.035 *5* (1980Sp01); -0.023 *4* (1983Ri05); -0.22 *11* ($\gamma\gamma(\theta)$ and ce in ^{182}Ta β^-,1992Ch26). All these values (except that from 1975Qu01) give unrealistically large B(M2)(W.u.) values for example B(M2)(W.u.)=150 *80* for δ=+0.069 *17*. RUL(M2)=1 suggests δ(M2/E1)<0.007. The evaluators assign pure E1. α: 0.1258. α: 0.1258.
		1044.41 *5*	3.36 *10*	E1+M2	0.46 *9*	B(E1)(W.u.)=1.36×10^{-8} *21*. B(M2)(W.u.)=0.012 *5*. α: 0.0051 *12*. α: 0.0051 *12*.
		1273.719 *3*	9.46 *14*	E1+M2+E3		B(E1)(W.u.)=1.37×10^{-8} *20*. B(E3)(W.u.)=9 *2*. B(M2)(W.u.)=8×10^{-4} . α: 0.007 *6*. α: 0.007 *6*.
		1373.824 *3*	3.21 *11*	E3		B(E3)(W.u.)=5.5 *8*. α: 0.00496. α: 0.00496.
1442.832	4+	1113.41 *2*	100.0 *22*	M1+E2	+5.6 *+13-10*	B(E2)(W.u.)=10.4 *10*. B(M1)(W.u.)=0.0010 *5*. Mult.: from ce data in ^{182}Ta β^-, 1990Ka35 suggest M1+E2(+E0) with δ(E2/M1)=20 *13*. δ(E2/M1)=+1.1 *2* from $\gamma\gamma(\theta)$ in ^{182}Ta β^- (1992Ch26). α: 0.00376 *8*. α: 0.00376 *8*.
		1342.720 *6*	59.7 *12*	E2		B(E2)(W.u.)=2.35 *23*. δ(M3/E2)=-0.11 *+4-20* from $\gamma(\theta)$ in ^{182}Ta β^- decay is inconsistent with RUL(M3)=10, which suggests that δ should be near zero. α(K)exp in ^{182}Re ε decay is consistent with δ(M3/E2)=0 assigned by the evaluators. α: 0.00256. α: 0.00256.
1487.5035	4-	44.66 *11*	1.13 *23*	[E1]		α: 0.637 *10*. α: 0.637 *10*.
		113.67170 *22*[a]	71 *3*	M1+E2	+0.36 *3*	B(E2)(W.u.)=1.3×10^{2} . B(M1)(W.u.)=0.036 . α: 3.18. α: 3.18.
		156.3864 *3*[a]	100.0 *4*	E1		B(E1)(W.u.)=0.00022 . δ(M2/E1)=-0.08 *5* ($\gamma\gamma(\theta)$ and ce in ^{182}Ta β^-, 1992Ch26). α: 0.1177. α: 0.1177.
		198.3519 *3*[a]	54.8 *11*	E2		B(E2)(W.u.)=64 . δ(M3/E2)=+0.067 *10* from $\gamma(\theta)$ in ^{182}Ta β^-, but RUL(M3)=10 suggests δ(M3/E2) should be near zero. The evaluators assign pure E2. α: 0.317.

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

E_i^{level}	J_i^{π}	E_γ†	I_γ†	Mult.‡	δ‡	Comments
						α: 0.317.
		1158.1 *1*	12.3 *6*	E1		B(E1)(W.u.)=8.4×10^{-8} . δ(M2/E1)=-0.01 *+2-1* ($\gamma\gamma(\theta)$ in ^{182}Ta β^-, 1992Ch26). I_γ: from ^{182}Re decay (64.0 h). α: 1.38×10^{-3}. α: 1.38×10^{-3}.
		1387.390 *3*	2.81 *20*	M2+E3	2.6 *4*	B(E3)(W.u.)=5.6 . B(M2)(W.u.)=0.0019 . α: 0.00554 *24*. α: 0.00554 *24*.
1510.22	4+	830.1 *4*	20 *3*			
		1180.7 *2*	100 *5*	E2+M1	-2.8 *10*	α: 0.0036 *4*. α: 0.0036 *4*.
		1410.2 *1*	48 *5*	E2		α: 0.00235. α: 0.00235.
1553.2256	4-	65.72215 *15*[a]	39.2 *9*	M1+E2	0.093 *6*	B(E2)(W.u.)=5.0 *7*. B(M1)(W.u.)=0.0060 *3*. α: 2.91 *5*. α: 2.91 *5*.
		110.39 *7*	1.31 *14*	[E1]		B(E1)(W.u.)=(3.70×10^{-7} *19*). α: 0.290. α: 0.290.
		179.39381 *25*[a]	40.8 *6*	M1+E2	+0.92 *8*	B(E2)(W.u.)=1.89 *20*. B(M1)(W.u.)=0.000172 *16*. δ: other: +2.2 *2* ($\gamma\gamma(\theta)$ and ce in ^{182}Ta β^-, 1992Ch26). α: 0.694 *23*. α: 0.694 *23*.
		222.1085 *3*[a]	100.0 *14*	E1		B(E1)(W.u.)=3.88×10^{-6} *12*. δ(M2/E1)=+0.027 *7* ($\gamma\gamma(\theta)$ and ce in ^{182}Ta β^-, 1992Ch26). α: 0.0480. α: 0.0480.
		264.0740 *3*[a]	47.5 *5*	E2		B(E2)(W.u.)=0.698 *22*. α: 0.1254. α: 0.1254.
		1223.9 *1*	2.5 *4*	E1+M2	0.32 *7*	B(E1)(W.u.)=7.0×10^{-10} *10*. B(M2)(W.u.)=0.00022 *10*. δ: other: -0.15 *+10-25* ($\gamma\gamma(\theta)$ in ^{182}Ta β^-, 1992Ch26). α: 0.0025 *5*. α: 0.0025 *5*.
		1453.13 *5*	0.47 *5*	M2+E3		B(E3)(W.u.)=0.0174 *6*. B(M2)(W.u.)=5.73×10^{-5} *20*. I_γ: 27 *3* in (α,2nγ) is much higher, probably an impurity. α: 0.0067 *24*. α: 0.0067 *24*.
1621.283	5-	111.07 *5*	4.1 *3*			
		133.80 *5*	49 *3*	M1+E2	+0.39 *+4-3*	α: 1.96 *4*. α: 1.96 *4*.
		178.47 *5*	45 *3*	E1		α: 0.0838. α: 0.0838.
		247.46 *5*	100 *7*	E2		α: 0.1538. α: 0.1538.
		1291.8 *4*	4.6 *5*	E1+M2	0.4 *2*	α: 0.0027 *14*. α: 0.0027 *14*.

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

E_i^{level}	J_i^π	E_γ†	I_γ†	Mult.‡	δ‡	Comments
		1521.3 *4*	1.89 *20*	(E3)		α: 0.00402. α: 0.00402.
1623.51	(5)+	943.1 *3*	14.0 *22*	E2		I_γ: 35 *5* in (n,n′γ) is discrepant. α: 0.00507. α: 0.00507.
		1294.0 *3*	100.0 *19*	E2(+M1)	>30	α: 0.00274. α: 0.00274.
1660.383	5-	39.1 *1*	3.7 *7*	M1+E2	0.061 *7*	α: 13.6 *4*. α: 13.6 *4*.
		107.13 *5*	20.1 *15*	M1+E2	-0.8 *2*	I_γ: 55 *4* in (α,2nγ) is discrepant. α: 3.54 *13*. α: 3.54 *13*.
		150.25 *5*	7.3 *7*	(E1)		I_γ: 51 *10* in (α,2nγ) is discrepant. α: 0.1305. α: 0.1305.
		172.87 *5*	51 *3*	M1+E2	+0.26 *1*	I_γ: 137 *14* in (α,2nγ) is discrepant. α: 0.971. α: 0.971.
		217.55 *5*	46 *3*	(E1)		I_γ: 93 *7* in (α,2nγ) is discrepant. α: 0.0506. α: 0.0506.
		286.56 *5*	100 *7*	E2		α: 0.0976. α: 0.0976.
		1330.9 *2*	5.3 *5*	E1+M2	0.5 *2*	α: 0.0032 *14*. α: 0.0032 *14*.
		1560.4 *4*	1.02 *11*	(E3)		α: 0.00382. α: 0.00382.
1711.97	10+	567.5 *1*	100	E2		B(E2)(W.u.)=203 *19*. α: 0.01543. α: 0.01543.
1756.75	6+	313.94 *12*	7.5 *5*	E2		α: 0.0743. α: 0.0743.
		1076.4 *1*	100 *3*	E2+M1	+2.56 *+9-8*	α: 0.00444. α: 0.00444.
		1427.2 *1*	92.1 *17*	E2		α: 0.00231. α: 0.00231.
1765.54		434.3 *2*	48 *12*			
		544.20 *15*	100 *15*			
1768.943	6-	108.58 *5*	12.6 *25*	M1+E2	-0.6 *2*	I_γ: 78 *6* in (α,2nγ) is discrepant. α: 3.50 *13*. α: 3.50 *13*.
		145.43 *5*	11.8 *9*	(E1)		I_γ: 45 *10* in (α,2nγ) is discrepant. α: 0.1420. α: 0.1420.
		147.71 *5*	16.2 *14*	M1+E2	+0.8 *2*	I_γ: 49 *10* in (α,2nγ) is discrepant. α: 1.30 *9*. α: 1.30 *9*.
		215.72 *5*	12.3 *24*	(E2)		I_γ: 65 *6* in (α,2nγ) is discrepant. α: 0.240. α: 0.240.
		281.43 *5*	100 *7*	E2		α: 0.1031. α: 0.1031.
		1088.5 *3*	3.5 *4*	E1+M2	0.4 *2*	α: 0.0040 *23*. α: 0.0040 *23*.
		1439.3 *3*	2.81 *18*	(M2)		Mult.: E1+M2 from α(K)exp but $\Delta J\pi$ requires M2. α: 0.00930. α: 0.00930.
1769.5	(6+)	1089.0				
		1440.1				

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

E_i^{level}	J_i^π	E_γ†	I_γ†	Mult.‡	δ‡	Comments
1809.64	5-	188.54 *5*	1.38 *14*			
		256.42 *11*	100 *8*	M1+E2	+0.037 *+6-7*	α: 0.336. α: 0.336.
1810.85	(6)-	42.0				
		187.34 *5*	18.4 *18*	E1+M2	+0.25 *+27-20*	α: 0.3 *7*. α: 0.3 *7*.
		189.60 *7*	21.8 *18*	M1+E2	+0.31 *+15-12*	α: 0.74 *4*. α: 0.74 *4*.
		323.33 *10*	100 *7*	E2		α: 0.0681. α: 0.0681.
1813.4		524.2 *3*	100			
1829.53	6-	19.85 *10*	0.32 *11*	M1+E2	0.07 *2*	α: 1.3×10^2 *3*. α: 1.3×10^2 *3*.
		60.65 *10*	0.91 *23*			
		169.15 *10*	100 *7*	M1+E2	+0.094 *6*	α: 1.060. α: 1.060.
		206.00 *5*	4.5 *5*	E1		α: 0.0581. α: 0.0581.
		208.26 *5*	5.5 *5*	M1+E2	-1.0 *5*	α: 0.43 *10*. α: 0.43 *10*.
		276.31 *5*	77 *5*	E2		α: 0.1090. α: 0.1090.
		342.03 *10*	9.3 *7*	E2		I_γ: 43 *4* in (α,2nγ) is discrepant. α: 0.0579. α: 0.0579.
1833.1		1733.0 *6*	100			
1856.06	(2+)	598.56 *5*	100 *11*			
		1527.0 *10*	10 *5*			E_γ: from (n,n′γ) only.
		1756.0 *2*	15 *3*			I_γ: 167 *40* in (n,n′γ) is discrepant.
		1857.3 *2*	8.0 *6*	(E2)		E_γ: from ^{182}Re decay only, poor fit, level-energy difference=1856.1. α: 1.59×10^{-3}. α: 1.59×10^{-3}.
1856.9	1	1757.0 *6*	35 *12*			
		1856.7 *6*	100 *23*			
1871.17	1-	1543 *2*	≈5			
		1771.0 *2*	100 *10*	E1		α: 1.04×10^{-3}. α: 1.04×10^{-3}.
		1871.2 *2*	90 *7*	E1		α: 1.06×10^{-3}. α: 1.06×10^{-3}.
1887.84		556.7 *3*	83 *25*			
		666.4 *4*	46 *17*			
		1558.5 *4*	100 *25*			
1917.05	7-	106.3 *1*	8 *2*			
		148.2 *1*	10 *2*			
		160.20 *5*				E_γ: from ^{182}Re decay only. This γ is considered as suspect by the evaluators since its intensity of 116 *7* relative to 100 for 295.7γ is much too high to have missed detection in in-beam γ-ray study.
		256.5 *1*	28 *4*	Q		
		295.63 *10*	100 *14*	E2		α: 0.0888. α: 0.0888.
1918.6	(2+ to 4+)	1818.5 *4*	100			
1959.34	(2+)	449.8 *3*	21 *10*	(Q)		
		627.5 *4*	50 *14*			
		1629.8 *2*	100 *14*			
		1859.1 *8*	71 *24*			
		1959.2 *10*	14 *5*			

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

E_i^{level}	J_i^{π}	$E\gamma^{\dagger}$	$I\gamma^{\dagger}$	Mult.‡	δ‡	Comments
1960.30	(7)-	130.81 *5*	100 *7*	M1+E2	-0.51 +*6-8*	α: 2.03 *6*. α: 2.03 *6*.
		149.45 *5*	12.1 *10*	M1+E2	-0.15 +*15-18*	α: 1.50 *6*. α: 1.50 *6*.
		191.39 *5*	90 *7*	M1+E2	-0.23 +*6-8*	α: 0.734 *18*. α: 0.734 *18*.
		203.55 *5*	6.6 *7*	(E1)		From $\gamma(\theta)$ in ^{182}Re ε decay, 1980Sp01 give δ(Q/D)=-17 +10-24 or +0.06 +*9-4*; favoring the former value from δ based on ce data of 1971Ga37. But 1971Ga37 assigned tentative E2 from their ce data. δ(M2/E1)=-17 +*10-24* is inconsistent with RUL(M2)=1 for $T_{1/2}$(1960.30 level)$<$1 ns or so. The evaluators assign tentative E1. $I\gamma$: 52 *4* in (α,2nγ) is discrepant. α: 0.0599. α: 0.0599.
		299.90 *10*	20 *3*	E2		$I\gamma$: 61 *6* in (α,2nγ) is discrepant. α: 0.0851. α: 0.0851.
		339.04 *10*	72 *10*	E2		α: 0.0594. α: 0.0594.
1960.78	6-	151.15 *5*	26 *3*	M1+E2	0.8 *3*	α: 1.21 *13*. α: 1.21 *13*.
		300.36 *10*	100 *23*	M1+E2	+0.048 *26*	α: 0.218. α: 0.218.
		1279.8 *3*	3.6 *5*			
		1631.4 *5*	0.74 *14*	M2+E3	≈2.5	α: ≈0.00396. α: ≈0.00396.
1971.04	(7)+	214.31 *5*	100	M1+E2	+0.25 +*8-7*	α: 0.532 *15*. α: 0.532 *15*.
1978.35	(7)-	18.05 *10*	1.9 *5*	M1+E2	0.016 *5*	α: 128 *4*. α: 128 *4*.
		148.86 *5*	27.2 *20*	M1+E2	+0.28 +*8-6*	α: 1.48 *4*. α: 1.48 *4*.
		209.40 *5*	7.6 *8*	M1+E2	-0.28 +*23-15*	$I\gamma$: 33 *3* in (α,2nγ) is discrepant. α: 0.56 *3*. α: 0.56 *3*.
		221.59 *6*	100 *8*	E1		α: 0.0483. α: 0.0483.
		357.04 *10*	8.4 *8*	E2		α: 0.0513. α: 0.0513.
1981.82		650.7 *3*	59 *18*			
		723.8 *7*	26 *9*			
		1653.1 *8*	82 *24*			
		1881.8 *8*	100 *18*			
1993.68	(7-)	182.8 *5*	$<$11			
		372.4 *1*	100 *17*	Q		
2016.8	(2,3,4)+	1688.3 *10*	100 *33*			
		1915.3 *12*	100 *33*			
2023.57	3-	470.26 *5*	100 *5*	M1+E2	0.6 *1*	α: 0.055 *3*. α: 0.055 *3*.
		536.04 *5*	10.3 *16*	M1+E2	0.7 *2*	α: 0.037 *4*. α: 0.037 *4*.
		649.73 *5*	16.8 *24*	M1+E2	0.8 *2*	α: 0.0219 *23*. α: 0.0219 *23*.
		734.53 *5*	18.7 *22*	M1+E2	1.0 *3*	α: 0.0148 *22*. α: 0.0148 *22*.
2057.39	1+	800 *1*	16 *4*			
		835.98 *5*	50 *5*	(M1+E2)	≈0.8	

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

E_i^{level}	J_i^{π}	E_γ†	I_γ†	Mult.‡	δ‡	Comments
		1957.4 *2*	49 *3*	(M1+E2)	1.0 *+6-4*	
		2057.4 *3*	100 *8*	D		
2087.43	8-	170.4 *1*	20 *4*			
		318.5 *1*	100 *15*	Q		α: 0.0716. α: 0.0716.
2109.96	(2-,3-)	556.7 *3*	100 *28*	(E2)		α: 0.01615. α: 0.01615.
		2010.1 *3*	86 *12*	(E1+M2)	0.9 *+7-4*	α: 0.0025 *9*. α: 0.0025 *9*.
		2109.3 *5*	<235			
2114.35	(8)-	154.10 *5*	58 *13*	M1+E2	0.6 *3*	α: 1.22 *12*. α: 1.22 *12*.
		197.4 *2*	23 *7*			
		285.1 *10*	46 *8*			
		345.29 *15*	100 *15*	E2		α: 0.0564. α: 0.0564.
2116.4		2016.3 *3*	100			
2120.25	(8-)	160.1 *1*	100 *18*	(M1)		α: 1.243. α: 1.243.
		290.5 *1*	35 *6*			
2131.3	(7-)	362.4 *3*	100			
2143.0		1813.6 *10*	100			
2147.95	(3-)	817.0 *10*	12 *4*			E_γ: from (n,n′γ) only.
		1818.7 *2*	92 *8*	(E1)		I_γ: 222 *33* in (n,n′γ) is discrepant.
		2047.4 *3*	100 *8*	(E1+M2)	1.0 *+10-5*	α: 0.0026 *9*. α: 0.0026 *9*.
		2148 *3*	24 *5*	[E3]		
2173.5	(0+ to 4+)	952.3 *6*	42 *12*			
		2073.3 *3*	100 *23*			
		2174	<23			E_γ: from (n,n′γ) only.
2180.4	(8+)	1036.0				
		1500.0				
2184.04	(2-,3-)	810.24 *5*	18.2 *21*	(M1)		α: 0.01639. α: 0.01639.
		894.85 *5*	100 *8*	(M1)		α: 0.01276. α: 0.01276.
		2084.0 *3*	3.1 *3*			
2204.54	(8)-	226.19 *5*	100	M1+E2	+0.15 *2*	α: 0.468. α: 0.468.
2207.21	(3-)	1877.6 *2*	58 *18*	(E1+M2)	-0.28 *6*	α: 0.00134 *12*. α: 0.00134 *12*.
		2106.8 *5*	<250			
		2207.7 *3*	100 *9*	(E3)		α: 0.00209. α: 0.00209.
2209.07	3-	835.9 *6*	33 *11*			E_γ: from (n,n′γ) only.
		1879.6 *2*	21 *6*	E1		α: 1.06×10^{-3}. α: 1.06×10^{-3}.
		2108.9 *4*	100 *17*			
		2208.8 *6*	78 *17*			E_γ: from (n,n′γ) only.
2212.49	(8+)	241.5 *1*	100 *15*	D+Q		
		454.9 *4*	15 *5*			
2225.35	(8-)	414.5 *1*	100	Q		
2230.63	(10+)	518.5 *1*	100 *13*	(M1)		B(M1)(W.u.)=6.9×10^{-8} *12*. α: 0.0514. α: 0.0514.
		1086.5 *1*	69 *7*	[E2]		B(E2)(W.u.)=1.8×10^{-6} *3*. I_γ: 116 *13* in (α,2nγ) is discrepant. α: 0.00382.

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

E_i^{level}	J_i^{π}	E_γ†	I_γ†	Mult.‡	δ‡	Comments
						α: 0.00382.
2240.83	(3+)	1911.8 *2*	100 *17*	(M1)		α: 0.00230. α: 0.00230.
		2140.3 *2*	87 *15*	(M1)		α: 0.00197. α: 0.00197.
2273.87	9-	186.5 *1*	16.7 *19*			
		356.8 *1*	100 *15*	Q		
2274.63	(3)-	787.11 *5*	86 *16*	(M1)		I_γ: 15 *8* in (n,n′γ) is discrepant. α: 0.01763. α: 0.01763.
		900.80 *5*	100 *17*	(M1+E2)	≈0.5	α: ≈0.01116. α: ≈0.01116.
		2175.2 *3*	13.2 *19*	E1		α: 1.14×10^{-3}. α: 1.14×10^{-3}.
2283.5	1	909.7 *6*	64 *29*			
		2283.5 *10*	100 *29*			
2301.56	(9-)	181.3 *10*	18 *9*			
		187.6 *3*	36 *9*			
		214.2 *10*	<27			
		341.3 *1*	109 *46*			
		384.4 *1*	100 *18*			
2316.1	(1,2+)	2216 *3*	≈275			
		2316 *3*	100 *20*			
2323.85	(8-)	406.8 *2*	100			
2327.91	(9-)	207.4 *2*	73 *15*	(M1+E2)		
		213.6 *1*	100 *16*			
2334.25		355.9 *2*	100			
2372.57	12+	660.6 *1*	100	E2		B(E2)(W.u.)=191 *10*. α: 0.01085. α: 0.01085.
2382.1	1	2282 *1*	142 *20*			
		2382 *1*	100			
2445.98	(9-)	452.3 *1*	100	Q		
2455.74	(9-)	251.2 *1*	100 *14*	(D+Q)		
		477.1 *10*	<7			
2474.1	1	2374 *1*	66 *14*			
		2474 *1*	100			
2479.83	(9+)	267.3 *1*	100 *18*	D+Q		
		508.8 *2*	29 *6*			
2486.89	10-	213.0 *1*	25 *3*			
		399.5 *2*	100 *19*	Q		
2492.76	(11+)	262.1 *1*	100	D+Q		
2507.48	(10-)	205.8 *2*	30 *10*			
		233.8 *10*	<20			
		387.1 *2*	120 *60*			
		393.4 *2*	60 *10*			
		420.0 *1*	100 *20*			
2563.94	(10-)	236.0 *1*	100 *16*			
		443.8 *2*	<8			
2710.93	11-	224.0 *1*	24 *3*			
		437.1 *1*	100 *18*	Q		
2730.85	(10-)	275.1 *1*	100 *14*	(D+Q)		
		526.2 *10*	<14			
2739.15	(10-)	513.8 *1*	100	Q		
2741.66	(11-)	440.1 *1*	100 *18*	Q		
		467.7 *5*	35 *6*			
2769.26	(10+)	289.4 *1*	100	D+Q		
		557.6 *5*	39 *4*			
2775.63	(12+)	282.8 *1*	100	D+Q		

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

E_i^{level}	J_i^π	E_γ†	I_γ†	Mult.‡	δ‡	Comments
		545.1 *2*	18 *3*	Q		
2823.93	(11-)	260.0 *1*	100	D+Q		
		496.0 *5*	48 *5*			
2884.1	1	2784 *1*	40 *11*			
		2884 *1*	100			
2892.1	(1)	2792 *1*	150 *90*			
		2892 *1*	100			
2941.0	(1,2+)	2941 *2*	100			
2972.49	12-	261.6 *2*	20 *5*			
		485.6 *1*	100 *20*	Q		
2980.58	(11-)	534.6 *1*	100	Q		
2981.33	(12-)	473.8 *1*	100 *19*			
		494.6 *2*	38 *6*			
2996.1	1	2896 *1*	168 *35*			
		2996 *1*	100			
3027.96	(11-)	297.1 *1*	100	(D+Q)		
		575.2 *20*	24 *11*			
3078.23	(13+)	302.5 *1*	100	D+Q		$I\gamma(586\gamma)/I\gamma(302)$=1.6 *7* in ($\alpha$,2n$\gamma$).
		585.8 *2*	47 *9*	Q		
3080.1	1	2980 *1*	61 *18*			
		3080 *1*	100			
3106.72	(12-)	282.8 *1*	100	(D+Q)		
		542.5 *5*	53 *6*			
3112.87	14+	740.3 *1*	100	(E2)		B(E2)(W.u.)=1.7×10^2 *5*. α: 0.00843. α: 0.00843.
3163.1	1	3063 *1*	54 *12*			
		3163 *1*	100			
3198.1	(1,2+)	3098 *1*	59 *21*			
		3198 *1*	100			
3224.53	13-	513.6 *1*	100	Q		
3269.56	(13-)	527.9 *1*	100	Q		
3319.7	(12-)	580.6 *4*	100			
3343.06	(12-)	315.1 *1*	100 *14*	(D+Q)		
		612.6 *10*	43 *29*			
3365.1	1	3265 *1*	63 *17*			
		3365 *1*	100			
3398.33	(14+)	320.0 *1*	100	D+Q		
		622.7 *1*	61 *18*	Q		
3410.54	(13-)	303.8 *1*	100 *13*			
		586.8 *5*	88 *13*			
3415.90	(12)	923.1 *1*	100	D+Q		
3422.1	(1,2+)	3322 *1*	53 *15*			
		3422 *1*	100			
3518.04	(14-)	536.7 *1*	100 *20*			
		545.7 *5*	40 *10*			
3549.99	14-	568.6 *10*	<22			
		577.5 *1*	100 *22*	Q		
3567.8	(13-)	587.2 *3*	100	(Q)		
3601.1	1	3501 *1*	77 *19*			
		3601 *1*	100			
3640.0	(1,2+)	3640 *2*				
3677.13	(13)	261.2 *1*	100 *14*			
		901.8 *3*	21 *7*			
3727.1	(1,2+)	3627 *2*				
		3727 *2*				
3733.85	(14-)	323.3 *1*	71 *10*			
		627.4 *5*	100 *14*			
3736.38	(15+)	338.0 *1*	100			

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

E_i^{level}	J_i^{π}	E_γ†	I_γ†	Mult.‡	δ‡	Comments
		658.2 *1*	94 *20*			
3754.87	(15+)	19	≈0.2	[M1]		B(M1)(W.u.)=9.8×10^{-7} . I_γ: from $\gamma\gamma$ data, I(γ+ce) branching is ≈ 10%. α: 107.1. α: 107.1.
		356.5 *1*	100 *17*	(M1+E2)		B(M1)(W.u.)=13.0×10^{-6} *23*. α: 0.09 *5*. α: 0.09 *5*.
		676.8 *2*	57 *13*	(E2)		B(E2)(W.u.)=0.00100 *23*. α: 0.01028. α: 0.01028.
3807.63	15-	583.1 *1*	100	Q		
3880.06	(15-)	610.5 *1*	100	Q		
3882.0	(1,2+)	3782 *2*				
		3882 *2*				
3893.67	(16+)	138.8 *1*	100	(M1)		B(M1)(W.u.)=0.00040 . α: 1.86. α: 1.86.
3910.07	16+	797.2 *1*	100	E2		B(E2)(W.u.)=204 *45*. α: 0.00719. α: 0.00719.
3920.0	1	3920 *2*	100			
3966.23	(14)	289.1 *1*	100 *50*			
		550.3 *10*	25 *13*			
4040.6	(17-)	146.9 *1*	100	(E1)		B(E1)(W.u.)=2.9×10^{-6} *2*. α: 0.1384. α: 0.1384.
4074.8	(15-)	340.9 *2*	75 *25*			
		664.2 *5*	100 *25*			
4078.87	(16+)	324.0 *1*	100			
4081.5	(16+)	345.1 *2*	60 *20*			
		683.2 *3*	100 *40*			
4116.9	(16-)	598.9 *2*	100			
4197.1	(15-)	629.3 *2*	100			
4211.1	16-	661.1 *2*	100	Q		
4218.1	(17+)	324.4 *5*	100			
4280.2	(15)	314.0 *1*	100 *67*			
		603.1 *10*	33 *17*			
4293.1	(17+)	399.4 *1*	100			
4421.5	(18-)	380.9 *1*	100			
4430.5	(17+)	351.6 *1*	100 *18*			
		675.5 *11*	18 *9*			
4453.2	(17+)	371.3 *10*	<33			
		717.3 *10*	100 *33*			
4456.2	17-	648.6 *2*	100	Q		
4569.7	(18+)	351.6 *5*	100 *32*			
		676.1 *7*	24 *8*			
4570.9	(17-)	690.8 *3*	100			
4690.87	18+	780.8 *1*	100	Q		
4711.9	(18+)	418.8 *1*	100 *18*			
		818.1 *6*	64 *27*			
4748.0	(18+)	837.9 *9*	100	[E2]		B(E2)(W.u.)=2.5×10^{2} *6*. α: 0.00648. α: 0.00648.
4779.6	(18-)	662.7 *2*	100			
4780.4	(18)	739.8 *2*	100			
4804.9	(18+)	374.5 *2*	100 *25*			
		725.7 *5*	50 *25*			

