^{110}Ag^{m} – Comments on evaluation of decay data by R. G. Helmer

1) Decay Scheme

The β^- decay of the ^{110}Ag^{m} (249 d) isomer to levels in ^{110}Cd occurs in 98,64(8) % of the decays and the remaining 1,36(8) % is by an isomeric transition to the ^{110}Ag ground state (24 s). The β^- emission to ^{110}Cd from the ground state occurs in 99,70(6) % of the decays and the remaining 0,30(6) % is by electron capture to ^{110}Pd. The comments on the decay ^{110}Ag (24 s) ground state are provided under that decay.

2) Q values and half-lives

The Q values from the 1995Au04 evaluation for the decay of the ^{110}Ag ground state are 2892,2 (16) keV for the β^- decay so the decay energy for the β^- decay of the ^{110}Ag^{m} (249 d) isomer is then 3009,8 (16) keV.

The half-life of the ^{110}Ag^{m} isomeric state has been determined from the following data (in days):

1938Li07	225 (20)	omitted, large uncertainty
1950Gu54	270	omitted, no uncertainty
1976WaZH	249,78 (4)	superseded by 1983Wa26
1980Ho17	249,74 (5)	
1983Wa26	249,79 (2)	
Adopted	249,78 (2)	

The adopted value is the weighted average of the last two values, and the reduced-χ^2 value is 0,86.

3) g-ray data

Several of the γ-rays from the decay of the isomer ^{110}Ag^{m} (249 d) have precisely measured energies; these values were taken from the evaluation 2000He14 and are on a scale for which the energy of the strong line from the decay of ^{198}Au is 411,80205(17) keV. The other energies were determined as shown in Table 1 from the data of 1979Ve03, 1981Ma09, 1990Me15, and 1993Ki18. In order to provide a set of energies consistent with those of 2000He14, the values 1990Me15 were adjusted by additive amounts of 0 to 15 eV as shown in the table. No additional uncertainty was assigned for these adjustments. The values of the remaining references were not adjusted.

Table 1. γ-ray energies (keV)

1979Ve03	1981Ma09 [a]	1993Ki18	1990Me15	1990Me15 adjusted & rounded	2000He14	Adopted
			116,485 (46)	116,48 (5)		116,48 (5)
120,4 (2)	120,3 (1)	120,2 (2)	120,226 (26)	120,23 (3)		120,23 (3)
133,3 (2)	133,4 (1)	133,2 (1)	133,333 (7)			133,333 (7)
219,2 (2)	219,4 (1)	219,4 (1)	219,348 (8)			219,348 (8)

1979Ve03	1981Ma09 [a]	1993Ki18	1990Me15	1990Me15 adjusted & rounded	2000He14	Adopted
221,0 (1)	221,0 (1)	221,1 (2)	221,079 (10)			221,079 (10)
229,3 (2)	229,4 (1)	229,4 (3)	229,423 (23)			229,423 (23)
	264,4 (1)	264,1 (3)	264,254 (58)	264,25 (6)		264,25 (6)
266,9 (2)	267,0 (1)	267,0 (3)	266,913 (12)			266,913 (12)
	341,4 (1)	340,9 (5)	341,2 (2)			341,3 (2)
	356,4 (1)	356,5 (2)	356,43 (10)			356,43 (10)
360,7 (2)	360,0 (1)	360,2 (5)	360,228 (75)	360,23 (8)		360,23 (8)
365,54 (10)	365,4 (1)	365,3 (1)	365,450 (10)	365,448 (10)		365,448 (10)
387,2 (2)	387,1 (1)	387,1 (6)	387,075 (9)	387,073 (9)		387,073 (9)
397,1 (2)	396,8 (1)	396,5 (6)	396,897 (23)	396,895 (23)		396,895 (23)
	409,6 (1) [d]	409,6 (4)	409,330 (45)	409,33 (5)		409,4 (5)
446,87 (5)		446,8 (2)	446,808 (8)		446,812 (3)	446,812 (3)
466,9 (2)	466,9 (1)	465,8 (7)	467,029 (36)	467,03 (4)		467,03 (4)
493,8 (2)	493,0 (1)	493,6 (1)	493,432 (91)	493,43 (9)		493,43 (10)
554,8 (2)	544,5 (1)	544,9 (5)	544,555 (45)	544,55 (5)		544,55 (5)
	572,7 (1)	573,1 (7)	573,0 (4)			572,8 (2)
	603,1 (1)	603,1 (4)	603,065 (90)	603,06 (9)		603,08 (10)
620,45 (5)		620,4 (1)	620,362 (1)		620,3553 (17)	620,3553 (17)
626,24 (5)	626,1 (1)	626,4 (2)	626,262 (10)	626,258 (10)		626,258 (10)
	630,6 (1)	630,7 (4)	630,626 (55)	630,62 (6)		630,62 (6)
	648,2 (10)	647,8 (4)				647,8 (4)
657,75 (5)		657,7 (2)	657,766 (5)		657,7600 (11)	657,7600 (11)
	666,1 (2)	667,1 (1)				666,6 (5)
	676,6 (1)		676,58 (10)			676,58 (10)
677,72 (5)		677,6 (1)	677,623 (7)		677,6217 (12)	677,6217 (12)
687,10 (5)			687,005 (11)		687,0091 (18)	687,0091 (18)
706,74 (5)			706,688 (8)		706,6760 (15)	706,6760 (15)
	708,3 (1)	708,6 (5)	708,133 (20)	708,128 (20)		708,128 (20)
	714,9 (1)	715,0 (3)				714,9 (1)
744,35 (5)			744,279 (8)		744,2755 (19)	744,2755 (18)
763,98 (5)			763,947 (8)		763,9424 (17)	763,9424 (17)
	774,8 (1)	774,6 (1)	774,8 (2)			774,70 (10)
818,00 (5)			818,037 (8)		818,0244 (18)	818,0244 (18)
884,65 (5)			884,037 (8)		884,6781 (13)	884,6781 (13)

