^{107}Ag(α,nγ) 1989Kr12

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	G. Gürdal and F. G. Kondev	NDS 113, 1315 (2012)	1-Aug-2011

Eα=14.5,17 MeV. Target: ≈0.8 mg/cm^2 (for γ-ray and γγ coinc. measurements) and ≈0.4 mg/cm^2 (for conversion electron measurements), 98.9% enriched ^{107}Ag. The beams were provided by Jyvaskyla 90 cm cyclotron for γ-ray measurements and Debrecen 103 cm cyclotron for conversion electron and lifetime measurements. The energy of γ-rays was measured at 90° angle to the beam direction using a 15.5% Ge(Li) detector in Jyvaskyla and a 20% Ge(HP) detector in Debrecen. The intensities of γ-rays were measured at 125° angle to the beam direction using a 25% Ge(HP) detector in Jyvaskyla and a 20% Ge(HP) detector in Debrecen. For γγ coinc. measurements 25% Ge(HP) and 15.5% Ge(Li) detectors were used. For the detection of the low-energy γ-rays an extra LEPS detector at 55° was used in coincidence with the Ge(HP) and Ge(Li) detectors. ≈20 million coinc events were recorded. The conversion electron spectra were collected by a superconducting magnet lens spectrometer with Si(Li) detectors positioned at 90° angle to the beam direction. Lifetime measurements using Doppler shift attenuation method were performed at 55°, 90° and 125° angles to the beam direction using a 20% Ge(HP) detector.

Measured: Eγ, Iγ, γγ, ce, cep(t). Deduced: ^{110}In levels, γ branching, mult., J, π, $T_{1/2}$.

^{110}In Levels

E(level)[†]	J^π[#]	$T_{1/2}$[‡]	Comments
0.0	7$^+$		
62.08 *4*	2$^+$		
202.39 *4*	3$^+$		
321.20 *4*	4$^+$		
334.09 *4*	2$^+$	≥4.9 ps	
342.55 *4*	1$^+$	≥4.9 ps	
346.33 *4*	4$^+$		
366.52 *4*	(5$^+$)		
413.483 *19*	(7)$^+$		
437.15 *4*	(5$^+$)		
541.24 *4*	3$^+$	2.4 ps *+17−6*	
568.40 *3*	(6)$^+$	1.9 ps *+9−6*	
714.47 *4*	(8)$^+$	1.4 ps *+15−5*	
756.46 *4*	(4,5)$^+$	1.0 ps *+4−2*	J^π: From Adopted Levels, but 2$^+$,3$^+$,4$^+$,5$^+$,6$^+$ in 1989Kr12. $T_{1/2}$: Weighted average of $T_{1/2}$(390γ)=1.0 ps *+8−3* and $T_{1/2}$(410γ)=1.0 ps *+4−2*.
756.56 *4*	2$^-$		
793.04 *4*	4$^+$	1.7 ps *+10−5*	
799.849 *17*	(7)$^-$	≥2.0 ps	
808.077 *22*	(8)$^-$	≥2.4 ps	
856.265 *24*	(6$^-$)		
886.41 *3*	(6)$^+$		
887.40 *4*	5		
958.46 *4*	3$^+$		
970.87 *5*	(4)		
989.84 *4*	2$^-$		
1006.06 *3*	(5$^-$)	≥1.7 ps	
1017.87 *5*	(9)$^-$	≥1.2 ps	
1020.81 *4*	(5,6)$^+$		
1023.40 *5*	3$^-$		
1049.89 *5*	2$^+$	1.0 ps *+9−4*	
1062.71 *5*	(4,5)		
1118.46 *11*			
1119.82 *5*	(0)$^-$		
1134.07 *5*	(4,3)$^-$		
1176.23 *5*	(2,3,4)		
1190.92 *5*	(1,2,3)$^-$		
1204.87 *5*	(4$^-$)	≥1.1 ps	

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^{107}Ag(α,nγ) 1989Kr12 (continued)

^{110}In Levels (continued)

E(level)†	J$^\pi$#	E(level)†	J$^\pi$#	$T_{1/2}$‡
1216.80 6	(2,3,4)$^+$	1482.35 6	(3$^-$)	≥1.8 ps
1230.05 4		1494.00 18	($^-$)	
1239.93 6	(1,2,3)$^-$	1507.11 5		
1254.91 7	0$^-$,1$^-$,2$^-$	1529.70 24		
1259.39 8		1561.77 11	(10)$^-$	
1280.23 9	($^+$)	1562.99 8		0.97 ps +21−14
1303.23 16		1617.48 7		
1390.70 9		1693.66 9		
1441.75 6				

† From least-squares fit to Eγ's.
‡ From DSAM.
# From the deduced γ-ray transition multipolarities and band structure.

