^{100}Cd ε decay (49.1 s) 1989Ry02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 172, 1 (2021)	31-Jan-2021

Parent: ^{100}Cd: E=0.0; $J^\pi=0^+$; $T_{1/2}$=49.1 s *5*; Q(ε)=3943 *5*; %ε+%β^+ decay=100.0

^{100}Cd-$T_{1/2}$: From ^{100}Cd Adopted Levels, from 1989Ry02.

^{100}Cd-Q(ε): From 2017Wa10.

1989Ry02: ^{100}Cd source was produced in spallation reaction of 600-MeV protons on ≈100 g/cm^2 molten tin target at the ISOLDE II facility. x and γ rays were detected with Ge(Li) detectors and conversion electrons were detected with a mini-orange spectrometer. Measured Eγ, Iγ, γγ-coin, E(ce), I(ce), (x ray)γ-coin, ce-γ-coin. γ(t). Deduced levels, J, π, parent $T_{1/2}$, conversion coefficients, γ-ray multipolarities, ε-decay branching ratios, log *ft*. Comparisons with theoretical calculations. See also 2010Ba51 review article.

Additional information 1.

Other: 1970Hn03: ($T_{1/2}$ and a few γ rays reported).

Total decay energy deposit of 4004 keV *98* calculated by RADLIST code is in agreement with the expected value of 3943 keV *5*, indicating the completeness of the decay scheme.

^{100}Ag Levels

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0	(5)$^+$	236.15 *17*	(3)$^+$	952.05 *19*	1$^+$	1393.15 *19*	1$^+$
15.51 *17*	(2)$^+$	303.64 *14*	(3)$^+$	1039.45 *21*	(1,2)$^-$	1574.30 *22*	1$^+$
124.70 *10*	(4)$^+$	583.38 *18*	(1,2,3)$^+$	1156.39 *20*	1$^+$	1892.95 *25*	1$^+$
155.22 *18*	(1,2,3)$^+$	886.03 *19*	(1,2,3)$^+$	1212.69 *20*	1$^+$	1960.2 *3*	1$^+$

† From a least-squares fit to Eγ data.

‡ From Adopted Levels.

ε,β^+ radiations

E(decay)	E(level)	Iβ^+ ‡	Iε‡	Log *ft*	I(ε+β^+)†‡	Comments
(1983 *5*)	1960.2	0.076 *8*	0.47 *5*	4.94 *5*	0.55 *6*	av Eβ=428.1 *22*; εK=0.7448 *19*; εL=0.09446 *24*; εM+=0.02337 *6*
(2050 *5*)	1892.95	0.32 *3*	1.6 *2*	4.45 *5*	1.9 *2*	av Eβ=457.7 *22*; εK=0.7194 *20*; εL=0.0912 *3*; εM+=0.02255 *7*
(2369 *5*)	1574.30	1.8 *2*	3.7 *3*	4.21 *4*	5.5 *5*	av Eβ=599.1 *23*; εK=0.5793 *23*; εL=0.0732 *3*; εM+=0.01810 *8*
(2550 *5*)	1393.15	6.7 *6*	9.1 *8*	3.88 *4*	15.8 *14*	av Eβ=680.3 *23*; εK=0.4969 *23*; εL=0.0627 *3*; εM+=0.01550 *7*
(2730 *5*)	1212.69	1.9 *2*	1.8 *1*	4.64 *4*	3.7 *3*	av Eβ=761.8 *23*; εK=0.4207 *20*; εL=0.0530 *3*; εM+=0.01311 *7*
(2787 *5*)	1156.39	1.2 *1*	1.1 *1*	4.89 *4*	2.3 *2*	av Eβ=787.4 *23*; εK=0.3986 *20*; εL=0.05023 *25*; εM+=0.01242 *6*
(2904# *5*)	1039.45	<0.2	<0.1	>5.9	<0.3	av Eβ=840.6 *23*; εK=0.3558 *18*; εL=0.04481 *23*; εM+=0.01107 *6*
(2991 *5*)	952.05	43 *3*	26 *2*	3.56 *4*	69 *5*	av Eβ=880.4 *23*; εK=0.3265 *17*; εL=0.04110 *21*; εM+=0.01016 *5*
(3057# *5*)	886.03	<0.71	<0.39	>5.4	<1.1	av Eβ=910.6 *23*; εK=0.3060 *16*; εL=0.03850 *20*; εM+=0.00951 *5* I(ε+β^+): no direct β^++ε feeding is expected from 0$^+$ parent state to 886-keV state for J=2 and 3. Apparent weak feeding is possibly due to weak unobserved γ transitions from higher levels.