1979Ve03	1981Ma09 [a]	1993Ki18	1990Me15	1990Me15 adjusted & rounded	2000He14	Adopted
937,55 (5)			937,505 (13)		937,485 (3)	937,485 (3)
957,3 (2)	957,4 (1)	957,6 (7)	957,368 (85)	957,35 (9)		957,35 (10)
997,12 (5)	997,2 (1)	997,2 (4)	997,258 (15)	997,243 (15)		997,243 (15)
1019,0 (2)	1019,1 (1)	1018,8 (5)	1018,893 (50)	1018,88 (5)		1018,95 (8)
	1050,1 (3)	1051,8 (6)				1050,5 (5)
1085,7 (1)	1085,5 (1)	1085,3 (4)	1085,462 (14)	1085,447 (14)		1085,447 (14)
1117,7 (2)	1117,5 (1)	1117,2 (3)	1117,474 (28)	1117,46 (3)		1117,46 (3)
1125,7 (2)	1125,6 (1)	1125,6 (4)	1125,714 (20)	1125,699 (20)		1125,699 (20)
1163,5 (2)	1163,1 (2)	1163,1 (3)	1163,159 (75)	1163,14 (8)		1163,14 (8)
1165,6 (2)	1164,5 (2)	1165,2 (8)	1164,959 (85)	1164,94 (9)		1164,94 (9)
	1186,7 (1)	1186,5 (2)	1186,7 (2)			1186,7 (1)
1251,2 (2)	1251,0 (1)	1251,2 (3)	1251,057 (42)	1251,04 (4)		1251,04 (4)
1300,0 (2)	1300,1 (1)	1300,3 (4)	1300,03 (12)	1300,02 (12)		1300,05 (10)
1334,53 (10)	1334,4 (1)	1334,3 (3)	1334,341 (17)	1334,326 (17)		1334,326 (17)
1384,47 (5)			1384,305 (8)		1384,2931 (20)	1384,2931 (20)
	1421,1 (1)	1420,9 (5)	1420,081 (50)	1420,07 (5)		1420,07 (5)
	1465,6 (1)	1465,6 (1)				1465,6 (1)
1475,80 (5)			1475,305 (12)		1475,7792 (23)	1475,7792 (23)
1505,05 (5)			1505,039 (8)		1505,0280 (20)	1505,0280 (20)
1562,37 (5)			1562, 305 (9)		1562,2940 (18)	1562,2940 (18)
	1572,3 (2)		1572,4 (2)			1572,4 (2)
1592,8 (1)	1593,0 (2)	1593,1 (4)	1592,672 (95)	1592,66 (10)		1592,80 (15)
	1630,0 (2)	1630,0 (1)	1629,692 (63)	1629,68 (6)		1629,75 (15)
	1698,5 (2)	1698,9 (1)				1698,8 (2)
1775,6 (2)	1775,4 (1)	1775,4 (2)	1775,422 (39)	1775,41 (4)		1775,41 (4)
1783,4 (2)	1783,6 (1)	1783,4 (2)	1783,480 (30)	1783,46 (3)		1783,46 (3)
1903,9 (2)	1903,4 (1)	1904,1 (8)	1903,530 (35)	1903,52 (4)		1903,52 (4)
	2004,6 (1)	2003,8 (8)	2004,74 (10)	2004,72 (10)		2004,65 (10)

