^{182}Ta β^- decay (114.74 d) 1992Ch26,1992Su09,1990Me15

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

Parent: ^{182}Ta: E=0.0; $J^\pi=3^-$; $T_{1/2}$=114.74 d *12*; Q(β^-)=1814.5 *17*; %β^- decay=100.0

^{182}Ta-J^π: 3^-,4^- from (n,γ),E=0.002-3 keV and E=2 keV; log *ft*=8.32 to 1289, 2^- level in ^{182}W rules out 4^-.

^{182}Ta-$T_{1/2}$: The following measured values (in days) have been used in the different averaging procedures in the AVETOOLS computer code available at ANU website to arrive at the recommended value: 114.43 *4* (1980Sc07,4π ionization chamber), 114.740 *24* (1973Vi13, well-type NaI(Tl) detector, authors quoted uncertainty of 0.08 is 3.3σ), 115.0 *2* (1972Em01,4π ionization chamber), 117.3 *10* (1967Wa29, differential ionization chamber), 118.4 *5* (1958Sp17, GM counter), 114.80 *12* (1958Ke26), 115.05 *25* (1957Wr37, single-ion chamber, same group as 1972Em01 but different experimental setup used), 111.2 *5* (1952Ei12, single-ion chamber), 111 *1* (1951Si25, single-ion chamber), 117.5 *18* (Meitner, Ann.Phys. 6, 113 (1948)), 117 *3* (1947Se33), 117 *3* (Zumstein et al., Phys.Rev. 63, 59 (1943)). Others: 97 *8* (Oldenberg: Phys Rev 53, 35 (1938), 200 *100* (Fomin and Houtermans: Physik Zeits d. Sowjetunion 9, 273 (1936). The above measurements present a discrepant set of values; the weighted average or the LWM methods, both giving 114.62 *12*, are unacceptable with normalized χ^2=15.5. The normalized residuals method (NRM) gives 114.74 *5* with normalized χ^2=3.8, somewhat larger than the critical χ^2; with the following uncertainties adjusted: 0.04 to 0.12 in 1980Sc07, 0.5 to 1.4 in 1958Sp17 and 1952Ei12, 1 to 1.4 in 1951Si25. The Rajeval (RT) method gives 114.744 *23* with χ^2=2.2, but with larger adjustments in the uncertainties. Selection of the five most precise data points (1980Sc07,1973Vi13, 1972Em01,1958Ke26,1957Wr37) gives 114.739 *23* with χ^2=2.2 using the NRM method, with uncertainty adjustment from 0.04 to 0.14 in 1980Sc07. Weighted average and the LWM method give 114.62 *12*, still suffer from high χ^2 of 10.5. Thus the evaluators recommend value of 114.739 *23* from NRM method used on five most precise data points, but with uncertainty increased to 0.1%, to account for any systematic uncertainties which may not have been included in some of the precisely quoted measurements used in the present analysis.

^{182}Ta-Q(β^-): From 2012Wa38.

Main references for Eγ data: 2000He14 (evaluation and analysis), 1992Su09, 1990Me15, 1990Ja02, 1989Ka20, 1974La15.

Precise Eγ measurements of low-energy (<300 keV) γ rays with curved-crystal spectrometers: 1975Bo05, 1973Pi02 (also 1974Be26), 1970Ne11, 1965Ed01, 1964Da15, 1962Se10, 1958Be73, 1957Su01, 1955Mu19, 1952Mu45.

Main references for Iγ data: 1998Mi17, 1992Ch26, 1992Ke02, 1992Su09, 1990Me15, 1990Ja02, 1986Wa35, 1983Ji01, 1981Is08, 1980Sc07, 1977Ge12 (also 1976He18), 1974La15, 1971Ja21, 1970Wh03, 1969Sa25, 1966Ko12, 1965Ed01, 1964Da15.

Main references for multipolarities and mixing ratios: 1992Ch26 ($\gamma\gamma(\theta)$ and ce); 1983Ri05 ($\gamma(\theta$,temp) and γ(lin pol,temp)); 1980Sp01 ($\gamma(\theta)$,temp in ^{182}Re decay); 1976He18 (ce), 1975Qu01 ($\gamma\gamma(\theta)$); 1972Kr05 ($\gamma(\theta)$,temp); 1972He10 ($\gamma\gamma(\theta)$ and ce); 1971Ga37 (ce); 1967Ni03 (ce, subshell ratios for low energy transitions up to 264 keV), 1966Ko12 (ce), 1966Dz01 (ce) 1975We22 investigate E0 component in interband ΔJ=0, ΔPI=no transitions by comparing γ(ce)(θ) or (ce)(ce)θ) data with measured conversion coefficients. Also 1976Kl09 and 1990Ka35 for E0 transitions.

2000He14: recommended γ-ray energies from evaluation and analysis.

Additional information 1.

1998Mi17: γ-ray emission probabilities for selected transitions.

1997Ka47: cross sections in ^{182}Ta(n,γ) and from multi-element standard (MES) technique deduced emission probabilities for two γ rays at 1189 and 1221 keV.

1994KaZL: Eγ measured for 100-keV γ ray, Ge detector.

1992Ch26 (also 1989Ka20,1989Ka01,1981Ka22,1967Ma31): measured Eγ, Iγ, $\gamma\gamma$, ce, $\gamma\gamma(\theta)$, lifetime. For γ rays, HPGe detectors and for electrons mini-orange spectrometer were used.

1992Su09 (also 1993Li03): Measured Eγ, Iγ, $\gamma\gamma$ coin. In 1993Li03, five new γ rays and two new levels reported in 1990Ja02 were found to be non-existent.

1992Ke02: K-x rays and γ rays, emission probabilities.

1992Yo05: measured 1189$\gamma(\theta$,H,T), oriented ^{182}Ta, search for violation of parity (P), time reversal (T) and PT through measurement of $\gamma\gamma(\theta)$ for 1189γ from 1289, 2^- level which is close in energy to 1221, 2^+ level. No results are reported.

1991Fa12, 1983Fa18: γ anisotropy vs polarizing field and temperature, deduced nuclear quadrupole resonance, quadrupole moment and quadrupole interaction, nuclear orientation technique.

1990Ja02 (1983El02 from the same lab): measured Eγ, Iγ, $\gamma\gamma$ coin, $\gamma\gamma$(t). Deduced α(K)(exp) from their measured Iγ and using ce(K) data from literature. 1983El02 report 15 new transitions and 5 new levels based on such transitions. A later study 1990Ja02 from the same laboratory retracted many of these transitions, yet contained five new transitions and two new levels, not reported in any other study. These were later disproved in the work of 1993Li03.

^{182}Ta β^- decay (114.74 d) 1992Ch26,1992Su09,1990Me15 (continued)

1990Me15: Eγ, Iγ.
1990Ka35, 1977Ka30: 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.
1986Bu19: KLL Auger electron energies and intensities, mag spec.
1985Je05: Eγ with a crystal spectrometer; energy of 67.7γ measured as 67.75016 *12* keV.
1985GoZK: evaluated low energy Eγ data from curved-crystal data.
1984He12: Deduced transition energies for ^{182}Ta decay.
1984AlZN: pair conversion spectra.
1983Ri05: γ(θ,T) and γ(lin pol,T) on oriented ^{182}Ta, low temperature nuclear orientation.
1983Ji01: Eγ, Iγ.
1981Al21, 1980Al27: NMR, oriented nuclei in Fe, deduced g factor.
1981Is08: Eγ, Iγ, $\gamma\gamma$ coin.
1981YoZX: Iγ.
1980Sc07 (also 1983De11 for 3 γ rays): Iγ, $T_{1/2}$, $\beta\gamma$ coin and γ(x ray) coin.
1980Al27: NMR on oriented nuclei, deduced μ.
1980Ro22: Iγ.
1979MaZI: conversion electrons and K-x rays.
1978Bu26: L-subshell ratios for 100-keV γ using magnetic spectrometer.
1977Ka30: ce, penetration parameters.
1977Ge12, 1976He18 (also 1971He20,1970Gr13,1967He18,1967He22): Eγ, Iγ, ce.
1977VyZX: Eγ, Iγ.
1976Kl09: ce data for 1035.8 and 1135.9 transitions.
1975Bo05: Eγ, curved-crystal spectrometer.
1975Gr15: $\beta\gamma$(t), γ(ce)(t), deduced level lifetime.
1975Qu01: $\gamma\gamma$(θ).
1975We22: Eγ, Iγ, ce, γ(ce)(θ), (ce)(ce)(θ); data 1076, 1113, 1121, 1157, 1189, 1221, 1231 and 1427 γ rays.
1975Be26: Iγ of 31.7 and 42.7 γ rays.
1974La15: Eγ, Iγ.
1974Ha47: $\gamma\gamma$(θ,H), deduced g factor.
1973Be55: K-x rays.
1973El11: ce, Eγ.
1973Mi28: Subshell data for 100-keV transition.
1973Pi02, 1974Be26: Eγ by curved crystal spectrometer.
1973Se14: $\gamma\gamma$(θ), $\gamma\gamma$(θ,H), deduced g factor.
1973Vi13: $T_{1/2}$ of ^{181}Ta g.s.
1973ScYU: $\gamma\gamma$(θ).
1973GrXX: $\gamma\gamma$(t), level lifetimes.
1972Be94: $\gamma\gamma$(θ), $\gamma\gamma$(θ,H), deduced g factor.
1972De67: Eγ, Iγ of 5 γ rays from 31-85 keV, Si detector.
1972Em01: $T_{1/2}$ of ^{181}Ta g.s.
1972Ga23: Iγ, ce, sub-shell ce data.
1972He10: $\gamma\gamma$(θ), $\gamma\gamma$(θ,H), (ce)(ce)(t), L-subshell ce.
1972He20: (ce)(ce)(t), $\gamma\gamma$(θ,H), ce; level lifetime and μ.
1972Kr05: γ(θ,temp), oriented nuclei.
1972Li11: γ(circ pol), deduced parity admixtures.
1972Si30: $\beta\gamma$(θ), $\beta\gamma$(circ pol), β-longitudinal pol.
1972Si33: $\gamma\gamma$(θ,H), deduced magnetic moment.
1972JeZZ: γ(circ pol), parity non-conservation.
1971Ja21: Iγ.
1971Ho14: β(ce)(t), $\beta\gamma$(t), deduced level lifetimes.
1971Ml01, 1971Ni02, 1970Ni13: Iγ.
1970Ab14: γ(ce)(t), $\beta\gamma$(t), (ce)(ce)(t), β(ce)(t), level lifetimes.