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^{100}Cd ε decay (49.1 s) 1989Ry02 (continued)

ϵ,β^+ radiations (continued)

E(decay)	E(level)	Iβ^+ ‡	Iε ‡	Log *ft*	I$(\varepsilon+\beta^+)$ †‡	Comments
(3360# *5*)	583.38	<0.5	<0.2	>5.8	<0.7	av Eβ=1049.8 *24*; εK=0.2275 *11*; εL=0.02859 *14*; εM+=0.00706 *4* I$(\varepsilon+\beta^+)$: no direct β^++ε feeding is expected from 0^+ parent state to 583-keV state for J=2 and 3. Apparent weak feeding is possibly due to weak unobserved γ transitions from higher levels.
(3639# *5*)	303.64	0.7 *5*	0.2 *1*	5.9 *3*	0.9 *6*	av Eβ=1179.5 *24*; εK=0.1745 *9*; εL=0.02191 *11*; εM+=0.00541 *3* I$(\varepsilon+\beta^+)$: no direct β^++ε feeding is expected from 0^+ parent state to 304, $(3)^+$ state. Apparent weak feeding is possibly due to weak unobserved γ transitions from higher levels.
(3707# *5*)	236.15	0.7 *3*	0.2 *1*	5.93 *20*	0.9 *4*	av Eβ=1210.9 *24*; εK=0.1640 *8*; εL=0.02059 *10*; εM+=0.005086 *24* I$(\varepsilon+\beta^+)$: no direct β^++ε feeding is expected from 0^+ parent state to 236, $(3)^+$ state. Apparent weak feeding is possibly due to weak unobserved γ transitions from higher levels.
(3788# *5*)	155.22	<0.82	<0.18	>5.9	<1.0	av Eβ=1248.6 *24*; εK=0.1524 *7*; εL=0.01912 *9*; εM+=0.004724 *22* I$(\varepsilon+\beta^+)$: no direct β^++ε feeding is expected from 0^+ parent state to 155-keV state for J=2 and 3. Apparent weak feeding is possibly due to weak unobserved γ transitions from higher levels.

† From I(γ+ce) balance at each level.
‡ Absolute intensity per 100 decays.
# Existence of this branch is questionable.

γ(^{100}Ag)

Iγ normalization: from Σ(I(γ+ce to g.s. and 15-keV level)=100. No ε feeding is expected to g.s. and 15-keV level. Unplaced intensity is ≈0.6%.

E_γ †	I_γ †@	E_i(level)	J^π_i	E_f	J^π_f	Mult.#	δ#	α&	Comments
111.4 *2*	0.32 *4*	236.15	$(3)^+$	124.70	$(4)^+$	M1(+E2)	<0.5	0.38 *7*	%Iγ=0.21 *3* α(K)=0.32 *5*; α(L)=0.048 *15*; α(M)=0.009 *3* α(N)=0.0015 *5*; α(O)=5.7×10^{-5} *7* Mult.: α(K)exp=0.23 *11*. Ice(K)=0.074 *32*.
117.0 *2*	0.14 *3*	1156.39	1^+	1039.45	$(1,2)^-$	[E1]		0.1020	%Iγ=0.092 *21* α(K)=0.0888 *14*; α(L)=0.01078 *16*; α(M)=0.00203 *3* α(N)=0.000346 *6*; α(O)=1.421×10^{-5} *21*
124.70 *10*	5.6 *4*	124.70	$(4)^+$	0.0	$(5)^+$	M1(+E2)	<0.1	0.228	%Iγ=3.7 *3* α(K)=0.198 *4*; α(L)=0.0247 *6*; α(M)=0.00471 *11* α(N)=0.000814 *18*; α(O)=3.72×10^{-5} *6* Mult.: α(K)exp=0.18 *2*. Ice(K)=1.0 *1*.