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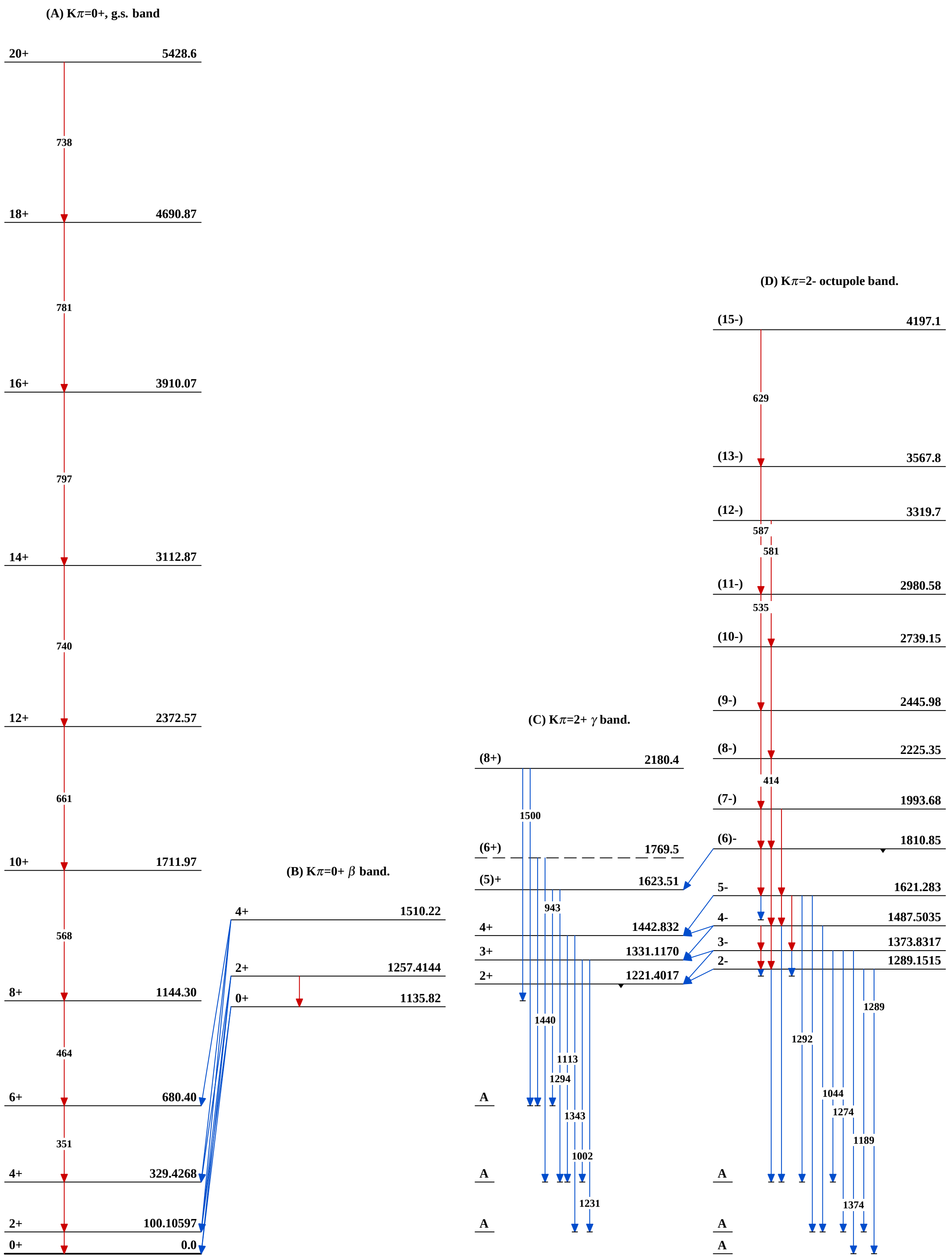
$\gamma(^{182}W)$ (continued)

E_i^{level}	J_i^{π}	E_{γ}†	I_{γ}†	Mult.‡	δ‡	Comments
4820.1	(19-)	398.5 *1*	100			
		779.9 *3*	24 *11*			
4847.4	(18+)	765.9 *10*	100 *33*			
		937.3 *10*	67 *33*			
4954.8	18-	743.7 *10*	100			
5148.6	(19+)	436.6 *9*	100 *25*			
		855.5 *4*	<50			
5170.8	19-	714.6 *3*	100			
5191.8	(19)	411.4 *2*	100			
5199.6	(19+)	394.7 *2*	100			
5225.3	(19+)	772.1 *10*	100			
5235.8	(20-)	415.6 *2*	100 *25*			
		814.8 *4*	75 *25*			
5338.6	(19-)	767.7 *10*	100			
5428.6	20+	737.7 *2*	100			
5618.5	(20)	426.7 *2*	100			
		838.4 *5*	50			
5666.9	(21-)	431.2 *10*	100			
		846.7 *10*	100			

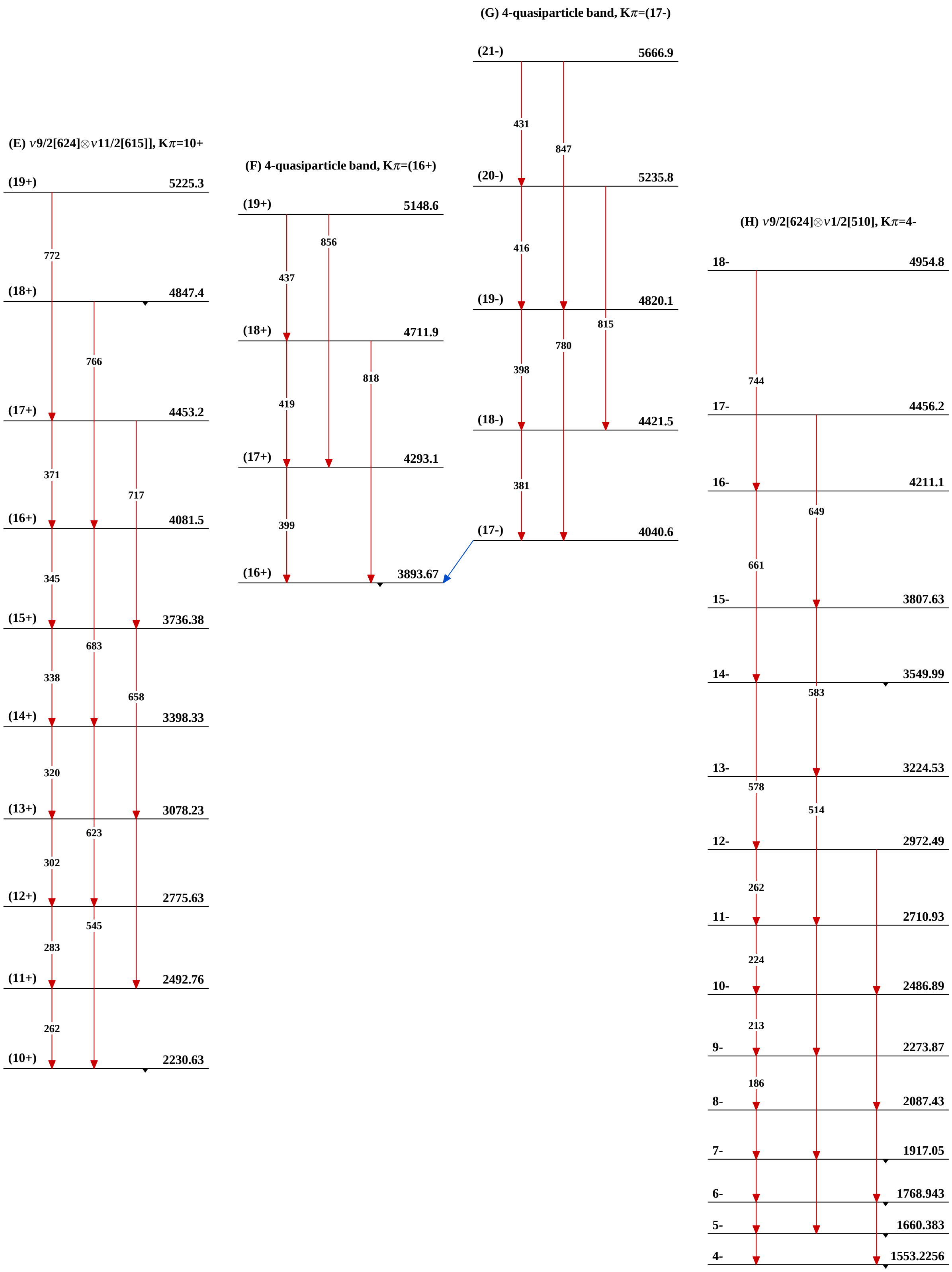
† The adopted values represent weighted averages from different studies. In cases where large discrepancies are found, those values were not considered in deducing averages. In (α,2nγ), many such cases are noted where the relative branching ratios are discrepant, generally being much higher than in other studies. For gammas from high-spin levels above 2500 keV, gamma-ray energies and intensities are almost entirely from ^{176}Yb(^{13}C,α3nγ) dataset since this dataset provides the most complete set of values.

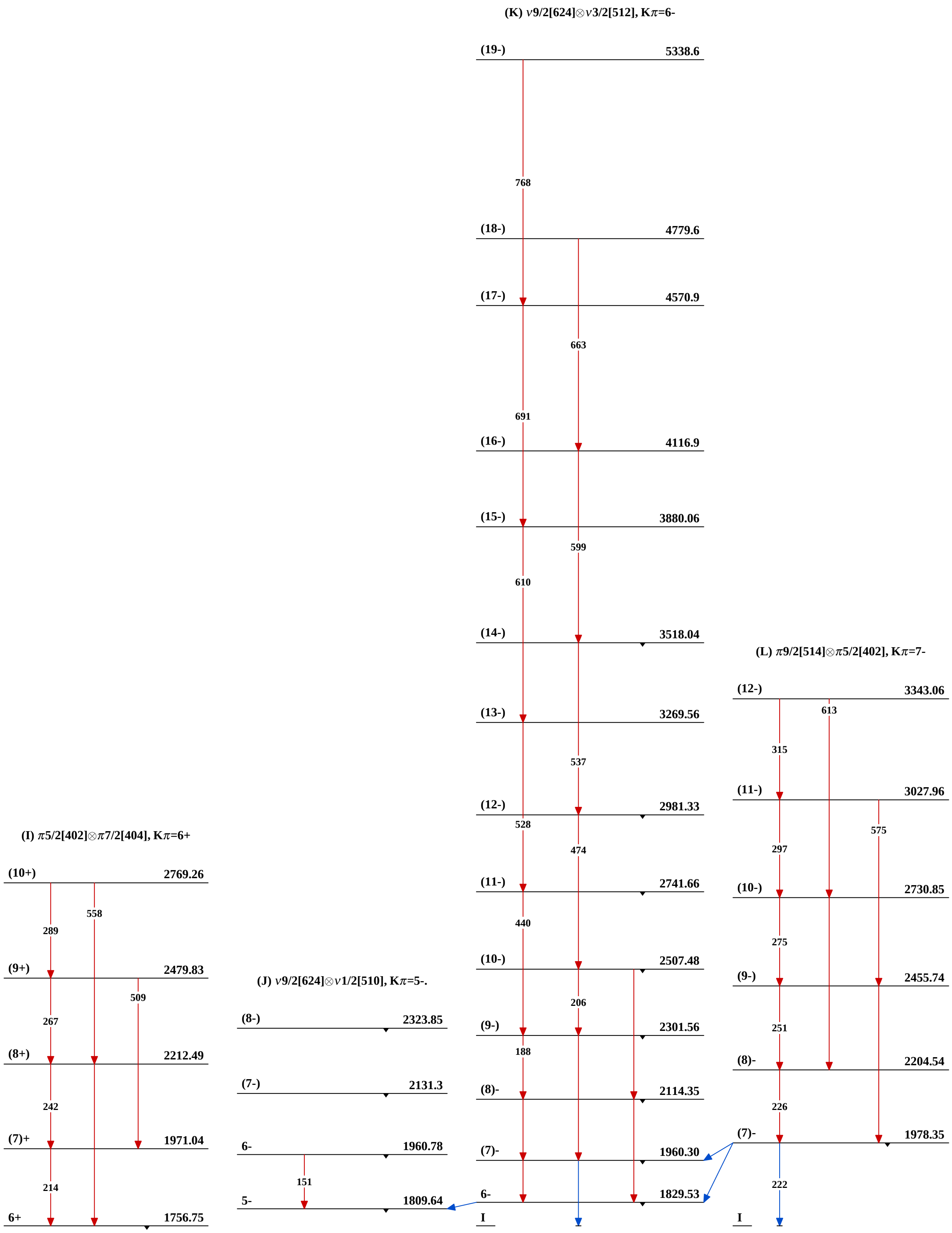
‡ From ce and angular distribution/correlation studies in ^{182}Ta decay, ^{182}Re decay and in-beam γ-ray studies.

[a] From evaluation by 1994HeZZ.



(A) Kπ=0+, g.s. band
20+ 5428.6
738
18+ 4690.87
781
16+ 3910.07
797
14+ 3112.87
740
12+ 2372.57
661
10+ 1711.97
568
8+ 1144.30
464
6+ 680.40
351
4+ 329.4268
2+ 100.10597
0+ 0.0
(B) Kπ=0+ β band.
4+ 1510.22
2+ 1257.4144
0+ 1135.82
(C) Kπ=2+ γ band.
(8+) 2180.4
1500
(6+) 1769.5
(5)+ 1623.51
943
4+ 1442.832
3+ 1331.1170
2+ 1221.4017
1440
1113
1294
1343
1002
1231
A
A
A
(D) Kπ=2- octupole band.
(15-) 4197.1
629
(13-) 3567.8
(12-) 3319.7
587
581
(11-) 2980.58
535
(10-) 2739.15
(9-) 2445.98
(8-) 2225.35
414
(7-) 1993.68
(6)- 1810.85
5- 1621.283
4- 1487.5035
3- 1373.8317
2- 1289.1515
1289
1292
1044
1274
1189
1374
A
A
A


(E) ν9/2[624]⊗ν11/2[615]], Kπ=10+
(19+) 5225.3
772
(18+) 4847.4
766
(17+) 4453.2
371
717
(16+) 4081.5
345
(15+) 3736.38
683
338
658
(14+) 3398.33
320
(13+) 3078.23
623
302
(12+) 2775.63
545
283
(11+) 2492.76
262
(10+) 2230.63
(F) 4-quasiparticle band, Kπ=(16+)
(19+) 5148.6
856
437
(18+) 4711.9
818
419
(17+) 4293.1
399
(16+) 3893.67
(G) 4-quasiparticle band, Kπ=(17-)
(21-) 5666.9
431
847
(20-) 5235.8
416
(19-) 4820.1
815
780
398
(18-) 4421.5
381
(17-) 4040.6
(H) ν9/2[624]⊗ν1/2[510], Kπ=4-
18- 4954.8
744
17- 4456.2
16- 4211.1
649
661
15- 3807.63
14- 3549.99
583
13- 3224.53
578
514
12- 2972.49
262
11- 2710.93
224
10- 2486.89
213
9- 2273.87
186
8- 2087.43
7- 1917.05
6- 1768.943
5- 1660.383
4- 1553.2256


(K) ν9/2[624]⊗ν3/2[512], Kπ=6-
(19-) 5338.6
(18-) 4779.6
(17-) 4570.9
(16-) 4116.9
(15-) 3880.06
(14-) 3518.04
(13-) 3269.56
(12-) 2981.33
(11-) 2741.66
(10-) 2507.48
(9-) 2301.56
(8)- 2114.35
(7)- 1960.30
6- 1829.53
768
663
691
599
610
537
528
474
440
206
188
(L) π9/2[514]⊗π5/2[402], Kπ=7-
(12-) 3343.06
(11-) 3027.96
(10-) 2730.85
(9-) 2455.74
(8)- 2204.54
(7)- 1978.35
613
315
575
297
275
251
226
222
(I) π5/2[402]⊗π7/2[404], Kπ=6+
(10+) 2769.26
(9+) 2479.83
(8+) 2212.49
(7)+ 1971.04
6+ 1756.75
558
289
509
267
242
214
(J) ν9/2[624]⊗ν1/2[510], Kπ=5-.
(8-) 2323.85
(7-) 2131.3
6- 1960.78
5- 1809.64
151
I
I

^{182}Ta β^- decay (114.43 d) 1992Ch26,1992Su09,1990Ja02

Parent: ^{182}Ta: E=0.0; Jπ=3-; $T_{1/2}$=114.43 d *4*; Q=1814.3 *17*; %β-=100
Q(g.s.): From 2003Au03.
1992Ch26 (1989Ka01,1989Ka20,1981Ka22 from the same group): measured Eγ, Iγ, γγ, ce, γγ(θ), lifetime. For γ rays, HPGe detectors and for electrons mini-orange spectrometer were used.
1992Su09 (also 1993Li03): Measured Eγ, Iγ, γγ coin.
1990Ja02: measured Eγ, Iγ, γγ coin.
1992Yo05: measured 1189γ(θ,H,,T), oriented ^{182}Ta, search for violation of parity (P), time reversal (T) and PT through measurement of γγ(θ) for 1189γ from 1289, 2- level which is close in energy to 1221, 2+ level. No results are reported.
Other measurements:.
2000He14: Recommended γ-ray energies from evaluation and analysis.
1998Mi17: γ-ray emission probabilities.
1997Ka47: cross sections in ^{182}Ta(n,γ) and from multi-element standard (MES) technique deduced emission probabilities for 1189γ and 1221γ.
1992Ke02: K-x rays and γ rays, emission probabilities.
1991Fa12, 1983Fa18: γ anisotropy vs polarizing field and temperature, deduced quadrupole moment and quadrupole interaction.
1990Me15: Eγ, Iγ.
1990Ka35: ce, deduced E0 transitions.
1987Ba66: x rays, γ(L x ray)(θ), oriented nuclei, deduced anisotropy.
1987Ka34: γ(θ,temp), deduced electric-field gradient.
1986Wa35: Eγ, Iγ.
1985Je05: Eγ with a crystal spectrometer.
1984He12: Deduced transition energies for ^{182}Ta decay.
1983Ri05: γ(θ,T) and γ(lin pol,T) on oriented ^{182}Ta, low temperature nuclear orientation.
1983El02: Eγ, Iγ, γγ, γγ(t), deduced α(K)exp′s from their measured Iγ and using Ice(K)) data from literature.
1983Ji01: Eγ, Iγ.
1981Al21, 1980Al27: NMR, oriented nuclei in Fe, deduced g factor
1981Is08: Eγ, Iγ, γγ coin.
1978Bu26: L-subshell ratios for 100γ using magnetic spectrometer.
1977Ka30: ce, penetration parameters.
1976He18: Iγ, ce.
1976Kl09: Eγ, ce.
1975Bo05: Eγ, curved-crystal spectrometer.
1975Gr15: γ(t), γ(ce)(t), deduced level lifetime.
1975Qu01: γγ(θ).
1975We22: Eγ, Iγ, ce, γ(ce)(θ), (ce)(ce)(θ).
1974Ha47: γγ(θ,H), deduced g factor.
1973Be55: K-x rays.
1973El11: ce, Eγ.
1973Mi28: ce.
1973Pi02: Eγ.
1973Se14: γγ(θ), γγ(θ,H), deduced g factor.
1973Vi13, 1972Em01: isotopic half-life.
1972Be94: γγ(θ), γγ(θ,H), deduced g factor.
1972Ga23: Eγ, Iγ.
1972He10: γγ(θ), γγ(θ,H), (ce)(ce)(t), L-subshell ce.
1972Kr05: γ(θ,temp), oriented nuclei.
1972Li11: γ(circ pol), deduced parity admixtures.
1972Si30: βγ(θ), βγ(circ pol), β-longitudinal pol.
1972Si33: γγ(θ,H), deduced magnetic moment.
1971Ho14: β(ce)(t), βγ(t), deduced level lifetimes.
1971Ml01, 1971Ni02, 1970Ni13: Eγ, Iγ.
1970Ab14: γ(ce)(t), βγ(t), (ce)(ce)(t), β(ce)(t), level lifetimes.
1970El09: ce.
1970Pa33: γγγ(θ).
1970Ro15: βγ(θ) for 521-keV β transition.
1970St03: Iγ, ce.
1970Wh03, 1969Wh03: Eγ, Iγ.
1969Sa25: Eγ, Iγ, γγ coin.
1968Bo01, 1968Bo38: ce data for M/L, K/L, K/L_3 and (N+O)/M ratios for E2 transitions.
1968Ho19, 1968Ni06, 1968Ni07, 1967Ni03: ce for M, K/L, L_3/M_3, M/(N+O+P) for E2 transitions.
1968Me24: Eγ, ce, subshell ratios.
1967Ba01: Eβ, Iβ.

1967Wa29: isotopic half-life.
1966Dz01: Eγ, Iγ.
1966Ka13: ce for L subshells for E2 transitions.
1966Ko12: Eγ, Iγ, ce.
1966Me13, 1965Me08: $\beta\gamma$(t), $\beta\gamma\gamma$(t), $\gamma\gamma$(t), γ(ce)(t), deduced level lifetimes.
1966Ra04: γ(ce)(t), deduced level lifetime.
1965Do02: $\gamma\gamma$(t) for first 2+ and 2- states in ^{182}W.
1965Ed01: Iγ.
1965Gr16: Eγ, Iγ.
1965Me08, 1964Ro19, 1964Be36, 1963Ko02, 1963Fo02, 1963Ba24, 1962Ba39: $\gamma\gamma$(t).
1965Me08, 1964R019, 1964Be36, 1963Ba24, 1961Go24: $\beta\gamma$(t).
1965He07, 1964Ko07, 1962Se10, 1962Mo15, 1961Vi07, 1961Vi02, 1961Va27, 1961Vo05, 1961Ry03, 1960Gv01: γ.
1964Da15: Eγ, Iγ, Eβ, Iβ, $\beta\gamma$ coin, ce.
1964Ha28: β, $\beta\gamma$ coin.
1964Ba12, 1964Ba47, 1963St16: ce.
1963El08: $\gamma\gamma$ coin.
1963Ko02, 1963Kl04: $\gamma\gamma(\theta$,H).
1963Ko02: $\gamma\gamma(\theta$,H,t).
1963Kl04, 1963El02, 1960Hi02: $\gamma\gamma(\theta)$.
References prior to 1960:.
1959Vo27, 1958Be73, 1957Su01, 1955Mu19, G. Backstrom: Arkiv Fysik 10, 387 (1956), C.M. Fowler et al.: Phys Rev 94, 1082 (1954): γ.
1959Si84: $\gamma\gamma$ coin.
1955Su64: $\gamma\gamma$(t).
1955Mu19, 1959Si84, J. Demuynck et al.: Compt Rend. 244, 3050 (1957), S. Jnanananda: J. Sci. Ind. Research (India) 8B, 147 (1949) :β.
1958Sp17, 1958Ke26, 1957Wr37, 1952Ei12, 1951Si25: isotopic half-life.
1959Si84: $\beta\gamma$ coin.
1954Su10: $\beta\gamma$(t).
1983El02 report 15 new transitions and 5 new levels that are not included here because the evaluators consider the identification tenuous due to poor energy fits and, in some cases, intensities large enough that they should not have been missed in other studies.
The 351 γ ray deexciting the 680 level has been observed although that level cannot be directly populated by β^- decay. No transitions feeding that level have been confirmed although weak feeding from higher lying 4+ states is likely.

^{182}W Levels

E(level)	J$^{\pi}$†	$T_{1/2}$‡	Comments
0.0	0+		
100.1065 *3*	2+	1.40 ns *2*	$T_{1/2}$: weighted average of 1.27 ns 10 (1955Su64,1954Su10), 1.55 ns 11 (1963Ba24), 1.26 ns 4 (1963Fo02), 1.41 ns 6 (1963Ko02), 1.47 ns 9 (1964Ro19), 1.4 ns 1 (1964Be36), 1.39 ns 3 (1965Do02), 1.37 ns 3 (1965Me08), 1.45 ns 4 (1966Bl08), 1.35 ns 7 (1966Fu03), 1.43 ns 5 (1966Ra04), 1.48 ns 3 (1970Ab14), 1.380 ns 20 (1971Ho14), 1.55 ns 5 (1973GrXX), 1.38 ns 3 (1983El02). See also Adopted Levels, where 1.381 ns 10 is recommended from all independent measurements using a variety of techniques.
329.4287 *10*	4+	<0.20 ns	$T_{1/2}$: from 1971Ho14.
680.48 *10*	6+		
1135.9 *2*	0+		
1221.4110 *17*	2+		
1257.4232 *18*	2+		
1289.1610 *17*	2-	1.12 ns *4*	$T_{1/2}$: weighted average (normalized residuals method) of 1.06 ns 2 (1970Ab14), 1.22 ns 2 (1971Ho14), 1.17 ns 8 (1983El02), 1.09 ns 4 (1989Ka01).
1331.1267 *17*	3+	<0.6 ns	$T_{1/2}$: from 1965Me08.
1373.8418 *17*	3-	78 ps *10*	$T_{1/2}$: from 1972He10. Others: 2.25 ns 8 (1962Ba39), >140 ps (1971Ho14).
1442.83 *5*	4+		
1487.5144 *17*	4-	<49 ps	$T_{1/2}$: from 1972He10. Other: <120 ps (1971Ho14).
1510.21 *10*	4+		
1553.2364 *17*	4-	1.27 ns *4*	$T_{1/2}$: weighted average of 1.35 ns 4 (1970Ab14), 1.23 ns 2 (1971Ho14), 1.20 ns 6 (1972He10) and 1.35 ns 3 (1983El02).

† From Adopted Levels.
‡ From delayed coincidence techniques.