[a] The uncertainties of 0,1 keV are from a general statement and not specific to each γ-ray.
[d] Reported to be a doublet.

The relative γ-ray intensities for the decay of $^{110}Ag^{m}$ (249 d) are given in Table 2. The adopted values are the weighted averages computed by the Limitation of Relative Statistical Weight method (1985ZiZY, 1992Ra09) and take into account the measurements from 1976De, 1977Ge12, 1979Ve03, 1980Ro22, 1980Yo05, 1981Ma09, 1990Me15, and 1993Ki18.

The γ-ray energies in Table 2 that are flagged with a "c" are from the evaluation 2000He14 and are considered especially suitable for energy calibration.

Table 2. Relative γ-ray intensities for $^{110}Ag^{m}$ decay

Energy (keV)	1969Br03 1972Ph04[a]	1976De	1977Ge12	1979Ve03	1980Ro22	1980Yo05	1981Ma09	1990Me15	1993Ki18	LRSW average	χ_R^2 if > 1,0	σ_{int}	σ^{ext}	σ_{LWM}
116,48 (5)	isomeric decay							0,085 (3)						
120,23 (3)	<0,15			0,17 (3)			0,18 (1)	0,19 (1)	0,66(1) [e]	0,179 (9)				
133,333(7)	0,9 (2)			0,86 (13)			0,80 (5)	0,77 (3)	0,78 (2)	0,780 (16)				
219,348(8)	1,3 (3)			0,80 (6)			0,77 (5)	0,70 (2)	0,81 (1) [i]	0,76 (5)	5,8	0,013	0,030	0,046
221,079 (10)	1,1 (3)			0,80 (11)			0,74 (5)	0,72 (1)	0,67 (3)	0,716 (10)	1,1	0,009	0,010	
229,423 (23)	0,32 (15)			0,19 (5)			0,11 (1)	0,128 (8) [i]	0,22 (3)	0,126 (14)	4,7	0,007	0,014	
264,25 (6)							0,070 (7)	0,059 (5)	0,11 (3)	0,064(6)	2,0	0,004	0,006	
266,913 (12)	0,5 (1)			0,65 (6)			0,37 (2)	0,43 (1) [i]	0,53 (4)	0,43 (4)	9,5	0,012	0,037	
341,3 (2)							0,06 (3)	0,022 (4)	0,13 (9)	0,023 (5)	1,5	0,004	0,005	
356,43(10)							0,06 (3)	0,045 (3)	0,04 (2)	0,045 (3)				
360,23 (8)				0,14 (2)			0,11 (5)	0,035(7) [i]	0,09 (5)	0,08 (5)	5,4	0,012	0,028	0,048
365,448 (10)	1,1 (2)			1,27(14)		0,91 (19)	0,92 (5)	1,02 (8)	1,10 (12)	0,98 (5)	1,8	0,038	0,050	
387,073(9)	0,43 (9)			0,54 (13)		0,8 (4)	0,54 (3)	0,55 (1)	0,61 (24)	0,549 (9)				
396,895 (23)	0,36 (8)			0,68 (12)		0,6 (3)	0,35 (2)	0,43 (1) [i]	0,30 (10)	0,39 (4)	3,8	0,014	0,027	0,036
409,4 (5)							0,08 (4)	0,068 (7)	0,01 (4)	0,067 (7)	1,1	0,007	0,007	
446,812 (3) [c]	35 (2)		38,6 (4)	41,8 (6) [e]	39,0 (12)	39,55 (28)	39 (2)	38,9 (6)	38,22 (12) [i]	38,7 (5)	2,9	0,15	0,25	0,48
467,03 (4)				0,35 (5)			0,26 (2)	0,26 (5)	0,21 (5)	0,264 (19)	1,4	0,016	0,019	
493,43(10)				0,06 (2)			0,10 (2)	0,11 (1)	0,13 (4)	0,101 (11)	1,8	0,008	0,011	
544,55 (5)				0,10 (2)			0,19 (1)	0,22 (1)	0,15 (6)	0,19 (3)	9,8	0,007	0,021	0,027
572,8 (2)							0,19 (1)	0,13 (3)	0,14 (6)	0,183 (13)	2,1	0,009	0,013	