^{182}Ta β^- decay (114.74 d) 1992Ch26,1992Su09,1990Me15 (continued)

1970El09: ce.
1970Pa33: $\gamma\gamma\gamma(\theta)$.
1970Ro15: $\beta\gamma(\theta)$ for 521-keV β transition.
1970St03: Iγ, ce.
1970Wh03, 1969Wh03: Eγ, Iγ.
1970Ne11: Eγ by curved-crystal spectrometer: three γ rays measured at 67.748 *2*, 84.678 *3* and 100.106 *3*.
1969Sa25: Eγ, Iγ, $\gamma\gamma$ 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, 1966Ba41: Eβ, Iβ.
1967Wa29: isotopic half-life.
1967Pi05: Eγ, Iγ.
1966Dz01: Eγ, Iγ, external conversion method.
1966Ka13: ce for L subshells for E2 transitions.
1966Ko12: Eγ, Iγ, ce for high-energy transitions.
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.
1966Ve05: β.
1965Do02: $\gamma\gamma$(t) for first 2^+ and 2^- states in ^{182}W.
1965Ed01: Iγ with curved-crystal spectrometer.
1965Gr16: Eγ, Iγ.
1964Da15: Eγ, Iγ, Eβ, Iβ, $\beta\gamma$ coin, ce, curved-crystal for Eγ.
1964Ha28: β, $\beta\gamma$ coin.
1964Ba12, 1964Ba47, 1963St16: ce.
1963El08: $\gamma\gamma$ coin.
1963Ko02: $\gamma\gamma(\theta$,H,t).
1963Kl04, 1963El02, 1960Hi02: $\gamma\gamma(\theta)$.
1962Se10: Eγ, Iγ using bent-crystal spectrometer.
1965Me08, 1964R019, 1964Be36, 1963Ba24, 1961Go24: $\beta\gamma$(t).
1965He07, 1964Ko07, 1962Mo15, 1961Vi07, 1961Vi02, 1961Va27, 1961Vo05, 1961Ry03, 1960Gv01, 1960Da11: Eγ, Iγ.
1965Me08, 1964Ro19, 1964Be36, 1963Ko02, 1963Fo02, 1963Ba24, 1962Ba39: $\gamma\gamma$(t).
1958Be73: Eγ using curved-crystal spectrometer.
1957Su01: Eγ, Iγ with a curved-crystal spectrometer.
1955Mu19: Eγ, Iγ, ce using curved-crystal spectrometer for γ rays and magnetic spectrometer for electrons.
Other (pre-1960) references (list may not be complete):
1959Vo27, 1952Mu45, 1950Co16: γ.
1959Si84: β, $\gamma\gamma$ coin.
1958Sp17, 1958Ke26, 1957Wr37, 1952Ei12, 1951Si25: ^{182}Ta half-life.
Demuynck et al.: Compt. Rend. 244, 3050 (1957) (β).
Froman et al., Ark. Fys. 12, 399 (1957).
Backstrom: Ark. Fys. 10, 387 (1956) (γ).
Williams et al., Can. Jour. Phys. 34, 1087 (1956).
1955Su64: $\gamma\gamma$(t).
1954Su10: $\beta\gamma$(t).
Fowler et al. Phys. Rev. 94, 1082 (1954) (γ).
1949Be60: isotopic assignment, γ.
Goddard et al., Phys. Rev. 76, 1419 (1949) (γ).
Cork et al., Phys. Rev. 75, 1778 (1949), ibid 72, 581 (1947) (ce).
Jnanananda: J. Sci. Ind. Research (India) ^{8}B, 147 (1949) (β).
Mandeville et al., Phys. Rev. 73, 340 (1948) (β).
Zumstein et al., Phys. Rev. 63, 59 (1943) (γ).
First identifications of ^{182}Ta in (n,γ): Fomin and Houtermans: Physik Z. Sowjetunion 9, 273 (1936); Oldenberg: Phys. Rev 53, 35 (1938); Naturwissenschaften 28, 578 (1940).

^{182}Ta β^- decay (114.74 d) 1992Ch26,1992Su09,1990Me15 (continued)

RADLST code (at www.nndc.bnl.gov) on the given level scheme gives total energy deposit of 1812 keV *6* in agreement with Q value=1814.3 keV *17*.

^{182}W Levels

E(level)†	Jπ‡	$T_{1/2}$#	Comments
0.0	0^+		
100.10598 *7*	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.
329.4268 *6*	4^+	62 ps *3*	$T_{1/2}$: other: <0.20 ns ($\gamma\gamma$(t),1971Ho14).
680.45 *6*	6^+	8.2 ps *9*	
1135.91 *14*	0^+		E(level): this level, proposed in 1976Kl09, cannot be populated directly by β decay due to highly forbidden $\Delta J=3$ transition involved. Feeding by γ rays from higher levels is not established.
1221.4001 *10*	2^+	0.434 ps *11*	This level could also feed 1136 level through an 85.5-keV transition, but large B(E2)(W.u.) resulting from the deduced intensity makes it improbable.
1257.4121 *11*	2^+	1.71 ps *13*	
1289.1498 *10*	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). Same value in Adopted Levels levels.
1331.1153 *10*	3^+	<0.6@ ns	$T_{1/2}$: from 1965Me08; same in Adopted Levels.
1373.8301 *10*	3^-	78@ ps *10*	$T_{1/2}$: from 1972He10. Others: 2.25 ns *8* (1962Ba39), >140 ps (1971Ho14). Same value in Adopted Levels.
1442.836 *9*	4^+	0.32 ps *3*	
1487.5018 *10*	4^-	<49@ ps	$T_{1/2}$: from 1972He10. Other: <120 ps (1971Ho14). Same value in Adopted Levels.
1510.25 *7*	4^+		
1553.2240 *10*	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). Same value in Adopted Levels.

† From least-squares fit to Eγ data with the omission of 1157.5γ due to its being a doublet. Normalized χ^2 is 0.4.
‡ From Adopted Levels.
# From Adopted Levels, unless otherwise stated.
@ From delayed coincidence techniques in ^{182}Ta decay.

β^- radiations

From 1813β measurements with a magnetic spectrometer, 1967Ba01 report upper limit of β feeding to g.s. of ^{182}W as <0.001%.

E(decay)†	E(level)	Iβ−#	Log *ft*	Comments
246 *4*	1553.2240	29.23 *25*	7.50 *1*	av Eβ=72.54 *52*
(304.3 *17*)	1510.25	0.142 *4*	10.03 *2*	av Eβ=85.74 *53*
(327.0 *17*)	1487.5018	1.3 *3*	9.2 *1*	av Eβ=92.86 *54*
(371.7 *17*)	1442.836	0.565 *8*	9.706 *9*	av Eβ=107.08 *55*
408 *8*	1373.8301	20.1 *7*	8.40 *2*	av Eβ=129.64 *57*
(483.4 *17*)	1331.1153	2.37 *5*	9.46 *1*	av Eβ=143.95 *58*
531 *10*	1289.1498	43.2 *9*	8.32 *1*	av Eβ=158.27 *59*
(557.1@ *17*)	1257.4121	<0.1	>11.0	av Eβ=169.22 *60*
591 *10*	1221.4001	3.2 *5*	9.63 *7*	av Eβ=181.82 *60*

Continued on next page (footnotes at end of table)

^{182}Ta β^- decay (114.74 d) 1992Ch26,1992Su09,1990Me15 (continued)

β^- radiations (continued)

E(decay)†	E(level)	Iβ^-#	Log *ft*	Comments
1470‡ *20*	329.4268	0.096‡ *10*	12.57 *5*	av Eβ=529.12 *71* Iβ^-: value of 0.096 *10* is inconsistent with intensity balance of −0.08 *6* in level scheme.
1713‡ *3*	100.10598	0.058‡ *6*	13.03 *5*	av Eβ=625.31 *72* Iβ^-: intensity balance in level scheme gives <1.5.

† From 1967Ba01 (also 1966Ba41), 1964Ha28, 1966Ve05, and 1964Da15.
‡ From 1967Ba01, 1966Ba41 using 2$\sqrt{2}$ magnetic spectrometer.
# Absolute intensity per 100 decays.
@ Existence of this branch is questionable.

$\gamma(^{182}W)$

Iγ normalization: weighted average of Iγ(absolute,1998Mi17)/Iγ(relative,adopted in this dataset) values of 16 strong γ rays. From summed transition intensity=100 to the g.s., this factor is 0.353 *4*. It also agrees with 0.3530 *32* deduced by 1980Sc07.

Data details for energies, relative intensities, multipolarities and mixing ratios of γ rays used in the evaluation process.

31.7γ:
Eγ: from table 4 of 2000He14; curved-crystal data of 1973Pi02.
Iγ: NRM average of 2.44 *7* (1992Ch26), 2.46 *5* (1992Ke02), 1.80 *6* (1992Su09), 2.21 *2* (1990Ja02), 2.75 *6* (1990Me15), 2.53 *6* (1980Sc07); uncertainties increased to 0.3 in 1992Su09, 0.14 in 1990Ja02 and 0.13 in 1990Me15. LWM gives 2.31 *14* with reduced χ^2=33. Other:1.18 *12* (1981Is08) omitted as outlier.
Absolute intensity=2.48 *6* (1980Sc07).

42.7γ:
Eγ: from table 4 in 2000He14; curved-crystal data of 1973Pi02.
Iγ: NRM, LWM average of 0.710 *21* (1992Ch26), 0.754 *18* (1992Ke02), 0.827 *24* (1992Su09), 0.82 *3* (1990Ja02), 0.86 *7* (1990Me15), 0.82 *10* (1981Is08), 0.75 *2* (1980Sc07), 0.70 *4* (1965Ed01).
Absolute intensity=0.266 *8* (1980Sc07).

44.7γ:
Eγ, Iγ: from 1992Su09 only. 42.72+44.66 form doublet STRUCTURE. Assignment by 1992Su09 in the level scheme is tentative.

65.7γ:
Iγ: NRM average of 8.40 *21* (1992Ch26), 9.02 *22* (1992Ke02), 7.61 *16* (1992Su09), 8.55 *7* (1990Ja02), 8.75 *17* (1990Me15), 8.04 *40* (1965Ed01), 8.0 *5* (1964Da15). LWM gives 8.44 *16* reduced χ^2=6.8. Other: 13.5 *14* (1981Is08) is omitted as an outlier.

67.7γ:
Eγ: other: 67.75016 *12* (1985Je05,curved crystal). It seems this value was not used in the analyses by 2000He14, although for ^{161}Tb decay, Eγ values measured in 1985Je05 for three γ rays were used.
Iγ: NRM average of 131.8 *25* (1992Ch26), 126.2 *24* (1992Su09), 120.0 *11* (1990Ja02), 131 *10* (1990Me15), 122 *6* (1977Ge12), 121 *5* (1974La15), 118 *6* (1965Ed01), 119 *6* (1964Da15). Other: 147.6 *37* (1992Ke02) omitted as outlier, mixed with K-x rays. LWM gives 123.3 *33* with reduced χ^2=2.9.
Mult, δ: RUL(M2)=1 implies δ<0.002, thus pure E1 is assigned. Experimental limit: δ<0.02.

84.7γ:
Iγ: NRM average of 7.58 *7* (1998Mi17), 7.65 *7* (1992Ch26), 7.43 *12* (1992Ke02), 7.80 *16* (1992Su09), 7.31 *5* (1990Ja02), 7.19 *15* (1990Me15), 7.30 *22* (1986Wa35), 7.64 *60* (1981Is08), 7.45 *17* (1980Sc07,1983De11), 7.8 *4* (1977Ge12), 7.82 *16* (1974La15), 7.6 *8* (1972Ga23), 6.7 *10* (1971Ml01), 7.0 *7* (1969Sa25), 7.56 *36* (1965Ed01), 8.3 *6* (1964Da15); uncertainty increased to 0.09 in 1990Ja02. LWM gives 7.48 *17* with reduced χ^2=2.4.
Absolute intensity=2.68 *2* (1998Mi17).
δ: from Adopted Gammas. Others: +0.32 *3* from A_2=−0.25 *4* (1983Ri05), +0.30 *2* (1972Kr05), +0.31 *5* (1975Qu01), 0.352 *3* (1972He10).