$\gamma(^{182}W)$

E_γ[‡]	E_i^{level}	J_i^π	E_f^{level}	J_f^π	I_γ[†§]	Mult.[φ]	δ	α[ψ]	Comments
31.737 *1*	1289.1610	2-	1257.4232	2+	1.9 *5*	E1		1.628	
42.72 *3*	1373.8418	3-	1331.1267	3+	0.827 *24*	E1		0.720	E_γ: from 1992Su09. 42.72+44.66 form doublet structure.
44.66 *11*	1487.5144	4-	1442.83	4+	0.085 *17*				E_γ: from 1992Su09. 42.72+44.66 form doublet structure.
65.72215 *15*[a]	1553.2364	4-	1487.5144	4-	8.4 *2*	M1+E2	0.093 *6*	2.91 *5*	
67.74970 *10*[a]	1289.1610	2-	1221.4110	2+	114.0 *17*	E1+M2	<0.02	0.215 *14*	E_γ: other: 67.75016 *12* (1985Je05).
84.68024 *26*[a]	1373.8418	3-	1289.1610	2-	7.4 *1*	M1+E2	+0.345 *11*[c]	7.66	δ: +0.32 *3* from A_2=-0.25 *4* (1983Ri05).
100.10595 *7*[a]	100.1065	2+	0.0	0+	39.2 *7*	E2		3.89	Mult.: L1/L2=0.0823 *13*, L2/L3=1.126 *10* (1978Bu26).
110.39 *7*	1553.2364	4-	1442.83	4+	0.28 *3*	[E1]		0.290	
113.67170 *22*[a]	1487.5144	4-	1373.8418	3-	5.30 *9*	M1+E2	+0.36 *3*[c]	3.18	δ: +0.36 *2* from A_2=-0.324 *21* (1983Ri05)
116.4179 *6*[a]	1373.8418	3-	1257.4232	2+	1.25 *1*	E1		0.253	
121.5 *2*[b]	1257.4232	2+	1135.9	0+	0.0075 *21*	[E2]		1.83	
152.42991 *26*[a]	1373.8418	3-	1221.4110	2+	19.8 *2*	E1		0.1258	δ: +0.069 *17* (1967Ni03, positive sign from 1963El02); -0.035 *5* (1980Sp01); +0.014 *13* (1975Qu01); -0.22 *11* (1992Ch26); -0.023 *4* (1983Ri05). None of these values is consistent with RUL(M2)=1 which suggests δ<0.006. The evaluators assign δ=0 as in Adopted Gammas. (152G)(THETA): A2=+0.392 *6*, P̂OL=-0.33 *3* (1983RI05). (152γ)[892γ](229γ)(θ): A_2=-0.14 *5*, A_4=-0.8 *6* (1992Ch26); A_2=-0.11 *4*, A_4=-0.01 *1* (1981Ka22).
156.3864 *3*[a]	1487.5144	4-	1331.1267	3+	7.53 *3*	E1		0.1177	δ(M2/E1)=-0.053 *4* from A_2=+0.411 *7*, POL=-0.36 *9* (1983Ri05). (156γ)[1002γ](229γ)(θ): A_2=-0.06 *2*, A_4=+0.03 *2* (1992Ch26); A_2=-0.05 *2*, A_4=+0.02 *2* (1981Ka22). δ: -0.08 *5* (1992Ch26).
179.39381 *25*[a]	1553.2364	4-	1373.8418	3-	8.76 *4*	M1+E2	+0.92 *8*[c]	0.694 *23*	δ: +2.2 *2* (1992Ch26). δ: +2.1 +3-2 from A_2=-0.706 *19*, POL=+0.17 *10* (1983Ri05). (179γ)[1044γ](229γ)(θ): A_2=+0.11 *2*, A_4=-0.30 *2* (1992Ch26); A_2=+0.15 *2*, A_4=+0.02 *3* (1981Ka22).
198.35187 *29*[a]	1487.5144	4-	1289.1610	2-	4.13 *3*	E2		0.317	δ(M3/E2)=+0.067 *10* from A_2=-0.519 *10*, POL=-0.43 *9* (1983Ri05), but RUL(M3)=10 suggests $\delta \approx 0$.
222.1085 *3*[a]	1553.2364	4-	1331.1267	3+	21.4 *3*	E1		0.0480	δ: +0.027 *7* (1992Ch26). A_2=+0.358 *10*, POL=-0.34 *8* (1972Kr05) (222γ)[1002γ](229γ)(θ): A_2=-0.026 *2*, A_4=-0.052 *3* (1992Ch26); A_2=-0.046 *14*, A_4=-0.032 *19* (1981Ka22). (222γ)(1002γ)(θ): A_2=+0.27 *8*, A_4=+0.33 *11* (1992Ch26). (222γ)(1231γ)(θ): A_2=-0.030 *6*, A_4=-0.015 *8* (1992Ch26); A_2=-0.031 *3*, A_4=-0.001 *2* (1981Ka22); A_2=-0.020 *12*, A_4=+0.010 *15* (1975Qu01).
229.3207 *6*[a]	329.4287	4+	100.1065	2+	10.32 *4*	E2		0.196	δ(M3/E2)=+0.007 *7* from A_2=-0.508 *7*, POL=-0.27 *12* (1983Ri05).
264.0740 *3*[a]	1553.2364	4-	1289.1610	2-	10.20 *7*	E2		0.1254	POL=-0.33 *14* (1983Ri05).
351.02 *7*	680.48	6+	329.4287	4+	0.330 *1*	E2		0.0538	
829.9 *4*	1510.21	4+	680.48	6+	0.040 *7*				

Continued on next page (footnotes at end of table)

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

E_γ[‡]	E_i^{level}	J_i^π	E_f^{level}	J_f^π	I_γ[†§]	Mult.[ϕ]	δ	α[ψ]	Comments
891.62 *8*	1221.4110	2+	329.4287	4+	0.159 *9*	E2		0.00569	
928.01 *7*	1257.4232	2+	329.4287	4+	1.76 *4*	E2		0.00524	α(K)exp=0.0039 *2* (1992Ch26). (928γ)(229γ)(θ): A_2=+0.18 *6*, A_4=+0.11 *1* (1992Ch26). δ: +0.04 *14* (1992Ch26).
959.73 *3*	1289.1610	2-	329.4287	4+	0.98 *5*	M2+E3	-5.5 *+19-10*	0.0116 *7*	α(K)exp=0.0095 *6*. α(L)exp=0.0019 *2* (1992Ch26). δ: -4.6 +36-∞ (1992Ch26). (960γ)(229γ)(θ): A_2=+0.31 *14*, A_4=-0.46 *20* (1992Ch26).
1001.72 *3*	1331.1267	3+	329.4287	4+	5.95 *2*	M1+E2	-8.9 *+18-21*[c]	0.00455 *8*	α(K)exp=0.0034 *2*. α(L)exp=0.00049 *4*. δ: -8.2 +22-42 (1992Ch26), -30 *+18-54* (1983Ri05). A_2=+0.26 *3*, POL=+0.58 *23* (1983Ri05). (1002γ)(229γ)(θ): A_2=+0.12 *3*, A_4=-0.10 *4* (1992Ch26).
1035.8 *2*[b]	1135.9	0+	100.1065	2+	0.019 *5*	E2		0.00420	
1044.41 *5*	1373.8418	3-	329.4287	4+	0.67 *1*	E1+M2	0.46 *9*	0.0051 *12*	α(K)exp=0.0048 *3* (1992Ch26). (1044γ)(229γ)(θ): A_2=-0.11 *6*, A_4=+0.16 *8* (1992Ch26).
1113.41 *2*	1442.83	4+	329.4287	4+	1.22 *3*	M1+E2	+5.6 *+13-10*	0.00376 *8*	δ: +1.1 *2* (1992Ch26). δ: from A_2=+0.127 *13* (1983Ri05). (1113γ)(229γ)(θ): A_2=-0.12 *2*, A_4=+0.09 *3* (1992Ch26); A_2=-0.11 *1*, A_4=+0.12 *1* (1981Ka22).
1121.290 *3*[a]	1221.4110	2+	100.1065	2+	100.0 *3*	M1+E2	+30 *+6-4*[c]	0.00360	α(K)exp=0.0030 *1*. α(L)exp=0.00054 *2* (1992Ch26). δ: from A_2=+0.088 *6*, POL=+0.03 *4* (1983Ri05). α(pair)/α(K)=0.00029.
1135.9 *2*[b]	1135.9	0+	0.0	0+		E0			I(ce(K))=0.00013 *4*.
1157.52 *6*	1257.4232	2+	100.1065	2+	2.01 *7*	M1+E2	-9 *+6-3*[c]	0.0034 *3*	α(K)exp=0.0077 *4* (1992Ch26). E_γ: 1157.5γ and 1158.1γ are close together, most precise energy of the doublet is given by 1990Me15 as 1157.505 *15*. The evaluators have adopted energy of 1157.52 *6* from 1992Su09 (who give separate values for the doublet as 1157.52 and 1158.1 *2*, the latter γ ray deexcites the 1487 level). It should be pointed out that the energy deviates from the level-energy difference by 0.2 keV. I_γ: from 1992Su09. 1157.50+1158.1 form doublet structure.
1158.1 *2*	1487.5144	4-	329.4287	4+	0.82 *5*	E1		1.38×10^{-3}	δ: -0.01 +20-10 (1992Ch26). (1158γ)(229γ)(θ): A_2=+0.20 *4*, A_4=+0.04 *5* (1992Ch26). E_γ: from 1992Su09. 1157.50+1158.1 form doublet structure.
1180.7 *2*	1510.21	4+	329.4287	4+	0.21 *5*	E2(+M1)	-2.8 *10*	0.0036 *4*	
1189.040 *3*[a]	1289.1610	2-	100.1065	2+	47.0 *3*	E1+M2+E3[d]		0.008 *7*	α(K)exp=0.0037 *3*. α(L)exp=0.00061 *3*. I_γ: 16.7 *2* per 100 decays (1997Ka47) as compared to 16.4 *3* from the level scheme presented here.

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

E_γ[‡]	E_i^{level}	J_i^π	E_f^{level}	J_f^π	I_γ[†§]	Mult.[ϕ]	δ	α[Ψ]	Comments
									δ(M2/E1)=+0.44 6, δ(E3/E1)=-0.69 10 from A_2=-0.884 19, POL=+0.13 3 (1983Ri05). α(pair)/α(K)=0.0022.
1221.395 3[a]	1221.4110	2+	0.0	0+	77.8 2	E2		0.00305	I_γ: 26.5 3 per 100 decays (1997Ka47) as compared to 27.1 5 from the level scheme presented here. POL=-0.34 9 (1983Ri05). α(K)=0.0025 used for normalization of ce data (1992Ch26). α(pair)/α(K)=0.0028.
1223.5 3	1553.2364	4-	329.4287	4+	0.47 7	E1+M2	0.32 7	0.0025 5	δ: -0.15 +10-25 (1992Ch26). (1223γ)(229γ)(θ): A_2=+0.23 3, A_4=+0.11 9 (1992Ch26).
1231.004 3[a]	1331.1267	3+	100.1065	2+	33.0 2	M1+E2	-33 +6-9[c]	0.00301	α(K)exp=0.0023 1. δ: +11 +6-3 (1992Ch26). δ: from A_2=-0.067 12, POL=-0.24 12 (1983Ri05). α(pair)/α(K)=0.0024.
1257.407 3[a]	1257.4232	2+	0.0	0+	4.28 1	E2		0.00289	α(K)exp=0.00032 2. POL=-0.36 9 (1983Ri05). α(pair)/α(K)=0.008.
1273.719 3[a]	1373.8418	3-	100.1065	2+	1.873 7	E1+M2+E3[d]		0.007 6	α(K)exp=0.0024 3. α(L)exp=0.00047 4 (1992Ch26). α(K)exp=0.00291 5. δ(M2/E1)=+0.36 10, δ(E3/E1)=-0.28 12 from A_2=-0.37 6, POL=-0.39 5 (1983Ri05). α(pair)/α(K)=0.014.
1289.145 3[a]	1289.1610	2-	0.0	0+	3.90 4	M2		0.01231	α(L)exp=0.0019 2. POL=+0.39 12 (1983Ri05). α(pair)/α(K)=0.0009.
1342.720 6	1442.83	4+	100.1065	2+	0.727 5	E2		0.00256	α(L)exp=0.00030 6. δ(M3/E2)=-0.11 +4-20 from A_2=-0.33 12, POL=-0.57 18 (1983Ri05) is inconsistent with RUL(M3)=10, which suggests that δ should be near zero. The evaluators assign pure E2 as in Adopted Gammas. α(pair)/α(K)=0.013.
1373.824 3[a]	1373.8418	3-	0.0	0+	0.63 1	E3		0.00496	α(K)exp=0.0036 3. α(L)exp=0.00074 4 (1992Ch26).
1387.390 3[a]	1487.5144	4-	100.1065	2+	0.208 7	M2+E3	2.6 4	0.00554 24	α(K)exp=0.0040 3 (1992Ch26).
1410.6 5	1510.21	4+	100.1065	2+	0.111 6	E2		0.00235	α(pair)/α(K) $\approx$ 0.026.
1453.13 5	1553.2364	4-	100.1065	2+	0.10 1	M2+E3		0.0067 24	α(K)exp=0.0028 4 (1992Ch26).

† For absolute intensity per 100 decays, multiply by 0.349 6.

‡ Weighted average of values from 1994KaZL, 1992Su09, 1990Ja02, 1990Me15, 1989Ka20, 1988Wa26, and 1985GoZK, using the lwm method, unless otherwise stated.

§ Weighted average of values from 1998Mi17, 1992Ch26, 1992Su09, 1990Ja02, 1990Me15, 1989Ka20, 1983El02, 1983Ji01, 1980Ro22, 1980Sc07, 1979Hn02, 1977Ge12, 1975Be26, and 1974La15 using LWM method, unless otherwise stated.

ϕ Derived from relative Ice values and $\gamma\gamma(\theta)$ measurements of 1967Ni03, 1983Ri05, 1972Kr05, 1961Ha23, 1963El02, 1971Ga37, 1972He10, 1975Qu01, 1980Sp01, and 1981Ka22.

Ψ α(pair)/α(K) from 1966Ko12.

a Recommended value from 2000He14 (evaluation and analysis).

[b] Transitions deexciting the 1136 level were only reported by 1976Kl09 and 1992Su09. Eγ, Iγ, and mult are from ce data. The 121.5γ feeding the 1136 level has not been observed. Eγ is from the level energy difference, and I(γ+ce) is deduced from the requirement of an intensity balance at the 1136 level. Iγ(121.5) is then deduced from I(γ+ce) and the assumed E2 multipolarity.
[c] Sign from $\gamma\gamma(\theta)$ measurements of 1983Ri05, 1972Kr05; magnitude from these measurements and ce data.
[d] From pol $\gamma\gamma(\theta)$ measurement of 1983Ri05.

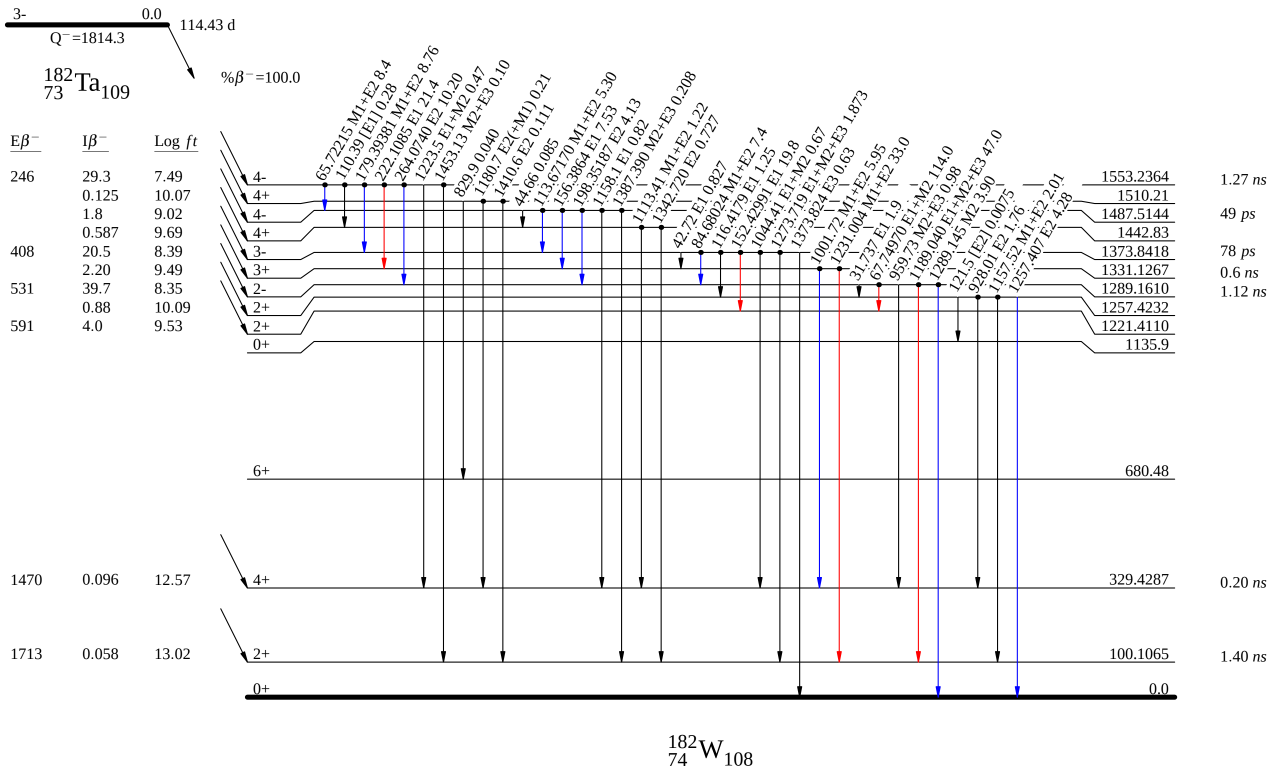
β^- radiations

Eβ^- †	E(level)	Iβ^-	Log *ft*
246	1553.2364	29.3 *4*	7.49 *2*
(304.1)	1510.21	0.125 *5*	10.07 *3*
(326.8)	1487.5144	1.8 *4*	9.02 *12*
(371.5)	1442.83	0.587 *7*	9.69 *1*
408	1373.8418	20.5 *8*	8.39 *2*
(483.2)	1331.1267	2.20 *6*	9.49 *2*
531	1289.1610	39.7 *12*	8.35 *2*
(556.9)	1257.4232	0.88 *11*	10.09 *6*
591	1221.4110	4.0 *10*	9.53 *13*
1470	329.4287	0.096 *10*‡	12.57 *5*
1713	100.1065	0.058 *6*‡	13.02 *5*

† From 1966Ba41, 1964Ha28, 1966Ve05, and 1964Da15.
‡ From 1966Ba41.

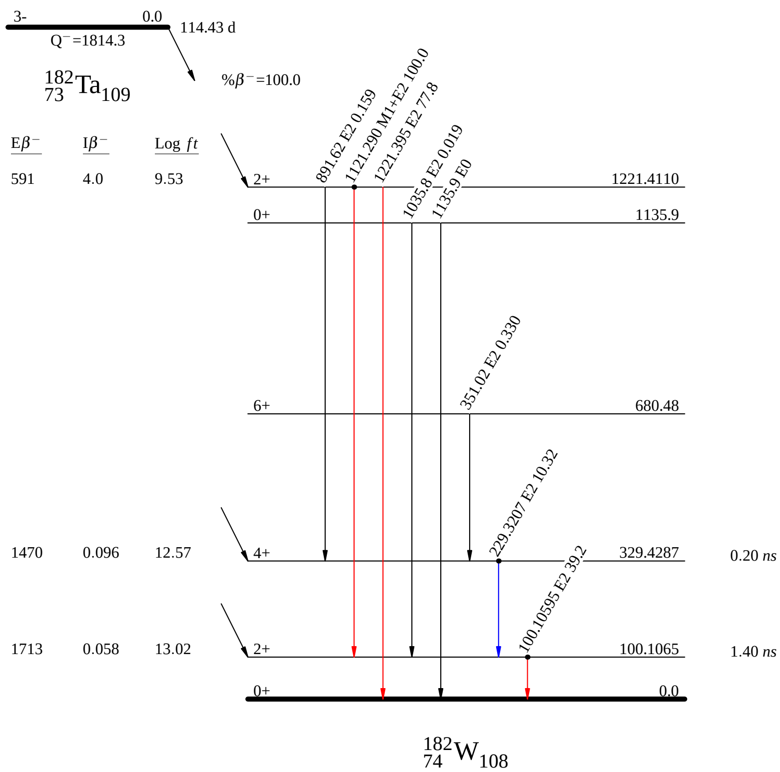
Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



Muonic atom 1970Hi03

^{182}W Levels

E(level)	Jπ	$T_{1/2}$	Comments
0			
100		1.33 ns *5*	B(E2)=4.29 *12*. $T_{1/2}$: from B(E2).

^{182}Re ε decay (64.0ħ) 1977Je02,1961Ha23,1972Ga15

Parent: ^{182}Re: E=0.0; Jπ=7+; $T_{1/2}$=64.0 h *5*; Q=2.80×10^3 *10*; %ε=100
1977Je02: Measured Eγ, Iγ, γγ.
1961Ha23: Measured ce.
1972Ga15 (also 1971Ga30): Measured Eγ, Iγ, γγ. The ce data were used from 1970Ag07 and 1961Ha23.
1971Ga37, 1970Ag07 (from the same group): measured conversion electrons using an iron-free $\pi 2^{1/2}$ β spectrometer.
1969Sa25: Measured Eγ, Iγ, γγ. Deduced conversion coefficients using ce data from 1961Ha23.
Others:.
1980Sp01: Measured γ(θ,temp), nuclear orientation at low temperature.
1964Ba43: Measured ce. Relative electron intensities measured for about 14 transitions from 734 to 1189 keV. No conversion coefficients given.
1958Ga24: Measured Eγ, ce.
Unless otherwise stated, experimental conversion coefficients are from 1972Ga15 who deduced these from their γ-ray intensities and ce data from 1961Ha23, 1964Ba43 and 1970Ag07. The ce data from 1971Ga37 (supplementary to those from their earlier publication 1970Ag07) were probably not available to 1972Ga15.

^{182}W Levels

E(level)	Jπ†	E(level)	Jπ†	E(level)	Jπ†	E(level)	Jπ†	E(level)	Jπ†
0.0	0+	1289.15 *5*	2-	1553.22 *5*	4-	1809.66 *7*	5-	1971.09 *8*	(7)+
100.11 *4*	2+	1331.13 *6*	3+	1621.27 *5*	5-	1810.89 *6*	(6)-	1978.37 *6*	(7)-
329.44 *5*	4+	1373.81 *5*	3-	1623.54 *6*	(5)+	1829.53 *5*	6-	2114.43 *7*	(8)-
680.50 *10*	6+	1442.81 *5*	4+	1660.37 *5*	5-	1916.94 *11*	(7)-	2120.53 *8*	(8-)
1221.37 *5*	2+	1487.50 *5*	4-	1756.77 *6*	6+	1960.33 *6*	(7)-	2204.56 *8*	(8)-
1257.52 *5*	2+	1510.21 *7*	4+	1768.95 *5*	(6)-	1960.79 *8*	6-		

† From Adopted Levels.

γ(^{182}W)

A_2 values and W(0°)-1 anisotropies are from low-temperature nuclear orientation study of 1980Sp01.

Eγ‡	E_i^{level}	J_i^π	Iγ†‡	Mult.§	δ§	α	Comments
18.05 *10*	1978.37	(7)-	0.48 *12*	M1+E2	0.016 *5*	128 *4*	
19.85 *10*	1829.53	6-	0.14 *5*	M1+E2	0.07 *2*	1.3×10^2 *3*	
31.7 *1*	1289.15	2-	1.0 *2*	E1		1.63 *3*	
39.1 *1*	1660.37	5-	1.0 *2*	M1+E2	0.061 *7*	13.6 *4*	L1/L2>8.7 (1971Ga37).
42.0	1810.89	(6)-					
42.7 *1*	1373.81	3-	1.8 *4*	E1		0.721 *12*	
60.65 *10*	1829.53	6-	0.4 *1*	[M1]		3.48	
65.8 *1*	1553.22	4-	11.2 *22*	M1+E2	0.093 *6*	2.90 *5*	L1/L2=7.9 *7*, L1/L3 ≈ 16, L2/L3 ≈ 2, M1/M2 ≈ 8 (1971Ga37).
67.85 *10*	1289.15	2-	86 *9*	E1(+M2)	<0.02	0.215 *14*	L1/L2=2.8 *4*, L1/L3=2.1 *4*, L2/L3=0.76 *14* (1971Ga37).
84.68 *5*	1373.81	3-	10.7 *6*	M1+E2	+0.345 *11*	7.66	α(K)exp ≈ 6.0 (1971Ga37), α(L1)exp=1.15 *35*; α(L2)exp=0.46 *14*; α(L3)exp=0.34 *10*. L1/L2=2.40 *14*, L1/L3=3.2 *3*, L2/L3=1.36 *12*, M1/M2=2.3 *4*, M1/M3=2.5 *5* M2/M3=1.1 *3* (1971Ga37).
100.10 *5*	100.11	2+	63.8 *17*	E2		3.89	ΔIγ(absolute)=0.4 per 100 decays.

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

E_γ[‡]	E_i^{level}	J_i^π	I_γ[†‡]	Mult.[§]	δ[§]	α	Comments
							Iγ: calculated from the intensity balance at the 100 level. Measured value is Iγ=580 *40*. W(0°)-1=-0.057 *25*. α(L1)exp=0.11, 0.091 *19*; α(L2)exp=1.17 *35*, 1.08 *13*; α(L3)exp=1.05 *32*, 1.04 *13*. L1/L2=0.078 *8*, L1/L3=0.083 *9*, L2/L3=1.07 *6* (1970Ag07).
107.13 *5*	1660.37	5-	5.5 *4*	M1+E2	-0.8 *2*	3.54 *13*	W(0°)-1=+0.54 *8*. α(K)exp=2.3 *7* for 107.1γ+108.6γ (1971Ga37). L1/L2=0.74 *8*, L1/L3=1.09 *16*, L2/L3=1.6 *3* (1971Ga37).
108.58 *5*	1768.95	(6)-	3.1 *2*	M1+E2	-0.6 *2*	3.50 *13*	W(0°)-1=+0.55 *15*. α(K)exp=2.3 *7* for 107.1γ+108.6γ, M1/M2=2.1 *9* (1971Ga37).
110.38 *5*	1553.22	4-	0.4 *4*	[E1]		0.290	
111.07 *5*	1621.27	5-	0.81 *6*	[E1]		0.286	
113.68 *5*	1487.50	4-	18.9 *12*	M1+E2	+0.36 *3*	3.18	W(0°)-1=-0.122 *15*. α(K)exp=2.7 *8* (1971Ga37), α(L1)exp=0.32 *5*; α(L2)exp=0.078 *25*; α(L3)exp=0.075 *19*. L1/L2=4.0 *6*, L1/L3=9.9 *13*, L2/L3=2.1 *17*, M1/M2=3.2 *5*, M1/M3=5.4 *10* M2/M3=1.8 *6* (1971Ga37).
116.23 *5*	1373.81	3-	2.0 *2*	E1		0.254	
130.81 *5*	1960.33	(7)-	29.0 *20*	M1+E2	-0.51 *+6-8*	2.03 *6*	W(0°)-1=+0.410 *9*. α(K)exp=1.4 *4*.
133.80 *5*	1621.27	5-	9.3 *6*	M1+E2	+0.39 *+4-3*	1.96 *4*	W(0°)-1=-0.153 *17*. α(K)exp=1.27 *18*, K/L3=67 *19* (1971Ga37).
145.43 *5*	1768.95	(6)-	2.6 *2*	(E1)		0.1420	W(0°)-1=+0.06 *9*. α(K)exp=0.11 *4* (1971Ga37).
147.69 *5*	1768.95	(6)-	3.5 *3*	M1+E2	+0.8 *2*	1.30 *9*	W(0°)-1=-0.31 *6*. α(K)exp=0.96 *30* for 147.6γ+148.8γ+149.4γ, L1/L2=1.6 *4*, L1/L3=2.8 *19*, L2/L3=1.8 *8* (1971Ga37).
148.86 *5*	1978.37	(7)-	6.8 *5*	M1+E2	+0.28 *+8-6*	1.48 *4*	W(0°)-1=-0.12 *6*. α(K)exp=0.96 *30* for 147.6γ+148.8γ+149.4γ (1971Ga37).
149.45 *5*	1960.33	(7)-	3.5 *3*	M1+E2	-0.15 *+15-18*	1.50 *6*	W(0°)-1=+0.23 *11*. α(K)exp=0.96 *30* for 147.6γ+148.8γ+149.4γ, K/L2=37 *25* (1971Ga37).
150.25 *5*	1660.37	5-	2.0 *2*	(E1)		0.1305	W(0°)-1=+0.10 *17*.
151.15 *5*	1960.79	6-	1.7 *2*	M1+E2	0.8 *3*	1.21 *13*	α(K)exp≈0.32. α(K)exp=0.17 *5* for 151.1γ+152.4γ+153.9γ, L1/L2=2.1 *6*, L1/L3>9.8, L2/L3>5.0 (1971Ga37).
152.43 *5*	1373.81	3-	33.0 *20*	E1		0.1258	α(K)exp=0.116 *35*. W(0°)-1=-0.14 *3*. L1/L2 ≈ 4.3, K/L2 ≈ 28 (1971Ga37). δ: +0.069 *17* from γ(θ) data, but RUL(M2)=1 suggests δ near zero.
154.10 *5*	2114.43	(8)-	0.9 *3*	M1+E2	0.6 *3*	1.22 *12*	α(K)exp=0.17 *5* for 151.1γ+152.4γ+154.0γ (1971Ga37). L1/L2=2.9 *8*, L1/L3=3.3 *10*, L2/L3=1.2 *5* (1971Ga37).
156.39 *5*	1487.50	4-	28.0 *20*	E1		0.1177	W(0°)-1=+0.119 *6*. α(L1)exp=0.0096 *36*.
160.20 *5*[b]	1916.94	(7)-	0.93 *6*[b]				
160.20 *5*[b]	2120.53	(8-)	0.93 *6*[b]	(M1)		1.243	α(K)exp ≈ 0.92 (1971Ga37).
169.15 *5*	1829.53	6-	44 *3*	M1+E2	+0.094 *6*	1.060	W(0°)-1=+0.051 *5*. α(K)exp=0.87 *21*; α(L1)exp=0.140 *17*. L1/L2=10 *4*, L1/L3>27, L2/L3>2.5, M1/M2=9.9 *18*, M1/M3=38 *21*, M2/M3=4.4 *24* (1971Ga37).