Energy (keV)	1969Br03 1972Ph04[a]	1976De	1977Ge12	1979Ve03	1980Ro22	1980Yo05	1981Ma09	1990Me15	1993Ki18	LRSW average	χ_R^2 if > 1,0	σ_{int}	σ^{ext}	σ_{LWM}
603,08(10)							0,20 (3)	0,042 (9) [i]	0,30 (12)	0,12 (8)	8,2	0,021	0,059	0,081
620,3553 (17) [c]	29 (2)		29,3 (3)	29,5 (4)	31,4 (13)	29,65 (19)	28,0 (14)	29,4 (5)	28,00 (15) [i]	28,8 (8)	10,1	0,10	0,32	0,8
626,258 (10)	1,85 (20)			2,2 (2)		2,28 (14)	2,3 (1)	2,48 (4)	2,10 (3) [i]	2,27 (17)	12,7	0,025	0,09	0,17
630,62 (6)							0,30 (2)	0,40 (1) [i]	0,30 (8)	0,35 (5)	6,6	0,014	0,035	0,050
647,8 (4)							0,19 (4)		0,186 (4)	0,185 (5)	1,6	0,004	0,005	
657,7600 (11) [c]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000				
666,6 (5)							0,16 (2) [i]		0,43 (5)	0,30 (14)	14,6	0,035	0,14	
676,58(10)								1,5 (1)						
677,6217 (12) [c]	122 (7)		113,1(11	111 (2)	112,6 (29)	110,9 (8)	112 (6)	112 (2)	112,6 (11)	111,9 (5)				
687,0091 (18) [c]	74 (6)		68,5 (7)	75,8 (14) [e]	69,0 (27)	68,0 (6)	67 (3)	68,5 (5) [i]	69,2 (21)	68,3 (3)				
706,6760 (15) [c]	172 (7)	175 (10)	176,7 (18)	175,4 (20)	176,2 (22)	176,6 (10)	174 (7)	172,8 (5) [i]	176,9 (26)	174,6 (7)	1,9	0,5	0,6	
708,128 (20)							2,0 (2)	2,9 (2)	2,4 (3)	2,4 (5)	5,1	0,11	0,29	0,46
714,9 (1)							0,09 (2)		0,17 (6)	0,098 (24)	1,6	0,019	0,024	
744,2755 (18) [c]	44 (4)		49,2 (5)	52,3 (8)	49,5 (16)	50,00 (27)	48,0 (25)	49,3 (8)	50,2 (14)	49,9 (3)	2,0	0,21	0,31	
763,9424 (17) [c]	240 (8)	237 (2)	236,0 (24)	243,7 (30)	237,4 (31)	235,5 (9)	243 (12)	236 (3)	239,1 (53)	236,4 (7)	1,1	0,70	0,74	
774,70 (10)							0,03 (2)	0,02 (1)	0,092 (4) [i]	0,06 (3)	15,4	0,006	0,025	0,035
818,0244 (18) [c]	78 (3)		77,3 (8)	80,5 (10)	77,4 (17)	77,6 (4)	79 (4)	77,1 (5)	78,8 (18)	77,7 (4)	1,7	0,27	0,35	
845,8 (1)							0,10 (3)		0,10 (2)	0,10 (2)				
884,6781 (13) [c]	796 (20)	775 (5)	769 (8)	811 (10)	780 (10)	767,6 (26)	800 (40)	771 (10)	706,6 (12) [i]	784 (12)	13,3	1,5	5,3	12,5
927,6 (1)							0,065 (10)		0,067 (8)	0,063 (6)				
937,483 (3) [c]	365 (11)	366 (3)	362,2 (36)	380 (4)	369 (4)	363,1 (12) [i]	374 (18)	363 (6)	376 (8)	365,7 (26)	2,7	1,2	1,9	2,6