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^{100}Cd ε decay (49.1 s) 1989Ry02 (continued)

$\gamma(^{100}Ag)$ (continued)

E_γ[†]	I_γ[†@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	δ[#]	α[&]	Comments
139.71 10	10.2 6	155.22	(1,2,3)+	15.51	(2)+	M1(+E2)	<0.3	0.177 12	%Iγ=6.7 5 α(K)=0.152 9; α(L)=0.0199 22; α(M)=0.0038 5 α(N)=0.00065 7; α(O)=2.81×10^{-5} 12 Mult.: α(K)exp=0.14 2. Ice(K)=1.4 2.
148.5 3	0.21 4	303.64	(3)+	155.22	(1,2,3)+	[M1,E2]		0.25 11	%Iγ=0.14 3 α(K)=0.20 9; α(L)=0.035 20; α(M)=0.007 4 α(N)=0.0011 7; α(O)=3.3×10^{-5} 11
x164.3 4	0.09 3								%Iγ=0.059 20
173.2 2	0.76 6	1212.69	1+	1039.45	(1,2)−	E1		0.0334	%Iγ=0.50 5 α(K)=0.0291 5; α(L)=0.00348 5; α(M)=0.000657 10 α(N)=0.0001124 17; α(O)=4.83×10^{-6} 7 Mult.: α(K)exp=0.030 7 gives δ<0.13. Ice(K)=0.023 5.
178.95 10	7.0 5	303.64	(3)+	124.70	(4)+	M1(+E2)	<0.4	0.091 7	%Iγ=4.6 4 α(K)=0.079 6; α(L)=0.0101 12; α(M)=0.00194 23 α(N)=0.00033 4; α(O)=1.45×10^{-5} 8 Mult.: α(K)exp=0.076 9. Ice(K)=0.53 5.
220.65 10	5.5 4	236.15	(3)+	15.51	(2)+	M1(+E2)	<0.8	0.056 8	%Iγ=3.6 3 α(K)=0.048 7; α(L)=0.0064 13; α(M)=0.00122 25 α(N)=0.00021 4; α(O)=8.7×10^{-6} 8 Mult.: α(K)exp=0.047 8. Ice(K)=0.26 4.
270.37 15	0.39 3	1156.39	1+	886.03	(1,2,3)+	M1,E2		0.036 8	%Iγ=0.257 23 α(K)=0.031 7; α(L)=0.0042 13; α(M)=0.00081 25 α(N)=0.00014 4; α(O)=5.4×10^{-6} 8 Mult.: α(K)exp=0.023 11. Ice(K)=0.009 4.
288.13 15	3.2 3	303.64	(3)+	15.51	(2)+	M1(+E2)	<1.1	0.027 4	%Iγ=2.11 22 α(K)=0.023 3; α(L)=0.0030 5; α(M)=0.00058 10 α(N)=9.9×10^{-5} 16; α(O)=4.2×10^{-6} 4 Mult.: α(K)exp=0.023 3. Ice(K)=0.073 8.
302.8 3	0.17 6	886.03	(1,2,3)+	583.38	(1,2,3)+	[M1,E2]		0.026 5	%Iγ=0.11 4 α(K)=0.022 4; α(L)=0.0029 8; α(M)=0.00056 14 α(N)=9.6×10^{-5} 23; α(O)=3.9×10^{-6} 5
347.23 15	3.2 3	583.38	(1,2,3)+	236.15	(3)+	M1,E2		0.0171 22	%Iγ=2.11 22

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^{100}Cd ε decay (49.1 s) 1989Ry02 (continued)

$\gamma(^{100}Ag)$ (continued)