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

E_γ‡	E_i^{level}	J_i^π	I_γ†‡	Mult.§	δ§	α	Comments
172.87 *5*	1660.37	5-	13.9 *9*	M1+E2	+0.26 *1*	0.971	W(0°)-1=-0.079 *9*. α(K)exp=0.67 *11* (1970Ag07). L1/L2=7.1 *8*, L1/L3=17 *3*, L2/L3=2.4 *6*, M1/M2=4.9 *14* (1971Ga37).
178.47 *5*	1621.27	5-	8.8 *5*	E1		0.0838	W(0°)-1=+0.102 *20*. α(K)exp=0.010 *4* (1971Ga37).
179.40 *5*	1553.22	4-	11.7 *7*	M1+E2	+0.92 *8*	0.694 *23*	W(0°)-1=-0.299 *12*. L1/L2=1.99 *19*, L1/L3=3.0 *3*, L2/L3=1.50 *19* (1971Ga37).
187.34 *5*	1810.89	(6)-	1.25 *12*	E1+M2	+0.25 *+27-20*	0.3 *7*	W(0°)-1=-0.07 *14*.
188.54 *5*	1809.66	5-	0.51 *5*				
189.65 *5*	1810.89	(6)-	1.5 *7*	M1+E2	+0.31 *+15-12*	0.74 *4*	W(0°)-1=-0.10 *8*. α(K)exp=0.077 *19* (1971Ga37).
191.39 *5*	1960.33	(7)-	26.0 *20*	M1+E2	-0.23 *+6-8*	0.734 *18*	W(0°)-1=+0.129 *9*. α(K)exp=0.66 *15*; α(L1)exp=0.098 *30*, 0.077 *8*; α(L2)exp=0.0081 *7*; α(L3)exp≈0.002.
198.34 *5*	1487.50	4-	15.7 *13*	E2		0.317	W(0°)-1=-0.182 *12*. α(K)exp=0.20 *4*. L1/L3=0.66 *34* (1970Ag07). δ: +0.067 *10* from $\gamma(\theta)$ data, but RUL(M3)=10 suggests δ near zero.
203.55 *5*	1960.33	(7)-	1.9 *2*	(E1)		0.0599	W(0°)-1=+0.07 *6*. δ: from $\gamma(\theta)$, 1980Sp01 give δ(Q/D)=-17 *+10-24* or +0.06 *+9-4*; favoring the former value from δ based on ce data of 1971Ga37. But 1971Ga37 (also 1972Ga15) assigned tentative E2 from α(K)exp=0.15 *3* (1971Ga37) and questioned the placement and mult assignment. δ(M2/E1)=-17 *+10-24* will be inconsistent with RUL(M2)=1 for $T_{1/2}$(1960.33 level)<1 ns or so. The evaluators assign tentative E1.
206.00 *5*	1829.53	6-	2.0 *2*	E1		0.0581	W(0°)-1=+0.14 *6*. α(K)exp ≈ 0.047 (1971Ga37).
208.26 *5*	1829.53	6-	2.4 *2*	M1+E2	-1.0 *5*	0.43 *10*	W(0°)-1=+0.52 *6*. α(L2)exp ≈ 0.024 (1970Ag07); α(K)exp=0.31 *4*.
209.40 *5*	1978.37	(7)-	1.9 *2*	M1+E2	-0.28 *+23-15*	0.56 *3*	W(0°)-1=+0.39 *10*. α(K)exp=0.53 *15*, 0.35 *11*; α(L1)exp=0.074 *14*. L1/L3>3 (1970Ag07).
214.32 *5*	1971.09	(7)+	4.3 *3*	M1+E2	+0.25 *+8-7*	0.532 *15*	W(0°)-1=-0.07 *5*. α(K)exp=0.44 *13*, 0.42 *8*; α(L1)exp=0.065 *19*, 0.064 *9*. L1/L2=8.7 *19* (1971Ga37).
215.73 *5*	1768.95	(6)-	3.0 *2*	(E2)		0.240	W(0°)-1=-0.17 *7*. α(L1)exp=0.026 *10* (1970Ag07).
217.55 *5*	1660.37	5-	12.7 *8*	(E1)		0.0506	W(0°)-1=+0.117 *20*. α(L2)exp=0.0038 *15* (1971Ga37).
221.61 *5*	1978.37	(7)-	25.0 *20*	E1		0.0483	W(0°)-1=+0.122 *3* for 221.6+222.1. α(K)exp≈0.04, 0.060 *20*; α(L1)exp=0.0068 *8*. α(K)exp=0.050 *10* for 221.6γ+222.1γ, L1/L2>4 (1970Ag07).
222.07 *5*	1553.22	4-	33 *3*	E1		0.0480	W(0°)-1=+0.122 *3* for 221.6+222.1. α(K)exp=0.050 *10* for 221.6γ+222.1γ (1970Ag07). L1/L2>4 (1970Ag07).
226.19 *5*	2204.56	(8)-	11.9 *8*	M1+E2	+0.15 *2*	0.468	W(0°)-1=-0.004 *15*. α(K)exp=0.50 *15*, 0.41 *6*; α(L1)exp=0.059 *18*, 0.058 *5*. L1/L2=7.8 *8*, L1/L3>24, L2/L3>3 (1971Ga37).
229.32 *5*	329.44	4+	100.0	E2		0.196	α(K)exp=0.117 *30*, 0.124 *16*. W(0°)-1=-0.154 *3*.

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

E_γ[‡]	E_i^{level}	J_i^π	I_γ[†‡]	Mult.[§]	δ[§]	α	Comments
							L1/L2=0.55 13, L1/L3=0.080 20, L2/L3=1.5 3 (1970Ag07).
247.46 5	1621.27	5-	19.6 13	E2		0.1538	W(0°)-1=-0.183 4. α(K)exp=0.088 22, L1/L2=0.66 13, L1/L3=1.04 23, L2/L3=1.6 3 (1970Ag07).
256.45 5	1809.66	5-	37 3	M1+E2	+0.037 +6-7	0.336	W(0°)-1=+0.099 3. α(L1)exp=0.040 7, L1/L2>7.7, L1/L3>38 (1970Ag07).
264.07 5	1553.22	4-	13.9 9	E2		0.1254	W(0°)-1=-0.182 7. α(K)exp=0.076 16 (1970Ag07). L1/L2=0.50 11, M1/M2=0.8 4, M1/M3=1.1 7, M2/M3=1.5 8 (1971Ga37).
276.31 5	1829.53	6-	34.0 20	E2		0.1090	W(0°)-1=-0.194 4. α(K)exp=0.078 24, 0.073 6; α(L1)exp=0.0105 11; α(L2)exp=0.0127 11; α(L3)exp=0.0080 10. L1/L2=0.74 6, L1/L3=1.10 10, L2/L3=1.49 13 (1970Ag07).
281.45 5	1768.95	(6)-	22.1 15	E2		0.1031	W(0°)-1=-0.188 5. α(K)exp=0.064 13, L2/L3=1.9 3 (1971Ga37,1970Ag07).
286.56 5	1660.37	5-	27.4 18	E2		0.0976	W(0°)-1=-0.193 4. α(K)exp=0.069 19 (1970Ag07). L1/L2=0.77 15, L1/L3=1.23 23, L2/L3=1.6 3 (1971Ga37).
295.67 10	1916.94	(7)-	0.8 3	(E2)		0.0888	
299.90 10	1960.33	(7)-	4.9 10	E2		0.0851	W(0°)-1=-0.064 8 for 299.9+300.4. L1/L3=1.35 6 (1970Ag07).
300.36 10	1960.79	6-	6.6 15	M1+E2	+0.048 26	0.218	W(0°)-1=-0.064 8 for 300.4+299.9. α(K)exp=0.23 6.
313.98 10	1756.77	6+	3.1 2	E2		0.0742	W(0°)-1=-0.18 3. α(L2)exp=0.0090 25, L1/L2=0.83 20, L1/L3=2.2 8, L2/L3=2.7 10 (1971Ga37).
323.40 10	1810.89	(6)-	6.8 5	E2		0.0681	W(0°)-1=-0.165 14. α(K)exp=0.059 10; α(L1)exp=0.0067 10; α(L3)exp=0.0058 10. α(L1)exp=0.007 2, L1/L2=0.97 18, L1/L3=1.6 5, L2/L3=1.7 5 (1970Ag07).
339.06 10	1960.33	(7)-	21.6 14	E2		0.0594	W(0°)-1=-0.173 5. α(K)exp=0.058 20, 0.038 8; α(L1)exp=0.0052 8; α(L2)exp=0.0069 10; α(L3)exp=0.0036 13, 0.0033 6. L1/L2=0.82 15, L1/L3=1.6 3, L2/L3=2.0 4 (1970Ag07).
342.03 10	1829.53	6-	4.1 3	E2		0.0579	W(0°)-1=-0.20 4. α(K)exp=0.038 5.
345.46 10	2114.43	(8)-	1.9 2	E2		0.0563	W(0°)-1=-0.28 18. α(K)exp=0.053 19 (1971Ga37).
351.07 10	680.50	6+	40 3	E2		0.0538	α(K)exp=0.038 12, 0.045 7; α(L1)exp=0.0050 5; α(L2)exp=0.0057 7; α(L3)exp=0.0028 7, 0.0032 5. L1/L2=0.99 11, L1/L3=1.82 25, L2/L3=1.85 25 (1970Ag07). W(0°)-1=-0.154 4.
357.04 10	1978.37	(7)-	2.1 2	E2		0.0513	W(0°)-1=-0.22 3. α(K)exp=0.032 13 (1970Ag07).
891.9 1	1221.37	2+	0.13 2	E2		0.00569	
928.0 1	1257.52	2+	1.44 15	E2		0.00524	α(K)exp=0.0036 10, 0.0047 13, 0.011 5.
943.2 3	1623.54	(5)+	0.88 14	E2		0.00507	α(K)exp=0.0044 15.
959.7 1	1289.15	2-	0.78 15	M2+E3	-5.5 +19-10	0.0116 7	α(K)exp=0.0060 24, 0.012 3, ≈ 0.012.
1001.7 1	1331.13	3+	9.6 3	M1+E2	-8.9 +21-18	0.00455 8	α(K)exp=0.0046 5, 0.0046 6, 0.0047 10. W(0°)-1=+0.102 9.
1044.4 1	1373.81	3-	1.11 4	E1+M2	0.46 9	0.0051 12	α(K)exp=0.0053 10, 0.0061 12, ≈ 0.0057.

Continued on next page (footnotes at end of table)

γ(^{182}W) (continued)

Eγ[‡]	E_i^{level}	J_i^π	Iγ[†‡]	Mult.[§]	δ[§]	α	Comments
1076.2 *2*	1756.77	6+	41.0 *12*	E2+M1	+2.56 *+9-8*	0.00444	W(0°)-1=-0.001 *3*. α(K)exp=0.0037 *4*, 0.0036 *4*, 0.0041 *8*. L1/L2=7.8 *9*, L1/L3=23 *5*, L2/L3=3.1 *9* (1970Ag07).
1088.5 *3*	1768.95	(6)-	0.77 *8*	E1+M2	0.4 *2*	0.0040 *23*	α(K)exp=0.0034 *6* (1971Ga37,1970Ag07).
1113.3 *1*	1442.81	4+	18.3 *4*	M1+E2	+5.6 *+13-10*	0.00376 *8*	W(0°)-1=+0.029 *4*. α(K)exp=0.0035 *4*, 0.0036 *7*. L1/L2=6.7 *15*, L1/L3>16, L2/L3>2.3 (1970Ag07).
1121.3 *1*	1221.37	2+	85.5 *25*	M1+E2	+30 *+6-4*	0.00360	α(K)exp=0.00302 *14*, 0.0030 *3*, 0.0032 *5*. L1/L2=6.8 *6*, L1/L3=11.8 *12*, L2/L3=1.8 *2* (1970Ag07). W(0°)-1=+0.004 *6*.
1157.3 *1*[a]	1257.52	2+	1.44 *15*[a]	M1+E2	-9 *+3-6*	0.00342 *7*	α(K)exp=0.0061 *12*. W(0°)-1=-0.12 *3* for 1157.3+1158.1.
1158.1 *1*[a]	1487.50	4-	3.43 *17*[a]	E1		1.38×10^{-3}	A_2=-1.35 *24*. Contribution from another component was cons. W(0°)-1=-0.12 *3* for 1158.1+1157.3. α(K)exp=0.0021 *7*.
1180.8 *3*	1510.21	4+	2.15 *10*	E2(+M1)	-2.8 *10*	0.0036 *4*	W(0°)-1=+0.156 *18*. α(K)exp ≈ 0.0018 (1970Ag07)
1189.0 *1*	1289.15	2-	35.1 *10*	E1+M2+E3		0.008 *7*	α(K)exp=0.0043 *5*, 0.0041 *8*, 0.0047 *9*. W(0°)-1=-0.243 *9*. L1/L2=6.1 *8*, L1/L3=32 *5*, L2/L3=5.3 *12* (1970Ag07).
1221.4 *1*	1221.37	2+	67.7 *14*	E2		0.00305	W(0°)-1=-0.103 *6*. L1/L2=6.7 *7*, L1/L3=20 *2*, L2/L3=3.1 *5* (1970Ag07). α(K)exp=0.00248 *25*, 0.0026 *5*.
1223.9 *1*[a]	1553.22	4-	1.02 *13*[a]	E1+M2	0.32 *7*	0.0025 *5*	
1231.0 *1*	1331.13	3+	57.9 *11*	M1+E2	-33 *+6-9*	0.00301	α(K)exp=0.0025 *3* (1971Ga37). W(0°)-1=-0.020 *4*.
1257.5 *1*	1257.52	2+	4.14 *12*	E2		0.00289	α(K)exp ≈ 0.0049. W(0°)-1=-0.095 *19*.
1273.8 *1*	1373.81	3-	3.67 *17*	E1+M2+E3		0.007 *6*	α(K)exp=0.0052 *24*.
1279.8 *3*	1960.79	6-	0.24 *3*				
1289.2 *2*	1289.15	2-	2.94 *6*	M2		0.01230	α(K)exp=0.0114 *18*, ≈ 0.012. W(0°)-1=-0.172 *18*.
1291.8 *4*	1621.27	5-	0.91 *9*	E1+M2	0.4 *2*	0.0027 *14*	α(K)exp=0.00205 *19*.
1294.0 *3*	1623.54	(5)+	6.27 *12*	E2(+M1)	>30	0.00274	W(0°)-1=+0.038 *14*. α(K)exp=0.00210 *19*. δ: >+30 or <-60.
1330.9 *2*	1660.37	5-	1.46 *13*	E1+M2	0.5 *2*	0.0032 *14*	α(K)exp ≈ 0.0014 (1971Ga37)
1342.7 *1*	1442.81	4+	10.0 *25*	E2		0.00256	W(0°)-1=-0.190 *11*. α(K)exp=0.0024 *4*, 0.0021 *8*.
1373.8 *1*	1373.81	3-	1.15 *4*	E3		0.00496	α(K)exp=0.011 *5*.
1387.4 *1*	1487.50	4-	1.03 *10*	M2+E3	2.6 *4*	0.00554 *24*	α(K)exp=0.0030 *11*.
1410.1 *1*	1510.21	4+	1.08 *7*	E2		0.00235	W(0°)-1=-0.18 *5*. α(K)exp=0.0019 *6*.
1427.3 *2*	1756.77	6+	38.1 *7*	E2		0.00231	W(0°)-1=-0.203 *3*. α(K)exp=0.00169 *15*, 0.0018 *6*.
1439.3 *3*	1768.95	(6)-	0.62 *4*	(M2)		0.00930	α(K)exp=0.0016 *4* (1971Ga37,1970Ag07). Mult.: α(K)exp gives E1+M2 or E2, but ΔJπ requires M2.
1453.1 *1*	1553.22	4-	0.15 *3*	M2+E3		0.0067 *24*	α(K)exp=0.0043 *13* (1971Ga37).
1521.3 *4*	1621.27	5-	0.37 *4*	(E3)		0.00402	α(K)exp=0.0032 *6*, 0.0050 *15*.
1560.4 *4*	1660.37	5-	0.28 *3*	(E3)		0.00382	α(K)exp=0.0055 *17*, ≈ 0.0028.
1631.4 *5*	1960.79	6-	0.049 *9*	M2+E3	≈2.5	≈0.00396	α(K)exp=0.0054 *20*, ≈ 0.0016.

[†] For absolute intensity per 100 decays, multiply by 0.258 *7*.

[‡] For Eγ < 84, values are from ce data of 1961Ha23 normalized assuming using E2 for the 100.1γ, energy uncertainty of 0.1 keV is assumed by the evaluators. For Eγ=85-357 from 1977Je02, and for Eγ > 357 from 1972Ga15. For ΔIγ(absolute) combine 5.5% in quadrature with ΔIγ(relative), except as noted.

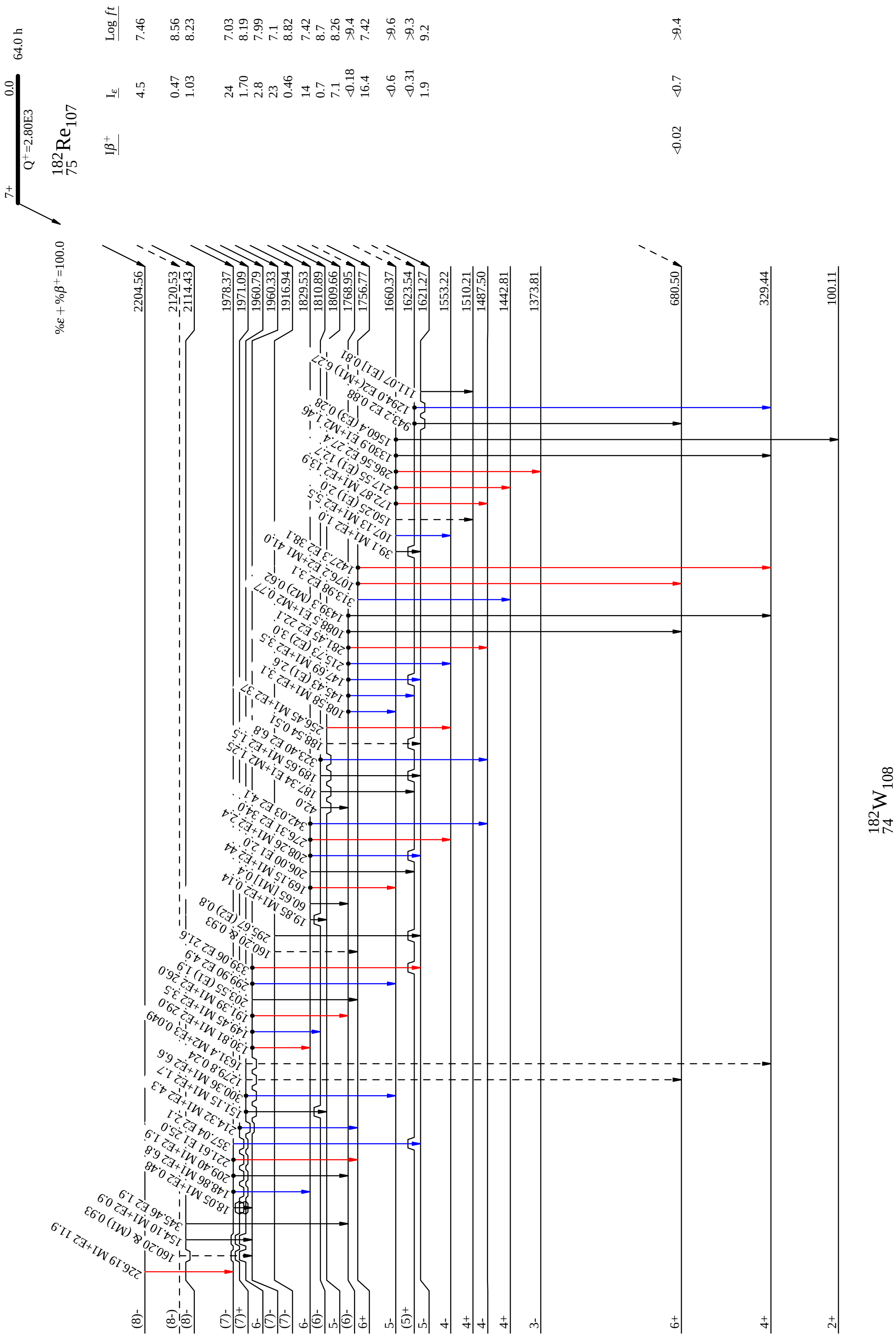
§ From ^{182}Ta β^- decay; ce data in 1971Ga37, 1970Ag07 and 1961Ha23; and $\gamma(\theta$,temp) data of 1980Sp01. The conversion data were normalized to 100.1γ with E2 multipolarity.
[a] Calculated from adopted branching ratios.
[b] Multiply placed with undivided intensity.

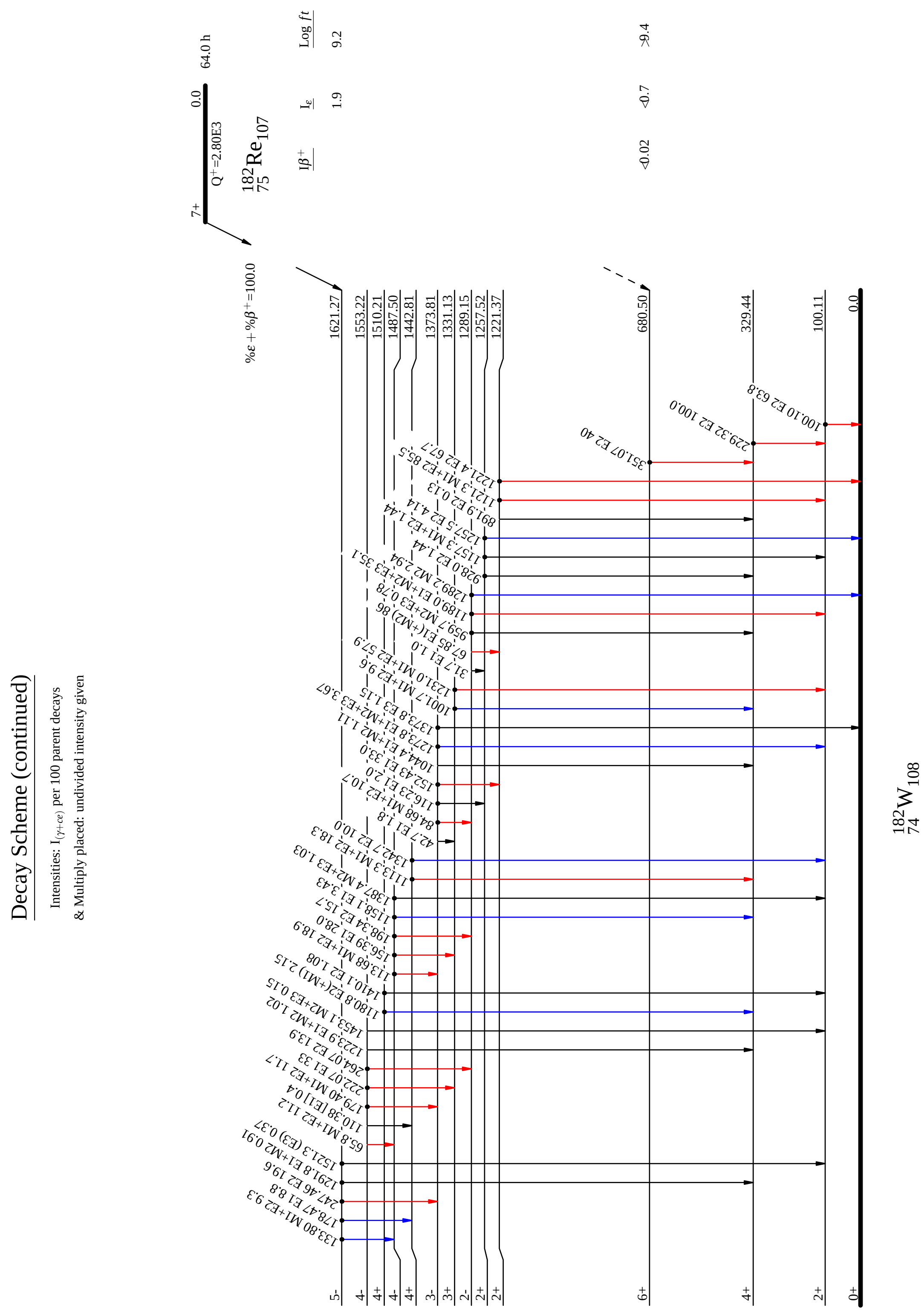
ε,β^+ radiatons

Eε	E(level)	Iε	Log *ft*	I($\varepsilon+\beta^+$)
(595.44)	2204.56	4.5 *3*	7.46 *19*	4.5 *3*
(679.47)	2120.53	0.47 *8*	8.56 *17*	0.47 *8*
(685.57)	2114.43	1.03 *19*	8.23 *17*	1.03 *19*
(821.63)	1978.37	24 *5*	7.03 *16*	24 *5*
(828.91)	1971.09	1.70 *13*	8.19 *13*	1.70 *13*
(839.21)	1960.79	2.8 *6*	7.99 *16*	2.8 *6*
(839.67)	1960.33	23 *5*	7.1 *2*	23 *5*
(883.06)	1916.94	0.46 *9*	8.82 *14*	0.46 *9*
(970.47)	1829.53	14 *4*	7.42 *16*	14 *4*
(989.11)	1810.89	0.7 *5*	8.7 *4*	0.7 *5*
(990.34)	1809.66	7.1 *23*	8.26 *25*	7.1 *23*
(1031.05)	1768.95	<0.18	>9.4	<0.18
(1043.23)	1756.77	16.4 *8*	7.42 *10*	16.4 *8*
(1139.63)	1660.37	<0.6	>9.6	<0.6
(1176.46)	1623.54	<0.31	>9.3	<0.31
(1178.73)	1621.27	1.9 *12*	9.2 *4*	1.9 *12*
(2119.50)	680.50	<0.7	>9.4	<0.7

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
& Multiply placed: undivided intensity given





Decay Scheme (continued)
Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
& Multiply placed: undivided intensity given
7+
0.0
64.0 h
Q+=2.80E3
$^{182}_{75}Re_{107}$
%ε+%β+=100.0
Iβ+
Iε
Log ft
1.9
9.2
<0.02
<0.7
>9.4
1621.27
1553.22
1510.21
1487.50
1442.81
1373.81
1331.13
1289.15
1257.52
1221.37
680.50
329.44
100.11
0.0
5-
4-
4+
4-
4+
3-
3+
2-
2+
2+
6+
4+
2+
0+
$^{182}_{74}W_{108}$

^{182}Re ε decay (12.7ℏ) 1971Ga37,1969Ga23,1969Sa25

Parent: ^{182}Re: E=0+x; Jπ=2+; $T_{1/2}$=12.7 h *2*; Q=2.80×10^{3} *10*; %ε=100

1971Ga37, 1970Ag07 (both papers from the same group): measured conversion electrons using an iron-free $\pi 2^{1/2}$ β spectrometer.

1969Ga23: Measured Eγ, Iγ, γγ and γ(ce) coin. Deduced conversion coefficients from their γ-ray data and ce data of 1961Ha23 and 1964Ba43.

1969Sa25: Measured Eγ, Iγ, γγ. Deduced conversion coefficients from their γ-ray data and ce data from 1961Ha23.

1980Sp01: Measured γ(θ,temp), nuclear orientation at low temperature.

1961Ha23: Measured ce.

Others:.

1964Ba43: Measured ce. Relative electron intensities measured for about 14 transitions from 734 to 1189 keV. No conversion coefficients given.

1963Ba37: Measured Eβ.

1959Ga15: Measured Eγ, Iγ.

The decay scheme is primarily that proposed by 1971Ga37.

^{182}W Levels

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0	0+	1373.91 *5*	3-	2057.47 *7*	1+	2208.94 *18*	3-
100.11 *4*	2+	1442.83 *11*	4+	2109.80 *21*	(2-,3-)	2240.83 *15*	(3+)
329.42 *5*	4+	1487.61 *5*	4-	2116.4 *3*		2274.73 *6*	(3)-
1221.49 *5*	2+	1553.33 *5*	4-	2147.98 *17*	(3-)	2316.1 *22*	
1257.45 *5*	2+	1856.02 *7*	(2+)	2173.3 *3*			
1289.24 *5*	2-	1871.17 *15*	1-	2184.12 *6*	(2-,3-)		
1331.24 *6*	3+	2023.66 *5*	3-	2207.17 *15*	(3-)		

† From least-squares fit to Eγ's. The 1857.3γ was not used in the fitting procedure due to poor agreement in energy.
‡ From Adopted Levels.

γ(^{182}W)

Additional unplaced transitions were reported by all authors. Only those unplaced transitions are listed here which are reported by more than one author.

For A_2 values from γ(θ,temp), see ^{182}Re ε decay (64.0 h).

E_γ§	E_i^{level}	J_i^π	I_γ†ϕ	Mult.‡	δ‡	α	Comments
67.75	1289.24	2-	120 *5*	E1		0.202	Eγ: based on values in Adopted Levels, Gammas dataset. This most intense but lowest-energy transition is not reported in this decay.
84.68 *5*	1373.91	3-	8.4 *7*	M1+E2	+0.345 *11*	7.66	
100.12 *5*	100.11	2+	45 *3*	E2		3.89	ΔIγ(absolute)=0.4 per 100 decays.
113.70 *5*	1487.61	4-	1.3 *2*	M1+E2	+0.358 *28*	3.18	
116.40 *5*	1373.91	3-	1.1 *3*	E1		0.253	
152.43 *5*	1373.91	3-	22.0 *19*	E1		0.1258	α(K)exp=0.17 *5* for 151.1γ+152.4γ+154.0γ (1971Ga37).
156.38 *5*	1487.61	4-	1.7 *3*	E1		0.1177	
179.38 *5*	1553.33	4-	0.92 *17*	M1+E2	+0.92 *8*	0.694 *23*	
198.36 *5*	1487.61	4-	0.55 *8*	E2		0.317	
222.08 *5*	1553.33	4-	2.17 *17*	E1		0.0480	
229.32 *5*	329.42	4+	8 *1*	E2		0.196	
264.08 *5*	1553.33	4-	0.90 *12*	E2		0.1254	
470.26 *5*	2023.66	3-	6.3 *3*	M1+E2	0.6 *1*	0.055 *3*	α(K)exp=0.051 *14* (1970Ag07). L1/L2 ≈ 13 (1971Ga37).
536.04 *5*	2023.66	3-	0.65 *10*	M1+E2	0.7 *2*	0.037 *4*	α(K)exp=0.044 *13* (1970Ag07).
555 *1*	2109.80	(2-,3-)	0.35 *10*	(E2)		0.01627	α(K)exp<0.018 (1970Ag07).
598.56 *5*	1856.02	(2+)	1.23 *13*	(M1)		0.0354	α(K)exp=0.035 *13* (1970Ag07).
649.73 *5*	2023.66	3-	1.06 *15*	M1+E2	0.8 *2*	0.0219 *23*	α(K)exp=0.028 *12* (1970Ag07).
734.53 *5*	2023.66	3-	1.18 *14*	M1+E2	1.0 *3*	0.0148 *22*	α(K)exp=0.026 *12* (1970Ag07).
787.11 *5*	2274.73	(3)-	0.95 *18*	(M1)		0.01763	α(K)exp=0.019 *13* (1970Ag07).