γ(^{110}In)

E$_\gamma$‡	I$_\gamma$#	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.@	α†	Comments
45.32 2		366.52	(5$^+$)	321.20	4$^+$			
56.40 2		856.265	(6$^-$)	799.849	(7)$^-$			
90.826 8	55.7 17	437.15	(5$^+$)	346.33	4$^+$			
93.44 20		808.077	(8)$^-$	714.47	(8)$^+$			
94.35 10	6.5 12	887.40	5	793.04	4$^+$			
115.951 6	73.1 22	437.15	(5$^+$)	321.20	4$^+$			
118.819 6	442 13	321.20	4$^+$	202.39	3$^+$			
131.28 8	3.1 4	568.40	(6)$^+$	437.15	(5$^+$)			
131.63 8		334.09	2$^+$	202.39	3$^+$			
140.304 6	1000 39	202.39	3$^+$	62.08	2$^+$	M1	0.198	α(K)exp=0.133 9 α(K)=0.1717 24; α(L)=0.0216 3; α(M)=0.00419 6; α(N+..)=0.000823 12 α(N)=0.000767 11; α(O)=5.67×10^{-5} 8
143.940 6	289 13	346.33	4$^+$	202.39	3$^+$	M1	0.185	α(K)exp=0.14 3
149.80 2	89 4	1006.06	(5$^-$)	856.265	(6$^-$)	M1	0.1656	α(K)exp=0.14 3 α(K)=0.1434 20; α(L)=0.0180 3; α(M)=0.00349 5; α(N+..)=0.000687 10 α(N)=0.000639 9; α(O)=4.73×10^{-5} 7
154.90 14		568.40	(6)$^+$	413.483	(7)$^+$			
165.42 9		958.46	3$^+$	793.04	4$^+$			
186.55 7	12.4 9	1693.66		1507.11				
194.92 10	1.5 2	541.24	3$^+$	346.33	4$^+$			
198.81 4	38.6 20	1204.87	(4$^-$)	1006.06	(5$^-$)	M1,E2	0.11 3	α(K)exp=0.087 6
201.10 4		1190.92	(1,2,3)$^-$	989.84	2$^-$			
207.17 3	52 3	541.24	3$^+$	334.09	2$^+$	M1	0.0688	α(K)exp=0.058 4 α(K)=0.0597 9; α(L)=0.00742 11; α(M)=0.001439 21; α(N+..)=0.000283 4 α(N)=0.000264 4; α(O)=1.96×10^{-5} 3
209.80 4	94 5	1017.87	(9)$^-$	808.077	(8)$^-$	M1,E2	0.090 24	α(K)exp=0.079 5
215.36 5	8.7 10	756.56	2$^-$	541.24	3$^+$			
220.09 10	1.5 2	541.24	3$^+$	321.20	4$^+$			
223.98 3	5.0 4	1230.05		1006.06	(5$^-$)			
231.52 10	5.3 5	799.849	(7)$^-$	568.40	(6)$^+$			
233.31 4	1.7 3	989.84	2$^-$	756.56	2$^-$			
234.70 6	4.7 4	437.15	(5$^+$)	202.39	3$^+$			

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^{107}Ag(α,nγ) 1989Kr12 (continued)

γ(^{110}In) (continued)