Energy (keV)	1969Br03 1972Ph04[a]	1976De	1977Ge12	1979Ve03	1980Ro22	1980Yo05	1981Ma09	1990Me15	1993Ki18	LRSW average	χ_R^2 if > 1,0	σ_{int}	σ^{ext}	σ_{LWM}
957,35(10)				0,28 (5)			0,11 (1)	0,08 (1)	0,14 (5)	0,099 (19)	6,2	0,007	0,017	0,019
997,243 (15)	1,4 (2)			1,6 (1)		1,42 (5)	1,4 (1)	1,32 (4)	1,33 (10)	1,36 (4)	1,8	0,033	0,043	
1018,95(8)	0,3 (1)			0,17 (5)			0,15 (1)	0,15 (1)	0,08 (5)	0,149 (7)				
1050,5 (5)							0,08 (1)		0,08 (6)	0,08 (1)				
1085,447 (14)	0,58 (8)			0,95 (10)		0,66 (12)	0,74 (4)	0,71 (2)	0,81 (24)	0,76 (4)	1,2	0,035	0,0371	
1117,46(3)	0,39 (7)			0,55 (20)		0,41 (6)	0,52 (3)	0,52 (1)	0,38 (20)	0,517 (9)				
1125,699 (20)	0,26 (6)			0,35 (10)		0,38 (8)	0,34 (2)	0,30 (2)	0,22 (21)	0,322 (14)				
1163,14(8)				1,5 (1)			0,54 (5) [i]	0,79 (7)	1,0 (4)	0,78 (24)	23,4	0,04	0,19	0,24
1164,94(9)				0,96 (10) [e]			0,42 (5)	0,50(5)	0,47 (4)	0,46 (3)				
1186,7 (1)								0,015 (5)	0,0170 (5)	0,0170 (5)				
1251,04(4)	0,58 (19)			0,52 (5)		0,24 (7)	0,31 (2)	0,26 (1) [i]	0,25 (2)	0,28 (3)	7,5	0,0090	0,0260	
1300,05 (10)				0,20 (2)		0,25 (8)	0,19 (1)	0,21 (1)	0,22 (11)	0,200 (7)				
1334,326 (17)	1,55 (20)			1,8 (1)		1,49 (6)	1,40 (7)	1,49 (5) [i]	1,55 (33)	1,50 (5)	2,8	0,03	0,05	
1384,2931 (20) [c]	277 (8)	261 (2)	257,0 (26)	277,9 (30)	271 (5)	256,6 (8) [i]	278 (14)	261 (5)	276,6 (26)	262 (5)	12,8	0,8	2,9	5,0
1420,07(5)						0,39 (3)	0,27 (2)	0,24 (2)	0,37 (9)	0,28 (4)	6,2	0,013	0,032	0,041
1465,6 (1)							0,019 (2)							
1475,7792 (23) [c]	45,0 (20)		42,1 (4)	44,8 (6)	44,9 (12)	42,22 (17) [i]	45 (2)	42,4 (8)	45,7 (13)	42,7 (5)	4,6	0,20	0,43	0,5
1505,0280 (20) [c]	148 (4)	139 (1)	138,4 (14)	145,2 (16)	147,0 (29)	137,8 (5) [i]	151 (7)	140,1 (19)	149,2 (28)	139,4 (16)	6,1	0,45	1,1	1,6
1562,2940 (18) [c]	13,3 (6)		12,50(13) [i]	13,2 (2)	14,0 (8)	10,87 (7)	13,0 (7)	12,6 (6)	13,5 (4)	12,8 (3)	3,4	0,11	0,21	0,30
1572,4 (2)								0,012 (3)						
1592,80 (15)				0,4 (1)		0,221 (13)	0,20 (2)	0,22 (1)	0,34 (18)	0,219 (8)	1,2	0,007	0,0081	

Energy (keV)	1969Br03 1972Ph04[a]	1976De	1977Ge12	1979Ve03	1980Ro22	1980Yo05	1981Ma09	1990Me15	1993Ki18	LRSW average	χ_R^2 if > 1,0	σ_{int}	σ^{ext}	σ_{LWM}
1629,75 (15)						0,061 (11)	0,036 (4)	0,046 (5)	0,11 (5)	0,042 (5)	2,6	0,003	0,005	
1698,8 (2)							0,019 (2)		0,012 (4)	0,018 (3)	2,4	0,002	0,003	
1775,41(4)				0,067(10		0,067 (11)	0,076 (4)	0,063 (4)	0,07 (6)	0,069 (3)	1,4	0,0026	0,0031	
1783,46(3)				0,085 (30)		0,103 (11)	0,110 (6)	0,092 (3)	0,07 (4)	0,107 (5)				
1903,52(4)				0,20 (2)		0,158 (15)	0,18 (1)	0,16 (1)	0,15 (2)	0,169 (7)	1,5	0,006	0,007	
2004,65 (10)							0,012(1)[i]	0,011 (2)	0,028 (4)	0,013 (4)	7,7	0,0013	0,0035	