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

E_γ[§]	E_i^{level}	J_i^π	I_γ[†ϕ]	Mult.[‡]	δ[‡]	α	Comments
800 *1*[b]	2057.47	1+	0.47 *12*[b]				
810.24 *5*	2184.12	(2-,3-)	1.20 *14*	(M1)		0.01639	α(K)exp=0.014 *7* (1970Ag07).
835.98 *5*	2057.47	1+	1.45 *15*	(M1+E2)	≈0.8		α(K)exp=0.015 *8* (1971Ga37,1970Ag07).
894.85 *5*	2184.12	(2-,3-)	6.6 *5*	(M1)		0.01276	α(K)exp=0.013 *2* (1971Ga37).
900.80 *5*	2274.73	(3)-	1.11 *19*	(M1+E2)	≈0.5	≈0.01116	α(K)exp=0.015 *5* (1971Ga37), 0.025 *16* (1970Ag07).
927.99 *5*	1257.45	2+	1.62 *17*	E2		0.00524	
959.81 *5*	1289.24	2-	1.7 *4*	M2+E3	-5.5 *+19-10*	0.0116 *7*	
1001.8 *1*	1331.24	3+	≈0.7	M1+E2	-8.9 *+18-21*	0.00455 *8*	
1044.5 *1*	1373.91	3-	0.55 *7*	E1+M2	0.46 *9*	0.0051 *12*	
1113.4 *1*[c]	1442.83	4+	1.1 *2*[c]	M1+E2	+5.6 *+13-10*	0.00376 *8*	
1121.4 *1*	1221.49	2+	100	M1+E2	+30 *+6-4*	0.00359	
1189.2 *1*	1289.24	2-	47.3 *19*	E1+M2+E3		0.008 *7*	
1221.5 *1*	1221.49	2+	78 *3*	E2		0.00305	ΔIγ(absolute)=1.4 per 100 decays.
1231.1 *1*	1331.24	3+	4.11 *20*	M1+E2	-33 *+6-9*	0.00300	α(K)exp=0.0025 *3* (1971Ga37).
1257.3 *1*	1257.45	2+	4.39 *19*	E2		0.00289	
1273.8 *1*	1373.91	3-	1.66 *14*	E1+M2+E3		0.007 *6*	
1289.3 *1*	1289.24	2-	3.85 *17*	M2		0.01230	ΔIγ(absolute)=0.08 per 100 decays.
1373.9 *1*	1373.91	3-	0.56 *6*	E3		0.00496	
1410.4 *3*	Unplaced		0.12 *2*				
1523 *2*	Unplaced		≈0.05				
1537 *2*	Unplaced		≈0.05				
1543 *2*	1871.17	1-	≈0.05				
1558 *2*	Unplaced		0.24 *3*				
1756.0 *2*	1856.02	(2+)	0.19 *4*				α(K)exp>0.0012 (1971Ga37).
1757.0	Unplaced						α(K)exp>0.00046 (1971Ga37).
1771.0 *2*	1871.17	1-	1.01 *10*	E1		1.04×10^{-3}	α(K)exp=0.00055 *16* (1971Ga37).
1818.8 *2*	2147.98	(3-)	0.33 *3*	(E1)			α(K)exp=0.00054 *24* (1971Ga37).
1857.3 *2*	1856.02	(2+)	0.099 *7*	(E2)		1.59×10^{-3}	α(K)exp=0.0014 *8* (1971Ga37). Eγ: poor fit in the level scheme, deviates by 1 keV.
1871.2 *2*	1871.17	1-	0.91 *7*	E1		1.06×10^{-3}	α(K)exp=0.00054 *20* (1971Ga37).
1877.6 *2*	2207.17	(3-)	0.19 *6*	(E1+M2)	0.8 *+4-3*	0.0026 *8*	α(K)exp=0.0021 *13* (1971Ga37).
1879.6 *2*	2208.94	3-	0.17 *5*	E1		1.06×10^{-3}	α(K)exp=0.0005 *3* (1971Ga37).
1911.8 *2*	2240.83	(3+)	0.139 *24*	(M1)		0.00230	α(K)exp=0.0021 *8* (1971Ga37).
1957.4 *2*	2057.47	1+	1.43 *10*	(M1+E2)	1.0 *+6-4*		α(K)exp=0.0022 *7* (1971Ga37).
2010.1 *3*	2109.80	(2-,3-)	0.30 *4*	(E1+M2)	0.9 *+7-4*	0.0025 *9*	α(K)exp=0.0019 *11* (1971Ga37).
2016.3 *3*	2116.4		2.5 *3*				α(K)exp=0.0020 *6* (1971Ga37).
2033.3 *3*	Unplaced		≈0.07				α(K)exp ≈ 0.00066 (1971Ga37).
2047.3 *3*	2147.98	(3-)	0.36 *3*	(E1+M2)	1.0 *+10-5*	0.0026 *9*	α(K)exp=0.0020 *8* (1971Ga37).
2057.4 *3*	2057.47	1+	2.90 *23*				α(K)exp=0.0044 *13* (1971Ga37). %Iγ=0.93 *9* (intensity per 100 decays).
2073.2 *3*	2173.3		0.13 *2*				α(K)exp ≈ 0.002 (1971Ga37).
2084.0 *3*	2184.12	(2-,3-)	0.204 *21*				α(K)exp=0.0008 *4* (1971Ga37).
2099 *3*	Unplaced		≈0.08				α(K)exp<0.00039 (1971Ga37).
2106.8 *5*[a]	2207.17	(3-)	<0.82[a]				α(K)exp>0.00050 (1971Ga37).
2108.6 *5*[a]	2208.94	3-	<0.82[a]				α(K)exp>0.0004 (1971Ga37).
2109.3 *5*[a]	2109.80	(2-,3-)	<0.82[a]				α(K)exp>0.0011 (1971Ga37).
2140.3 *2*	2240.83	(3+)	0.121 *21*	(M1)		0.00197	α(K)exp=0.0017 *8* (1971Ga37).
2148 *3*[b]	2147.98	(3-)	0.088 *19*	[E3]			
2175.2 *3*	2274.73	(3)-	0.147 *21*	E1		1.14×10^{-3}	α(K)exp<0.00039 (1971Ga37).
2189 *3*[b]	Unplaced		0.055 *15*				
2207.7 *3*	2207.17	(3-)	0.33 *3*	(E3)		0.00209	α(K)exp=0.0014 *7* (1971Ga37).
2216 *3*[b]	2316.1		≈0.07[b]				
2230 *3*[b]	Unplaced		0.034 *10*				
2316 *3*[b]	2316.1		0.025 *5*[b]				

† For absolute intensity per 100 decays, multiply by 0.320 *16*.

‡ From ^{182}Ta β^- decay for transitions from levels below 1800 keV. Transitions from higher levels were derived from α(K) data of 1971Ga37. Interpretation of data from 1971Ga37 is ambiguous because M1+E2 and E1+M2 were experimentally indistinguishable.

§ From ce data of 1971Ga37 (also 1970Ag07) unless otherwise stated

$^{\phi}$ Weighted averages of values from 1969Ga23 and 1969Sa25. The uncertainties from 1969Ga23 were increased substantially to reflect the poor agreement of that data with 1969Sa25. For ΔIγ(absolute) combine 5.1% in quadrature with ΔIγ(rel), except as noted.

[a] Energy from ce data of 1971Ga37. The γ-ray intensity is 0.82 *5* combined for Eγ=2109.3 *10* (1969Sa25), 0.82 *8* for 2110 *2* (1969Ga23) corresponding to a triplet (2106.8+2108.6+2109.3) from conversion electron data.

[b] From 1969Ga23.

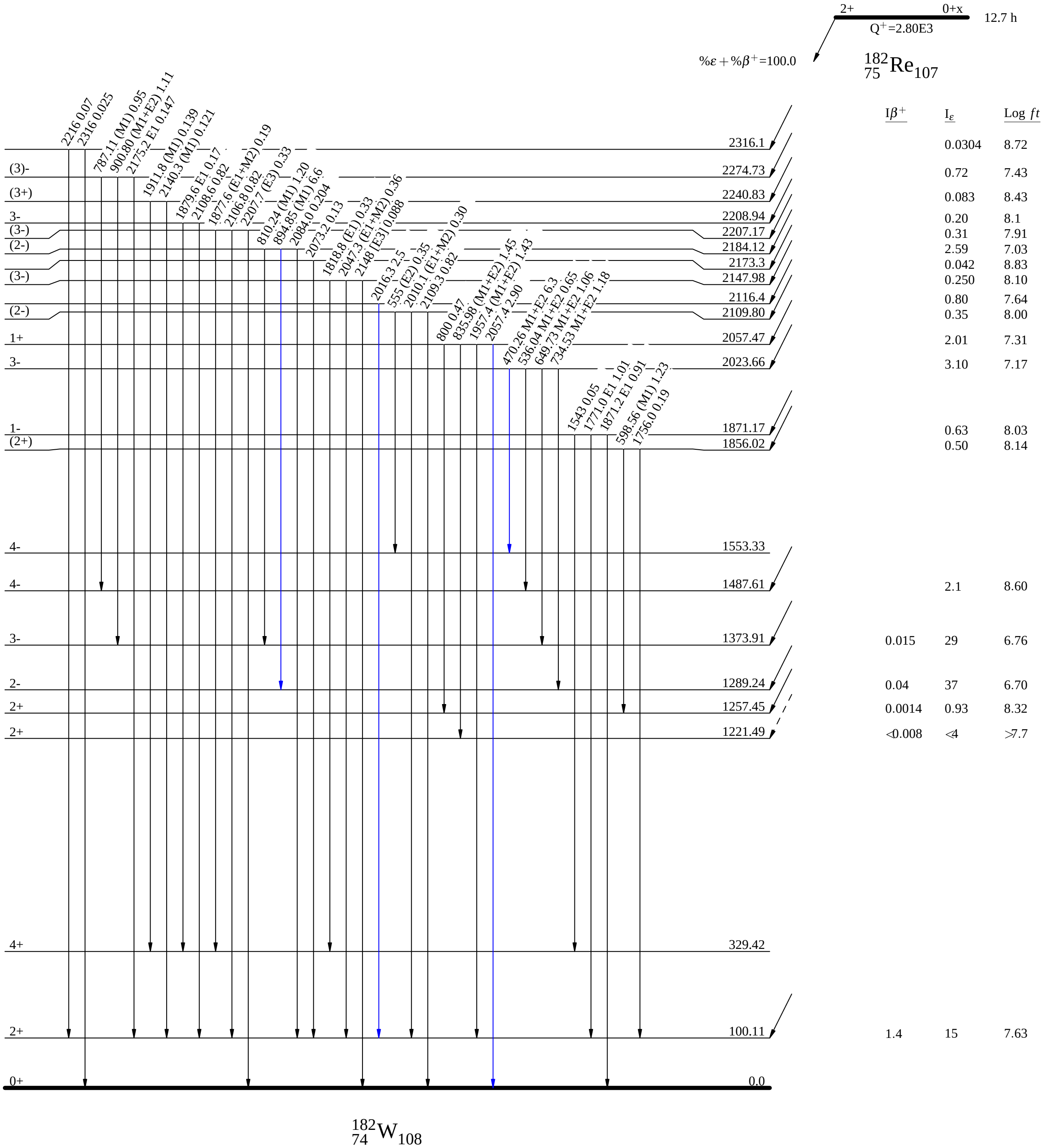
[c] From 1969Sa25.

ε,β^+ radiatons

Eε	E(level)	Iε	Log *ft*	I(ε+β⁺)
(483.9+x)	2316.1	0.0304 *22*	8.72 *24*	0.0304 *22*
(525.27+x)	2274.73	0.72 *10*	7.43 *22*	0.72 *10*
(559.17+x)	2240.83	0.083 *11*	8.43 *21*	0.083 *11*
(591.06+x)	2208.94	0.20 *8*	8.1 *3*	0.20 *8*
(592.83+x)	2207.17	0.31 *8*	7.91 *22*	0.31 *8*
(615.88+x)	2184.12	2.59 *22*	7.03 *18*	2.59 *22*
(626.7+x)	2173.3	0.042 *7*	8.83 *19*	0.042 *7*
(652.02+x)	2147.98	0.250 *20*	8.10 *17*	0.250 *20*
(683.6+x)	2116.4	0.80 *11*	7.64 *17*	0.80 *11*
(690.20+x)	2109.80	0.35 *9*	8.00 *19*	0.35 *9*
(742.53+x)	2057.47	2.01 *15*	7.31 *15*	2.01 *15*
(776.34+x)	2023.66	3.10 *21*	7.17 *14*	3.10 *21*
(928.83+x)	1871.17	0.63 *5*	8.03 *12*	0.63 *5*
(943.98+x)	1856.02	0.50 *6*	8.14 *12*	0.50 *6*
(1312.39+x)	1487.61	2.1 *4*	8.60 *17*	2.1 *4*
(1357.17+x)	1442.83	<0.42	>8.6	<0.42
(1426.09+x)	1373.91	29 *3*	6.76 *8*	29 *3*
(1468.76+x)	1331.24	0.21 *14*	8.9 *3*	0.21 *14*
(1510.76+x)	1289.24	37 *4*	6.70 *8*	37 *4*
(1542.55+x)	1257.45	0.93 *17*	8.32 *10*	0.93 *17*
(1578.51+x)	1221.49	<4	>7.7	<4
(2699.89+x)	100.11	15 *5*	7.63 *15*	16 *5*

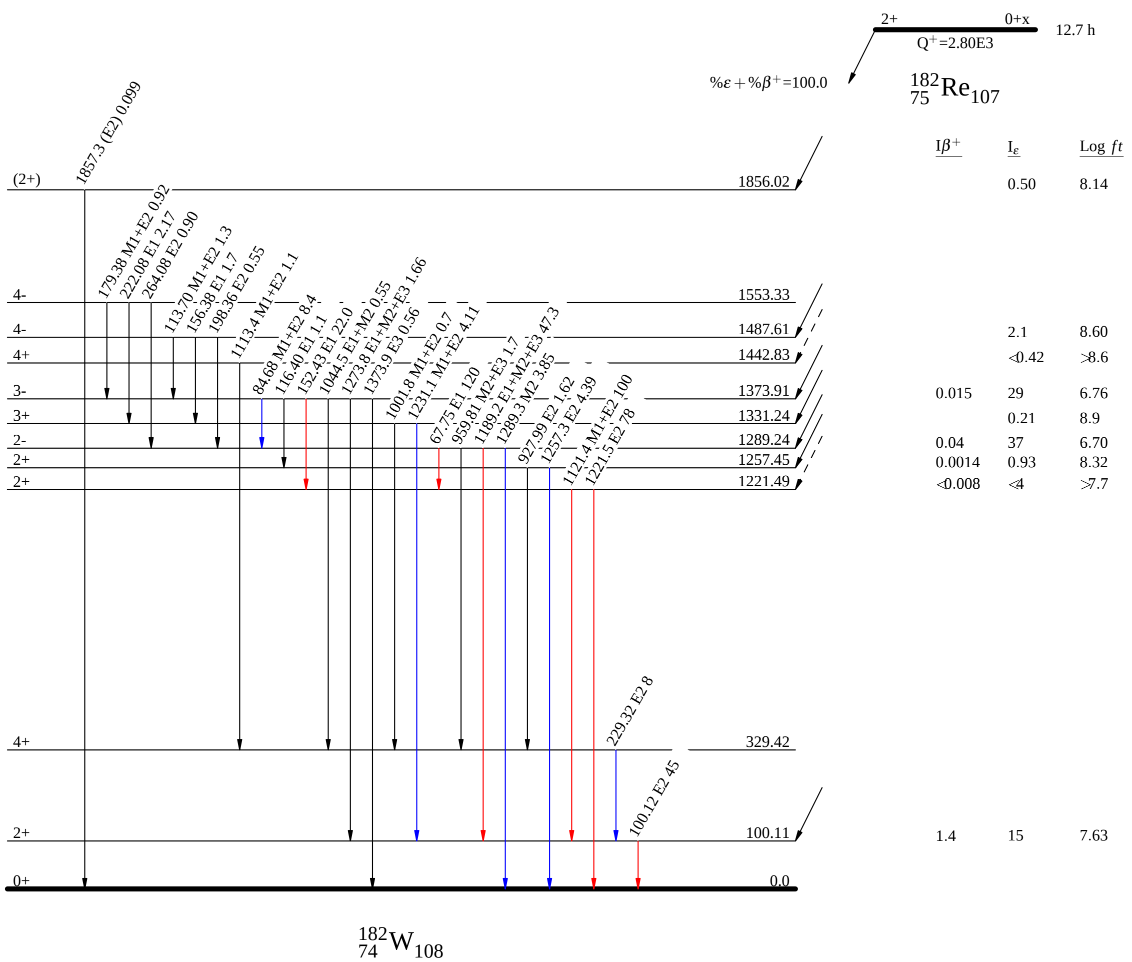
Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



^{186}Os α decay 1975Vi01

Parent: ^{186}Os: E=0.0; Jπ=0+; $T_{1/2}$=2.0×10^{15} y *11*; Q=2823.1 *12*; %α=100
$T_{1/2}$(^{186}Os)=2.0×10^{15} y 11, measured by 1975Vi01, is adopted in 2003Ba44 and is recommended by 1990Ho28. This half-life is used in calculations here.
%α=100. ^{186}Os is β stable.
Q(α)(^{186}Os)=2823.1 *12* is recommended by 2003Au03.

^{182}W Levels

E(level)	Jπ
0.0	0+

α radiations

Eα	E(level)	Iα	HF	Comments
2761.3	0.0		1.0	Energy: calculated from Q(α)(^{186}Os)=2822.0 *17*. Eα ≈ 2760 was measured by 1975Vi01. Iα: only one α group has been observed. An upper limit of 5% is calculated for an unobserved 2663.4-keV α to the 2+ state at 100.1060 keV by requiring its hindrance factor to be greater than 1. Iα(2761.3α)=97.5% *25* (Iα>95%) is used in computations.

† For absolute intensity per 100 decays, multiply by 1.0.
‡ Calculations requiring HF(2761α)=1.0 yield r_0(^{182}W)=1.49 *3*.

^{176}Yb(^{9}Be,3nγ) 1994Re03

1994Re03: E=40 MeV. Also ^{176}Yb(^{13}C,α3nγ) E=65 MeV. Measured Eγ, Iγ, γγ, γγ(t).

^{182}W Levels

Nuclear Level Sequences

- A Kπ=0+ band.
- B Kπ=10+ band. Configuration=ν9/2[624]⊗ν11/2[615])) from $i_{13/2}$ neutron multiplet. (g_K-g_R)=0.34 *4*.
- C Kπ=(16+). 4-quasiparticle band. Configuration=(ν9/2[624]ν11/2[615]])$_{10+}$⊗ (π7/2[404]π5/2[402])$_{6+}$. (g_K-g_R)=0.21 *19*.
- D Kπ=(17-). 4-quasiparticle band. Configuration=(ν9/2[624]ν11/2[615]])$_{10+}$⊗ (π9/2[514]π5/2[402])$_{7-}$. (g_K-g_R)=0.30 *7* or 0.18 *7*.

Seq.	E(level)	Jπ‡	$T_{1/2}$†	Comments
A	0.0	0+		
A	100.3 *2*	2+		
A	329.2 *4*	4+		
A	680.2 *6*	6+		
A	1143.8 *7*	8+		
A	1711.0 *7*	10+		
B	2229.7 *8*	10+		
A	2370.8 *8*	12+		
B	2491.6 *8*	11+		
B	2774.4 *9*	12+		
B	3076.9 *9*	13+		
A	3110.4 *10*	14+		
B	3396.8 *9*	14+		
B	3734.3 *10*	15+		
	3753.1 *9*	(15+)	54 ns *10*	E(level): bandhead of configuration=(ν9/2[624]ν7/2[503])$_{8-}$⊗ (π9/2[514]π5/2[402])$_{7-}$. Other possible configuration= (π9/2[514]π1/2[541])$_{5+}$⊗(ν9/2[624]ν11/2[615]])$_{10+}$ is less likely. $T_{1/2}$: 1994Re03 also quote 57.5 ns 14 from centroid-shift method but they adopt 54 ns 10 from γγ(t).

Continued on next page (footnotes at end of table)

^{182}W Levels (continued)

Seq.	E(level)	J$^{\pi\ddagger}$	$T_{1/2}$†	Comments
C	3891.6 *10*	(16+)	≤7 ns	
A	3907.3 *11*	16+		
D	4038.2 *11*	(17-)	17 ns *7*	$T_{1/2}$: 1994Re03 also quote 10 ns 5 from centroid-shift method but they adopt 17 ns 7 from $\gamma\gamma$(t).
C	4216.0 *11*	(17+)		
D	4418.9 *12*	(18-)		
C	4567.6 *11*	(18+)		
A	4745.2 *15*	(18+)		
	4777.2 *13*	(18)		E(level): possible configuration=$(\nu 9/2[624]\nu 11/2[615]])_{10+} \otimes (\pi 9/2[514]\pi 7/2[404])_{8-}$.
D	4817.9 *12*	(19-)		
D	5236.6 *13*	(20-)		

† $\gamma\gamma$(t) (1994Re03).
‡ As proposed by 1994Re03. The assignments in Adopted Levels are the same except that some are placed in parentheses when strong arguments are lacking.

γ(^{182}W)

E_i^{level}	J_i^{π}	E_f^{level}	J_f^{π}	E_γ	I_γ†	Mult.	α	Comments
100.3	2+	0.0	0+	100.3 *2*	28.7 *10*			
329.2	4+	100.3	2+	228.9 *3*	44.5 *25*			
680.2	6+	329.2	4+	351.0 *4*	42 *3*			
1143.8	8+	680.2	6+	463.6 *3*	32.8 *25*			
1711.0	10+	1143.8	8+	567.2 *3*	18.3 *20*			
2229.7	10+	1711.0	10+	518.5 *5*	11.7 *15*			
		1143.8	8+	1086.2 *8*	8.1 *8*			
2370.8	12+	1711.0	10+	659.8 *4*	4.2 *5*			
2491.6	11+	2229.7	10+	261.9 *2*	11.0 *12*			
2774.4	12+	2491.6	11+	282.7 *2*	6.2 *6*			$(g_K-g_R)/Q_0$=0.048 *5*.
		2229.7	10+	545.3 *5*	1.7 *3*			
3076.9	13+	2774.4	12+	302.4 *3*	3.7 *5*			$(g_K-g_R)/Q_0$=0.045 *6*.
		2491.6	11+	585.3 *5*	2.3 *5*			
3110.4	14+	2370.8	12+	739.6 *5*	1.9 *4*			
3396.8	14+	3076.9	13+	319.9 *4*	2.4 *5*			$(g_K-g_R)/Q_0$=0.051 *9*.
		2774.4	12+	622.5 *5*	2.0 *4*			
3734.3	15+	3396.8	14+	337.7 *5*	0.37 *15*			$(g_K-g_R)/Q_0$=0.034 *12*.
		3076.9	13+	657.2 *6*	0.74 *20*			
3753.1	(15+)	3734.3	15+	19				E_γ: from (657γ)(138γ,147γ)(t) the existence of a 19-keV transition with ≈ 10% branch is expected.
		3396.8	14+	356.3 *4*	3.0 *5*			
		3076.9	13+	676.1 *5*	1.7 *4*			
3891.6	(16+)	3753.1	(15+)	138.5 *4*	1.30 *20*	(M1)	1.93	Mult.: α(exp)=1.8 *6* (1994Re03) from intensity balance at 3892 level.
3907.3	16+	3110.4	14+	796.9 *6*	1.13 *25*			
4038.2	(17-)	3891.6	(16+)	146.6 *4*	2.2 *4*	(E1)	0.140	Mult.: α(exp) < 0.27 (1994Re03) from intensity balance at 4038 level, 0.45 *35* from prompt intensities given here.
4216.0	(17+)	3891.6	(16+)	324.4 *5*	0.80 *20*			
4418.9	(18-)	4038.2	(17-)	380.8 *5*	1.1 *3*			
4567.6	(18+)	4216.0	(17+)	351.6 *5*	0.62 *20*			$(g_K-g_R)/Q_0$=0.030 *13*.
		3891.6	(16+)	676.1 *7*	0.15 *5*			
4745.2	(18+)	3907.3	16+	837.9 *9*	0.25 *7*			
4777.2	(18)	4038.2	(17-)	739.0 *7*	0.50 *20*			
4817.9	(19-)	4418.9	(18-)	398.9 *5*	1.2 *3*			$(g_K-g_R)/Q_0$=0.043 *10*.
		4038.2	(17-)	779.7 *7*	0.20 *7*			
5236.6	(20-)	4817.9	(19-)	418.5 *6*	0.35 *15*			$(g_K-g_R)/Q_0$=0.025 *10*.
		4418.9	(18-)	818.0 *9*	0.24 *7*			

† 1994Re03 list I(γ+ce)′s also based on assumed multipolarities.

^{176}Yb(^{13}C,α3nγ) 1995Sh27

1995Sh27: E= 65 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$(DCO), (particle)γ coin using 4π Si detector array for particle detection and NORDBALL array for γ ray detection.

Other: 1994Re03: E=65 MeV. See ^{176}Yb(^{9}Be,3nγ) dataset where ^{176}Yb(^{13}C,α3nγ) reaction May have been used for some of the measurements.

^{182}W Levels

The two g_K values in each case refer to positive and negative signs of mixing ratio of ΔJ=1, M1+E2 in-band transition.
The g_K values were deduced from $(g_K-g_R)/Q_0$ using g_R=0.25 and Q_0=7.0.

Nuclear Level Sequences

A	Kπ=0+, g.s. band. Backbending at $\hbar\omega \approx$ 0.38 MeV.
B	Kπ=2-, octupole band.
C	π5/2[402]$\otimes\pi$7/2[404], Kπ=6+ g_K(exp)=+1.11 *5*.
D	ν9/2[624]$\otimes\nu$11/2[615]], Kπ=10+ g_K(exp)=-0.15 *2*.
E	ν9/2[624]$\otimes\nu$1/2[510], Kπ=4- g_K(exp)=+0.05 *4*.
F	ν9/2[624]$\otimes\nu$3/2[512], Kπ=6- g_K(exp)=+0.01 *1*.
G	π9/2[514]$\otimes\pi$5/2[402], Kπ=7- g_K(exp)=+1.17 *7*.
H	ν9/2[624]$\otimes\nu$7/2[503], Kπ=8- g_K(exp)=-0.21 *5*.
I	ν9/2[624]$\otimes\nu$1/2[510], Kπ=5-.
J	$\nu^2_{(8-)}\otimes\pi^2_{(7-)}$, K$\pi$=15+. ν^2(8-): ν9/2[624]$\otimes\nu$7/2[503]; π^2(7-): π9/2[514]$\otimes\pi$5/2[402]. g_K(exp)=+0.52 *4*.
K	$\nu^2_{(8-)}\otimes\pi^2_{(8-)}$, K$\pi$=16+. ν^2(8-): ν9/2[624]$\otimes\nu$7/2[503]; π^2(8-): π9/2[514]$\otimes\pi$7/2[404]. g_K(exp)=+0.36 *6*.
L	$\nu^2_{(10+)}\otimes\pi^2_{(7-)}$, K$\pi$=17-. ν^2(10+):ν9/2[624]$\otimes\nu$11/2[615]]; π^2(7-):π9/2[514]$\otimes\pi$5/2[402]. g_K(exp)=+0.46 *3*.
M	$\nu^2_{(10+)}\otimes\pi^2_{(8-)}$, K$\pi$=18-. ν^2(10+):ν9/2[624]$\otimes\nu$11/2[615]]; π^2(8-):π9/2[514]$\otimes\pi$7/2[404]. g_K(exp) $\approx$ +0.32.
N	K=(12) band.