100.1γ:
Iγ: NRM average of 38.5 *2* (1998Mi17), 41.4 *5* (1992Ch26), 40.5 *5* (1992Ke02), 42.6 *5* (1992Su09), 40.45 *51* (1990Ja02), 40.4 *5* (1990Me15), 39.03 *64* (1986Wa35), 40.3 *6* (1983Ji01), 41.6 *14* (1981Is08), 40.6 *26* (1980Ro22), 40.33 *98* (1980Sc07), 40.8 *13* (1977Ge12), 37.43 *80* (1974La15), 40.3 *40* (1972Ga23), 40.2 *10* (1971Ja21), 38 *2* (1971Ml01), 40.7 *41* (1969Sa25). Reduced χ^2=2.0 with Δ(Iγ) increased to 0.11 in 1974La15. LWM gives 40.2 *17* with reduced χ^2=4.8.

Absolute intensity=13.59 *6* (1998Mi17).
Mult: L1/L2=0.0823 *13*, L2/L3=1.126 *10* (1978Bu26).

110.4γ:
Eγ: weighted average of 110.41 *4* (1992Su09), 110.391 *12* (1990Me15). Eγ=109.52 *19* in 1990Ja02 is an outlier, thus not used in averaging.
Iγ: weighted average of 0.300 *10* (1992Ch26), 0.32 *2* (1992Ke02), 0.37 *3* (1992Su09), 0.30 *4* (1990Ja02), 0.30 *2* (1990Me15), 0.25 *6* (1983Ji01), 0.25 *4* (1981Is08).

$^{182}_{74}W_{108}$-7

^{182}Ta β^- decay (114.74 d) 1992Ch26,1992Su09,1990Me15 (continued)

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

113.7γ:
Iγ: NRM average of 5.21 *5* (1998Mi17), 5.27 *10* (1992Ch26), 5.34 *6* (1992Ke02), 5.64 *11* (1992Su09), 5.31 *8* (1990Ja02), 5.34 *5* (1990Me15), 4.44 *16* (1986Wa35), 5.36 *7* (1983Ji01), 5.87 *40* (1981Is08), 4.95 *40* (1980Ro22), 5.29 *19* (1980Sc07,1983De11), 5.43 *18* (1977Ge12), 5.28 *40* (1972Ga23), 4.90 *29* (1971Ml01), 5.2 *5* (1969Sa25), 5.47 *28* (1965Ed01), 5.21 *28* (1964Da15); uncertainty increased to 0.4 in 1986Wa35. LWM gives 5.30 *9* with reduced χ^2=3.1. Other: 6.15 *14* (1974La15) for mixed 113γ+116γ.
Absolute intensity=1.839 *15* (1998Mi17).
δ: from 0.36 *2* from A_2=−0.324 *21* (1983Ri05) and 0.36 *1* from subshell ratios in 1972He10. Others: +0.31 *2* (1972Kr05), +0.31 *5* (1975Qu01).
Additional information 2.

116.4γ:
Iγ: NRM, LWM average of 1.230 *22* (1992Ch26), 1.27 *2* (1992Ke02), 1.33 *3* (1992Su09), 1.28 *6* (1990Ja02), 1.26 *2* (1990Me15), 1.26 *3* (1983Ji01), 1.14 *8* (1981Is08), 1.18 *18* (1980Ro22), 1.26 *5* (1980Sc07), 1.26 *4* (1977Ge12), 1.27 *13* (1972Ga23), 1.00 *8* (1971Ml01), 1.2 *2* (1969Sa25), 1.27 *8* (1965Ed01), 1.31 *11* (1964Da15).
Absolute intensity=0.445 *15* (1980Sc07).

152.4γ:
Iγ: NRM average of 19.60 *11* (1998Mi17), 20.40 *26* (1992Ch26), 19.81 *22* (1992Ke02), 20.94 *24* (1992Su09), 19.86 *17* (1990Ja02), (1990Me15), 21.19 *39* (1986Wa35), 19.94 *19* (1983Ji01), 19.59 *80* 19.95 *19* (1980Ro22), 19.69 *28* (1980Sc07), 20.5 *6* (1977Ge12), 18.7 *6* (1974La15),19.3 *14* (1972Ga23), 20.5 *5* (1971Ja21), 19.7 *13* (1971Ml01), 21.3 *10* (1970Wh03), 19.5 *20* (1969Sa25), 20.5 *8* (1965Ed01), 18.1 *7* (1964Da15); uncertainties increased to 0.4 in 1992Su09 and 0.5 in (1964Da15); LWM gives 19.92 *32* with reduced χ^2=3.2. Other: 23.15 *50* (1981Is08) omitted as an outlier.
Absolute intensity=6.92 *2* (1998Mi17).
δ: −0.22 *11* (1992Ch26), −0.023 *4* (1983Ri05), 0.035 *53* (1980Sp01 in ^{182}Re decay); +0.014 *13* (1975Qu01); all from $\gamma(\theta)$ or $\gamma\gamma(\theta)$. Subshell ratios in ce data (1967Ni03) give pure E1 consistent with RUL(M2)=1 suggests δ<0.006, thus the evaluators assign pure E1.
(152γ)(θ): A_2=+0.392 *6*, Pol=−0.33 *3* (1983Ri05).
(152γ)[892γ](229γ)(θ): A_2=−0.14 *5*, A_4=−0.8 *6* (1992Ch26);

156.4γ:
Iγ: NRM average of 7.57 *5* (1998Mi17), 7.54 *10* (1992Ch26), 7.51 *8* (1992Ke02), 7.89 *16* (1992Su09), 7.59 *12* (1990Ja02), 7.59 *10* (1990Me15), 7.26 *18* (1986Wa35), 7.60 *8* (1983Ji01), 7.55 *80* (1981Is08), 7.43 *40* (1980Ro22), 7.46 *12* (1980Sc07), 7.77 *24* (1977Ge12), 7.78 *20* (1974La15), 7.13 *48* (1972Ga23), 7.6 *2* (1971Ja21), 7.5 *7* (1971Ml01), 8.07 *4* (1970Wh03), 7.5 *8* (1969Sa25), 8.04 *36* (1965Ed01), 6.79 *37* (1964Da15); uncertainty increased to 0.18 in 1970Wh03. LWM gives 7.56 *52* with reduced χ^2=6.5.
Absolute intensity=2.672 *10* (1998Mi17).
δ(M2/E1)=−0.053 *4* from A_2=+0.411 *7*, Pol=−0.36 *9* (1983Ri05); −0.08 *5* (1992Ch26) from (156γ)[1002γ](229γ)(θ): A_2=−0.06 *2*, A_4=+0.03 *2* (1992Ch26); +0.06 *+3−6* (1981Ka22) from $\gamma\gamma(\theta)$, +0.003 *16* (1980Sp01), −0.13 *19* (1975Qu01), pure E1 (1967Ni03, 1971Ga37 from subshell ce data). RUL(M2)=1 implies δ<0.005, thus the evaluators assign E1.

179.4γ:
Iγ: NRM average of 8.77 *5* (1998Mi17), 8.93 *12* (1992Ch26), 8.81 *9* (1992Ke02), 9.04 *18* (1992Su09), 8.83 *8* (1990Ja02), 8.82 *10* (1990Me15), 8.85 *24* (1986Wa35), 8.84 *10* (1983Ji01), 9.11 *70* (1981Is08), 8.88 *66* (1980Ro22), 8.75 *11* (1980Sc07), 9.10 *30* (1977Ge12), 8.57 *25* (1974La15), 8.7 *6* (1972Ga23), 8.8 *3* (1971Ja21), 8.7 *5* (1971Ml01), 9.57 *5* (1970Wh03), 8.7 *9* (1969Sa25), 9.21 *40* (1965Ed01), 9.30 *47* (1964Da15); uncertainty increased to 0.3 in 1970Wh03. LWM gives 9.0 *6* with reduced χ^2=9.3.
Absolute intensity=3.098 *11* (1998Mi17).
δ: unweighted average of +2.2 *2* (1992Ch26), +2.1 *+3−2* (1983Ri05), +1.3 *5* (1980Sp01), +0.9 *4* (1975Qu01), +0.92 *+13−7* (1972Kr05), +0.90m +40-23

$^{182}_{74}W_{108}$-8

(1972He10), 0.7 *1* (1967Ni03). Weighted average is 1.0 *2* but with reduced χ^2=10.
A_2=−0.706 *19*, Pol=+0.17 *10* (1983Ri05); +0.56 to +1.3 (1975Qu01).
(179γ)[1044γ](229γ)(θ): A_2=+0.11 *2*, A_4=−0.30 *2* (1992Ch26).

198.3γ:
Iγ: LWM, NRM average of 4.150 *24* (1998Mi17), 4.19 *5* (1992Ch26), 4.12 *6* (1992Ke02), 4.21 *10* (1992Su09), 4.12 *5* (1990Ja02), 4.19 *9* (1990Me15), 4.14 *7* (1986Wa35), 4.22 *6* (1983Ji01), 4.2 *2* (1981Is08), 4.13 *28* (1980Ro22), 4.09 *6* (1980Sc07), 4.31 *14* (1977Ge12), 4.15 *28* (1972Ga23), 4.2 *2* (1971Ml01), 4.40 *25* (1970Wh03), 4.3 *4* (1969Sa25), 4.30 *24* (1965Ed01), 4.19 *28* (1964Da15). Other: 3.75 *12* (1974La15) is omitted as an outlier.
Absolute intensity=1.465 *6* (1998Mi17).

$^{182}_{74}W_{108}$-9

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

δ(M3/E2)=+0.067 *10* from A_2=−0.519 *10*, Pol=−0.43 *9* (1983Ri05), but RUL(M3)=10 suggests $\delta\approx0$.

222.1γ:
Iγ: weighted average of 21.17 *12* (1998Mi17), 21.90 *27* (1992Ch26), 21.43 *23* (1992Ke02), 21.6 *5* (1992Su09), 21.80 *20* (1990Ja02), 21.6 *3* (1990Me15), 21.62 *51* (1986Wa35), 21.61 *20* (1983Ji01), 21.3 *8* (1981Is08), 21.75 *56* (1980Ro22), 21.27 *28* (1980Sc07), 21.9 *7* (1977Ge12), 21.26 *62* (1974La15), 21.5 *15* (1972Ga23), 21.30 *55* (1971Ja21), 21.5 *12* (1971Ml01), 22.6 *12* (1970Wh03), 21.2 *21* (1969Sa25), 22.6 *9* (1965Ed01), 21.8 *7* (1964Da15).
Absolute intensity=7.48 *3* (1998Mi17).
δ: +0.007 *5* (1972Kr05), +0.027 *7* (1992Ch26), −0.12 *18* (1975Qu01), pure E1 from subshell data (1967Ni01), as also suggested by RUL for M2.
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).
(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=−0.020 *12*, A_4=+0.010 *15* (1975Qu01).