E_γ ‡	I_γ #	E_i(level)	J_i^π	E_f	J_f^π	Mult. @	α †	Comments
249.96 15		1239.93	(1,2,3)$^-$	989.84	2$^-$			
251.81 3	38.9 18	793.04	4$^+$	541.24	3$^+$	M1,E2	0.051 10	α(K)exp=0.043 3
256.63 8	1.4 5	1390.70		1134.07	(4,3)$^-$			
259.12 5	12.8 6	321.20	4$^+$	62.08	2$^+$			
266.87 10		1023.40	3$^-$	756.56	2$^-$			
272.018 15	174 4	334.09	2$^+$	62.08	2$^+$	M1,E2	0.040 7	α(K)exp=0.0337 17
277.48 3	18.5 8	1482.35	(3$^-$)	1204.87	(4$^-$)			
280.459 15	202 8	342.55	1$^+$	62.08	2$^+$	M1,E2	0.037 6	α(K)exp=0.0310 18
284.24 10	12.3 9	346.33	4$^+$	62.08	2$^+$			
287.93 5	3.8 5	856.265	(6$^-$)	568.40	(6)$^+$			
300.99 3	8.4 6	714.47	(8)$^+$	413.483	(7)$^+$	M1,E2	0.030 4	α(K)exp=0.029 3
^{x}315.64 3	8.7 5					E2,M1	0.026 3	α(K)exp=0.0277 23
319.01 4	6.2 5	887.40	5	568.40	(6)$^+$			
338.85 5	6.3 11	541.24	3$^+$	202.39	3$^+$			
358.12 6	3.6 4	1562.99		1204.87	(4$^-$)			
363.24 4	1.4 3	1119.82	(0)$^-$	756.56	2$^-$			
^{x}366.96 10								
377.51 2	11.7 6	1134.07	(4,3)$^-$	756.56	2$^-$	E2,M1	0.0154 9	α(K)exp=0.0169 12
386.36 2	57.2 16	799.849	(7)$^-$	413.483	(7)$^+$	E1	0.00423 6	α(K)exp=0.005 3 α=0.00423 6; α(K)=0.00369 6; α(L)=0.000441 7; α(M)=8.50×10^{-5} 12; α(N+..)=1.661×10^{-5} 24 α(N)=1.550×10^{-5} 22; α(O)=1.113×10^{-6} 16
389.93 3	9.7 7	756.46	(4,5)$^+$	366.52	(5$^+$)	M1,E2	0.0141 7	α(K)exp=0.0157 14
394.59 2	41.6 11	808.077	(8)$^-$	413.483	(7)$^+$	E1	0.00401 6	α(K)exp=0.0041 3 α=0.00401 6; α(K)=0.00350 5; α(L)=0.000418 6; α(M)=8.06×10^{-5} 12; α(N+..)=1.575×10^{-5} 22 α(N)=1.470×10^{-5} 21; α(O)=1.056×10^{-6} 15
410.11 2	32.2 9	756.46	(4,5)$^+$	346.33	4$^+$			
413.52 5	311 8	413.483	(7)$^+$	0.0	7$^+$	M1,E2	0.0119 4	α(K)exp=0.0098 5
413.99 2	40 5	756.56	2$^-$	342.55	1$^+$			
417.16 5	4.8 5	958.46	3$^+$	541.24	3$^+$			
419.65 8	3.1 4	1176.23	(2,3,4)	756.56	2$^-$			
422.48 4	7.9 8	756.56	2$^-$	334.09	2$^+$			
429.63 15	2.0 6	970.87	(4)	541.24	3$^+$			
434.35 3	9.5 8	1190.92	(1,2,3)$^-$	756.56	2$^-$			
435.32 4	40 3	756.46	(4,5)$^+$	321.20	4$^+$	M1,E2	0.01037 22	α(K)exp=0.0101 6
^{x}438.15 20	0.7 6							
442.82 7	3.6 7	856.265	(6$^-$)	413.483	(7)$^+$			
448.61 5	1.3 13	989.84	2$^-$	541.24	3$^+$			
449.22 4	12.1 11	886.41	(6)$^+$	437.15	(5$^+$)	M1,E2		α(K)exp=0.0093 9
452.35 5	6.9 6	1020.81	(5,6)$^+$	568.40	(6)$^+$	M1,E2		α(K)exp=0.0093 13
471.79 6	1.2 17	793.04	4$^+$	321.20	4$^+$			
472.95 3	26.3 15	886.41	(6)$^+$	413.483	(7)$^+$	M1,E2		α(K)exp=0.0094 16
479.15 3	71.8 19	541.24	3$^+$	62.08	2$^+$	M1,E2		α(K)exp=0.0080 6
483.34 5	3.7 5	1239.93	(1,2,3)$^-$	756.56	2$^-$			
487.19 8	7.5 9	1280.23	($^+$)	793.04	4$^+$	M1,E2		α(K)exp=0.0096 22 α(K)exp: For 487.19γ+487.94γ.
487.94 17	8.0 6	1494.00	($^-$)	1006.06	(5$^-$)	M1,E2		α(K)exp=0.0096 22 α(K)exp: For 487.19γ+487.94γ.
498.31 7		1254.91	0$^-$,1$^-$,2$^-$	756.56	2$^-$			
501.10 6	8.1 10	1507.11		1006.06	(5$^-$)			