E_γ †	I_γ †@	E_i(level)	J^π_i	E_f	J^π_f	Mult.#	δ#	α&	Comments
									α(K)=0.0148 *18*; α(L)=0.0019 *4*; α(M)=0.00037 *7* α(N)=6.3×10^{-5} *11*; α(O)=2.62×10^{-6} *20* Mult.: α(K)exp=0.017 *2*. Ice(K)=0.054 *5*.
361.4 *3*	0.33 *11*	1574.30	1$^+$	1212.69	1$^+$				%Iγ=0.22 *8*
368.70 *15*	7.0 *5*	952.05	1$^+$	583.38	(1,2,3)$^+$	M1,E2		0.0144 *16*	%Iγ=4.6 *4* α(K)=0.0124 *12*; α(L)=0.0016 *3*; α(M)=0.00031 *5* α(N)=5.2×10^{-5} *8*; α(O)=2.22×10^{-6} *13* Mult.: α(K)exp=0.014 *2*. Ice(K)=0.097 *11*.
428.20 *15*	6.9 *5*	583.38	(1,2,3)$^+$	155.22	(1,2,3)$^+$	M1(+E2)	<1.3	0.0092 *4*	%Iγ=4.6 *4* α(K)=0.0080 *3*; α(L)=0.00099 *7*; α(M)=0.000189 *14* α(N)=3.25×10^{-5} *22*; α(O)=1.46×10^{-6} *3* Mult.: α(K)exp=0.0074 *8*. Ice(K)=0.051 *4*.
441.10 *15*	1.15 *11*	1393.15	1$^+$	952.05	1$^+$	M1,E2		0.0087 *5*	%Iγ=0.76 *8* α(K)=0.0075 *4*; α(L)=0.00095 *9*; α(M)=0.000180 *18* α(N)=3.1×10^{-5} *3*; α(O)=1.355×10^{-6} *25* Mult.: α(K)exp=0.0078 *12*. Ice(K)=0.009 *1*.
500.0 *5*	0.13 *4*	1892.95	1$^+$	1393.15	1$^+$				%Iγ=0.09 *3*
507.25 *25*	8.4 *16*	1393.15	1$^+$	886.03	(1,2,3)$^+$	M1,E2		0.00597 *12*	%Iγ=5.5 *11* α(K)=0.00519 *9*; α(L)=0.00064 *4*; α(M)=0.000122 *7* α(N)=2.10×10^{-5} *10*; α(O)=9.36×10^{-7} *22* Mult.: α(K)exp=0.0042 *14*. Ice(K)=0.035 *10*.
^{x}525.5 *3*	0.61 *7*								%Iγ=0.40 *5*
535.0 *3*	0.31 *5*	1574.30	1$^+$	1039.45	(1,2)$^-$				%Iγ=0.20 *4*
567.90 *15*	7.9 *5*	583.38	(1,2,3)$^+$	15.51	(2)$^+$	M1,E2		0.00445 *8*	%Iγ=5.2 *4* α(K)=0.00387 *8*; α(L)=0.000473 *12*; α(M)=8.99×10^{-5} *23* α(N)=1.55×10^{-5} *4*; α(O)=7.0×10^{-7} *3* Mult.: α(K)exp=0.0043 *6*. Ice(K)=0.034 *4*.
573.1 *4*	0.39 *8*	1156.39	1$^+$	583.38	(1,2,3)$^+$				%Iγ=0.26 *6*
582.5 *3*	9.5 *6*	886.03	(1,2,3)$^+$	303.64	(3)$^+$	M1,E2		0.00417 *9*	%Iγ=6.3 *5* α(K)=0.00363 *9*; α(L)=0.000442 *9*; α(M)=8.40×10^{-5} *18* α(N)=1.449×10^{-5} *25*; α(O)=6.6×10^{-7} *3* Mult.: α(K)exp=0.0037 *13*. Ice(K)=0.035 *12*.