229.3γ:
Iγ: NRM, LWM average of 10.20 *6* (1998Mi17), 10.43 *13* (1992Ch26), 10.43 *12* (1992Ke02), 10.5 *2* (1992Su09), 10.38 *11* (1990Ja02), 10.39 *18* (1990Me15), 10.24 *22* (1986Wa35), 10.49 *10* (1983Ji01), 10.24 *60* (1981Is08), 10.39 *34* (1980Ro22), 10.32 *13* (1980Sc07), 10.6 *3* (1977Ge12), 10.3 *7* (1972Ga23), 10.3 *3* (1971Ja21), 10.3 *7* (1971Ml01), 10.9 *5* (1970Wh03), 10.5 *11* (1969Sa25), 11.1 *5* (1965Ed01), 9.6 *5* (1964Da15). Iγ=9.24 *26* (1974La15) is an outlier thus omitted from the averaging procedure.
Absolute intensity=3.601 *13* (1998Mi17).
δ(M3/E2)=+0.007 *7* from A_2=−0.508 *7*, Pol=−0.27 *12* (1983Ri05).

264.1γ:
Iγ: weighted average of 10.13 *6* (1998Mi17), 10.37 *15* (1992Ch26), 10.43 *14* (1992Ke02), 10.26 *22* (1992Su09), 10.14 *9* (1990Ja02), 10.26 *18* (1990Me15), 9.91 *80* (1986Wa35), 10.37 *7* (1983Ji01), 9.98 *50* (1981Is08), 10.36 *52* (1980Ro22), 10.26 *16* (1980Sc07), 10.5 *3* (1977Ge12), 10.4 *7* (1972Ga23), 10.1 *3* (1971Ja21), 10.0 *6* (1971Ml01), 10.6 *4* (1970Wh03), 10.3 *10* (1969Sa25), 10.8 *5* (1965Ed01), 9.9 *7* (1964Da15). Other: 9.46 *29* (1974La15) is omitted as an outlier.
Absolute intensity=3.579 *13* (1998Mi17).
Pol=−0.33 *14* (1983Ri05).

351.0γ:
Eγ: weighted average of 351.0 *2* (1992Su09), 351.023 *85* (1990Me15), 351.03 *10* (1969Wh03).
Iγ: LWM average of 0.033 *3* (1992Ch26, uncertainty of 3% quoted by the authors increased to 10% by the evaluators for this very weak γ ray), 0.028 *6* (1992Ke02), 0.3 *1* (1992Su09), 0.034 *8* (1990Me15), 0.033 *19* (1983Ji01).

829.9γ:
Eγ: from 1992Su09.
Iγ: weighted average of 0.039 *8* (1992Ch26), 0.05 *2* (1992Su09), 0.038 *15* (1983Ji01).

891.7γ:
Eγ: weighted average of 891.59 *9* (1992Su09), 891.73 *18* (1990Ja02), 891.92 *13* (1969Wh03). Level-energy difference=891.97.
Iγ: NRM, LWM average of 0.160 *10* (1992Ch26), 0.174 *22* (1992Ke02), 0.20 *6* (1992Su09), 0.15 *4* (1990Ja02), 0.16 *5* (1983Ji01), 0.21 *5* (1981Is08), 0.164 *19* (1976He18), 0.15 *2* (1970Wh03), 0.20 *7* (1969Sa25). Others: <0.3 (1972Ga23), ≈0.3 (1966Dz01).

928.0γ:
Eγ: weighted average of 928.08 *4* (1992Su09), 927.983 *42* (1990Me15), 927.90 *7* (1990Ja02), 927.96 *11* (1989Ka20), 927.78 *10* (1974La15), 927.99 *7*

$^{182}_{74}W_{108}$-10

(1969Wh03).

Iγ: weighted average (LWM, NRM give the same result) of 1.720 *24* (1992Ch26), 1.75 *7* (1992Ke02), 1.72 *8* (1992Su09), 1.77 *6* (1990Ja02), 1.73 *3* (1990Me15), 1.76 *4* (1983Ji01), 1.64 *10* (1981Is08), 1.53 *45* (1980Ro22), 1.78 *3* (1976He18), 1.75 *20* (1972Ga23), 1.5 *3* (1971Ml01), 1.79 *9* (1970Wh03), 1.6 *2* (1969Sa25), 1.74 *26* (1966Dz01). Other: 2.10 *8* (1974La15) is omitted as outlier.

(928γ)(229γ)(θ): A_2=+0.18 *6*, A_4=+0.11 *1* (1992Ch26).

δ(M3/E2)=+0.04 *14* (1992Ch26).

α(K)exp=0.0039 *2* (1992Ch26).

$^{182}_{74}W_{108}$-11

^{182}Ta β^- decay (114.74 d) 1992Ch26,1992Su09,1990Me15 (continued)

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

959.7γ:
Eγ: weighted average of 959.83 *7* (1992Su09), 959.722 *42* (1990Me15), 959.69 *7* (1990Ja02), 959.71 *8* (1989Ka20), 959.60 *10* (1974La15), 959.74 *7* (1969Wh03).
Iγ: weighted average (also LWM and NRM) of 0.970 *21* (1992Ch26), 0.99 *8* (1992Ke02), 0.99 *8* (1992Su09), 1.01 *3* (1990Ja02), 0.98 *3* (1990Me15), 0.98 *5* (1983Ji01), 0.87 *8* (1981Is08), 0.92 *47* (1980Ro22), 1.00 *2* (1976He18), 1.12 *6* (1974La15), 0.95 *11* (1972Ga23), 1.0 *1* (1971Ml01), 1.02 *6* (1970Wh03), 1.3 *2* (1969Sa25), 0.94 *24* (1966Dz01).
δ: −4.6 *+36−∞* (1992Ch26).
(960γ)(229γ)(θ): A_2=+0.31 *14*, A_4=−0.46 *20* (1992Ch26).
α(K)exp=0.0095 *6*; α(L)exp=0.0019 *2* (1992Ch26).

1001.7γ:
Eγ: weighted average of 1001.79 *4* (1992Su09), 1001.696 *18* (1990Me15), 1001.67 *12* (1990Ja02), 1001.66 *6* (1989Ka20), 1001.62 *10* (1974La15), 1001.68 *7* (1969Wh03).
Iγ: NRM average of 5.86 *10* (1992Ch26), 5.89 *12* (1992Ke02), 5.87 *13* (1992Su09), 6.01 *5* (1990Ja02), 5.87 *6* (1990Me15), 5.89 *34* (1986Wa35), 5.85 *10* (1983Ji01), 5.36 *11* (1981Is08), 5.99 *35* (1980Ro22), 5.90 *9* (1976He18), 6.43 *11* (1974La15), 5.66 *40* (1972Ga23), 5.4 *10* (1971Ml01), 5.98 *30* (1970Wh03), 5.6 *6* (1969Sa25), 5.4 *3* (1966Dz01), 7.9 *25* (1966Ko12); uncertainties increased to 0.21 in 1981Is08 and 0.19 in 1974La15. LWM gives 5.91 *10* with reduced χ^2=3.6.
δ: from 1972Kr05. Others: −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).
α(K)exp=0.0034 *2*, α(L)exp=0.00049 *4*, α(M)exp + α(N)exp=0.00026 *3* (1992Ch26).

1035.7γ:
Eγ: average of 1035.8 *6* (1976Kl09) and 1035.6 *5* (1992Su09). This γ not reported in any other study.
Iγ: average of 0.017 *6* (1992Su09) and 0.021 *6* (1976Kl09), the latter deduced by the evaluators from authors' ce(K) data.

1044.4γ:
Eγ: weighted average of 1044.47 *11* (1992Su09), 1044.39 *9* (1990Ja02), 1044.40 *7* (1989Ka20), 1044.43 *9* (1969Wh03).
Iγ: weighted average of 0.660 *21* (1992Ch26), 0.72 *5* (1992Ke02), 0.68 *5* (1992Su09), 0.70 *8* (1990Ja02), 0.72 *7* (1983Ji01), 0.58 *10* (1981Is08), 0.679 *16* (1976He18), 0.69 *10* (1972Ga23), 0.6 *1* (1971Ml01), 0.69 *8* (1970Wh03), 0.8 *1* (1969Sa25), 1.2 *2* (1966Dz01). Other: <1 (1966Ko12).
δ: from Adopted Gammas. Other: +0.4 *3* (1972Kr05).
Mult: E3 admixture is possible, δ(E3/E1)=−0.3 *2* (1972Kr05).
(1044γ)(229γ)(θ): A_2=−0.11 *6*, A_4=+0.16 *8* (1992Ch26).
α(K)exp=0.0048 *3* (1992Ch26).

1113.4γ:
Eγ: weighted average of 1113.4 *1* (1992Su09), 1113.414 *18* (1990Me15), 1113.50 *12* (1990Ja02), 1113.38 *7* (1989Ka20), 1113.36 *20* (1974La15), 1113.38 *10* (1969Wh03).
Iγ: NRM average of 1.240 *22* (1992Ch26), 1.19 *7* (1992Ke02), 1.08 *5* (1992Su09), 1.35 *15* (1990Ja02), 1.32 *3* (1990Me15), 1.30 *3* (1983Ji01), 1.18 *7* (1980Ro22), 1.28 *2* (1976He18), 1.11 *7* (1974La15), 1.44 *20* (1972Ga23), 1.13 *10* (1970Wh03), 1.2 *2* (1969Sa25); uncertainty increased to 0.07 in 1992Su09. LWM gives 1.261 *24* with reduced χ^2=4.4. Other: 2.21 *20* (1981Is08) omitted as an outlier.
Mult, δ: from A_2=+0.127 *13* (1983Ri05). Other: +1.1 *2* (1992Ch26). E0 admixture is measured and discussed in 1975We22 from ce and γ(ce)(θ) data with q(E0/E2)=0.41 *9*, X(E0/E2)=0.011 *5*.
(1113γ)(229γ)(θ): A_2=−0.12 *2*, A_4=+0.09 *3* (1992Ch26).

$^{182}_{74}W_{108}$-12

1121.3γ:
Iγ: 100.0 for the intensity of this γ ray is used as a reference for intensities of other γ rays.
Absolute intensity=35.32 *12* (1998Mi17), 35.30 *32* (1980Sc07).
δ: from A_2=+0.088 *6*, Pol=+0.03 *4* (1983Ri05). Others: +21 *+19−8* (1972Kr05), +24 *+21−8* (1972He10), +12 *+2−1* (1975Qu01). E0 admixture is measured and discussed in 1975We22 from ce and (ce)(ce)(θ) data with q(E0/E2)=0.16 *9*, X(E0/E2)=0.0016 *11*, ρ(magnitude)=0.019 *11*. See also 1990Ka35.
α(pair)/α(K)=0.00029.
α(K)exp=0.0030 *1*, α(L)exp=0.00054 *2* (1992Ch26), α(K)exp=0.00303 *10* (1975We22).

$^{182}_{74}W_{108}$-13

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

1135.9 E0 transition:
This transition reported in $\pi\sqrt{2}$ magnetic spectrograph study by 1976Kl09. Not reported by 1976He18 in their ce data.
Intensity: deduced from I(ce(K))=0.000134 *33* in 1976Kl09.