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^{107}Ag(α,nγ) 1989Kr12 (continued)

γ(^{110}In) (continued)

E_γ‡	I_γ#	E_i(level)	J^π_i	E_f	J^π_f	Mult.@	α†	Comments
502.95 *9*	4.1 *6*	1259.39		756.46	(4,5)$^+$			
520.75 *13*	5.1 *7*	887.40	5	366.52	(5$^+$)			
533.83 *11*	9.5 *10*	970.87	(4)	437.15	(5$^+$)			
541.03 *8*	10.6 *7*	887.40	5	346.33	4$^+$	M1,E2		α(K)exp=0.0061 *7*
543.90 *10*	33.4 *10*	1561.77	(10)$^-$	1017.87	(9)$^-$	M1,E2		α(K)exp=0.0068 *4*
554.09 *7*		756.56	2$^-$	202.39	3$^+$			
566.24 *7*	47.0 *17*	887.40	5	321.20	4$^+$	M1,E2		α(K)exp=0.0054 *4*
568.41 *6*	129 *3*	568.40	(6)$^+$	0.0	7$^+$	M1,E2		α(K)exp=0.0052 *3*
569.06 *19*	6.4 *8*	1006.06	(5$^-$)	437.15	(5$^+$)			
590.65 *2*	30.1 *17*	793.04	4$^+$	202.39	3$^+$	M1,E2		α(K)exp=0.0044 *4*
592.04 *20*		958.46	3$^+$	366.52	(5$^+$)			
599.63 *5*	16.1 *15*	1617.48		1017.87	(9)$^-$	M1,E2		α(K)exp=0.0029 *4*
612.19 *5*	13.7 *11*	958.46	3$^+$	346.33	4$^+$	M1,E2		α(K)exp=0.0034 *6*
^{x}613.16 *20*	4.7 *8*							
615.95 *10*	1.9 *4*	958.46	3$^+$	342.55	1$^+$			
624.41 *6*	4.9 *5*	958.46	3$^+$	334.09	2$^+$			
637.27 *3*	11.6 *13*	958.46	3$^+$	321.20	4$^+$			
647.27 *4*	9.8 *9*	989.84	2$^-$	342.55	1$^+$			
649.68 *5*	12.1 *13*	970.87	(4)	321.20	4$^+$			
650.74 *10*	7.2 *12*	1507.11		856.265	(6$^-$)			
655.73 *5*		989.84	2$^-$	334.09	2$^+$			
674.53 *5*	8.7 *16*	1020.81	(5,6)$^+$	346.33	4$^+$			
677.12 *15*		1023.40	3$^-$	346.33	4$^+$			
689.27 *10*		1023.40	3$^-$	334.09	2$^+$			
694.44 *5*	16.8 *15*	756.56	2$^-$	62.08	2$^+$			
696.18 *4*	23.0 *22*	1062.71	(4,5)	366.52	(5$^+$)			
^{x}699.38 *5*	8.9 *14*							
702.07 *19*		1023.40	3$^-$	321.20	4$^+$			
707.34 *4*	16.7 *20*	1049.89	2$^+$	342.55	1$^+$			
714.37 *10*	91 *4*	714.47	(8)$^+$	0.0	7$^+$	M1,E2		α(K)exp=0.0028 *2*
715.72 *8*	2.0 *4*	1049.89	2$^+$	334.09	2$^+$			
716.37 *10*	5.7 *6*	1062.71	(4,5)	346.33	4$^+$			
741.52 *10*	3.3 *8*	1062.71	(4,5)	321.20	4$^+$			
751.93 *10*	16.5 *11*	1118.46		366.52	(5$^+$)	M1,E2		α(K)exp=0.0026 *3*
756.03 *6*	8.1 *15*	958.46	3$^+$	202.39	3$^+$			
768.45 *5*	13.4 *10*	970.87	(4)	202.39	3$^+$			
773.24 *23*	7.2 *8*	1529.70		756.46	(4,5)$^+$			
777.32 *6*	2.6 *4*	1119.82	(0)$^-$	342.55	1$^+$			
787.48 *6*	7.6 *8*	989.84	2$^-$	202.39	3$^+$			
799.83 *2*	248 *5*	799.849	(7)$^-$	0.0	7$^+$	E1	0.000801 *12*	α(K)exp=0.00082 *4* α=0.000801 *12*; α(K)=0.000700 *10*; α(L)=8.20×10^{-5} *12*; α(M)=1.580×10^{-5} *23*; α(N+..)=3.11×10^{-6} α(N)=2.89×10^{-6} *4*; α(O)=2.14×10^{-7} *3*
808.09 *3*	97.1 *24*	808.077	(8)$^-$	0.0	7$^+$	E1	0.000784 *11*	α(K)exp=0.00066 *5* α=0.000784 *11*; α(K)=0.000686 *10*; α(L)=8.03×10^{-5} *12*; α(M)=1.547×10^{-5} *22*; α(N+..)=3.04×10^{-6} α(N)=2.83×10^{-6} *4*; α(O)=2.09×10^{-7} *3*
813.00 *15*	3.8 *9*	1134.07	(4,3)$^-$	321.20	4$^+$			
817.44 *17*	29.9 *15*	1617.48		799.849	(7)$^-$			
821.00 *17*		1023.40	3$^-$	202.39	3$^+$			
822.21 *10*	20.9 *12*	1259.39		437.15	(5$^+$)			