a The values from these two articles, by the same authors, are for comparison and were not used in the calculated averages.
c γ-ray energy is from the 2000He14 evaluation and is useful for energy calibrations.
e Value was not used in the calculation of the average.
i The published uncertainty, which is given, was increased in the LRSW analysis to reduce the relative weight to 50 %.

The mixing ratios for the M1+E2 γ-rays have been evaluated in this work (from references 1962Ka07, 1963Su07, 1964Ne05, 1970Kr03, 1973Jo08, 1978Wa07, 1979Ve03, 1980Ru03, 1990Ke02, and 1993Ki18). The results are very similar to those in the most recent ENSDF evaluation (2000De11), so those from ENSDF have been used. From the measurements of 1979Ve03, mixing ratios for M3 contributions to predominantly E2 transitions are quoted in ENSDF. The δ(M3/E2) values that do not include 0,0 in their uncertainties are those of 763 and 1562-keV γ-rays; both are δ = -0,10 (+2-3). Although the conversion coefficients are small, the high precision of the relative γ-ray intensities makes them significant; for example, $\alpha_{(657)}$ = 0,00318.

The normalization of the relative emission probabilities for the γ-rays from the decay of $^{110}Ag^{m}$ (249 d) is determined by requiring that the sum of the γ-ray transition intensities to the ground states of ^{110}Cd and ^{110}Ag be 100 % of the decays of the isomeric state. However, the 657 keV γ-ray occurs in both the direct β^- decay and that which follows the isomeric decay. Since 4,6(4) % the ground-state decays lead to the 657-keV γ ray, the intensity of the isomeric decay is reduced by this fraction in computing the intensity feeding the ground states.

Then, in the units of Table 2, one has $I_{\gamma(116)}[1+\alpha_{(116)}][0,954] + I_{\gamma(657)}[1+\alpha_{(657)}] + I_{\gamma(1475)} + I_{\gamma(1783)}$ = 0,085[169][0,954] + 1000[1,003] + 42,7 + 0,107. If an uncertainty of 5 % is assigned to $\alpha_{(116)}$, this sum is 1059,5 (9), so the normalization factor for the γ-ray intensities in Table 2 is 0,09438 (8).

The resulting intensity of the isomeric decay branch is then 0,085[0,09438][169] = 1,36 with an uncertainty of 0,08 and that of the β^- decay is 98,64 (8) %. This gives the 657-keV photon intensity of 94,38 (8) per 100 decays of the isomeric state.

The isomeric decay of $^{110}Ag^{m}$ (249 d) occurs via an M4 γ-ray of 116,48 (5) keV with α = 168 [i.e., P_γ = 0,0080 (4)] followed by an E1 γ-ray of 1,113 keV energy. The γ-rays following the β^- decay of the ground state are all very weak due to the small isomeric decay branch (1,36 %) and the large β^- branch to the ground state (95,1 %). Also, the 4,6 % branch to the 657 level is already included in Table 2. Therefore, the remaining γ-rays following the β^- decay of the ground state are neglected.

The γ-ray multipolarities and mixing ratios were taken from the 2000De11 evaluation and are as follows:

E1: 603, 1421-keV

E1(+M2): 409 [δ = -0,029(23)]; 997 [δ = -0,30(46)]; 1117 [δ = +0,021(44); 1300 [δ = +0,0(1)]

E2: 626, 657, 884, 1085, 1334, 1475, 1592, 1783, 2004

(E2): 467; 774

M1(+E2): 120 [δ = -0,13(33)]

M1+E2: 446 [δ = -0,38(2)]; 544; 620 [δ = -0,50(4)]; 677 [δ = 0,36(2)]; 687 [δ = -1,76(6)]; 706 [δ = -1,42 (7)]; 708 [δ = -0,15(9)]; 818 [δ = -1,36(7)]; 957 [δ = -0,9(7)]; 1018 [δ = -0,56(35)]; 1125 [δ = +0,33(8)]; 1163 [δ = -0,03(+6-9)]; 1164 [δ = +0,0(3)]; 1384 [δ = -0,44(2)]; 1505 [δ = -1,21(4)]; 1629 [δ = +0,06(3)]; 1697; 1775

E2(+M3): 744 [δ = -0(+16-10)]; 937 [δ = -0,07(+7-3)]; 1562 [δ = -0,10(+2-3)]

M3+E2: 763 [δ = -0,10 (+2-3)]

4) Atomic data

From the EMISSION code and the decay data, the following information was obtained.