1157.3γ:
Eγ: from level-energy difference, with recoil removed. Weighted average of 1157.52 *6* (1992Su09), 1157.505 *15* (1990Me15), 1157.53 *7* (1990Ja02), 1157.52 *20* (1974La15) and 1157.58 *8* (1969Wh03) is 1157.510 *15*, which fits poorly in the level scheme, differing by 0.2 keV from the level-energy difference. The poor fit is due to the presence of a weak component at 1158.1 keV reported in 1992Su09 deexciting 1487 level. For this reason, the evaluators have not used this γ in the least-squares fitting procedure and have adopted the value from level-energy difference, deduced uncertainty=0.0011 keV.
Iγ: deduced from total intensity of 1157+1158 doublet= 2.896 *14* and the intensity of 0.82 *10* for the weaker 1158 γ ray; the former value is determined from the weighted average (same result for LWM, NRM) of 2.930 *22* (1998Mi17), 2.83 *5* (1992Ch26), 2.87 *5* (1992Ke02), 2.83 *9* (1992Su09), 2.71 *20* (1990Ja02), 2.92 *3* (1990Me15), 2.91 *34* (1986Wa35), 2.88 *32* (1983Ji01), 2.65 *20* (1981Is08), 2.85 *5* (1977Ge12), 2.96 *9* (1974La15), 2.90 *20* (1972Ga23), 2.6 *2* (1971Ml01), 2.83 *7* (1970Wh03), 2.76 *34* (1969Sa25), 4.1 *12* (1966Dz01), 2.67 *15* (1966Ko12). From singles spectra, intensity of 1157γ: 2.01 *7* (1992Su09), 1.66 *24* (1983Ji01), 1.84 *35* (1970Wh03), 2.0 *3* (1968Sa25). Ice(1157K)/Ice(1221K)=6.65 *6*/100 (1976He18) (large Ice(K), factor of ≈2.2 higher if 1157 is M1+E2, gives clear evidence of E0 admixture, 1.84 *35* (1970Wh03).
Absolute intensity=1.036 *6* for 1157+1158 (1998Mi17).
δ: from Adopted Gammas. α(K)exp=0.0077 *4* (1992Ch26) disagrees with M1 or any mixture of M1+E2, gives evidence of E0 admixture. Others: −7.6 *+48*−∞ (1972Kr05), −0.65 to −1.6 (1972He10). E0 admixture is measured and discussed in 1975We22 from ce and (ce)(ce)(θ) data with q(E0/E2)=1.13 *13*, X(E0/E2)=0.090 *24*, r(magnitude)=0.049 *6*. Ice(1157K)/Ice(1221K)=6.56 *6*/100 (1976He18) also clearly indicates presence of E0 component of 0.5% *1*.
α(K)exp=0.0077 *4* (1992Ch26).
α: from α(K)exp multiplied by a factor of 1.2 to account for other shells.

1158.1γ:
Eγ: from 1992Su09. Others: 1983Ji01, 1976He18 (as K- conversion line), 1969Sa25 ($\gamma\gamma$ coin).
Iγ: weighted average of 0.76 *16* ($\gamma\gamma$ coin,1969Sa25). 0.99 *28* (singles γ,1970Wh03), 0.82 *5* (singles γ,1992Su09); uncertainty increased to 0.10 in 1992Su09. Others: 1.22 *21* (1983Ji01, singles γ), 1.85 *35* (deduced by the evaluators from Ice(1158K)/Ice(1223K)=1.10 *21*/100 (1976He18)); values are inconsistent, due possibly to poor splitting of the 1157+1158 doublet and large contribution of E0 component in Ice(K).
δ: −0.01 *+20−10* (1992Ch26).
(1158γ)(229γ)(θ): A_2=+0.20 *4*, A_4=+0.04 *5* (1992Ch26).

1180.8γ:
Eγ: weighted average of 1180.5 *5* (1992Su09), 1180.88 *14* (1990Ja02).
Iγ: weighted average of 0.250 *10* (1992Ch26), 0.22 *6* (1992Ke02), 0.23 *4* (1992Su09), 0.23 *9* (1990Ja02), 0.21 *4* (1983Ji01), 0.249 *15* (1976He18), 0.28 *4* (1972Ga23), 0.25 *4* (1969Sa25). Other: 0.56 *7* (1981Is08) is omitted as an outlier.

1189.0γ:
Iγ: weighted average (also LWM and NRM) of 46.70 *24* (1998Mi17), 46.6 *8* (1992Ch26), 47.0 *6* (1992Ke02), 46.3 *19* (1992Su09), 47.37 *29* (1990Ja02), 47.1 *8* (1990Me15), 47.02 *48* (1986Wa35), 46.40 *20* (1983Ji01), 48.8 *17* (1981Is08), 47.61 *53* (1980Ro22), 46.59 *47* (1980Sc07), 46.5 *7* (1977Ge12), 46.1 *15* (1974La15), 46.7 *23* (1972Ga23), 46.5 *7* (1971Ja21), 47.2 *15* (1971Ml01), 47.4 *7* (1970Wh03), 46.3 *33* (1969Sa25), 44.3 *15* (1966Dz01), 48.1 *20* (1966Ko12).
Absolute intensity=16.49 *6 6* (1998Mi17), 16.7 *2* (1997Ka47).
Mult, α: 59% *4* E1, 14% *1* M2 and 27% *3* E3. Conversion coefficient deduced for this admixture, it agrees well with measured values from 1992Ch26.
δ: from weighted averages of δ(M2/E1)=+0.44 *6*, δ(E3/E1)= −0.69 *10* from A_2=−0.884 *19*, Pol=+0.13 *3* (1983Ri05); δ(M2/E1)=+0.49 *3*, δ(E3/E1)=−0.64 *5* (1972Kr05); δ(M2/E1)=0.49 *3*, δ(E3/E1)=0.72 *7* (1972He10) from α(K)exp ratios of 1189, 1121 and 1221 γ rays and $\gamma\gamma(\theta)$.

$^{182}_{74}W_{108}$-14

α(pair)/α(K)=0.0022.
α(K)exp=0.0037 *3*, α(L)exp=0.00061 *3*, α(M+...)expα(N)exp=0.00014 *1* (1992Ch26); α(K)exp=0.00418 *14* (1975We22).

1221.4γ:
Iγ: deduced from total intensity of 1221+1223 doublet= 77.94 *20* and the intensity of 0.67 *8* for the weaker 1223 γ ray; the former value is determined from the weighted average (same result in LWM, NRM) of 78.5 *5* (1998Mi17), 78.3 *11* (1992Ch26), 78.0 *10* (1992Ke02), 76.8 *15* (1992Su09), 78.03 *36* (1990Ja02), 78.1 *13* (1990Me15), 77.3 *13* (1986Wa35), 77.3 *6* (1983Ji01), 77.9 *27* (1981Is08), 78.14 *93* (1980Ro22), 76.96 *76* (1980Sc07), 77.8 *11* (1977Ge12), 78.4 *12* (1974La15), 80.3 *41* (1972Ga23), 77.3 *12* (1971Ja21), 78.0 *30* (1971Ml01), 79.3 *12* (1970Wh03), 77.9 *54* (1969Sa25), 77 *6* (1966Dz01). Other: 85.1 *31* (1966Ko12) omitted as outlier. From singles spectra intensity of 1221γ: 76.2 *15* (1992Su09), 77.8 *15* (1990Me15), 76.8 *6* (1983Ji01), 77.3 *54* (1969Sa25); all

$^{182}_{74}W_{108}$-15

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

these are consistent with the adopted value of 77.34 *22*.
Absolute intensity=27.71 *9* for 1221+1223 (1998Mi17), 26.5 *3* (1997Ka47).
Pol=−0.34 *9* (1983Ri05). α(pair)/α(K)=0.0028.
α(K)=0.0025 used for normalization of ce data (1992Ch26).

1223.6γ:
Eγ: weighted average (NRM method) of 1223.7 *1* (1992Su09), 1223.2 *1* (1990Me15), 1224.0 *4* (1990Ja02), 1223.2 *5* (1969Sa25); Δ(Eγ) adjusted to 0.2 keV in 1990Me15. LWM weighted average is 1223.46 *26* with reduced χ^2=4.7. Level-energy difference=1223.79.
Iγ: weighted average of 0.58 *10* (1992Su09), 0.53 *24* (1983Ji01), 0.75 *7* (deduced by the evaluators from K-conversion intensities of 1223γ and 1221γ measured in 1976He18), 0.6 *1* ($\gamma\gamma$ coin, 1969Sa25). Other: 0.3 *1* (1990Me15) omitted as outlier.
Mult,δ: from $\gamma\gamma(\theta)$ (1992Ch26). Other: %E1>80% (or δ<0.5 from α(K)exp=0.0024 *4* and assuming equal M2 and E3 admixtures (ce data, 1976He18, using Iγ=0.8 from 19). E3 admixture cannot be ruled out.
(1223γ)(229γ)(θ): A_2=+0.23 *3*, A_4=+0.11 *9* (1992Ch26).

1231.0γ:
Iγ: NRM average of 33.18 *19* (1998Mi17), 32.8 *5* (1992Ch26), 33.17 *37* (1992Ke02), 32.2 *7* (1992Su09), 33.85 *22* (1990Ja02), 33.1 *5* (1990Me15), 33.42 *31* (1986Wa35), 32.72 *14* (1983Ji01), 32.3 *11* (1981Is08), 32.32 *56* (1980Ro22), 32.81 *32* (1980Sc07), 32.96 *47* (1977Ge12), 32.60 *52* (1974La15), 34.5 *25* (1972Ga23), 32.8 *5* (1971Ja21), 32.3 *10* (1971Ml01), 33.4 *5* (1970Wh03), 32.7 *23* (1969Sa25), 26 *5* (1966Dz01), 28.6 *11* (1966Ko12); uncertainties increased to 0.4 in 1990Ja02 and 1.6 in 1966Ko12. LWM gives 32.4 *4* with reduced χ^2=2.4.
Absolute intensity=11.72 *4* (1998Mi17).
δ: from 1983Ri05. Others: +11 *+6−3* (1992Ch26), −60 *+20−100* (1972Kr05), −32 *+15−142* (1975Qu01).
A_2=−0.067 *12*, Pol=−0.24 *12* (1983Ri05).
α(pair)/α(K)=0.0024.
α(K)exp=0.0023 *1*, α(M)exp + α(N)exp=0.000085 *7* (1992Ch26).

1257.4γ:
Iγ: weighted average (also LWM and NRM) of 4.320 *24* (1998Mi17), 4.31 *7* (1992Ch26), 4.34 *7* (1992Ke02), 4.22 *9* (1992Su09), 4.35 *6* (1990Ja02), 4.36 *8* (1990Me15), 4.30 *16* (1986Wa35), 4.276 *24* (1983Ji01), 4.07 *30* (1981Is08), 4.33 *15* (1980Ro22), 4.25 *2* (1980Sc07), 4.26 *6* (1977Ge12), 4.31 *8* (1974La15), 4.46 *45* (1972Ga23), 4.27 *14* (1971Ml01), 4.33 *7* (1970Wh03), 4.3 *3* (1969Sa25), 3.8 *3* (1966Dz01), 3.91 *15* (1966Ko12).
Absolute intensity=1.524 *7* (1998Mi17).
Pol=−0.36 *9* (1983Ri05). α(pair)/α(K)=0.008.
α(K)exp=0.00032 *2*, α(M)exp + α(N)exp=0.00012 *2* (1992Ch26).