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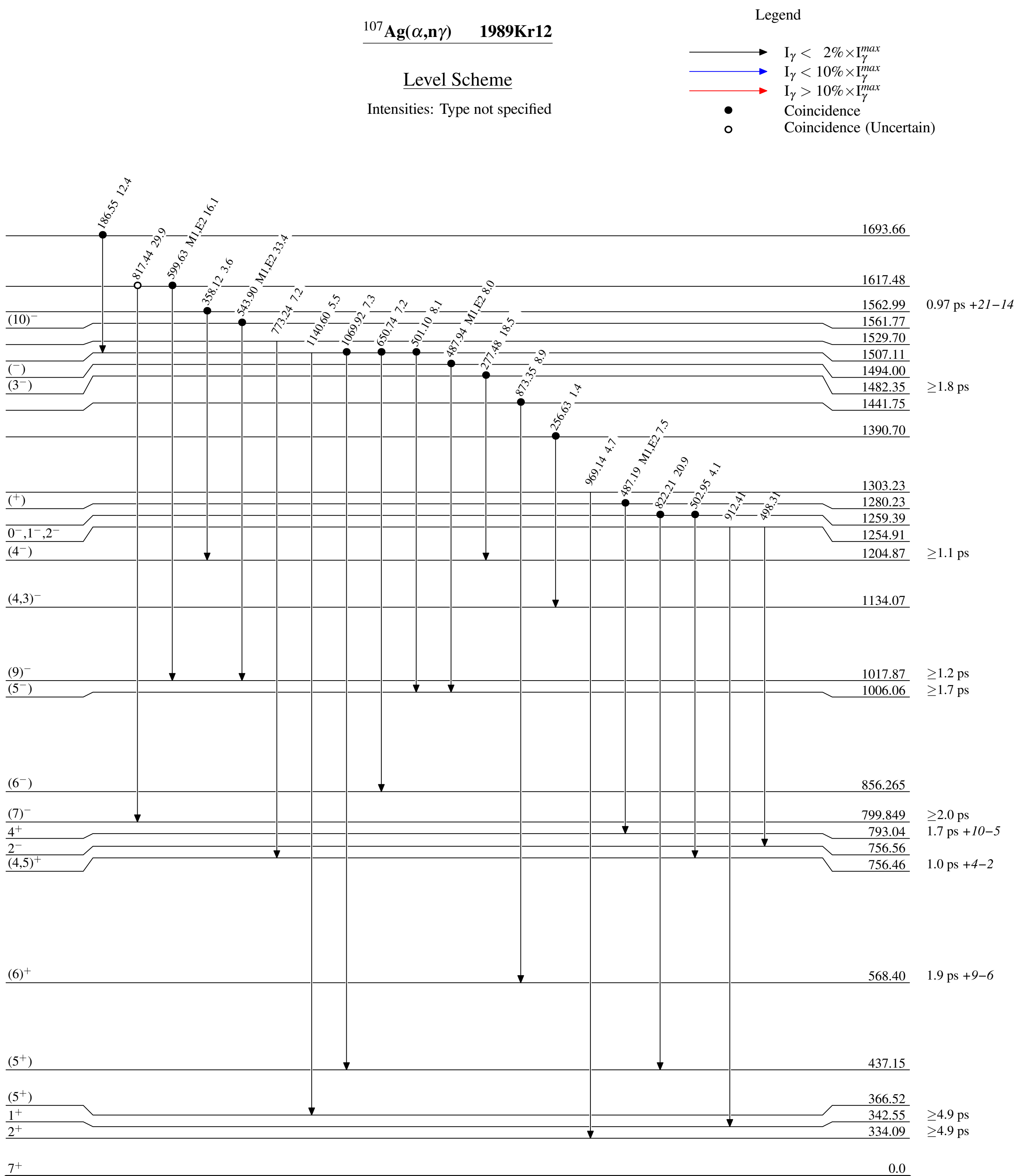
^{107}Ag(α,nγ) 1989Kr12 (continued)