Seq.	E(level)†	J$^{\pi}$‡	$T_{1/2}$	Comments
A	0.0	0+		
A	100.20 *10*	2+		
A	329.29 *14*	4+		
A	680.13 *16*	6+		
A	1144.03 *19*	8+		
B	1289.31 *14*	2-		
B	1373.89 *16*	3-		
B	1487.45 *16*	4-		
E	1553.00 *16*	4-		
B	1621.14 *16*	5-		
E	1660.18 *16*	5-		
A	1711.53 *22*	10+		
C	1756.56 *16*	6+		
E	1768.71 *16*	6-		g_K=+0.53 *2* or -0.03 *2*.
I	1809.09 *19*	5-		
B	1810.55 *17*	6-		
F	1829.17 *16*	6-		
E	1916.77 *16*	7-		g_K=+0.41 *1* or +0.09 *1*.
F	1959.94 *17*	7-		
I	1960.0 *3*	6-		
C	1970.72 *19*	7+		
G	1978.16 *19*	(7-)		
B	1993.44 *19*	7-		
E	2087.10 *17*	8-		g_K=+0.44 *1* or +0.06 *1*.
F	2113.71 *17*	8-		g_K=+0.49 *2* or +0.01 *2*.
H	2119.86 *17*	8-		
I	2130.6 *11*	7-		
G	2204.16 *21*	(8-)		
C	2212.12 *21*	8+		g_K=+1.06 *6* or -0.56 *6*.
B	2225.05 *20*	8-		
D	2230.3 *7*	10+		

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^{182}W Levels (continued)

Seq.	E(level)†	Jπ‡	$T_{1/2}$	Comments
E	2273.51 *18*	9-		g_K=+0.47 *1* or +0.03 *1*.
F	2301.22 *17*	9-		$g_K \approx$ +0.39 or $\approx$ +0.11.
I	2323.8 *11*	(8-)		
H	2327.23 *18*	9-		
A	2372.13 *24*	12+		
B	2445.74 *21*	9-		
G	2455.26 *23*	(9-)		g_K>+1.25 or <-0.75.
C	2479.37 *22*	9+		g_K=+1.09 *5* or -0.59 *5*.
E	2486.43 *18*	10-		g_K=+0.58 *3* or -0.08 *3*.
D	2492.4 *7*	11+		
F	2507.09 *18*	10-		g_K=+0.50 *3* or 0.00 *3*.
H	2563.32 *20*	10-		$g_K \approx$ +0.91 or $\approx$ -0.41.
E	2710.42 *19*	11-		g_K=+0.65 *3* or -0.15 *3*.
G	2730.36 *25*	(10-)		g_K>+1.31 or <-0.81.
B	2738.86 *22*	10-		
F	2741.31 *20*	11-		
C	2768.79 *24*	10+		g_K=+1.17 *5* or -0.67 *5*.
D	2775.3 *7*	12+		g_K=+0.67 *4* or -0.17 *4*.
H	2823.30 *22*	11-		g_K=-0.67 *3* or -0.17 *3*.
E	2972.03 *20*	12-		g_K=+0.62 *4* or -0.12 *4*.
B	2980.44 *24*	11-		
F	2980.92 *20*	12-		
G	3027.5 *3*	(11-)		g_K=+1.25 *26* or -0.75 *26*.
D	3077.9 *7*	13+		g_K=+0.63 *4* or -0.13 *4*.
H	3106.10 *24*	12-		g_K=+0.77 *3* or -0.27 *3*.
A	3112.6 *3*	14+		
E	3224.02 *21*	13-		
F	3269.21 *22*	13-		
B	3319.5 *5*	(12-)		
G	3342.6 *3*	(12-)		g_K=+1.11 *23* or -0.61 *23*.
D	3398.0 *7*	14+		g_K=+0.67 *7* or -0.17 *7*.
H	3409.9 *3*	13-		g_K=+0.73 *4* or -0.23 *4*.
N	3415.6 *7*	(12)		
F	3517.63 *22*	(14-)		
E	3549.53 *22*	14-		
B	3567.6 *4*	(13-)		
N	3676.8 *7*	(13)		
H	3733.2 *3*	14-		g_K=+0.67 *3* or -0.17 *3*.
D	3736.1 *7*	15+		g_K=+0.64 *5* or -0.14 *5*.
J	3754.5 *7*	15+	37 ns *2*	$T_{1/2}$: from time differences between the transitions above and below the isomer: 139γ and 324γ above the isomer and 262γ, 283γ and 356γ below the isomer.
E	3807.12 *24*	15-		
F	3879.71 *24*	15-		
K	3893.3 *7*	16+		
A	3909.8 *3*	16+		
N	3965.9 *7*	(14)		g_K=+0.51 *19* or -0.01 *19*.
L	4040.2 *7*	17-	20 ns *1*	$T_{1/2}$: from time differences between the transitions above and below the isomer: 381γ, 399γ and 740γ above the isomer and 147γ below the isomer.
H	4074.1 *4*	15-		g_K=+0.72 *6* or -0.22 *6*.
J	4078.5 *7*	16+		
D	4081.2 *7*	16+		g_K=+0.65 *5* or -0.15 *5*.
F	4116.5 *3*	(16-)		
B	4196.9 *5*	(15-)		
E	4210.6 *3*	16-		
N	4279.9 *7*	(15)		g_K=+0.61 *25* or -0.11 *25*.
K	4292.7 *7*	17+		
L	4421.2 *7*	18-		

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^{182}W Levels (continued)

Seq.	E(level)†	Jπ‡	$T_{1/2}$	Comments
J	4430.1 *7*	17+		g_K=+0.54 *4* or -0.04 *4*.
D	4453.4 *12*	(17+)		
E	4455.7 *3*	17-		
F	4570.5 *4*	(17-)		
A	4690.6 *3*	18+		
K	4711.5 *7*	18+		g_K=+0.36 *6* or +0.14 *6*.
F	4779.2 *4*	(18-)		
M	4780.0 *8*	(18)		
J	4804.6 *8*	18+		g_K=+0.46 *6* or +0.04 *6*.
L	4819.8 *7*	19-		g_K=+0.49 *7* or +0.01 *7*.
D	4847.1 *9*	(18+)		
E	4954.3 *11*	(18-)		
K	5148.2 *8*	19+		$g_K \approx$ +0.47 or $\approx$ +0.03.
E	5170.3 *5*	(19-)		
M	5191.5 *8*	(19)		
J	5199.3 *8*	(19+)		
D	5225.5 *16*	(19+)		
L	5235.5 *8*	20-		g_K=+0.43 *6* or +0.07 *6*.
F	5338.2 *11*	(19-)		
A	5428.3 *4*	(20+)		
M	5618.2 *8*	(20)		$g_K \approx$ +0.32 or $\approx$ +0.18.
L	5666.6 *10*	21-		$g_K \approx$ +0.49 or $\approx$ +0.01.

† From least-squares fit to Eγ's. The data for β and γ bands are not reported by 1995Sh27 even though these bands and associated transitions have been seen by these authors. Normalized χ^2=0.96.
‡ As proposed by 1995Sh27 based on γγ(θ) data and band assignments. The assignments in Adopted Levels are the same except that many are placed in parentheses when strong arguments are lacking.

γ(^{182}W)

DCO ratios correspond to gates on ΔJ=2, quadrupole transitions unless otherwise stated.
$(g_K-g_R)/Q_0$ values have been deduced by 1995Sh27 from ΔJ=2/ΔJ=1 branching ratios, assuming rotational model. The values of (M1+E2) mixing ratios for ΔJ=1 transitions were also deduced by these authors but not listed in the paper.

E_i^{level}	J_i^π	E_f^{level}	J_f^π	Eγ	Iγ	Mult.†	Comments
Unplaced				237.1 *1*	1.8 *3*	(D+Q)	DCO= 0.8 *3*, ΔJ=1 gated.
				261.9 *1*	1.4 *2*	(D+Q)	DCO= 1.0 *4*, ΔJ=1 gated.
				285.6 *1*	1.2 *2*	(D+Q)	DCO= 1.0 *4*, ΔJ=1 gated.
				307.4 *1*	0.7 *1*	(D+Q)	DCO= 1.0 *5*, ΔJ=1 gated.
				327.5 *1*	0.4 *1*	(D+Q)	DCO= 1.1 *6*, ΔJ=1 gated.
				1148.0 *1*	2.6 *5*	(D+Q)	DCO= 1.0 *2*, ΔJ=1 gated.
100.20	2+	0.0	0+	100.2 *1*	33 *6*	Q	DCO= 1.0 *1*.
329.29	4+	100.20	2+	229.1 *1*	100	Q	DCO= 1.0 *1*.
680.13	6+	329.29	4+	350.8 *1*	103 *22*	Q	DCO= 1.0 *1*.
1144.03	8+	680.13	6+	463.9 *1*	89 *21*	Q	DCO= 1.0 *1*.
1289.31	2-	100.20	2+	1189.1 *1*	3.1 *5*		
1373.89	3-	1289.31	2-	84.8 *1*	1.7 *3*	D+Q	DCO= 0.5 *3*.
		100.20	2+	1273.7 *6*	<6		
1487.45	4-	1373.89	3-	113.7 *1*	3.3 *6*	D+Q	DCO= 0.8 *3*.
		1289.31	2-	198.2 *1*	2.4 *4*	Q	DCO= 1.3 *5*.
1553.00	4-	1373.89	3-	179.2 *1*	0.9 *1*		
		1289.31	2-	263.4 *1*	1.2 *2*		
1621.14	5-	1487.45	4-	133.8 *1*	2.7 *5*		
		1373.89	3-	247.3 *1*	5.3 *9*	Q	DCO= 0.9 *3*.
1660.18	5-	1553.00	4-	107.2 *1*	0.6 *1*		
		1487.45	4-	172.7 *1*	1.4 *2*		

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

E_i^{level}	J_i^π	E_f^{level}	J_f^π	E_γ	I_γ	Mult.†	Comments
		1373.89	3-	286.2 *1*	3.3 *5*		
1711.53	10+	1144.03	8+	567.5 *1*	45 *10*	Q	DCO= 1.0 *1*.
1756.56	6+	680.13	6+	1076.4 *1*	3.0 *4*		
		329.29	4+	1427.3 *1*	2.3 *3*		
1768.71	6-	1660.18	5-	108.5 *1*	0.5 *1*	D+Q	DCO= 0.5 *3*. $(g_K-g_R)/Q_0$=0.039 *3* for Iγ(215.4γ)/Iγ(108.5γ)= 0.87 *13*.
		1621.14	5-	147.8 *1*	1.1 *2*		
		1553.00	4-	215.4 *3*	0.5 *1*		
		1487.45	4-	281.3 *1*	6.2 *9*		
1809.09	5-	1621.14	5-	187.9 *6*	<0.1		
		1553.00	4-	256.1 *1*	2.4 *4*		
1810.55	6-	1621.14	5-	189.4 *1*	0.8 *1*		
		1487.45	4-	323.2 *1*	3.5 *5*	Q	DCO= 1.0 *4*.
1829.17	6-	1660.18	5-	169.0 *1*	2.4 *4*		
		1553.00	4-	276.0 *1*	1.5 *2*		
1916.77	7-	1810.55	6-	106.3 *1*	0.4 *1*		
		1768.71	6-	148.2 *1*	0.5 *1*		$(g_K-g_R)/Q_0$=0.023 *2* for Iγ(256.5γ)/Iγ(148.2γ)= 2.51 *25*.
		1660.18	5-	256.5 *1*	1.4 *2*	Q	DCO= 1.1 *3*.
		1621.14	5-	295.6 *1*	5.0 *7*		
1959.94	7-	1829.17	6-	130.8 *1*	2.9 *5*		
		1768.71	6-	191.3 *1*	2.8 *5*		
		1660.18	5-	299.8 *2*[c]	0.7 *1*[c]		
		1621.14	5-	338.7 *2*	1.5 *2*		
1960.0	6-	1810.55	6-	149.0 *11*	0.2 *1*		
		1660.18	5-	299.8 *2*[c]	<0.1[c]		
1970.72	7+	1756.56	6+	214.2 *1*	2.6 *4*	D+Q	DCO= 1.1 *2*, ΔJ=1 gated.
1978.16	(7-)	1829.17	6-	148.9 *4*	0.3 *1*		
		1756.56	6+	221.6 *1*	1.4 *2*		
1993.44	7-	1810.55	6-	182.8 *5*	<0.2		
		1621.14	5-	372.3 *1*	1.8 *3*	Q	DCO= 0.9 *3*.
2087.10	8-	1916.77	7-	170.4 *1*	1.1 *2*		$(g_K-g_R)/Q_0$=0.027 *1* for Iγ(318.4γ)/Iγ(170.4γ)=4.9 *3*.
		1768.71	6-	318.4 *1*	5.4 *8*	Q	DCO= 1.0 *2*.
2113.71	8-	1959.94	7-	153.5 *5*	1.2 *2*		$(g_K-g_R)/Q_0$=0.034 *3* for Iγ(285.1γ)/Iγ(153.5γ)=0.52 *7*.
		1916.77	7-	197.4 *2*	0.3 *1*		
		1829.17	6-	285.1 *10*	0.6 *1*		
		1768.71	6-	345.0 *1*	1.3 *2*		
2119.86	8-	1959.94	7-	160.0 *1*	1.7 *3*		
		1829.17	6-	290.5 *1*	0.6 *1*		
2130.6	7-	1768.71	6-	361.9 *10*	<0.4		
2204.16	(8-)	1978.16	(7-)	226.0 *1*	5.5 *8*	(D+Q)	DCO= 1.0 *1*, ΔJ=1 gated.
2212.12	8+	1970.72	7+	241.4 *1*	2.0 *3*	D+Q	DCO= 1.1 *4*, ΔJ=1 gated. $(g_K-g_R)/Q_0$=0.116 *9* for Iγ(454.9γ)/Iγ(241.4γ)=0.14 *2*.
		1756.56	6+	454.9 *4*	0.3 *1*		
2225.05	8-	1810.55	6-	414.5 *1*	1.7 *3*	Q	DCO= 1.3 *5*.
2230.3	10+	1711.53	10+	519[a]			
		1144.03	8+	1086[a]			
2273.51	9-	2087.10	8-	186.5 *1*	0.9 *1*		$(g_K-g_R)/Q_0$=0.032 *1* for Iγ(356.7γ)/Iγ(186.5γ)=6.1 *4*.
		1916.77	7-	356.7 *1*	5.4 *8*	Q	DCO= 1.2 *2*.
2301.22	9-	2119.86	8-	181.3 *10*	0.2 *1*		
		2113.71	8-	187.6 *3*	0.4 *1*		$(g_K-g_R)/Q_0 \approx$ 0.020 for Iγ(341.3γ)/Iγ(187.6γ)≈2.25.
		2087.10	8-	214.2 *10*	<0.3		
		1959.94	7-	341.3 *1*	1.2 *5*		I_γ: 1995Sh27 list 0.9 +*8*-*2*.

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

E_i^{level}	J_i^π	E_f^{level}	J_f^π	E_γ	I_γ	Mult.†	Comments
		1916.77	7-	384.4 *1*	1.1 *2*		
2323.8	(8-)	1916.77	7-	407.0 *10*	<0.2		
2327.23	9-	2119.86	8-	207.2 *1*	1.3 *2*		
		2113.71	8-	213.6 *1*	1.9 *3*		
2372.13	12+	1711.53	10+	660.6 *1*	10.9 *16*	Q	DCO= 0.9 *1*.
2445.74	9-	1993.44	7-	452.3 *1*	1.9 *3*	Q	DCO= 1.0 *3*.
2455.26	(9-)	2204.16	(8-)	251.1 *1*	4.2 *6*	(D+Q)	DCO= 0.9 *2*, ΔJ=1 gated. $(g_K-g_R)/Q_0$>0.14 for Iγ(477.1γ)/Iγ(251.1γ)<0.07.
		1978.16	(7-)	477.1 *10*	<0.3		
2479.37	9+	2212.12	8+	267.2 *1*	1.7 *3*	D+Q	DCO= 0.9 *3*, ΔJ=1 gated. $(g_K-g_R)/Q_0$=0.120 *7* for Iγ(508.8γ)/Iγ(267.2γ)=0.29 *3*.
		1970.72	7+	508.8 *2*	0.5 *1*		
2486.43	10-	2273.51	9-	213.0 *1*	0.9 *1*		$(g_K-g_R)/Q_0$=0.047 *4* for Iγ(399.3γ)/Iγ(213.0γ)=4.1 *5*.
		2087.10	8-	399.3 *1*	3.6 *7*	Q	DCO= 1.0 *2*.
2492.4	11+	2230.3	10+	262.1 *1*	19 *3*	D+Q	DCO= 1.0 *1*, ΔJ=1 gated.
2507.09	10-	2301.22	9-	205.8 *2*	0.3 *1*		$(g_K-g_R)/Q_0$=0.035 *4* for Iγ(393.4γ)/Iγ(205.8γ)=2.1 *4*.
		2273.51	9-	233.8 *10*	<0.2		
		2119.86	8-	387.1 *2*	1.2 *6*		I_γ: 1995Sh27 list 0.8 *+10-2*.
		2113.71	8-	393.4 *2*	0.6 *1*		
		2087.10	8-	420.0 *1*	1.0 *2*		
2563.32	10-	2327.23	9-	236.0 *1*	2.5 *4*		$(g_K-g_R)/Q_0$=0.094 for Iγ(443.8γ)/Iγ(236.0γ)=0.09.
		2119.86	8-	443.8 *2*	<0.2		
2710.42	11-	2486.43	10-	224.0 *1*	0.8 *1*		$(g_K-g_R)/Q_0$=0.057 *4* for Iγ(436.9γ)/Iγ(224.0γ)=4.3 *6*.
		2273.51	9-	436.9 *1*	3.4 *6*	Q	DCO= 0.9 *2*.
2730.36	(10-)	2455.26	(9-)	275.1 *1*	2.9 *4*	(D+Q)	DCO= 1.0 *2*, ΔJ=1 gated. $(g_K-g_R)/Q_0$>0.15 for Iγ(526.2γ)/Iγ(275.1γ)<0.14.
		2204.16	(8-)	526.2 *10*	<0.4		
2738.86	10-	2225.05	8-	513.8 *1*	1.3 *2*	Q	DCO= 1.0 *3*.
2741.31	11-	2301.22	9-	440.1 *1*	1.7 *3*	Q	DCO= 0.8 *3*.
		2273.51	9-	467.7 *5*	0.6 *1*		
2768.79	10+	2479.37	9+	289.4 *1*	1.1 *2*	D+Q	DCO= 1.0 *3*, ΔJ=1 gated. $(g_K-g_R)/Q_0$=0.131 *7* for Iγ(557.1γ)/Iγ(289.4γ)=0.39 *4*.
		2212.12	8+	557.1 *5*	0.4 *1*		
2775.3	12+	2492.4	11+	282.8 *1*[c]	14.0 *24*[c]	D+Q	DCO= 1.1 *1*, ΔJ=1 gated. $(g_K-g_R)/Q_0$=0.061 *5* for Iγ(545.1γ)/Iγ(282.8γ)=0.18 *3*.
		2230.3	10+	545.1 *2*	2.6 *5*	Q	DCO= 1.8 *5*, ΔJ=1 gated.
2823.30	11-	2563.32	10-	260.0 *1*	1.7 *2*		$(g_K-g_R)/Q_0$=0.060 *4* for Iγ(496.0γ)/Iγ(260.0γ)=0.48 *5*.
		2327.23	9-	496.0 *5*	0.8 *1*		
2972.03	12-	2710.42	11-	261.6 *2*	0.4 *1*		$(g_K-g_R)/Q_0$=0.053 *5* for Iγ(485.6γ)/Iγ(261.6γ)=5.2 *9*.
		2486.43	10-	485.6 *1*	2.0 *4*	Q	DCO= 1.1 *3*.
2980.44	11-	2445.74	9-	534.7 *1*	1.4 *2*	Q	DCO= 1.2 *3*.
2980.92	12-	2507.09	10-	473.8 *1*	1.6 *3*		
		2486.43	10-	494.6 *2*	0.6 *1*		
3027.5	(11-)	2730.36	(10-)	297.1 *1*	1.7 *2*	(D+Q)	DCO= 1.0 *4*, ΔJ=1 gated. $(g_K-g_R)/Q_0$=0.14 *4* for Iγ(572.2γ)/Iγ(297.1γ)=0.24 *11*.
		2455.26	(9-)	572.2 *20*	0.4 *2*		
3077.9	13+	2775.3	12+	302.5 *1*	9.1 *18*	D+Q	DCO= 0.9 *1*, ΔJ=1 gated.

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

E_i^{level}	J_i^π	E_f^{level}	J_f^π	E_γ	I_γ	Mult.†	Comments
							$(g_K-g_R)/Q_0$=0.054 *6* for $I\gamma(585.6\gamma)/I\gamma(302.5\gamma)$=0.47 *9*.
		2492.4	11+	585.6 *1*	4.2 *9*	Q	DCO= 1.8 *4*, ΔJ=1 gated.
3106.10	12-	2823.30	11-	282.8 *1*[c]	1.4 *2*[c]		$(g_K-g_R)/Q_0$=0.074 *4* for $I\gamma(542.5\gamma)/I\gamma(282.8\gamma)$=0.53 *6*.
		2563.32	10-	542.5 *5*	0.7 *1*		
3112.6	14+	2372.13	12+	740.5 *1*	4.3 *6*	Q	DCO= 0.9 *1*.
3224.02	13-	2710.42	11-	513.6 *1*	2.6 *5*	Q	DCO= 1.1 *2*.
3269.21	13-	2741.31	11-	527.9 *1*	1.3 *2*	Q	DCO= 0.8 *3*.
3319.5	(12-)	2738.86	10-	580.6 *4*	0.2 *1*		
3342.6	(12-)	3027.5	(11-)	315.1 *1*	0.7 *1*	(D+Q)	DCO= 1.0 *5*, ΔJ=1 gated. $(g_K-g_R)/Q_0$=0.12 *3* for $I\gamma(612.2\gamma)/I\gamma(315.1\gamma)$=0.44 *22*.
		2730.36	(10-)	612.6 *10*	0.3 *2*		
3398.0	14+	3077.9	13+	320.0 *1*	6.7 *17*	D+Q	DCO= 1.0 *2*, ΔJ=1 gated. $(g_K-g_R)/Q_0$=0.060 *10* for $I\gamma(622.7\gamma)/I\gamma(320.0\gamma)$= 0.61 *18*.
		2775.3	12+	622.7 *1*	4.1 *11*	Q	DCO= 1.8 *4*, ΔJ=1 gated.
3409.9	13-	3106.10	12-	303.8 *1*	0.8 *1*		$(g_K-g_R)/Q_0$=0.068 *6* for $I\gamma(586.8\gamma)/I\gamma(303.8\gamma)$= 0.88 *13*.
		2823.30	11-	586.8 *5*	0.7 *1*		
3415.6	(12)	2492.4	11+	923.1 *1*	1.9 *3*	D+Q	DCO= 1.2 *3*, ΔJ=1 gated.
3517.63	(14-)	2980.92	12-	536.7 *1*	1.0 *2*		
		2972.03	12-	545.7 *5*	0.4 *1*		
3549.53	14-	2980.92	12-	568.6 *10*	<0.2		
		2972.03	12-	577.5 *1*	0.9 *2*	Q	DCO= 1.0 *2*.
3567.6	(13-)	2980.44	11-	587.2 *3*	0.7 *1*	(Q)	DCO= 0.8 *4*.
3676.8	(13)	3415.6	(12)	261.2 *1*	1.4 *2*		
		2775.3	12+	901.8 *3*	0.3 *1*		
3733.2	14-	3409.9	13-	323.3 *1*	0.5 *1*		$(g_K-g_R)/Q_0$=0.060 *4* for $I\gamma(627.4\gamma)/I\gamma(323.3\gamma)$= 1.44 *19*.
		3106.10	12-	627.4 *5*	0.7 *1*		
3736.1	15+	3398.0	14+	338.0 *1*	1.4 *3*		$(g_K-g_R)/Q_0$=0.055 *7* for $I\gamma(658.2\gamma)/I\gamma(338.0\gamma)$= 0.94 *20*.
		3077.9	13+	658.2 *1*	1.3 *3*		
3754.5	15+	3398.0	14+	356.5 *1*	7.1 *25*	D+Q	DCO= 0.9 *2*, ΔJ=1 gated.
		3077.9	13+	676.8 *2*	3.6 *13*	Q	DCO= 1.7 *6*, ΔJ=1 gated.
3807.12	15-	3224.02	13-	583.1 *1*	1.3 *2*	Q	DCO= 1.2 *3*.
3879.71	15-	3269.21	13-	610.5 *1*	0.8 *1*	Q	DCO= 1.1 *6*.
3893.3	16+	3754.5	15+	138.8 *1*	3.6 *6*	(M1)[b]	
3909.8	16+	3112.6	14+	797.2 *1*	1.3 *2*	Q	DCO= 0.9 *2*.
3965.9	(14)	3676.8	(13)	289.1 *1*	0.8 *4*		$(g_K-g_R)/Q_0$>0.032 for $I\gamma(550.3\gamma)/I\gamma(289.0\gamma)$<0.31.
		3415.6	(12)	550.3 *10*	0.2 *1*		
4040.2	17-	3893.3	16+	146.9 *1*	4.4 *7*	(E1)[b]	
4074.1	15-	3733.2	14-	340.9 *2*	0.3 *1*		$(g_K-g_R)/Q_0$=0.067 *9* for $I\gamma(664.2\gamma)/I\gamma(340.9\gamma)$=1.5 *4*.
		3409.9	13-	664.2 *5*	0.4 *1*		
4078.5	16+	3754.5	15+	324.0 *1*	2.4 *4*		
4081.2	16+	3736.1	15+	345.1 *2*	0.3 *1*		$(g_K-g_R)/Q_0$=0.057 *8* for $I\gamma(683.2\gamma)/I\gamma(345.1\gamma)$=1.2 *3*.
		3398.0	14+	683.2 *3*	0.5 *2*		
4116.5	(16-)	3517.63	(14-)	598.9 *2*	0.5 *1*		
4196.9	(15-)	3567.6	(13-)	629.3 *2*	0.3 *1*		
4210.6	16-	3549.53	14-	661.1 *2*	0.7 *2*	Q	DCO= 0.9 *3*.
4279.9	(15)	3965.9	(14)	314.0 *1*	0.6 *4*		$(g_K-g_R)/Q_0$>0.044 for $I\gamma(603.1\gamma)/I\gamma(314.0\gamma)$<0.43.
		3676.8	(13)	603.1 *10*	0.2 *1*		
4292.7	17+	3893.3	16+	399.4 *1*	2.9 *5*		

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

E_i^{level}	J_i^{π}	E_f^{level}	J_f^{π}	E_γ	I_γ	Mult.†	Comments
4421.2	18-	4040.2	17-	380.9 *1*	2.4 *4*		
4430.1	17+	4078.5	16+	351.6 *1*	1.1 *2*		$(g_K-g_R)/Q_0$=0.042 *6* for Iγ(675.5γ)/Iγ(351.6γ)=0.17 *4*.
		3754.5	15+	675.5 *11*	0.2 *1*		
4453.4	(17+)	4081.2	16+	371.3 *10*	<0.1		
		3736.1	15+	717.3 *10*	0.3 *1*		
4455.7	17-	3807.12	15-	648.6 *2*	0.6 *1*	Q	DCO= 1.0 *3*.
4570.5	(17-)	3879.71	15-	690.8 *3*	0.3 *1*		
4690.6	18+	3909.8	16+	780.8 *1*	0.6 *2*	Q	DCO= 0.9 *2*.
4711.5	18+	4292.7	17+	418.8 *1*	1.1 *2*		$(g_K-g_R)/Q_0$=0.015 *9* for Iγ(818.1γ)/Iγ(418.8γ)= 0.66 *25*.
		3893.3	16+	818.1 *6*	0.7 *3*		
4779.2	(18-)	4116.5	(16-)	662.7 *2*	0.4 *1*		
4780.0	(18)	4040.2	17-	739.8 *2*	0.9 *2*		
4804.6	18+	4430.1	17+	374.5 *2*	0.4 *1*		$(g_K-g_R)/Q_0$=0.029 *9* for Iγ(725.7γ)/Iγ(374.5γ)=0.6 *3*.
		4078.5	16+	725.7 *5*	0.2 *1*		
4819.8	19-	4421.2	18-	398.5 *1*	1.1 *3*		$(g_K-g_R)/Q_0$=0.034 *11* for Iγ(779.9γ)/Iγ(398.5γ)= 0.24 *11*.
		4040.2	17-	779.9 *3*	0.3 *1*		
4847.1	(18+)	4081.2	16+	765.9 *10*	0.3 *1*		
		3909.8	16+	937.3 *10*	0.2 *1*		
4954.3	(18-)	4210.6	16-	743.7 *10*	0.3 *1*		
5148.2	19+	4711.5	18+	436.6 *9*	0.4 *1*		$(g_K-g_R)/Q_0 \approx 0.032$ for Iγ(855.5γ)/Iγ(436.6γ)≈0.65.
		4292.7	17+	855.5 *4*	<0.2		
5170.3	(19-)	4455.7	17-	714.6 *3*	<0.3		
5191.5	(19)	4780.0	(18)	411.4 *2*	0.4 *1*		
5199.3	(19+)	4804.6	18+	394.7 *2*	0.3 *1*		
5225.5	(19+)	4453.4	(17+)	772.1 *10*	<0.2		
5235.5	20-	4819.8	19-	415.6 *2*	0.4 *1*		$(g_K-g_R)/Q_0$=0.025 *9* for Iγ(814.8γ)/Iγ(415.6γ)=0.7 *3*.
		4421.2	18-	814.8 *4*	0.3 *1*		
5338.2	(19-)	4570.5	(17-)	767.7 *10*	<0.2		
5428.3	(20+)	4690.6	18+	737.7 *2*	<0.3		
5618.2	(20)	5191.5	(19)	426.7 *2*	<0.2		$(g_K-g_R)/Q_0 \approx 0.010$ for Iγ(838.4γ)/Iγ(426.6γ)≈0.72.
		4780.0	(18)	838.4 *5*	<0.1		
5666.6	21-	5235.5	20-	431.2 *10*	<0.1		$(g_K-g_R)/Q_0 \approx 0.034$ for Iγ(846.7γ)/Iγ(431.2γ)≈0.71.
		4819.8	19-	846.7 *10*	<0.1		

† From DCO ratios. The assignment D+Q refers to ΔJ=1 transition implied by DCO ≈ 0.6 for ΔJ=2 gate and ≈ 1 for ΔJ=1 gate; the assignment Q refers to ΔJ=2 transition implied by DCO ≈ 1 for ΔJ=2 gate and ≈ 1.7 for ΔJ=1 gate. All ΔJ=2 transitions are expected to be E2 rather than M2, and ΔJ=1 transitions M1+E2.
[a] From figure 2 of 1995Sh27, not listed in authors′ table 1.
[b] 1995Sh27 deduce M1 for 139γ and E1 for 147γ based on expected equality of total transition intensities of 139γ and 147γ. All other possible combinations of multipolarities for these two γ rays give inconsistent ratios.
[c] Multiply placed with intensity suitably divided.

^{180}Hf(α,2nγ) 1977Je02

1977Je02: E=26 MeV. Measured Eγ, Iγ, $\gamma\gamma$ using two large volume Ge(Li) detectors and a small Ge(Li) detector of better resolution for low-energy γ rays.
1969No05: E=27 MeV. Natural Hf target, measured Eγ, Iγ, ce, $\alpha\gamma$(t), lifetime. α total of 7 γ rays reported, five in g.s. band up to 10+ and two from a 1.4-μs isomer at 2230 keV.
Other: 1965La02: g.s. band reported up to 10+.