1273.7γ:
Iγ: weighted average of 1.85 *3* (1992Ch26), 1.86 *3* (1992Ke02), 1.84 *5* (1992Su09), 1.90 *4* (1990Ja02), 1.95 *3* (1990Me15), 1.73 *12* (1986Wa35), 1.871 *13* (1983Ji01), 1.67 *15* (1981Is08), 1.66 *18* (1980Ro22), 1.86 *3* (1977Ge12), 1.83 *5* (1974La15), 1.96 *19* (1972Ga23), 1.92 *8* (1971Ml01), 1.90 *4* (1970Wh03), 1.80 *13* (1969Sa25), 1.5 *3* (1966Dz01), 1.64 *15* (1966Ko12).
Mult, α: 81% *5* E1, 12% *4* M2 and 7% *2* E3. Conversion coefficient deduced for this admixture, it agrees well with measured values from 1992Ch26.
δ: from A_2=−0.37 *6*, Pol=−0.39 *5* (1983Ri05). Other: δ(M2/E1)=+0.42 *4* (1972Kr05), only M2/E1 mixing given.
α(pair)/α(K)=0.014.
α(K)exp=0.0024 *3*, α(L)exp=0.00047 *4* (1992Ch26); α(K)exp=0.00291 *5*.

1289.1γ:

$^{182}_{74}W_{108}$-16

Iγ: NRM average of 3.940 *23* (1998Mi17), 3.91 *6* (1992Ch26), 4.03 *7* (1992Ke02), 3.80 *8* (1992Su09), 3.90 *5* (1990Ja02), 4.29 *8* (1990Me15), 4.17 *30* (1986Wa35), 3.80 *3* (1983Ji01), 3.65 *20* (1981Is08), 4.06 *22* (1980Ro22), 3.86 *2* (1980Sc07), 3.86 *6* (1977Ge12), 3.96 *8* (1974La15), 4.10 *40* (1972Ga23), 4.06 *14* (1971Ml01), 4.04 *7* (1970Wh03), 3.8 *3* (1969Sa25), 3.7 *2* (1966Dz01), 3.67 *15* (1966Ko12). Uncertainties increased to 0.14 in 1990Me15 and 0.05 in 1983Ji01. LWM gives 3.895 *35* with reduced χ^2=3.3.

Absolute intensity=1.393 *7* (1998Mi17).

Pol=+0.39 *12* (1983Ri05). α(pair)/α(K)=0.0009.

α(L)exp=0.0019 *2*, α(M+...)expα(N)exp=0.00036 *3* (1992Ch26).

1342.7γ:

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

Eγ: weighted average of 1342.80 *7* (1992Su09), 1342.731 *15* (1990Me15), 1342.73 *6* (1990Ja02), 1342.70 *7* (1989Ka20), 1342.60 *10* (1974La15), 1342.72 *6* (1969Wh03).
Iγ: weighted average of 0.720 *12* (1992Ch26), 0.748 *21* (1992Ke02), 0.69 *3* (1992Su09), 0.76 *4* (1990Ja02), 0.74 *1* (1990Me15), 0.723 *7* (1983Ji01), 0.66 *8* (1981Is08), 0.718 *12* (1977Ge12), 0.74 *3* (1974La15), 0.80 *9* (1972Ga23), 0.75 *3* (1971Ml01), 0.75 *2* (1970Wh03), 0.7 *1* (1969Sa25), 0.60 *9* (1966Dz01), 0.79 *5* (1966Ko12).
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.
α(L)exp=0.00030 *6*, α(M+...)expα(N)exp=0.00009 *3* (1992Ch26).

1373.8γ:
Iγ: NRM average of 0.610 *15* (1992Ch26), 0.628 *13* (1992Ke02), 0.55 *2* (1992Su09), 0.65 *2* (1990Ja02), 0.68 *1* (1990Me15), 0.626 *6* (1983Ji01), 0.58 *8* (1981Is08), 0.628 *11* (1977Ge12), 0.65 *3* (1974La15), 0.70 *8* (1972Ga23), 0.69 *3* (1971Ml01), 0.66 *2* (1970Wh03), 0.6 *1* (1969Sa25), 0.52 *9* (1966Dz01), 0.70 *14* (1966Ko12); uncertainties increased to 0.02 in 1990Me15. LWM gives 0.634 *8* with reduced χ^2=3.8.
α(K)exp=0.0036 *3*, α(L)exp=0.00074 *4* (1992Ch26).

1387.4γ:
Iγ: NRM average of 0.205 *6* (1992Ch26), 0.220 *11* (1992Ke02) , 0.19 *2* (1992Su09), 0.24 *3* (1990Ja02), 0.27 *1* (1990Me15), 0.204 *4* (1983Ji01), 0.20 *5* (1981Is08), 0.202 *7* (1977Ge12), 0.21 *1* (1974La15), 0.225 *23* (1972Ga23), 0.24 *2* (1971Ml01), 0.217 *10* (1970Wh03), 0.18 *2* (1969Sa25), 0.25 *6* (1966Dz01), 0.18 *4* (1966Ko12); uncertainty increased to 0.023 in 1990Me15. LWM average is 0.211 *7* with reduced χ^2=3.5.
α(K)exp=0.0040 *3* (1992Ch26).

1410.1γ:
Eγ: weighted average of 1410.13 *8* (1992Su09), 1410.15 *11* (1990Ja02), 1410.10 *10* (1969Wh03). Eγ=1411.077 *45* is an outlier thus not used in averaging. If it is 1410.077, then weighted average is 1410.10 *4*.
Iγ: LWM average of 0.109 *4* (1992Ch26), 0.117 *8* (1992Ke02), 0.083 *10* (1992Su09), 0.14 *2* (1990Ja02), 0.117 *4* (1990Me15), 0.111 *5* (1983Ji01), 0.10 *4* (1981Is08), 0.112 *6* (1977Ge12), 0.130 *25* (1972Ga23), 0.14 *3* (1971Ml01), 0.117 *8* (1970Wh03), 0.11 *2* (1969Sa25), 0.115 *17* (1966Dz01), 0.13 *6* (1966Ko12).
Ice(K)+(Ice(M+N) for 1343γ)=0.094 *20* (1992Ch26). α(pair)/α(K)≈0.026.

1453.1γ:
Eγ: weighted average of 1453.1 *1* (1992Su09), 1453.125 *62* (1990Me15), 1453.22 *14* (1990Ja02), 1453.05 *11* (1969Wh03). Level-energy difference=1453.112.
Iγ: NRM average of 0.083 *3* (1992Ch26), 0.097 *7* (1992Ke02), 0.11 *1* (1992Su09), 0.11 *2* (1990Ja02), 0.123 *8* (1990Me15), 0.0872 *24* (1983Ji01), 0.10 *4* (1981Is08), 0.079 *3* (1977Ge12), 0.10 *2* (1972Ga23), 0.12 *3* (1971Ml01), 0.123 *10* (1970Wh03), 0.12 *2* (1969Sa25), 0.094 *12* (1966Dz01), 0.14 *6* (1966Ko12); uncertainty increased to 0.014 in 1990Me15 and 1970Wh03. LWM average is 0.106 *19* with reduced χ^2=4.3.
Mult: α(K)exp=0.0028 *4* (1992Ch26) suggests dominant E3.

α(pair)/α(K) are from 1966Ko12.
Pol=coefficient of linear polarization measurement by 1983Ri05.

$^{182}_{74}W_{108}$-18

^{182}Ta β^- decay (114.74 d) 1992Ch26,1992Su09,1990Me15 (continued)

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

E_γ[†]	I_γ[@ d]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	α[c]	Comments
31.7377 *5*	2.48 *6*	1289.1498	2^-	1257.4121	2^+	E1	1.628	α(L)=1.259 *18*; α(M)=0.293 *4* α(N)=0.0675 *10*; α(O)=0.00910 *13*; α(P)=0.000305 *5*
42.7148 *4*	0.760 *16*	1373.8301	3^-	1331.1153	3^+	E1	0.720	α(L)=0.557 *8*; α(M)=0.1286 *18* α(N)=0.0299 *5*; α(O)=0.00419 *6*; α(P)=0.0001586 *23*
44.66[e] *11*	0.085 *17*	1487.5018	4^-	1442.836	4^+	[E1]	0.637 *10*	α(L)=0.493 *8*; α(M)=0.1136 *18* α(N)=0.0264 *5*; α(O)=0.00373 *6*; α(P)=0.0001436 *22*

$^{182}_{74}W_{108}$-19

^{182}Ta β^- decay (114.74 d) 1992Ch26,1992Su09,1990Me15 (continued)

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

E_γ[†]	I_γ[@ d]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ[&]	α[c]	Comments
65.72215[‡] *15*	8.55 *9*	1553.2240	4$^-$	1487.5018	4$^-$	M1+E2	0.093 *6*	2.91 *5*	α(L)=2.25 *4*; α(M)=0.517 *9* α(N)=0.1242 *20*; α(O)=0.0200 *3*; α(P)=0.001340 *19*
67.74970[‡] *10*	121.8 *10*	1289.1498	2$^-$	1221.4001	2$^+$	E1		0.202	α(L)=0.1563 *22*; α(M)=0.0358 *5* α(N)=0.00840 *12*; α(O)=0.001234 *18*; α(P)=5.51×10^{-5} *8*
84.68024[‡] *26*	7.53 *5*	1373.8301	3$^-$	1289.1498	2$^-$	M1+E2	+0.326 *11*	7.66	α(K)=5.84 *9*; α(L)=1.40 *3*; α(M)=0.331 *8* α(N)=0.0790 *18*; α(O)=0.0121 *3*; α(P)=0.000593 *9*
100.10595[‡] *7*	40.3 *3*	100.10598	2$^+$	0.0	0$^+$	E2		3.89	α(K)=0.878 *13*; α(L)=2.28 *4*; α(M)=0.576 *8* α(N)=0.1358 *19*; α(O)=0.0186 *3*; α(P)=7.08×10^{-5} *10*
110.393 *12*	0.305 *9*	1553.2240	4$^-$	1442.836	4$^+$	[E1]		0.290	α(K)=0.238 *4*; α(L)=0.0408 *6*; α(M)=0.00931 *13* α(N)=0.00220 *3*; α(O)=0.000335 *5*; α(P)=1.717×10^{-5} *24*
113.67170[‡] *22*	5.309 *24*	1487.5018	4$^-$	1373.8301	3$^-$	M1+E2	+0.36[a] *1*	3.18	α(K)=2.49 *4*; α(L)=0.530 *9*; α(M)=0.1242 *22* α(N)=0.0297 *5*; α(O)=0.00462 *8*; α(P)=0.000250 *4*
116.4179[‡] *6*	1.260 *10*	1373.8301	3$^-$	1257.4121	2$^+$	E1		0.253	α(K)=0.207 *3*; α(L)=0.0353 *5*; α(M)=0.00805 *12* α(N)=0.00191 *3*; α(O)=0.000290 *4*; α(P)=1.510×10^{-5} *22*
(121.5[#])	0.0067[#] *18*	1257.4121	2$^+$	1135.91	0$^+$	[E2]		1.83	α(K)=0.596 *9*; α(L)=0.936 *13*; α(M)=0.236 *4* α(N)=0.0556 *8*; α(O)=0.00765 *11*; α(P)=4.50×10^{-5} *7* $I_{(\gamma+ce)}$: 0.019 *5*.
152.42991[‡] *26*	19.91 *10*	1373.8301	3$^-$	1221.4001	2$^+$	E1		0.1258	α(K)=0.1038 *15*; α(L)=0.01703 *24*; α(M)=0.00387 *6* α(N)=0.000919 *13*; α(O)=0.0001421 *20*; α(P)=7.85×10^{-6} *11*
156.3864[‡] *3*	7.58 *3*	1487.5018	4$^-$	1331.1153	3$^+$	E1		0.1177	α(K)=0.0972 *14*; α(L)=0.01590 *23*; α(M)=0.00362 *5* α(N)=0.000858 *12*; α(O)=0.0001328 *19*; α(P)=7.38×10^{-6} *11*
179.39381[‡] *25*	8.85 *4*	1553.2240	4$^-$	1373.8301	3$^-$	M1+E2	+1.3 *2*	0.62 *4*	α(K)=0.42 *5*; α(L)=0.149 *5*; α(M)=0.0363 *13* α(N)=0.0086 *3*; α(O)=0.00126 *4*; α(P)=3.9×10^{-5} *5*
198.35187[‡] *29*	4.157 *16*	1487.5018	4$^-$	1289.1498	2$^-$	E2		0.317	α(K)=0.1725 *25*; α(L)=0.1097 *16*; α(M)=0.0273 *4* α(N)=0.00646 *9*; α(O)=0.000910 *13*; α(P)=1.364×10^{-5} *19*
222.1085[‡] *3*	21.47 *7*	1553.2240	4$^-$	1331.1153	3$^+$	E1		0.0480	α(K)=0.0399 *6*; α(L)=0.00630 *9*; α(M)=0.001429 *20* α(N)=0.000340 *5*; α(O)=5.34×10^{-5} *8*; α(P)=3.17×10^{-6} *5*
229.3207[‡] *6*	10.34 *4*	329.4268	4$^+$	100.10598	2$^+$	E2		0.196	α(K)=0.1167 *17*; α(L)=0.0605 *9*; α(M)=0.01497 *21* α(N)=0.00354 *5*; α(O)=0.000505 *7*; α(P)=9.50×10^{-6} *14*
264.0740[‡] *3*	10.25 *4*	1553.2240	4$^-$	1289.1498	2$^-$	E2		0.1254	α(K)=0.0799 *12*; α(L)=0.0347 *5*; α(M)=0.00852 *12* α(N)=0.00202 *3*; α(O)=0.000291 *4*; α(P)=6.69×10^{-6} *10*
351.02 *6*	0.0321 *25*	680.45	6$^+$	329.4268	4$^+$	E2		0.0538	α(K)=0.0380 *6*; α(L)=0.01210 *17*; α(M)=0.00293 *5* α(N)=0.000696 *10*; α(O)=0.0001027 *15*; α(P)=3.34×10^{-6} *5*
829.9 *4*	0.040 *8*	1510.25	4$^+$	680.45	6$^+$	[E2]		0.00661	α(K)=0.00536 *8*; α(L)=0.000962 *14*; α(M)=0.000222 *4* α(N)=5.32×10^{-5} *8*; α(O)=8.41×10^{-6} *12*; α(P)=4.98×10^{-7} *7*