γ(^{110}In) (continued)

Eγ[‡]	Iγ[#]	Ei(level)	J^π_i	Ef	J^π_f	Mult.[@]	α[†]	Comments
829.86 *10*	2.8 *6*	1176.23	(2,3,4)	346.33	4+			
842.22 *10*		1176.23	(2,3,4)	334.09	2+			
855.01 *10*		1176.23	(2,3,4)	321.20	4+			
856.5 *3*	≤4.1	856.265	(6−)	0.0	7+			
857.11 *20*		1190.92	(1,2,3)−	334.09	2+			
870.39 *10*	9.3 *16*	1216.80	(2,3,4)+	346.33	4+	M1,E2		α(K)exp=0.0014 *4*
873.35 *5*	8.9 *16*	1441.75		568.40	(6)+			
882.69 *7*	8.1 *6*	1216.80	(2,3,4)+	334.09	2+			
883.76 *8*	8.8 *9*	1230.05		346.33	4+			
895.70 *10*		1216.80	(2,3,4)+	321.20	4+			
896.31 *6*	5.0 *9*	958.46	3+	62.08	2+			
905.92 *10*	3.9 *9*	1239.93	(1,2,3)−	334.09	2+			
912.41 *8*		1254.91	0−,1−,2−	342.55	1+			
[x]921.36 *10*	9.8 *11*					M1,E2		α(K)exp: 0.0013 *3* for 921.36 + 923.10 γ′s.
[x]923.10 *15*	8.7 *9*					M1,E2		α(K)exp: 0.0013 *3* for 921.36 + 923.10 γ′s.
927.74 *5*	5.6 *9*	989.84	2−	62.08	2+			
961.32 *3*	25.8 *17*	1023.40	3−	62.08	2+	E1	0.000556 *8*	α(K)exp=0.00044 *11* α=0.000556 *8*; α(K)=0.000486 *7*; α(L)=5.67×10^{-5} *8*; α(M)=1.092×10^{-5} *16*; α(N+..)=2.15×10^{-6} *3* α(N)=2.00×10^{-6} *3*; α(O)=1.484×10^{-7} *21*
969.14 *15*	4.7 *5*	1303.23		334.09	2+			
987.81 *4*		1049.89	2+	62.08	2+			
1020.84 *6*	17.4 *12*	1020.81	(5,6)+	0.0	7+	M1,E2		α(K)exp=0.0014 *5*
1069.92 *6*	7.3 *13*	1507.11		437.15	(5+)			
1114.15 *6*		1176.23	(2,3,4)	62.08	2+			
1140.60 *20*	5.5 *9*	1507.11		366.52	(5+)			
1177.93 *10*		1239.93	(1,2,3)−	62.08	2+			

† Additional information 1.
‡ From θ=90° and Eα=17 MeV.
\# From γγ coinc at θ=125° and Eα=17 MeV. (Iγ(140.304)=1000).
@ From α(K)exp in 1989Kr12.
x γ ray not placed in level scheme.