^{182}W Levels

Nuclear Level Sequences

A Kπ=0+, g.s. band.
B Kπ=2, γ band.
C Kπ=0, β band.
D Kπ=2-, octupole band.
E π5/2[402]$\otimes\pi$7/2[404], Kπ=6+.
F ν9/2[624]$\otimes\nu$11/2[615]], Kπ=10+.
G ν9/2[624]$\otimes\nu$1/2[510], Kπ=4-.
H ν9/2[624]$\otimes\nu$3/2[512], Kπ=6-.
I π9/2[514]$\otimes\pi$5/2[402], Kπ=7-.
J ν9/2[624]$\otimes\nu$7/2[503], Kπ=8-.
K ν9/2[624]$\otimes\nu$1/2[510], Kπ=5-.

Seq.	E(level)	$J^{\pi\dagger}$	$T_{1/2}$	Comments
A	0.0	0+		
A	100.11 *10*	2+		
A	329.42 *12*	4+		
A	680.47 *14*	6+		
A	1144.47 *17*	8+		
B	1221.50 *12*	2+		
C	1257.37 *17*	2+		
D	1289.19 *13*	2-		
B	1331.19 *13*	3+		
D	1373.88 *12*	3-		
B	1442.90 *13*	4+		
D	1487.55 *13*	4-		
C	1510.24 *15*	4+		
G	1553.25 *13*	4-		
D	1621.34 *13*	5-		
B	1623.62 *17*	5+		
G	1660.45 *13*	5-		
A	1712.13 *22*	10+		
E	1756.83 *14*	6+		
G	1769.05 *13*	6-		
K	1809.85 *16*	5-		
D	1810.93 *14*	6-		
H	1829.64 *13*	6-		
G	1917.24 *16*	7-		
H	1960.41 *13*	7-		
E	1971.23 *18*	7+		
I	1978.52 *21*	(7-)		
D	1993.84 *16*	(7-)		
	2087.75 *17*			
H	2114.50 *15*	(8-)		
J	2120.58 *16*	(8-)		
K	2131.4 *3*	7-		
I	2204.72 *23*	(8-)		
E	2212.93 *20*	(8+)		
D	2225.53 *17*	(8-)		
F	2230.80 *22*	10+	1.4 μs *1*	$T_{1/2}$: from 1969No05.
H	2274.2 *3*	(9-)		

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^{182}W Levels (continued)

Seq.	E(level)	Jπ†	$T_{1/2}$	Comments
K	2324.0 *3*	(8-)		
J	2328.24 *18*	(9-)		
	2334.4 *3*			Jπ: (11-) proposed in figure 4 of 1977Je02 seems incorrect since 355.9γ to (7-).
A	2372.74 *24*	12+		
D	2446.14 *19*	(9-)		
I	2456.02 *25*	(9-)		
E	2480.35 *23*	(9+)		
	2487.55 *20*			
F	2493.10 *24*	(11+)		
J	2564.34 *20*	(10-)		
	2711.4 *3*			
I	2731.3 *3*	(10-)		
D	2739.6 *4*	(10-)		
E	2770.8 *3*	(10+)		g_K=+0.96 *19* or -0.46 *19* for Iγ(558.2)/Iγ(290.4)=0.57 *30*; +1.02 *26* or -0.53 *26* for Iγ(558.2)/Iγ(290.4)=0.48 *30*.
F	2776.2 *3*	(12+)		
J	2824.54 *23*	(11-)		
D	2980.64 *22*	(11-)		
I	3030.1 *3*	(11-)		
F	3079.4 *3*	(13+)		g_K=-0.27 *13* (sign of mixing ratio is negative from γ(θ) data for 11+ to 10+ and 12+ to 11+ transitions in Kπ=10+ band.
J	3104.3 *4*	(12-)		
A	3112.8 *3*	(14+)		
F	3399.6 *3*	(14+)		
F	3736.6 *11*	(15+)		

† As proposed by 1977Je02 based on γ(θ) data, band assignments and previous assignments in β decay. The assignments are consistent with those in Adopted Levels, with only the difference of parentheses in a few cases.

γ(^{182}W)

E_i^{level}	J_i^π	E_f^{level}	J_f^π	E_γ	I_γ†	Mult.	Comments
100.11	2+	0.0	0+	100.1 *1*	35 *3*	[a]	
329.42	4+	100.11	2+	229.3 *1*	100	(Q)[ab]	
680.47	6+	329.42	4+	351.1 *1*	80 *6*	(Q)[ab]	
1144.47	8+	680.47	6+	464.0 *1*	48 *4*	(Q)[ab]	
1221.50	2+	100.11	2+	1121.4 *1*	24.5 *20*		
		0.0	0+	1221.8 *4*	16.6 *13*		
1257.37	2+	329.42	4+	927.6 *2*	1.77 *18*		
		100.11	2+	1157.7 *4*	2.33 *19*		
		0.0	0+	1257.2 *4*	3.4 *3*		
1289.19	2-	100.11	2+	1189.1 *2*	10.3 *8*		
1331.19	3+	329.42	4+	1001.8 *1*	3.5 *3*		
		100.11	2+	1230.9 *2*	13.9 *11*		
1373.88	3-	1289.19	2-	84.7 *1*	3.8 *3*		
		1257.37	2+	116.4 *2*	0.54 *4*		
		1221.50	2+	152.4 *1*	10.0 *10*	D[c]	
		100.11	2+	1273.9 *4*	2.9 *5*		I_γ: 0.94 expected from branching ratios in Adopted Gammas.
1442.90	4+	329.42	4+	1113.5 *1*	5.6 *5*		
		100.11	2+	1342.3 *2*	5.2 *4*		
1487.55	4-	1373.88	3-	113.5 *1*	10.6 *9*	D[c]	
		1331.19	3+	156.4 *1*	8.7 *7*	D[c]	
		1289.19	2-	198.4 *1*	5.3 *4*		
1510.24	4+	329.42	4+	1180.5 *4*	3.2 *3*		
		100.11	2+	1410.9 *5*	0.77 *16*		
1553.25	4-	1373.88	3-	179.4 *1*	1.92 *15*		
		1331.19	3+	222.0 *1*	6.4 *6*		

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

E_i^{level}	J_i^π	E_f^{level}	J_f^π	E_γ	I_γ[†]	Mult.	Comments
		1289.19	2-	264.0 *1*	2.56 *20*	(Q)[b]	
		100.11	2+	1454.3 *5*	1.75 *19*		
1621.34	5-	1510.24	4+	111.1 *3*	0.4 *2*		
		1487.55	4-	133.8 *1*	4.1 *3*	D[c]	
		1442.90	4+	178.5 *1*	3.5 *3*	D[c]	
		1373.88	3-	247.5 *1*	7.9 *6*	(Q)[b]	
1623.62	5+	680.47	6+	943.3 *4*	0.89 *18*		
		329.42	4+	1293.9 *4*	5.1 *4*		
1660.45	5-	1553.25	4-	107.0 *2*	1.19 *8*		
		1510.24	4+	150.2 *1*	1.1 *2*		
		1487.55	4-	172.9 *1*	3.0 *3*		
		1442.90	4+	217.5 *1*	2.03 *16*	D[c]	
		1373.88	3-	286.6 *1*	2.2 *3*	(Q)[b]	
1712.13	10+	1144.47	8+	567.5 *1*	22.2 *18*		I_γ: uncertainty in table 1 of 1977Je02 seems too low to be consistent with others in the table. evaluators have increased this by a factor of 10.
1756.83	6+	1442.90	4+	313.6 *3*	0.4 *1*		
		680.47	6+	1076.4 *1*	6.0 *5*		
		329.42	4+	1426.8 *5*	5.1 *5*		
1769.05	6-	1660.45	5-	108.4 *2*	4.0 *3*		
		1623.62	5+	145.4 *2*	2.3 *5*	D[c]	
		1621.34	5-	147.8 *1*	2.5 *5*		
		1553.25	4-	215.4 *1*	3.3 *3*		
		1487.55	4-	281.5 *1*	5.1 *4*	(Q)[b]	
1809.85	5-	1553.25	4-	256.6 *1*	5.6 *4*		
1810.93	6-	1623.62	5+	186.7 *2*	0.56 *8*	D[c]	
		1621.34	5-	189.6 *1*	1.2 *1*		
		1487.55	4-	323.4 *1*	5.5 *5*	(Q)[b]	
1829.64	6-	1660.45	5-	169.2 *1*	4.0 *3*	D[c]	
		1623.62	5+	206.1 *2*	0.46 *7*		
		1553.25	4-	276.4 *1*	1.90 *20*		
		1487.55	4-	341.6 *1*	1.72 *14*		
1917.24	7-	1621.34	5-	295.9 *1*	2.50 *20*	(Q)[b]	
1960.41	7-	1829.64	6-	130.8 *1*	3.1 *3*	D+Q[c]	
		1769.05	6-	191.4 *1*	2.9 *2*	D[c]	
		1756.83	6+	203.6 *1*	1.62 *13*		
		1660.45	5-	299.8 *2*	1.90 *20*		
		1621.34	5-	339.1 *1*	2.78 *22*	(Q)[b]	
1971.23	7+	1756.83	6+	214.4 *1*	5.4 *4*		
1978.52	(7-)	1829.64	6-	148.9 *2*	0.7 *4*		
		1769.05	6-	209.9 *2*	0.50 *5*		
		1756.83	6+	221.2 *2*	1.50 *15*		
1993.84	(7-)	1621.34	5-	372.5 *1*	2.74 *22*	(Q)[b]	
2087.75		1769.05	6-	318.7 *1*	5.6 *5*		
2114.50	(8-)	1960.41	7-	154.1 *1*	1.1 *2*	D+Q[c]	
		1769.05	6-	345.4 *1*	2.24 *23*	(Q)[b]	
2120.58	(8-)	1960.41	7-	160.2 *1*	1.2 *1*	D+Q[c]	
2131.4	7-	1769.05	6-	362.4 *3*	1.30 *15*		
2204.72	(8-)	1978.52	(7-)	226.2 *1*	6.1 *6*		
2212.93	(8+)	1971.23	7+	241.7 *1*	2.57 *21*		
2225.53	(8-)	1810.93	6-	414.6 *1*	2.66 *21*	(Q)[b]	
2230.80	10+	1712.13	10+	518.5 *1*	6.3 *5*	(M1)[a]	α(K)exp=0.6 *2* (1969No05). Mult.: α(K)exp is consistent with M1, E1+M2 (50% admixture of both) or M2+E3 (25% M2+75% E3). The half-life of the 2230 level makes E3, M3 or higher multipolarities unlikely. M2 is also unlikely since the transition is expected to be highly K-forbidden and the forbiddenness factor of 10^3 is much smaller than expected for M2 transition and ΔK-L=6.
		1144.47	8+	1086.5 *1*	7.3 *6*		
2274.2	(9-)	1917.24	7-	357.0 *2*	5.6 *8*	(Q)[b]	

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

E_i^{level}	J_i^π	E_f^{level}	J_f^π	E_γ	I_γ[†]	Mult.	Comments
2324.0	(8-)	1917.24	7-	406.8 *2*	1.3 *5*		
2328.24	(9-)	2120.58	(8-)	207.7 *1*	1.32 *11*	D+Q[c]	
		2114.50	(8-)	213.6 *2*	1.7 *3*	D[c]	
2334.4		1978.52	(7-)	355.9 *2*	3.2 *6*		
2372.74	12+	1712.13	10+	660.6 *1*	4.9 *4*		
2446.14	(9-)	1993.84	(7-)	452.3 *1*	2.12 *17*	(Q)[b]	
2456.02	(9-)	2204.72	(8-)	251.3 *1*	5.8 *5*		
2480.35	(9+)	2212.93	(8+)	267.4 *1*	0.83 *9*		
2487.55		2087.75		399.8 *1*	5.6 *5*		
2493.10	(11+)	2230.80	10+	262.3 *1*	4.6 *4*	D+Q[c]	
2564.34	(10-)	2328.24	(9-)	236.1 *1*	2.12 *21*		
2711.4		2274.2	(9-)	437.2 *1*	2.76 *22*		
2731.3	(10-)	2456.02	(9-)	275.3 *2*	1.34 *13*	D+Q[c]	
2739.6	(10-)	2225.53	(8-)	514.1 *3*	1.2 *3*		
2770.8	(10+)	2480.35	(9+)	290.4 *2*	1.5 *3*		$(g_K-g_R)/Q_0$=0.11 *3* or 0.12 *4* for $I\gamma(558.2)/I\gamma(290.4)$=0.57 *30* or 0.48 *30*, respectively.
		2212.93	(8+)	558.2 *4*	0.85 *17*	(Q)[b]	
2776.2	(12+)	2493.10	(11+)	283.0 *1*	1.60 *20*	D+Q[c]	
2824.54	(11-)	2564.34	(10-)	260.2 *1*	1.20 *10*	D+Q[c]	
2980.64	(11-)	2446.14	(9-)	534.5 *1*	0.97 *9*		
3030.1	(11-)	2731.3	(10-)	298.8 *1*	1.2 *3*		
3079.4	(13+)	2776.2	(12+)	302 *1*	1.3 *5*	D[c]	$(g_K-g_R)/Q_0$=0.081 *20* for $I\gamma(586.0)/I\gamma(302.0)$=0.2 *1*.
		2493.10	(11+)	586.2 *1*	2.13 *17*	(Q)[b]	
3104.3	(12-)	2824.54	(11-)	279.8 *3*	1.17 *23*		
3112.8	(14+)	2372.74	12+	740.1 *2*	0.65 *7*		
3399.6	(14+)	3079.4	(13+)	320.2 *2*	1.10 *20*		
3736.6	(15+)	3399.6	(14+)	337 *1*	0.3 *2*		

[†] Large discrepancies between these values and the adopted branchings are observed.
[a] K-conversion electron lines seen by 1969No05, also L-conversion for 100γ and 229γ.
[b] Positive A_2 and magnitude consistent with ΔJ=2, quadrupole (expected to be E2), since A_4 values are not available, these assignments are not considered as unique by the evaluators.
[c] Negative A_2 indicates ΔJ=1, dipole or dipole+quadrupole (when magnitude of $A_2 > \approx 0.3$). In the latter case the transition is expected to be M1+E2.

^{180}W(t,p) 1980Mo11,1976Ca10

1980Mo11: E(t))=15 MeV, FWHM=20 keV. Measured $\sigma(\theta)$, multi-angle spectrograph and emulsion plates.
1976Ca10: E=15 MeV, measured $\sigma(\theta)$, Q3D spectrometer, FWHM=13 keV. Four excited states reported at 100, 329, 1221 and 1257. cross sections listed at seven angles from 15° to 60°.

^{182}W Levels

E(level)	J^π	L[#]	$d\sigma/d\Omega$ (max) (μb/sr).[#]	Comments
0.0		0	283[@]	
98 *3*[†]		2[&]	77	
327 *3*[†]			33	
1135 *5*[‡]		0	147	E(level): this level is not seen by 1976Ca10.
1225 *5*[†]		2[&]	41	
1266 *5*[‡]			20	
1444 *5*[‡]			10	

[†] From 1976Ca10.
[‡] From ^{184}W(p,t) (1980Mo11).
[#] From 1980Mo11 unless otherwise stated.
[@] From 1976Ca10.
[&] From 1976Ca10.

^{182}W(γ,γ):Mossbauer 1968Pe06,1965Ch14,1962Su14

Since 1960 many Mossbauer measurements have been reported for the first 2+ level in ^{182}W. These deduce various properties such as level width, lifetime, g factor, quadrupole moments, hyperfine structure, isomer shift, nuclear Zeeman effect, etc.
References: 1993Wa05, 1975Bo38, 1973Ru01, 1973We20, 1973Zi02, 1973ZiZX, 1972He01, 1971Ob02, 1970Me09, 1969Ch23, 1969Fr19, 1968Pe06, 1965Sh04, 1965Ch14, 1963Da15, 1962Su14, 1961Ka25, 1959Le36.

^{182}W Levels

E(level)	J$^\pi$	Comments
0	0+	
100	2+	g=+0.2605 *8* (1968Pe06), +0.23 *3* (1965Ch14). Γ(in eV)=0.34$\times10^{-6}$(1965Sh04), 0.35$\times10^{-6}$9 (1962Su14), 0.34$\times10^{-6}$3 (1961Ka25), 0.73$\times10^{-6}$ (1959Le36).

γ(^{182}W)

E_i^{level}	J_i^π	E_f^{level}	J_f^π	Eγ
100	2+	0	0+	100

^{182}W(γ,γ') 1993He15

1993He15: E $\approx$ 2.9-3.7 MeV bremsstrahlung radiation. Measured Eγ, Iγ, $\gamma\gamma(\theta)$, deduced g.s. transition widths.

^{182}W Levels

E(level)	J$^\pi$‡	$T_{1/2}$†	Cross section in eV.b	Comments
0.0	0+			
100	2+			E(level): rounded off value from Adopted Levels. Jπ: from Adopted Levels.
2382 *1*	1	7.9 fs *11*	21.6 *25*	$\Gamma_{\gamma0}$(reduced)=0.00176 eV 25. B(M1)(↑)=0.46 *6*. B(E1)(↑)=5.0$\times10^{-5}$7.
2474 *1*	1#	15 fs *2*	21.8 *26*	$\Gamma_{\gamma0}$(reduced)=0.00121 eV 17. B(M1)(↑)=0.31 *5*. B(E1)(↑)=3.5$\times10^{-5}$5.
2884 *1*	1#	16 fs *2*	20.9 *23*	$\Gamma_{\gamma0}$(reduced)=0.00085 eV 12. B(M1)(↑)=0.22 *3*. B(E1)(↑)=2.4$\times10^{-5}$3.
2892 *1*	(1)	27 fs *17*	4.0 *21*	$\Gamma_{\gamma0}$(reduced)=0.00029 eV 18. B(M1)(↑)=0.07 *4*. B(E1)(↑)=0.8$\times10^{-5}$5.
2941 *2*				
2996 *1*	1	6.7 fs *13*	13 *2*	$\Gamma_{\gamma0}$(reduced)=0.00094 eV 18. B(M1)(↑)=0.25 *5*. B(E1)(↑)=2.7$\times10^{-5}$5. K=(0) (1993He15).
3080 *1*	1#	17 fs *3*	13 *2*	$\Gamma_{\gamma0}$(reduced)=0.00056 eV 11. B(M1)(↑)=0.15 *3*. B(E1)(↑)=1.6$\times10^{-5}$3.
3163 *1*	1#	10.3 fs *14*	22.2 *25*	$\Gamma_{\gamma0}$(reduced)=0.00091 eV 12. B(M1)(↑)=0.24 *3*. B(E1)(↑)=2.6$\times10^{-5}$4.
3198 *1*	(1,2)#	16 fs *3*	12.8 *22*	$\Gamma_{\gamma0}$(reduced)=0.00054 eV 11. B(M1)(↑)=0.14 *3*. B(E1)(↑)=1.5$\times10^{-5}$3.
3365 *1*	1#	11.1 fs *23*	15 *3*	$\Gamma_{\gamma0}$(reduced)=0.00066 eV 13. B(M1)(↑)=0.17 *4*. B(E1)(↑)=1.9$\times10^{-5}$4.
3422 *1*	(1,2)#	10.3 fs *20*	19 *3*	$\Gamma_{\gamma0}$(reduced)=0.00072 eV 12. B(M1)(↑)=0.19 *3*. B(E1)(↑)=2.1$\times10^{-5}$4.
3601 *1*	1#	6.2 fs *12*	21 *3*	$\Gamma_{\gamma0}$(reduced)=0.00089 eV 18. B(M1)(↑)=0.23 *4*. B(E1)(↑)=2.5$\times10^{-5}$5.
3640 *2*				
3727 *2*				
3882 *2*				
3920 *2*	1			

† Deduced from $\Gamma_{\gamma0}$ and branching ratio.

‡ From $\gamma\gamma(\theta)$. The same assignments are the same in Adopted Levels.
# K=1 (1993He15).

$\gamma(^{182}W)$

E_i^{level}	J_i^π	E_f^{level}	J_f^π	E_γ	I_γ	E_i^{level}	J_i^π	E_f^{level}	J_f^π	E_γ	I_γ
2382	1	100	2+	2282 *1*	142 *20*	3198	(1,2)	100	2+	3098 *1*	59 *21*
		0.0	0+	2382 *1*	100			0.0	0+	3198 *1*	100
2474	1	100	2+	2374 *1*	66 *14*	3365	1	100	2+	3265 *1*	63 *17*
		0.0	0+	2474 *1*	100			0.0	0+	3365 *1*	100
2884	1	100	2+	2784 *1*	40 *11*	3422	(1,2)	100	2+	3322 *1*	53 *15*
		0.0	0+	2884 *1*	100			0.0	0+	3422 *1*	100
2892	(1)	100	2+	2792 *1*	150 *90*	3601	1	100	2+	3501 *1*	77 *19*
		0.0	0+	2892 *1*	100			0.0	0+	3601 *1*	100
2941		0.0	0+	2941 *2*		3640		0.0	0+	3640 *2*	
2996	1	100	2+	2896 *1*	168 *35*	3727		100	2+	3627 *2*	
		0.0	0+	2996 *1*	100			0.0	0+	3727 *2*	
3080	1	100	2+	2980 *1*	61 *18*	3882		100	2+	3782 *2*	
		0.0	0+	3080 *1*	100			0.0	0+	3882 *2*	
3163	1	100	2+	3063 *1*	54 *12*	3920	1	0.0	0+	3920 *2*	
		0.0	0+	3163 *1*	100						

^{182}W(e,e′) 1987PeZV

1987PeZV: E=75-345 MeV for scattering at 90° and 150-250 MeV for scattering at 45°. Measured cross sections at 45° and 90° for E(e)=75-345 MeV, deduced form factors and charge densities. the ground state band observed up to 8+. Comparisons with Hartree- Fock calculations and nuclear models (rotational model and IBA).
In table 6.1.1 of 1987PeZV, cross sections at 90° and 45° for 30 different electron energies are listed.

^{182}W Levels

E(level)†	J^{π}‡	Comments
0	0+	RMS radius=5.361 fm *4* (1987PeZV). dσ/dΩ=1.55 mb/sr *4* at 45° and 148.35 MeV; 0.466 mb/sr *16* at 90° and 75.9 MeV. In table 6.1.1 of 1987PeZV, cross sections at 45° are listed for four higher (175-252 MeV) electron energies and at 90° for 24 higher (89-343 MeV) electron energies.
100	2+	B(E2)=4.14 *3* (1987PeZV). B(E2)=4.34 *8* is also listed by 1987PeZV in table 6.1.3. dσ/dΩ=57.4 μb/sr *14* at 45° and 174.8 MeV; 33.7 μb/sr *16* at 90° and 75.9 MeV. In table 6.1.1 of 1987PeZV, cross sections at 45° are listed for three higher (199-252 MeV) electron energies and at 90° for 24 higher (89-343 MeV) electron energies.
329	4+	dσ/dΩ=5.3 μb/sr *7* at 45° and 148.35 MeV; 0.62 μb/sr *9* at 90° and 88.97 MeV. In table 6.1.1 of 1987PeZV, cross sections at 45° are listed for four higher (174-252 MeV) electron energies and at 90° for 23 higher (89-343 MeV) electron energies.
681	6+	dσ/dΩ=20 nb/sr *6* at 90° and 127.0 MeV. In table 6.1.1 of 1987PeZV, cross sections are listed at 90° for 16 higher (140-329 MeV) electron energies.
1144	8+	E(level): this level is close in energy of the first excited 0+ state at 1136, but 1987PeZV discuss that in (e,e′), the 0+ state is not expected to be populated, thus all of the 1144 peak is due to 8+. dσ/dΩ=2.1 nb/sr *10* at 90° and 155.85 MeV. In table 6.1.8 of 1987PeZV, cross sections are listed at 90° for seven higher (166-241 MeV) electron energies.

† Rounded values from Adopted Levels.
‡ From Adopted Levels.

^{182}W(n,n′γ) 1975De01

1975De01: E=fast reactor spectrum (energy range not specified). The decay scheme was derived by the authors by comparison with other experiments. Measured Eγ, Iγ with a Ge(Li) detector.
1998Be62 (also 2000De59): measured γ(θ), deduced mixing ratios. this work is from the same laboratory as 1975De01.

^{182}W Levels

Nuclear Level Sequences

A g.s. band.
B Kπ=0+ β band.
C Kπ=2+ γ band.
D Kπ=2- octupole band.

Seq.	E(level)†	Jπ‡	Relative population intensity	Comments
A	0.0	0+		
A	100.09 *9*	2+	72×10^1 *23*	
A	329.44 *13*	4+	81 *25*	
A	680.49 *16*	6+	15 *4*	
B	1135.70 *15*	0+	13.4 *15*	
A	1144.4 *4*	8+	1.4 *4*	
C	1221.43 *9*	2+	30 *8*	
B	1257.48 *11*	2+	34.0 *15*	
D	1289.16 *13*	2-	44 *7*	
C	1331.14 *12*	3+	24 *4*	
D	1373.86 *17*	3-	20 *5*	
C	1442.97 *17*	4+	10 *2*	
D	1487.7 *4*	4-	12 *6*	
B	1510.22 *19*	4+	12 *1*	
	1553.0 *2*	4-	9 *3*	
D	1621.2 *5*	5-	8 *3*	
C	1623.3 *3*	(5)+	7.3 *10*	
	1660.2 *3*	5-	0.9 *5*	
	1756.3 *4*	6+	2.5 *7*	
	1765.44 *24*		4.8 *10*	Jπ: 3- (1975De01).
	1768.3 *5*	(6)-	1.5 *5*	
	1813.4 *3*			
	1833.1 *6*			
	1856.2 *3*	(2+)	5.3 *13*	Jπ: (1,2,3)+ (1975De01).
	1856.9 *4*	1	5.8 *14*	
	1871.2 *3*	1-	5.5 *10*	
	1887.87 *23*		3.7 *5*	Jπ: (3-) (1975De01).
	1918.6 *4*		4.7 *7*	Jπ: (2-) (1975De01).
	1959.31 *21*	(2+)	10.5 *20*	Jπ: 3+,(2+) (1975De01).
	1960.6 *4*	6-		
	1981.8 *3*		4.5 *9*	Jπ: (3+) (1975De01).
	2016.6 *10*		0.9 *3*	
	2023.2 *5*	(3-)	2.0 *7*	
	2057.4 *10*	1	≤1.8	Jπ: 1+ (1975De01).
	2110.3 *8*	(2-,3-)	≤2.0	Jπ: 1+ (1975De01).
	2116.1 *6*		2.3 *5*	Jπ: 2+ (1975De01).
	2143.1 *4*			
	2148.1 *6*	(3-)	2.1 *4*	Jπ: 2+ (1975De01).
	2173.9 *5*		1.8 *4*	Jπ: 2+,3- (1975De01).
	2183.6 *5*	(2-,3-)	3.0 *15*	Jπ: 2- (1975De01).
	2207.0 *8*	(3-)		
	2209.2 *3*	3-	3.6 *7*	Jπ: (2+) (1975De01).
	2239.5 *10*	(3+)	1.1 *3*	Jπ: 0+ (1975De01).
	2274.3 *7*	(3)-	2.3 *6*	
	2283.5 *5*	1	1.4 *5*	Jπ: 1+ (1975De01).

† From least-squares fit to Eγ′s.

‡ From Adopted Levels.

$\gamma(^{182}W)$

A_2 and A_4 values are from 1998Be62.