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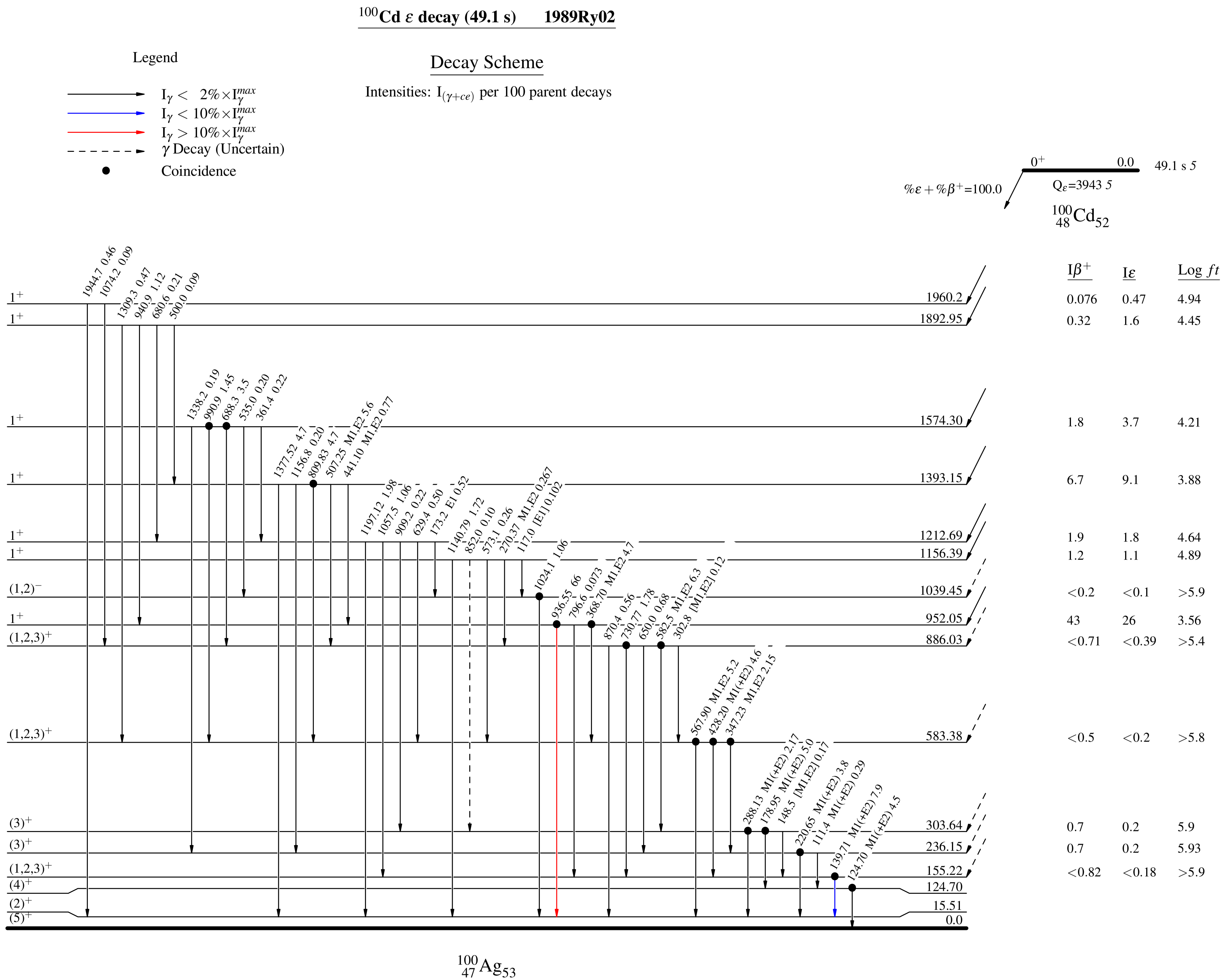
^{100}Cd ε decay (49.1 s) 1989Ry02 (continued)

γ(^{100}Ag) (continued)

E_γ[†]	I_γ[†@]	E_i(level)	J^π_i	E_f	J^π_f	Comments
629.4 *3*	0.75 *7*	1212.69	1+	583.38	(1,2,3)+	%Iγ=0.50 *5*
650.0 *3*	1.03 *10*	886.03	(1,2,3)+	236.15	(3)+	%Iγ=0.68 *8*
680.6 *4*	0.32 *10*	1892.95	1+	1212.69	1+	%Iγ=0.21 *7*
688.3 *3*	5.3 *5*	1574.30	1+	886.03	(1,2,3)+	%Iγ=3.5 *4*
[x]707.5 *5*	0.10 *3*					%Iγ=0.066 *20*
730.77 *25*	2.6 *2*	886.03	(1,2,3)+	155.22	(1,2,3)+	%Iγ=1.72 *15*
796.6 *4*	0.11 *3*	952.05	1+	155.22	(1,2,3)+	%Iγ=0.073 *20*
809.83 *20*	7.1 *5*	1393.15	1+	583.38	(1,2,3)+	%Iγ=4.7 *4*
852.0[‡a] *4*	0.15 *4*	1156.39	1+	303.64	(3)+	%Iγ=0.10 *3*
870.4 *3*	0.85 *8*	886.03	(1,2,3)+	15.51	(2)+	%Iγ=0.56 *6*
909.2 *4*	0.34 *6*	1212.69	1+	303.64	(3)+	%Iγ=0.22 *4*
936.55 *15*	100 *6*	952.05	1+	15.51	(2)+	%Iγ=66.0 *15*
940.9 *3*	1.7 *3*	1892.95	1+	952.05	1+	%Iγ=1.12 *21*
[x]974.3 *5*	0.14 *4*					%Iγ=0.09 *3*
990.9 *3*	2.1 *2*	1574.30	1+	583.38	(1,2,3)+	%Iγ=1.39 *15*
1024.1 *3*	1.5 *2*	1039.45	(1,2)−	15.51	(2)+	%Iγ=0.99 *14*
1057.5 *3*	1.5 *2*	1212.69	1+	155.22	(1,2,3)+	%Iγ=0.99 *14*
1074.2 *5*	0.14 *5*	1960.2	1+	886.03	(1,2,3)+	%Iγ=0.09 *4*
1140.79 *20*	2.5 *2*	1156.39	1+	15.51	(2)+	%Iγ=1.65 *15*
1156.8 *5*	0.30 *7*	1393.15	1+	236.15	(3)+	%Iγ=0.20 *5*
1197.12 *20*	2.9 *2*	1212.69	1+	15.51	(2)+	%Iγ=1.91 *15*
1309.3 *3*	0.71 *5*	1892.95	1+	583.38	(1,2,3)+	%Iγ=0.47 *4*
1338.2 *4*	0.29 *10*	1574.30	1+	236.15	(3)+	%Iγ=0.19 *7*
1377.52 *20*	7.1 *5*	1393.15	1+	15.51	(2)+	%Iγ=4.7 *4*
1944.7 *3*	0.70 *5*	1960.2	1+	15.51	(2)+	%Iγ=0.46 *4*