Quantity	Ag (Z=47)	Cd (Z=48)
ω_K	0,831 (4)	0,842 (4)
ω_L average	0,0583 (14)	0,0632 (16)
n_{KL}	0,964 (4)	0,953 (4)
$K_{\alpha2}/K_{\alpha1}$	0,5305 (25)	0,5317 (25)
K_β/K_α	0,2125 (17)	0,2151 (18)

Due the high energy of the strong transitions, the Auger electrons are negligible and no related data are included here.

The K X-ray emission probabilities are calculated as follows:

For the decay of $^{110}Ag^m$ (249 d), Ag KX-rays per 100 decays of parent
$K_{\alpha2}$ 0,198 (12)
$K_{\alpha1}$ 0,372 (22)
K_β 0,121 (7)

Cd KX-rays per 100 decays of the parent
$K_{\alpha2}$ 0,153 (9)
$K_{\alpha1}$ 0,288 (16)
K_β 0,095 (6)

5) b$^-$ decay intensities

The β^- decay intensities for the decay of the ^{110}Ag ground state are simply deduced from the above data and the γ-ray intensity balances. Since the spin of the isomeric state is large, namely 6, there are several β^- decay branches for which the log*ft* systematics (1998Si17) given lower limits on the intensities than can be derived from the intensity balances. These data are given in Table 3

Table 3. Data used to deduce β^- decay intensities and log*ft* values.

Level(keV)	J^π	ΔJ,Δπ	log*ft* limit	I_β from log*ft* limit	I_β from intensity balance	I_β adopted	log*ft*
0	0^+	6,no			1,3 (4)	0	
657	2^+	4,no	>22	$<10^{-10}$	-1,2 (12)	0	
1475	2^+	4,no	>22	$<10^{-10}$	0,08 (8)	0	
1522	4^+	2,no	>10,6	<6	0,8 (13)	<2	>11
1783	2^+	4,no	>22	$<10^{-11}$	0,0156 (23)	0	
2078	3^-	3,yes	>16,5	$<10^{-6}$	0,002 (8)	$<10^{-6}$	>16,5
2162	3^+	3,no	>13,9	<0,0004	-0,01 (19)	<0,0004	>13,9
2220	4^+	2,no	>10,6	<0,6	0,06 (9)	<0,15	>11,2

Level(keV)	J^{π}	$\Delta J, \Delta\pi$	log*ft* limit	I_β from log*ft* limit	I_β from intensity balance	I_β adopted	log*ft*
2250	4^+	2,no	>10,6	<0,6	0,06 (5)	0,06 (5)	11,5
2287	2^+	4,no	>22	<2x10^{-12}	0,0040 (5)	0	
2356	$(1^+,2^+)$	4 or 5, no	>22	<10^{-12}	0	0	
2433	3^+	3,no	>13,9	<0,0001	-0,008 (6)	0	
2479	6^+	0,no			30,8 (3)	30,8 (3)	8,282
2539	5^-	1,yes			0,060 (4)	0,060 (4)	10,82
2561	4^+	2,no	>10,6	<0,1	-0,003 (7)	<0,005	>11,8
2659	5^-	1,yes			0,031 (4)	0,031 (4)	10,67
2662					0	0	
2705	4^+	2,no	>10,6	<0,03	0,006 (23)	<0,029	>10,5
2707	4^+	2,no	>10,6	<0,03	-0,010 (7)	0	
2793	4^+	2,no	>10,6	<0,03	-0,013 (7)	0	
2842	5^-	1,yes			0,0252 (10)	0,0252 (10)	9,73
2876	6^+	0,no			0,392 (18)	0,392 (18)	8,23
2926	5^+	1,no			67,5 (6)	67,5 (6)	5,36

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