$^{182}_{74}W_{108}$-20

^{182}Ta β^- decay (114.74 d) 1992Ch26,1992Su09,1990Me15 (continued)

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

E_γ †	I_γ @ d	E_i(level)	J_i^π	E_f	J_f^π	Mult. &	δ &	α c	Comments
891.70 *10*	0.163 *7*	1221.4001	2^+	329.4268	4^+	E2		0.00569	α(K)=0.00464 *7*; α(L)=0.000810 *12*; α(M)=0.000187 *3* α(N)=4.47×10^{-5} *7*; α(O)=7.10×10^{-6} *10*; α(P)=4.31×10^{-7} *6*
928.00 *4*	1.741 *14*	1257.4121	2^+	329.4268	4^+	E2		0.00524	α(K)=0.00429 *6*; α(L)=0.000738 *11*; α(M)=0.0001698 *24* α(N)=4.07×10^{-5} *6*; α(O)=6.47×10^{-6} *9*; α(P)=3.98×10^{-7} *6* Additional information 5.
959.73 *3*	0.992 *11*	1289.1498	2^-	329.4268	4^+	M2+E3	−5.5 *+19−10*	0.0116 *7*	α(K)=0.0090 *6*; α(L)=0.00196 *8*; α(M)=0.000463 *17* α(N)=0.000111 *4*; α(O)=1.73×10^{-5} *7*; α(P)=9.3×10^{-7} *6* α(K)exp=0.0095 *6* (1992Ch26); α(L)exp=0.0019 *2* (1992Ch26) Additional information 8.
1001.700 *18*	5.92 *3*	1331.1153	3^+	329.4268	4^+	E2+M1	−8.9 [a] *+18−21*	0.00455 *8*	α(K)=0.00374 *6*; α(L)=0.000627 *10*; α(M)=0.0001438 *23* α(N)=3.45×10^{-5} *6*; α(O)=5.51×10^{-6} *9*; α(P)=3.48×10^{-7} *6* Additional information 11.
1035.7 *5*	0.019 *6*	1135.91	0^+	100.10598	2^+	[E2]		0.00420	α(K)=0.00346 *5*; α(L)=0.000575 *8*; α(M)=0.0001317 *19* α(N)=3.16×10^{-5} *5*; α(O)=5.05×10^{-6} *7*; α(P)=3.21×10^{-7} *5*
1044.42 *5*	0.678 *12*	1373.8301	3^-	329.4268	4^+	E1+M2(+E3)	0.46 *9*	0.0051 *12*	α(K)=0.0042 *10*; α(L)=0.00067 *16*; α(M)=0.00015 *4* α(N)=3.7×10^{-5} *9*; α(O)=6.0×10^{-6} *14*; α(P)=4.2×10^{-7} *10* Additional information 13.
1113.410 *18*	1.262 *17*	1442.836	4^+	329.4268	4^+	E2+M1+E0	+5.6 *+13−10*	0.00376 *8*	α(K)=0.00311 *7*; α(L)=0.000504 *10*; α(M)=0.0001151 *22* α(N)=2.76×10^{-5} *6*; α(O)=4.43×10^{-6} *9*; α(P)=2.89×10^{-7} *7*; α(IPF)=3.52×10^{-7} *6*
1121.290 ‡ *3*	100.0	1221.4001	2^+	100.10598	2^+	E2+M1+E0	+30 [a] *+6−4*	0.00360	α(K)=0.00297 *5*; α(L)=0.000483 *7*; α(M)=0.0001104 *16* α(N)=2.65×10^{-5} *4*; α(O)=4.25×10^{-6} *6*; α(P)=2.76×10^{-7} *4*; α(IPF)=4.73×10^{-7} *7* Additional information 3.
1135.9 *6*		1135.91	0^+	0.0	0^+	E0			$I_{(\gamma+ce)}$: E0 intensity=0.00016 *4*.
1157.302	2.08 *10*	1257.4121	2^+	100.10598	2^+	E2+M1+E0	−9 *+6−3*	0.0092 *5*	Additional information 6.
1158.1 *2*	0.82 *10*	1487.5018	4^-	329.4268	4^+	E1		1.38×10^{-3}	α(K)=0.001159 *17*; α(L)=0.0001632 *23*;

$^{182}_{74}W_{108}$-21

^{182}Ta β^- decay (114.74 d) 1992Ch26,1992Su09,1990Me15 (continued)

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

E_γ [†]	I_γ [@ d]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [&]	δ [&]	α [c]	Comments
									α(M)=3.66×10^{-5} *6* α(N)=8.79×10^{-6} *13*; α(O)=1.432×10^{-6} *20*; α(P)=1.021×10^{-7} *15*; α(IPF)=7.59×10^{-6} *12* Additional information 16.
1180.85 *14*	0.248 *8*	1510.25	4$^+$	329.4268	4$^+$	E2+M1	−2.8 *10*	0.0036 *4*	α(K)=0.0030 *4*; α(L)=0.00047 *5*; α(M)=0.000108 *11* α(N)=2.59×10^{-5} *25*; α(O)=4.2×10^{-6} *5*; α(P)=2.8×10^{-7} *4*; α(IPF)=3.12×10^{-6} *16*
1189.040‡ *3*	46.78 *11*	1289.1498	2$^-$	100.10598	2$^+$	E1+M2+E3 [b]		0.0047 *3*	δ(M2/E1)=+0.48 *3*, δ(E3/E1)=−0.67 *5*. Additional information 9.
1221.395‡ *3*	77.27 *22*	1221.4001	2$^+$	0.0	0$^+$	E2		0.00305	α(K)=0.00252 *4*; α(L)=0.000402 *6*; α(M)=9.15×10^{-5} *13* α(N)=2.20×10^{-5} *3*; α(O)=3.53×10^{-6} *5*; α(P)=2.34×10^{-7} *4*; α(IPF)=6.75×10^{-6} *10* Additional information 4.
1223.60 *9*	0.67 *8*	1553.2240	4$^-$	329.4268	4$^+$	E1+M2(+E3)	−0.15 *+10−25*	0.0016 *15*	α(K)=0.0013 *13*; α(L)=1.9×10^{-4} *20*; α(M)=4.2×10^{-5} *46* α(N)=1.0×10^{-5} *11*; α(O)=1.6×10^{-6} *18*; α(P)=1.2×10^{-7} *13*; α(IPF)=2.7×10^{-5} *3*
1231.004‡ *3*	32.96 *8*	1331.1153	3$^+$	100.10598	2$^+$	E2+M1	−33 [a] *+6−9*	0.00301	α(K)=0.00249 *4*; α(L)=0.000395 *6*; α(M)=9.01×10^{-5} *13* α(N)=2.16×10^{-5} *3*; α(O)=3.48×10^{-6} *5*; α(P)=2.31×10^{-7} *4*; α(IPF)=7.86×10^{-6} *11* Additional information 12.
1257.407‡ *3*	4.283 *12*	1257.4121	2$^+$	0.0	0$^+$	E2		0.00289	α(K)=0.00239 *4*; α(L)=0.000378 *6*; α(M)=8.60×10^{-5} *12* α(N)=2.06×10^{-5} *3*; α(O)=3.33×10^{-6} *5*; α(P)=2.21×10^{-7} *3*; α(IPF)=1.119×10^{-5} *16* Additional information 7.
1273.719‡ *3*	1.872 *9*	1373.8301	3$^-$	100.10598	2$^+$	E1+M2+E3 [b]		0.0029 *5*	δ(M2/E1)=+0.36 *10*; δ(E3/E1)=−0.28 *12*.
1289.145‡ *3*	3.893 *20*	1289.1498	2$^-$	0.0	0$^+$	M2		0.01231	α(K)=0.01019 *15*; α(L)=0.001630 *23*; α(M)=0.000372 *6* α(N)=8.98×10^{-5} *13*; α(O)=1.466×10^{-5} *21*; α(P)=1.047×10^{-6} *15*; α(IPF)=5.96×10^{-6} *9* Additional information 10.
1342.730 *15*	0.728 *4*	1442.836	4$^+$	100.10598	2$^+$	E2		0.00256	α(K)=0.00211 *3*; α(L)=0.000329 *5*; α(M)=7.49×10^{-5} *11* α(N)=1.80×10^{-5} *3*; α(O)=2.90×10^{-6} *4*; α(P)=1.95×10^{-7} *3*; α(IPF)=2.56×10^{-5} *4* Additional information 15.
1373.824‡ *3*	0.631 *6*	1373.8301	3$^-$	0.0	0$^+$	E3		0.00496	α(K)=0.00400 *6*; α(L)=0.000728 *11*;