^{107}Ag(α,nγ) 1989Kr12



$^{110}_{49}In_{61}$

$^{107}Ag(\alpha,n\gamma)$ 1989Kr12

Level Scheme (continued)

Intensities: Type not specified

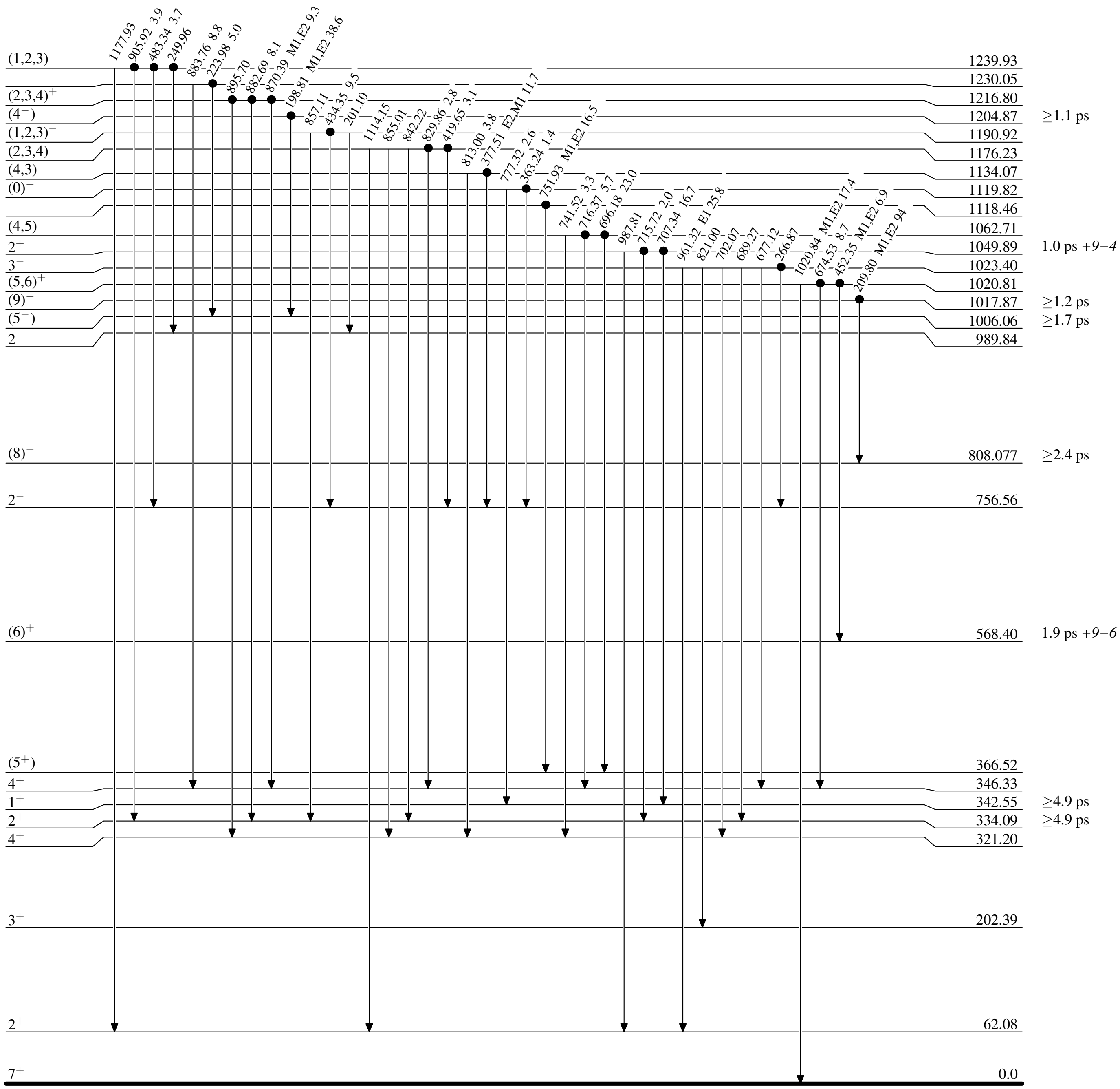
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