† From 1989Ry02. Quoted values of Iγ and I(ce) are the original values in 1989Ry02 divided by a factor of 10.
‡ Placement suggested by the evaluators on the basis of energy sums.
# From ce data in 1989Ry02, adopted in Adopted Gammas. Conversion coefficients are not explicitly given in 1989Ry02 but plotted in Fig.7 of 198902; quoted values under comments are deduced by evaluators from Iγ and I(ce) values in 1989Ry02.
@ For absolute intensity per 100 decays, multiply by 0.66 *3*.
& Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
a Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.



100Cd ε decay (49.1 s) 1989Ry02
Decay Scheme
Intensities: I(γ+ce) per 100 parent decays
Legend
Iγ < 2%×Iγmax
Iγ < 10%×Iγmax
Iγ > 10%×Iγmax
γ Decay (Uncertain)
Coincidence
0+ 0.0 49.1 s 5
Qε=3943 5
%ε+%β+=100.0
100 48Cd52
Iβ+ Iε Log ft
1+ 1960.2 0.076 0.47 4.94
1+ 1892.95 0.32 1.6 4.45
1+ 1574.30 1.8 3.7 4.21
1+ 1393.15 6.7 9.1 3.88
1+ 1212.69 1.9 1.8 4.64
1+ 1156.39 1.2 1.1 4.89
(1,2)− 1039.45 <0.2 <0.1 >5.9
1+ 952.05 43 26 3.56
(1,2,3)+ 886.03 <0.71 <0.39 >5.4
(1,2,3)+ 583.38 <0.5 <0.2 >5.8
(3)+ 303.64 0.7 0.2 5.9
(3)+ 236.15 0.7 0.2 5.93
(1,2,3)+ 155.22 <0.82 <0.18 >5.9
(4)+ 124.70
(2)+ 15.51
(5)+ 0.0
1944.7 0.46
1074.2 0.09
1309.3 0.47
940.9 1.12
680.6 0.21
500.0 0.09
1338.2 0.19
990.9 1.45
688.3 3.5
535.0 0.20
361.4 0.22
1377.52 4.7
1156.8 0.20
809.83 4.7
507.25 M1,E2 5.6
441.10 M1,E2 0.77
1197.12 1.98
1057.5 1.06
909.2 0.22
629.4 0.50
173.2 E1 0.52
1140.79 1.72
852.0 0.10
573.1 0.26
270.37 M1,E2 0.267
117.0 [E1] 0.102
1024.1 1.06
936.55 66
796.6 0.073
368.70 M1,E2 4.7
870.4 0.56
730.77 1.78
650.0 0.68
582.5 M1,E2 6.3
302.8 [M1,E2] 0.12
567.90 M1,E2 5.2
428.20 M1(+E2) 4.6
347.23 M1,E2 2.15
288.13 M1(+E2) 2.17
178.95 M1(+E2) 5.0
148.5 [M1,E2] 0.17
220.65 M1(+E2) 3.8
111.4 M1(+E2) 0.29
139.71 M1(+E2) 7.9
124.70 M1(+E2) 4.5
100 47Ag53

$^{100}_{47}Ag_{53}$-6