$^{182}_{74}W_{108}$-22

^{182}Ta β^- decay (114.74 d) 1992Ch26,1992Su09,1990Me15 (continued)

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

E_γ [†]	I_γ [@ d]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [&]	δ [&]	α [c]	Comments
									α(M)=0.0001685 *24* α(N)=4.05×10^{-5} *6*; α(O)=6.44×10^{-6} *9*; α(P)=3.97×10^{-7} *6*; α(IPF)=1.252×10^{-5} *18* Additional information 14.
1387.390 [‡] *3*	0.207 *3*	1487.5018	4$^-$	100.10598	2$^+$	E3+M2	2.6 *4*	0.00554 *24*	α(K)=0.00450 *21*; α(L)=0.00079 *3*; α(M)=0.000183 *7* α(N)=4.39×10^{-5} *16*; α(O)=7.0×10^{-6} *3*; α(P)=4.50×10^{-7} *21*; α(IPF)=1.426×10^{-5} *22* Additional information 17.
1410.13 *8*	0.1123 *22*	1510.25	4$^+$	100.10598	2$^+$	E2		0.00235	α(K)=0.00193 *3*; α(L)=0.000298 *5*; α(M)=6.76×10^{-5} *10* α(N)=1.624×10^{-5} *23*; α(O)=2.62×10^{-6} *4*; α(P)=1.783×10^{-7} *25*; α(IPF)=4.20×10^{-5} *6*
1453.120 *6*	0.087 *3*	1553.2240	4$^-$	100.10598	2$^+$	E3(+M2)	>2.3	0.0048 *4*	α(K)=0.0039 *4*; α(L)=0.00068 *5*; α(M)=0.000156 *11* α(N)=3.76×10^{-5} *25*; α(O)=6.0×10^{-6} *4*; α(P)=3.9×10^{-7} *4*; α(IPF)=2.29×10^{-5} *4* δ: from ce data of 1992Ch26, 1976He18 and 1966Ko12; used weighted averaged I(ceK)=0.167 *16* and Iγ=0.113 *4*, both relative to 100 for 1221γ; deduced α_K(expt)=0.0038 *4*. Additional information 18.

[†] Values for 22 γ rays, as indicated, are recommended values from 2000He14 evaluation and analysis, based on curved-crystal data for low-energy (<270 keV) transitions, and from precise energy difference measurements of closely spaced γ rays of other isotopes. Two others are in table 4 of 2000He14 from curved-crystal data. Others are from weighted averages of values from 1992Su09, 1990Ja02, 1990Me15, 1989Ka20, 1974La15 and 1969Wh03 (also 1970Wh03).

[‡] Recommended value from 2000He14 (evaluation and analysis).

[#] The 121γ not seen, its energy is from level-energy difference. Intensity is deduced (by evaluators) by requiring intensity balance at 1136 level and assumed E2 multipolarity. It is considered as an uncertain transition.

[@] Average of available values from 1998Mi17, 1992Ch26, 1992Ke02, 1992Su09, 1990Ja02, 1990Me15, 1986Wa35, 1983Ji01, 1981Is08, 1980Ro22, 1980Sc07, 1977Ge12 (includes 1976He18), 1974La15, 1972Ga23, 1971Ja21, 1971Ml01, 1970Wh03, 1969Sa25, 1966Dz01, 1966Ko12, 1965Ed01, 1964Da15. AVETOOLS code is used for averaging procedure; this code combines four methods: weighted average, limitation of statistical weights (LWM), normalized residuals method (NRM) and Rajeval technique (RT). Adopted value is from best reduced χ^2 as compared to critical value of χ^2, with as small adjustment (increase) of uncertainties in input values as possible. In most cases LWM and/or NRM values are adopted. Values in 1965Ed01 and 1964Da15 are normalized to 40.3 for 100-keV γ ray. Values in 1976He18 are renormalized to 77.94 for 1221+1223 doublet.

[&] From ce data, $\gamma(\theta)$, and $\gamma\gamma(\theta)$ measurements of 1967Ni03, 1983Ri05, 1972Kr05, 1961Ha23, 1963El02, 1971Ga37, 1972He10, 1975Qu01, 1980Sp01 and 1992Ch26.

[a] Sign from $\gamma\gamma(\theta)$ measurements of 1983Ri05, 1972Kr05; magnitude from these measurements and ce data.

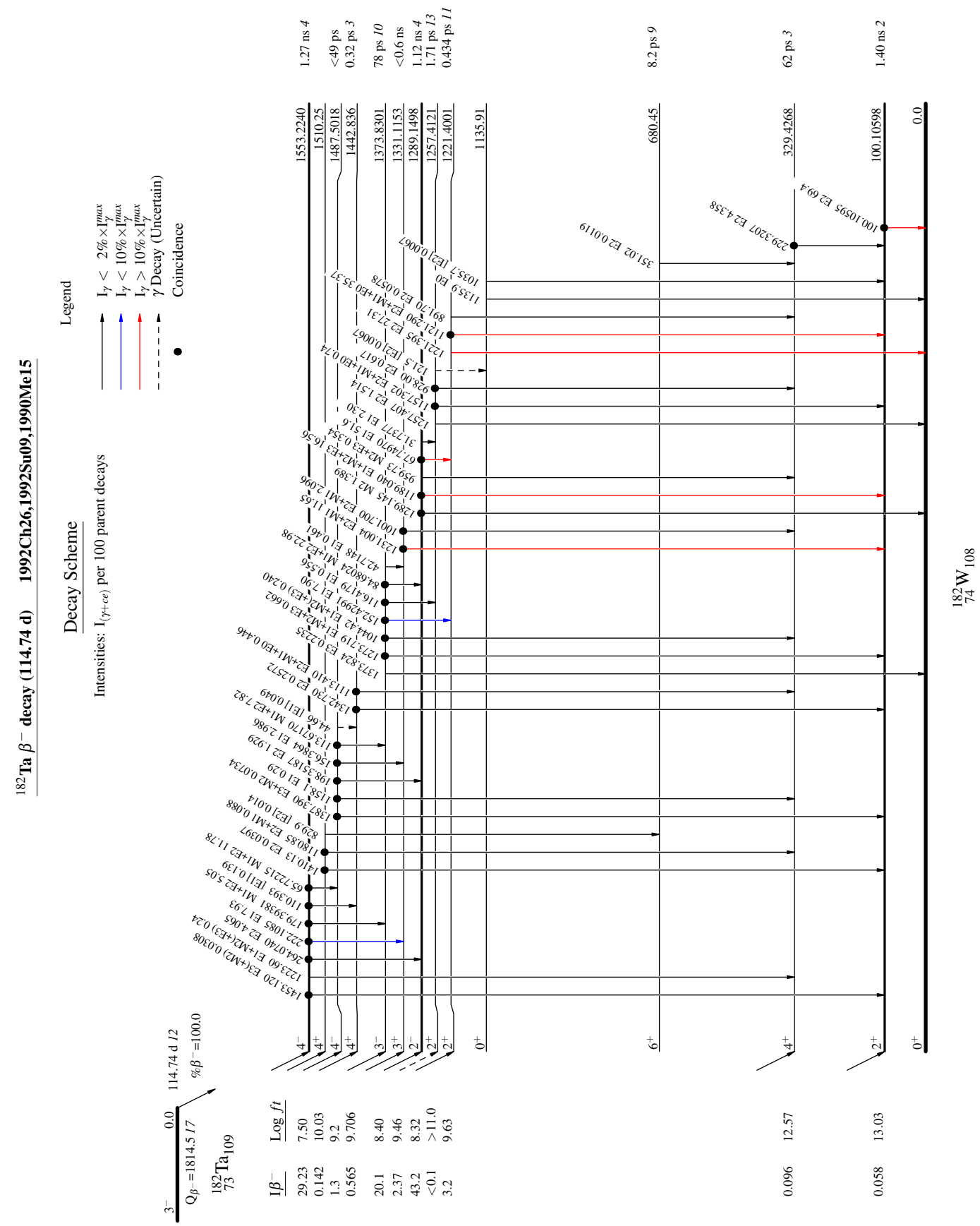
[b] From pol $\gamma\gamma(\theta)$ measurement of 1983Ri05.

[c] Theoretical values from BrIcc v2.3b (16-Dec-2014) 2008Ki07, "Frozen Orbitals" approximation. If mixing ratio δ is not given, it was assumed as 1.0 for E2/M1 and E3/M2 and 0.10 for others.

$^{182}_{74}W_{108}$-23

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

[d] For absolute intensity per 100 decays, multiply by 0.3524 *8*.
[e] Placement of transition in the level scheme is uncertain.


182Ta β− decay (114.74 d) 1992Ch26,1992Su09,1990Me15
Decay Scheme
Intensities: I(γ+ce) per 100 parent decays
Legend
Iγ < 2%×Iγmax
Iγ < 10%×Iγmax
Iγ > 10%×Iγmax
γ Decay (Uncertain)
Coincidence
3−
0.0
114.74 d 12
%β−=100.0
Qβ−=1814.5 17
182 73 Ta109
Iβ− Log ft
29.23 7.50
0.142 10.03
1.3 9.2
0.565 9.706
20.1 8.40
2.37 9.46
43.2 8.32
<0.1 >11.0
3.2 9.63
1.27 ns 4
<49 ps
0.32 ps 3
78 ps 10
<0.6 ns
1.12 ns 4
1.71 ps 13
0.434 ps 11
8.2 ps 9
62 ps 3
1.40 ns 2
1553.2240
1510.25
1487.5018
1442.836
1373.8301
1331.1153
1289.1498
1257.4121
1221.4001
1135.91
680.45
329.4268
100.10598
0.0
4−
4+
4−
4+
3−
3+
2−
2+
2+
0+
6+
4+
2+
0+
1453.120 E3(+M2) 0.0308
1223.60 E1+M2(+E3) 0.24
264.0740 E2 4.065
222.1085 E1 7.93
179.39381 M1+E2 7.93
110.3931 [E1] 0.139
65.7221 5 M1+E2 11.78
1410.13 E2 0.0397
1180.85 E2+M1 0.088
829.9 [E2] 0.014
1387.390 E3+M2 0.0734
1158.1 E1 0.29
198.3518 7 E2 1.929
156.3864 E2 2.986
113.6717 0 M1+E2 7.82
44.66 [E1] 0.049
1342.730 E2 0.2572
1113.410 E2+M1+E0 0.446
1373.824 E3 0.2235
1273.719 E1+M2+E3 0.662
1044.42 E1+M2+E3 0.240
1524.2991 E1+M2+E3 0.240
1164.1779 E1 7.90
884.6802 4 M1+E2 0.556
427.148 E1 0.461
1231.004 E2+M1 22.98
1001.700 E2+M1 1165
1289.145 M2 1.389
1189.040 E1+M2+E3 2.096
959.73 M2+E3 0.354
67.7497 0 E1 5.16
1237.407 E1 2.30
1157.302 E2 1.514
928.00 E2+M1+E0 0.617
121.5 [E2] 0.0067
1221.395 E2 22.31
1121.290 E2+M1+E0 0.74
891.70 E2+M1+E0 35.37
1035.7 [E2] 0.0067
1135.9 E0
1035.7 E0 0.0578
351.02 E2 0.0119
229.3207 E2 4.358
100.10595 E2 69.4
182 74 W108
25