Coincidence



$^{110}_{49}In_{61}$

^{107}Ag(α,nγ) 1989Kr12

Level Scheme (continued)

Intensities: Type not specified

Legend

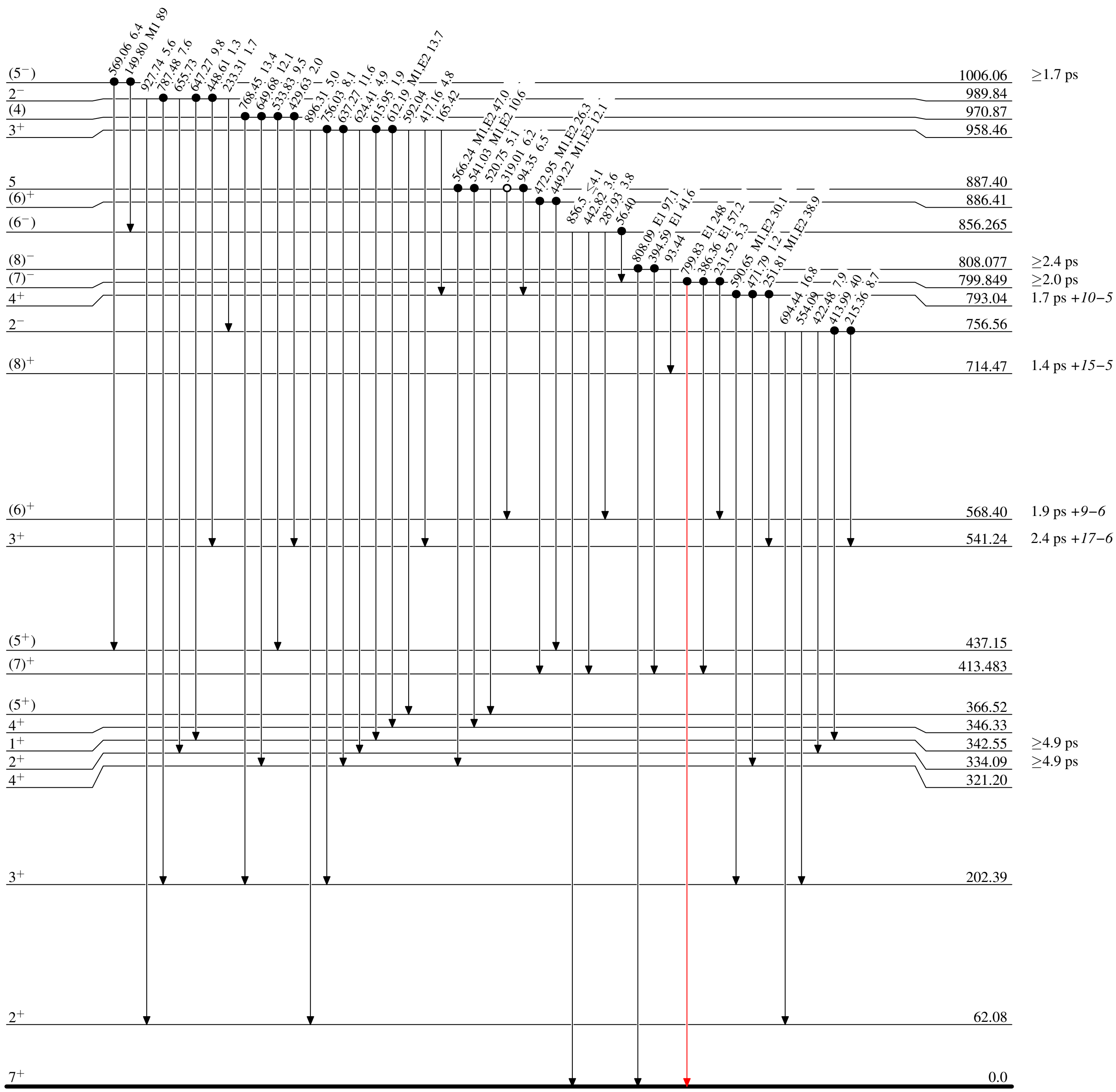
$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

Coincidence

Coincidence (Uncertain)



$^{110}_{49}In_{61}$

^{107}Ag(α,nγ) **1989Kr12**

Level Scheme (continued)

Intensities: Type not specified