E_i^{level}	J_i^π	E_γ	I_γ†	Mult.‡	δ	Comments
Unplaced		170.6 *8*	1.4 *4*			
		256.2 *3*	2.7 *8*			
		365.6 *2*	1.6 *4*			
		564.0 *8*	2.1 *5*			
		573.8 *8*	0.70 *25*			
		586.0 *8*	0.40 *15*			
		622.8 *8*	0.60 *20*			Placement: 1871.1 to 1257.4 (1975De01) is incorrect.
		678.2 *6*	0.88 *25*			
		738.1 *10*	0.40 *20*			
		744.6 *8*	1.1 *3*			
		777.6 *10*	0.44 *20*			
		798.2 *4*	1.8 *4*			
		867.6 *3*	0.55 *10*			
		888.8 *5*	1.3 *3*			
		959.6 *3*	1.3 *3*			
		979.1 *4*	0.90 *25*			
		1066.0 *10*	0.30 *15*			
		1088.6 *4*	0.50 *15*			
		1101.1 *3*	1.0 *2*			Placement: 1331.1 to 329.4 (1975De01) is incorrect.
		1438.1 *4*	1.5 *3*			
		1446.1 *8*	1.1 *3*			
		1468.0 *10*	1.0 *3*			
		1503.8 *10*	0.6 *3*			
		1510.4 *10*	0.6 *3*			
		1521.0 *10*	0.6 *2*			
		1538	<0.15			
		1544.8 *8*	0.70 *20*			
		1588.7 *10*	0.7 *3*			
		1614.0 *10*	0.9 *3*			
		1649.7 *10*	0.6 *2*			
		1662.2 *5*	1.8 *4*			
		1672.6 *10*	0.9 *3*			
		1714.0 *10*	0.5 *2*			
		1745.6 *4*	2.6 *5*			
		1833.0 *20*	0.30 *20*			
		1843.0 *20*	0.40 *15*			
		1944.6 *8*	0.6 *3*			
		1990.7 *8*	0.9 *3*			
		2039.9 *10*	0.35 *20*			
		2067.0 *10*	1.1 *4*			
		2145.4 *12*	0.8 *3*			
		2185.4 *10*	1.2 *3*			
		2231.7 *12*	0.65 *25*			
		2294.7 *12*	0.9 *3*			
		2312.0 *20*	0.7 *3*			
		2428.6 *10*	1.2 *4*			
		2474.0 *20*	0.7 *3*			
		2635.0 *15*	0.4 *2*			
		2644.5 *15*	0.6 *2*			
		3093.0 *20*	0.5 *2*			
		3284.0 *20*	0.7 *3*			
100.09	2+	100.0 *3*	1.04×10^3 *20*	(Q)		Sign of A_4 should be negative for ΔJ=2, Q transition.
329.44	4+	229.20 *15*	166 *16*	Q		

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

E_i^{level}	J_i^π	E_γ	I_γ[†]	Mult.[‡]	δ	Comments
680.49	6+	351.04 *10*[a]	21 *3*	Q		
1135.70	0+	1035.60 *12*	15.5 *12*			
1144.4	8+	463.9 *4*	1.4 *4*	Q		
1221.43	2+	1121.32 *8*[a]	56 *3*	D+Q	+25 *+10-8*	
		1221.45 *10*	44.0 *20*	(Q)		
1257.48	2+	927.9 *2*	8.9 *9*	(Q)		
		1157.42 *12*	10.7 *8*	D+Q	-7.9 *+12-17*	
		1257.45 *15*	16.9 *8*	Q		
1289.16	2-	67.8 *5*				
		1189.08 *10*	14.7 *10*			
		1289.5 *8*	1.5 *4*	(Q)		
1331.14	3+	1001.6 *2*	7.1 *7*	Q+D	-25 *+6-10*	δ: from 2000De59. Other: -30 *+20-30* (1998Be62).
		1231.03 *10*	33.1 *15*	Q+D	$+17\times10^1$ *+83-10*	$1/\delta$=+0.006 *+8-5* (2000De59).
1373.86	3-	152.4 *2*	23 *5*	D(+Q)	-0.03 *+4-6*	
		1273.8 *3*	1.3 *2*	D+Q	+0.35 *+5-3*	
1442.97	4+	1113.5 *3*	9.7 *10*	D+Q	+4.1 *3*	
		1342.8 *2*	5.0 *5*	Q		
1487.7	4-	156.5 *4*	10 *3*	D(+Q)	-0.01 *+3-4*	
1510.22	4+	831.0 *10*	1.6 *4*			
		1180.7 *2*	7.5 *5*	D+Q	-1.11 *+7-10*	
		1410.4 *3*	3.7 *4*	Q		
1553.0	4-	178.2 *5*[e]	6.4 *20*[e]			
		221.7 *3*	4.5 *15*	D		
		264.0 *2*	1.7 *3*	Q		
1621.2	5-	178.2 *5*[e]	6.4 *20*[e]			
1623.3	(5)+	942.5 *5*	2.3 *3*	D+Q	-2.9 *3*	
		1294.0 *3*	6.6 *7*			
1660.2	5-	286.3 *2*	0.70 *20*			
1756.3	6+	1075.8 *5*	1.3 *3*	D+Q	+2.50 *+20-17*	
		1426.9 *5*	1.2 *3*	Q		
1765.44		434.3 *2*	1.6 *4*			
		544.20 *15*	3.3 *5*			
1768.3	(6)-	280.6 *3*	1.1 *4*			
1813.4		524.2 *3*	1.6 *3*			
1833.1		1733.0 *6*	1.3 *3*			
1856.2	(2+)	598[c]	<3[b]			
		1527.0 *10*	0.30 *15*			
		1756.1 *3*	5.0 *12*			
1856.9	1	1757.0 *6*	1.5 *5*			
		1856.7 *6*	4.3 *10*	D		
1871.2	1-	1771.1 *4*	2.0 *4*			
		1871.1 *5*	2.1 *4*	D		
1887.87		556.7 *3*[e]	1.0 *3*[e]			
		666.4 *4*	0.55 *20*			
		1558.5 *4*	1.2 *3*			
1918.6		1818.5 *4*[e]	4.7 *7*[e]			δ: for J(1919)=2, δ=+0.06 *+11-6* or +2.0 *4*.
1959.31	(2+)	449.8 *3*	0.9 *4*	(Q)		
		627.5 *4*	2.1 *6*			
		1629.8 *2*	4.2 *6*			δ: for J(1959)=3, δ=+0.01 *+3-2* or -9 *+2-4*. Negative A_2 is inconsistent with ΔJ=2 transition.
		1859.1 *8*	3.0 *10*			δ: for J(1959)=3, δ=+0.05 *+7-8* or -5.0 +14-28.
		1960.2 *10*	0.58 *20*			
1960.6	6-	300.4 *3*	0.55 *20*			
1981.8		650.7 *3*	1.0 *3*			
		723.8 *7*	0.44 *15*			
		1653.1 *8*	1.4 *4*			
		1881.8 *8*	1.7 *3*			
2016.6		1688.3 *10*[d]	0.9 *3*			
		1915.3 *12*[d]	0.9 *3*			

Continued on next page (footnotes at end of table)

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

E_i^{level}	J_i^{π}	E_γ	I_γ[†]	Mult.[‡]	δ	Comments
2023.2	(3-)	470.4 *5*	1.5 *5*			
		733.5 *8*	0.40 *20*	D+Q		δ: -0.10 +6-10 or -2.8 +6-7.
2057.4	1	835.9 *6*[ec]	0.60 *20*[e]			
		1956.4 *8*[c]	1.8 *5*			
		2057.4 *10*	0.8 *3*	D		
2110.3	(2-,3-)	556.7 *3*[e]	1.0 *3*[e]	D+Q		δ: for J(2110)=3, δ=-0.64 *+4-7* or +12 +18-3 Assignment from 1998Be62.
		2010.2 *8*	0.36 *20*			
2116.1		2016.0 *6*	2.3 *5*			
2143.1		1813.6 *10*	1.5 *5*			
2148.1	(3-)	817.0 *10*	0.55 *20*			
		1818.5 *4*[ec]	4.7 *7*[e]			
		2048.0 *8*	2.1 *4*			
		2148[c]	<0.20			
2173.9		952.3 *6*	0.55 *15*			
		2074.0 *8*	1.3 *3*			
		2174[ec]	<0.3[e]			
2183.6	(2-,3-)	809.5 *8*	0.40 *20*			
		894.3 *8*	2.4 *12*			
		2084.2 *10*	0.20 *10*			
2207.0	(3-)	1877.5 *8*	0.8 *3*	D+Q	-0.28 *6*	
2209.2	3-	835.9 *6*[e]	0.60 *20*[e]			
		1879.6 *10*	0.6 *6*	D+Q		δ: -0.24 *8* or -2.6 +10-5.
		2109.1 *4*	1.8 *3*			
		2208.8 *6*	1.4 *3*			
2239.5	(3+)	2139.4 *10*	1.1 *3*			
2274.3	(3)-	786.5 *10*	0.30 *15*			
		900.5 *8*	2.0 *4*			
		2174[ec]	<0.3[e]			
2283.5	1	909.7 *6*	0.9 *4*			
		2283.5 *10*	1.4 *4*	D		

[†] Relative intensities normalized to 100 for γ's (1121γ and 1221γ) from 1221 level.
[‡] 1998Be62 list mult=E2 and E1 or M1 for Q and D, respectively, listed here. The evaluators prefer the latter terminology since since $\gamma(\theta)$ data are parity-insensitive.
[a] 1975De01 take value from 1970Wh03 and use it as a calibration standard.
[b] The quoted limit is lower than expected from branchings in in Adopted Gammas. The spectrum near 598 is dominated by impurity lines in (n,n$'\gamma$).
[c] Placement as given in table 2 of 1975De01, not shown in authors$'$ table 1.
[d] Placement as given in the text of 1975De01, not shown in authors$'$ table 1.
[e] Multiply placed with undivided intensity.

^{182}W(n,n′) 1981De02,1982Gu18,1985An20

1981De02: E(n))=3.4 MeV. Coupled channel and statistical model analysis.
1982Gu18: E(n))=0.3-5.0 MeV. Coupled channel and statistical model analysis.
1985An20: E(n))=4.87, 6.00 MeV. Coupled channel and rotational- vibrational model analysis.
Other: 1967Li11.

^{182}W Levels

E(level)†	Jπ‡	Comments	E(level)†	Jπ‡	E(level)†	E(level)†
0	0+		1229 *12*	2+	1492 *15*	1792 *20*
102 *8*	2+	β_2=0.223, β_4=-0.054.	1281 *22*	2+	1539 *16*	1858 *20*
326 *15*	4+		1309 *18*		1618 *24*	1914 *20*
671 *14*	6+		1357 *21*		≈1678	1988 *21*
1138 *16*	0+		1428 *38*		1745 *23*	

† From 1982Gu18.
‡ From angular distributions. Systematics of (n,n′) show that only positive parity states are strongly populated. The assignments are the same in Adopted Levels.
# Derived from B(E2).
@ From 1981De02.

^{182}W(p,p′),(pol p,p′),(α,α′) 1986Og02,1985La15,1975Le22

E(p))=65 MeV (1986Og02), E(pol p)=134 MeV (1985La15), E(α))=13-21 MeV.
1987Ic04 (also 1986Ic02): (pol p,p′).

^{182}W Levels

E(level)‡	Jπ†	Comments
0	0+	
100	2+	β_2=0.204 *5* (1985La15), 0.2256 (1986Og02), 0.206 (1975Le22).
329	4+	β_4=-0.057 *3* (1985La15), -0.0566 (1986Og02), -0.076 (1975Le22).
680	6+	β_6=0.001 *2* (1985La15), 0.0014 (1986Og02).
1221	2+	
1380	3-	

† From Adopted Levels.
‡ From 1985La15.

^{182}W(d,d′) 1971Gu17

1971Gu17: E=12.08 MeV, magnetic spectrograph, nuclear emulsion plates.

^{182}W Levels

E(level)	Jπ	E(level)	E(level)	E(level)
0.0		1257.4‡	1860 *7*	≈2328
100.1‡		1373.8‡	1889 *7*	≈2335
329.4‡		1442.8‡	1961 *8*	2607 *10*
680.5‡		1623 *5*	2149 *8*	2725 *11*
1138 *2*	0+†	1661 *5*	2176 *8*	
1221.4‡		1768 *6*	2208 *9*#	

† Assigned on the basis of energy and cross section.
‡ Rounded values from Adopted Levels.
# Multiplet.

Coulomb excitation 1991Wu05,1989Ku04,1971Mi08

1991Wu05 (also 1989Wu04): (^{58}Ni,^{58}Ni$'\gamma$) E=235 MeV and (^{136}Xe,^{136}Xe$'\gamma$) E=561 MeV. Measured γ, $T_{1/2}$ by recoil-distance method (RDM), particle $\gamma(\theta)$. Deduced E2 transition and static matrix elements.
1989Ku04: (^{208}Pb,^{208}Pb$'\gamma$) E=4.9 MeV/nucleon. Measured γ, ^{208}Pb-γ coin., (^{208}Pb)(γ)(θ). Deduced E2 matrix elements for g.s. band members up to 18+.
1979Hu01: (^{84}Kr,^{84}Kr$'\gamma$) E(^{84}Kr)=340 MeV.
1977Mc11: (α,$\alpha'\gamma$) E(α))=15 MeV.
1971Mi08: (^{16}O,^{16}Oγ) E(^{16}O)=45.5 MeV; (α,$\alpha'\gamma$) E(α))=15 MeV; (p,p$'\gamma$) E(p))=5 MeV.
Others:.
1991St04 (also 1988St16,1988St09): (^{37}Cl,^{37}Cl$'\gamma$) E=115 MeV and (^{58}Ni,^{58}Ni$'\gamma$) E=160 MeV. Measured $\gamma(\theta$,H,,T) using transient-field precession. Particle-γ coincidences.
1986Bi13: (^{32}S,^{32}S$'$) E=100 MeV. Measured $\gamma\gamma(\theta)$ attenuation from recoil-in vacuum.
Other references: 1975Le22, 1973Be40, 1968St13, 1965Eb03, 1964De07, 1964Al25, 1964Sc21, 1964Sp03, 1963Gr04, 1962Af01, 1962Go17, 1962Bi05, 1961Ha21, 1961Ke07, 1960An08, 1960El01, 1960Na13, 1959Bi10, 1958Al11, 1958Mc02, 1957Ch39, 1956Hu49, 1955Mc44.

^{182}W Levels

All the E2 transition matrix elements have positive sign (1991Wu05,1989Ku04).
B(E2) values given here are deduced from E2 transition matrix elements (experimental) of 1991Wu05 and 1989Ku04.
B(E2)(from 8+,2180) to 10+ member of γ band=1.45 +12-32 (1991Wu05). The 10+ member is not identified experimentally.

E(level)	J$^{\pi\dagger}$	$T_{1/2}$	Comments
0.0	0+		
100.1	2+	1.373 ns *14*	B(E2)=4.20 *8*. g=+0.23 *1*. B(E2): weighted average of 4.00 *20* (1961Ha21), 4.58 *40* (1963Gr04), 4.30 *8* (1968St13), 4.21 *7* (1973Be40), 5.0 *6* (1989Ku04), 3.76 *16* (1991Wu05). γ: average of measurements from 1965Eb03, 1964Sc21, 1963Kl04, 1963Ko02, 1962Go17, 1961Ke07. Static E2 matrix element=-2.00 *+4-8* (1991Wu05), -2.12 +23-21 (1989Ku04). $T_{1/2}$: weighted average of 1.366 ns 14 (1961Ke07,γ(t)), 1.43 ns 4 (1962Bi05,γ(t), earlier value was 1.55 ns 14 (1959Bi10)) and 1.372 ns 14 (1964Sc21, pulsed beam in (p,p$'\gamma$). B(E2)=4.20 *8* gives 1.35 ns 4.
329.4	4+	62 ps *3*	B(E2)=1.85 *+7 − 10* (1991Wu05). B(E2): other values: 2.08 *15* (1971Mi08), 2.20 *24* (1989Ku04) Static E2 matrix element=-2.32 *+9-27* (1991Wu05), -1.64 +64-17 (1989Ku04). $T_{1/2}$: from RDM (1991Wu05). B(E2) gives 72 ps 4.
680.5	6+	8.2 ps *9*	B(E2)=1.80 *5* (1991Wu05). B(E2): other values: 1.67 *17* (1971Mi08), 1.91 *10* (1979Hu01), 1.67 *17* (1989Ku04). Static E2 matrix element=-3.09 *+15-10* (1991Wu05), -1.55 +58-16 (1989Ku04). $T_{1/2}$: from RDM (1991Wu05). B(E2) gives 8.08 ps 18.
1144.5	8+	2.01 ps *17*	B(E2)=1.59 *+8 − 6* (1991Wu05). B(E2): other values: 1.92 *13* (1979Hu01), 1.74 *18* (1989Ku04) Static E2 matrix element=-4.10 *20* (1991Wu05), -1.52 *+16-79* (1989Ku04). $T_{1/2}$: from RDM (1991Wu05). B(E2) gives 2.10 ps 9.
1221.4	2+	0.434 ps *11*	B(E2)(from 0+,g.s.)=0.106 *3* (1991Wu05), 0.124 *6* (1971Mi08). B(E2)(from 2+,100)=0.040 *+3-1* (1991Wu05), 0.047 *3* (1971Mi08). B(E2)(from 4+,329)=0.000121 *+31-21* (1991Wu05). Static E2 matrix element=+1.94 *+10-4* (1991Wu05). $T_{1/2}$: weighted average of values deduced from B(E2)(from g.s.)=0.106 *3* and B(E2)(from 2+,100)=0.040 *+3-2*. Branchings used from adopted gammas.
1257	2+	1.71 ps *13*	$T_{1/2}$: from B(E2)(from 0+,g.s.)=0.028 *2* (1971Mi08) and adopted branching.
1289	2-		
1331.2	3+		
1374	3-		
1442.9	4+	0.32 ps *3*	B(E2)(from 2+,100)=0.029 *+3-2* (1991Wu05). B(E2)(from 4+,329)=0.060 *4* (1991Wu05). B(E2)(from 6+,680)=0.016 *+12-3* (1991Wu05). B(E2)(from 2+,1221)=1.03 *+22-5* (1991Wu05). Static E2 matrix element=-1.66 *11* (1991Wu05).

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^{182}W Levels (continued)

E(level)	J$^{\pi}$†	$T_{1/2}$	Comments
			$T_{1/2}$: from average of values deduced from B(E2)(from 2+,100) and B(E2)(from 4+). Branchings used from adopted gammas.
1623.6	(5)+		
1712.1	10+	0.76 ps *7*	B(E2)=1.37 *7* (1991Wu05). B(E2): other values: 1.84 *15* (1979Hu01), 1.90 *26* (1989Ku04) Static E2 matrix element=-4.75 *+10-69* (1991Wu05), -5.82 *59* (1989Ku04). $T_{1/2}$: from RDM (1991Wu05). B(E2) gives 0.85 ps 4.
1769.5	(6+)		B(E2)(from 4+,329)=0.025 *+1-3* (1991Wu05). B(E2)(from 6+,680)=0.090 *+3-10* (1991Wu05). B(E2)(from 8+,1144)=0.015 *+6-10* (1991Wu05). B(E2)(from 4+,1443)=1.24 *+25-5* (1991Wu05). Static E2 matrix element=-3.18 *+10-46* (1991Wu05).
2180.5	(8+)		B(E2)(from 6+,680)=0.024 *+1-2* (1991Wu05). B(E2)(from 8+,1144)=0.134 *+15-17* (1991Wu05). B(E2)(from 10+,1712)=0.012 *+10-8* (1991Wu05). B(E2)(from 6+,1769)=1.45 *+7-32* (1991Wu05). Static E2 matrix element=-4.6 *+3-4* (1991Wu05).
2372.7	12+	0.38 ps *2*	B(E2)=1.40 $+9-5$ (1991Wu05). B(E2): other values: 1.32 *33* (1979Hu01), 1.54 *+15-28* (1989Ku04). Static E2 matrix element=-6.0 *+7-4* (1991Wu05), -6.4 *6* (1989Ku04). $T_{1/2}$: from B(E2).
3112.8	(14+)	0.24 ps *6*	B(E2)=1.74 $+22-14$ (1991Wu05). B(E2): other value: 0.99 *+22-11* (1989Ku04). $T_{1/2}$: average of values deduced from B(E2) from 1991Wu05 and 1989Ku04. Static E2 matrix element=-6.1 *+29-15* (1991Wu05), -6.5 *+23-7* (1989Ku04).
3909.8	(16+)	0.14 ps *3*	B(E2)=2.2 $+5-7$ (1991Wu05). B(E2): other value: 1.04 *+16-21* (1989Ku04). Static E2 matrix element=-6.1 *+8-10* (1989Ku04). $T_{1/2}$: average of values deduced from B(E2) from 1991Wu05 and 1989Ku04.
4747.9	(18+)	0.088 ps *+22-17*	B(E2)=1.75 $+44-34$ (1989Ku04). Static E2 matrix element=-6.4 *+33-8* (1989Ku04). $T_{1/2}$: from B(E2).

† Positive parity states from Coulomb excitation analysis. Negative parity levels are inferred from comparison with similar levels populated in ^{184}W and ^{186}W (1977Mc11). B(E3) values could not be inferred due to impurities in the γ-ray spectrum. All assignments are the same in Adopted Levels.

$\gamma(^{182}W)$

E_i^{level}	J_i^{π}	E_f^{level}	J_f^{π}	E_γ§	$I_\gamma$$^{\phi}$	Mult.†	δ‡	Comments
100.1	2+	0.0	0+	100.1		E2		
329.4	4+	100.1	2+	229.3		E2		
680.5	6+	329.4	4+	351.1		E2		
1144.5	8+	680.5	6+	464.0		E2		
1221.4	2+	100.1	2+	1121.3	100	M1+E2	+16 *+16-7*	
		0.0	0+	1221.4	123 *4*	E2		
1257	2+	329.4	4+	928[a]	35 *2*	E2		
		100.1	2+	1157[a]	72 *5*	M1+E2	-9 *+3-6*	
		0.0	0+	1257[a]	100	E2		
1289	2-	100.1	2+	1189[a]		(E1)		
1331.2	3+	100.1	2+	1231.1				
1374	3-	1289	2-	85[ab]		(M1)		
		1221.4	2+	153[ab]		(E1)		
1442.9	4+	329.4	4+	1113.5		M1+E2[c]		
		100.1	2+	1342.8				
1623.6	(5)+	329.4	4+	1294.2				
1712.1	10+	1144.5	8+	567.6		E2		

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

E_i^{level}	J_i^{π}	E_f^{level}	J_f^{π}	E_{γ}[§]	I_{γ}[φ]	Mult.[†]	δ[‡]	Comments
1769.5	(6+)	680.5	6+	1089.0		(M1+E2)[c]		
		329.4	4+	1440.1				
2180.5	(8+)	1144.5	8+	1036.0		(M1+E2)[c]		
		680.5	6+	1500.0				
2372.7	12+	1712.1	10+	660.6		E2		
3112.8	(14+)	2372.7	12+	740.1		(E2)		
3909.8	(16+)	3112.8	(14+)	797.0				
4747.9	(18+)	3909.8	(16+)	838.1				E_{γ}: from 1989Ku04.

[†] From Adopted Gammas unless otherwise stated.
[‡] From $p\gamma(\theta)$ and $\alpha\gamma(\theta)$ 1971Mi08.
[§] From 1991Wu05 unless otherwise stated. For the γ band, the γ-ray energies are deduced from the level energies given by 1991Wu05.
[φ] Relative photon branching (1971Mi08).
[a] From 1971Mi08, 1979Hu01.
[b] Contamination from impurities partially obscure these transitions.
[c] From B(E2) and B(M1) calculations (1991Wu05).

^{183}W(d,t) 1973Kl06

$J\pi(^{183}W$ target)=1/2-.
E(d))=12.08 MeV, FWHM=7-8 keV. Measured $\sigma(\theta)$ at three angles 60°, 90° and 125°, broad-range magnetic spectrograph. Absolute cross section uncertainties are 20%.

^{182}W Levels

Band assignments proposed by 1973Kl06 from comparison of calculated and Q-reduced experimental cross sections (finger-print method).

Nuclear Level Sequences

- A $K\pi$=0+, g.s. band.
- B $K\pi$=0+, β band.
- C $K\pi$=2+, γ band.
- D $K\pi$=2-, octupole band.
- E Probable $K\pi$=4-, 9/2[624]⊗1/2[510].
- F Probable $K\pi$=5-, 9/2[624]⊗1/2[510].
- G Possible $K\pi$=6-, 9/2[624]⊗3/2[512].
- H Possible $K\pi$=1+, 1/2[521]⊗1/2[510].
- I Possible $K\pi$=0+, 1/2[521]⊗1/2[510].
- J Probable $K\pi$=2+, 3/2[512]⊗1/2[510].
- K Probable $K\pi$=1+, 3/2[512]⊗1/2[510].

Seq.	E(level)[†]	J^{π}[‡]	L[#]	$d\sigma/d\Omega$ (90°) (μb/sr)[a]	Comments
A	0	0+		4	
A	100 *2*	2+	1,3	169	
A	329 *2*	4+	3	39	
A	≈678	6+	>3	1.8	
B	≈1137	0+		0.9	
C	1221 *3*	2+	1,3	3	
B	1258 *3*	2+	1,3	11	
D	≈1288	2-		0.6	
C	1331 *3*	3+	3	36	
C	1442 *4*	4+	3,>3	4	
B	1510 *4*	4+	3,>3	8	
E	1553 *4*	4-	4	5	
C	1623 *5*	5+	(4)	2.1	$J\pi$: (5)+ in Adopted Levels.

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^{182}W Levels (continued)

Seq.	E(level)†	Jπ‡	L#	dσ/dΩ (90°) (μb/sr)[a]	Comments
E	≈1664	5-	(4)	2.1	
E	1768 *5*	6-	6	14	Jπ: (6)- in Adopted Levels.
F	1811 *6*	5-	4	11	
G	1831 *6*	6-	(6)	5	
J	1857 *6*	2+	(1,3)	19	Jπ: (2+) in Adopted Levels.
E	1916 *6*	7-	6	16	Jπ: (7)- in Adopted Levels.
	1923 *6*			≤4	
K	≈1957@	3+		≈21	Jπ: (2+) in Adopted Levels.
K	≈1961@	6-	6	≈12	
K	≈1966@			≈21	
	1985 *6*			≈5	
	2016 *7*		1,3	8	
K	2057 *7*@	1+	1,3	11	
	≈2071			≈3	
J	≈2086	4+		5	
H	≈2110&	1+	1	107	
F	2131 *7*	7-	6	12	
K	≈2148@&	2+		22	
	2171 *7*		3,1	17	
	2204 *7*		3,>3	13	
	≈2217			7	
I	≈2240&	(0,1)+	1	127	
	≈2270			≈3	
I	≈2284&	(0,1)+	1	147	
	≈2322&		3	≥61	
	2359 *8*		3	22	
	≈2376		4	≈37	
	≈2384		1,3	≈26	
	2395 *8*		3,1	38	
	2427 *8*&		3	18	
	2453 *8*		3,>3	62	
	2471 *8*		3	14	
	2492 *8*			16	

† Uncertainty for well-resolved peaks is quoted by 1973Kl06 as ranging from 2 keV for levels below 1200 to 8 keV at 2500. The evaluators have assigned 3 keV for levels 1221-1331, 4 keV for levels 1442-1553, 5 keV for level 1623-1768, 6 keV for levels 1811-1985, 7 keV for levels 2131-2204 and 8 keV for levels above 2204.
‡ As proposed by 1973Kl06 based on L-transfers and band assignments. The corresponding assignments are different in some cases in Adopted Levels.
# Approximate assignments within one unit from cross section data at three angles: 60°, 90°, and 125°.
@ Component of a composite peak, resolved with difficulty.
& Multiplet.
a Q-reduced Cross sections at 90°. Experimental cross sections are listed by 1973Kl06 at 60°, 90° and 125°.

^{183}W(^{3}He,α) 1973Kl06

1973Kl06: E(^{3}He)=20.3 MeV, FWHM=30 keV. Measured cross sections at 60°, broad-range magnetic spectrograph. Absolute cross section uncertainties are 20%.

^{182}W Levels

E(level)†	Jπ‡	dσ/dΩ (60°) (μb/sr)
100 *2*	2+	0.8
329 *2*	4+	0.6
1331 *3*	3+	1.1
1768 *5*	(6)-	8

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^{182}W Levels (continued)

E(level)†	Jπ‡	dσ/dΩ (60°) (μb/sr)
1831 *6*	6-	2.1
1916 *6*	(7)-	8
≈1961	6-	7
2131 *7*	(7-)	≈6

† From ^{182}W(d,t) (1973Kl06).
‡ From Adopted Levels.

^{184}W(p,t) 1980Mo11

1980Mo11 (also 1977Mo15): E(p))=21 MeV, E(t))=15 MeV, FWHM=20 keV. Measured $\sigma(\theta)$, multi-angle spectrograph and emulsion plates.
1972Ma15: E=17 MeV. Measured $\sigma(\theta)$. Five groups reported at 0, 100, 328, 1137 and 1225.
1970Ku06: E=51.7 MeV. Analyzed $\sigma(\theta)$ data, deduced Y_4 deformation parameter.

^{182}W Levels

E(level)	L	dσ/dΩ (max) (μb/sr)
0.0	0#	700
100 *5*		200
330 *5*		26
690 *5*		6
1135 *5*	0#	100
1219 *5*		60
1266 *5*		12
1372 *5*		7
1444 *5*		12
1626 *5*		3
1663 *5*†		5
1767 *5*†		15
1814 *5*		2
1824 *5*		8
1853 *5*		8
1890 *5*		20
1961 *5*†		22
2094 *10*		5
2117 *10*		3
2154 *10*		14
2175 *10*		17
2209 *10*		15
2251 *10*		4
2278 *10*		14
2311 *10*†		13
2331 *10*†		7
2363 *10*		34
2520 *10*†	0	14
2552 *10*	0	10
≈2625‡		30
2689 *10*		12
2725 *10*	0	22
2775 *10*		10
2815 *10*		5

† Doublet.
‡ Multiplet.
# Also from 1972Ma15.

^{186}W(n,5nγ) **2000Ya22**

2000Ya22: E=250-600 MeV spallation neutrons at WNR facility at LANSCE. Measured Eγ, Iγ, $\gamma\gamma$ using GEANIE array of HPGe and LEPS detectors including four HPGe detectors in close geometry.

^{182}W Levels

Nuclear Level Sequence

A g.s. band.

Seq.	E(level)	$J^{\pi\dagger}$
A	0	0+
A	100	2+
A	329	4+
A	680	6+
A	1144	8+
A	1712	10+
A	2374	12+

† From Adopted Levels.

$\gamma(^{182}W)$

E_i^{level}	J_i^π	E_f^{level}	J_f^π	E_γ	Comments
100	2+	0	0+	100	E_γ: rounded energy from Adopted Gammas.
329	4+	100	2+	229	
680	6+	329	4+	351	
1144	8+	680	6+	464	
1712	10+	1144	8+	568	
2374	12+	1712	10+	662	