^{34}S(α,pγ),(α,p) 1974No16,1976No05,1986La10

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	John Cameron, Jun Chen and Balraj Singh, Ninel Nica	NDS 113, 365 (2012)	15-Jan-2012

1974No16: ^{34}S(α,pγ), E=11.5 MeV alpha particles. Targets of enriched CdS (90% ^{34}S). Two large Ge(Li) detectors for detecting γ- rays. Measured Eγ, Iγ, $\gamma(\theta)$, polarization. Deduced levels, J^π, branchings, mixing ratios, $T_{1/2}$ using Doppler Shift Attenuation Method (DSAM) and Recoil Distance Method (RDM).

1976No05: ^{34}S(α,pγ), E=17 MeV alpha beam of 50 nA. Targets of CdS (90% ^{34}S). Five 5-in by 6-in NaI(Tl) and A Ge(Li) detector for γ-rays and an annular E-ΔE counter telescope for detecting protons. Measured Eγ, Iγ, pγ-coin, $\gamma(\theta)$. Deduced levels, J^π, branchings, mixing ratios, $T_{1/2}$ using DSAM.

1986La10: ^{34}S(α,pγ) and (α,p), E=11.685-11.910, 12 MeV alphas produced from the 5.5 MV van de Graaff accelerator. Targets of Sb_2S_3 (94% ^{34}S). A 99.7-cm^3 Ge(Li) detector for detecting γ-rays and two silicon surface barrier detectors for detecting protons. Measured Eγ, Iγ, $\gamma(\theta)$, $\sigma(E_p)$. Deduced levels, J^π, branchings, mixing ratios, $T_{1/2}$ using DSAM.

1972Al51: ^{34}S(α,pγ), E=10, 12 and 14 MeV alpha particles produced from the 80-cm cyclotron at the Research Institute for Physics in Stockholm. Targets of enrich ^{34}S (90%). A 60-cm^3 Ge(Li) detector. Measured Eγ, Iγ, $\gamma(\theta)$. Deduced levels, J^π, branchings, mixing ratios.

1975Av03: ^{34}S(α,p), E=18 MeV alpha beam produced from the EN tandem of the Utrecht University. Target of enriched PbS (86% ^{34}S). Four positive detectors in the focal plane of an Enge split-pole magnetic spectrograph. Measured $\sigma(E_p)$. Deduced levels.

1973Br26: ^{34}S(α,pγ), E=11.2 MeV alpha particles. Target of CdS (90% ^{34}S). A 50-cm^3 Ge(Li) detector. Measured Eγ, Iγ. Deduced $T_{1/2}$ for the level of 3105 keV using RDM.

1978Ba56: ^{34}S(α,pγ), E=16-22 MeV alpha beams. Targets of Ag_2S (90% ^{34}S). A Ge(Li) detector for γ-rays and a E-ΔE counter for protons. Measured Eγ, pγ-coin, $\gamma\gamma$-coin. Deduced levels.

1993Sc05: ^{34}S(α,p). Measured cross section.

^{37}Cl Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[&]	Comments
0	3/2$^+$[#]		
1726.5 *4*	1/2$^+$[#]	0.13 ps *4*	$T_{1/2}$: weighted average of 104 fs *49* from 1986La10 and 152 fs *42* from 1974No16.
3086.7 *10*	5/2$^+$	<28 fs	J^π: from $\gamma(\theta)$ in 1972Al51.
3104.6 *6*	7/2$^-$[#]	19 ps *3*	$T_{1/2}$: from RDM in 1973Br26. Other: 33 ps *4* (1974No16).
3287.2 *11*			
3626.3 *8*	3/2$^-$[@]	31 fs *16*	$T_{1/2}$: weighted average of 35 fs *17* from 1986La10 and 28 fs *16* from 1974No16.
3708.1 *8*	(3/2$^+$,5/2$^-$)	42[a] fs *17*	J^π: from $\gamma(\theta)$. 5/2$^+$ from angular distribution measurement in 1986La10.
3740.9 *7*	5/2$^-$	22[a] fs *17*	J^π: (3/2$^+$,5/2$^-$) from $\gamma(\theta)$ in 1976No05 and 5/2$^-$ from angular distribution in 1986La10.
4011.0 *6*	9/2$^-$	21 ps *2*	
4016.7 *14*	1/2[@]	0.13[a] ps *+18−8*	
4179.6 *5*	(3/2,5/2$^+$)[@]	>0.4 ps	E(level): from 1986La10.
4269.7 *25*	(1/2,3/2)[@]	<32[a] fs	
4272.9 *6*	7/2$^-$[@]		E(level): from 1986La10.
4397.5 *7*	7/2$^+$[@]	0.19[a] ps *+12−7*	E(level): from 1986La10.
4461 *3*	7/2$^+$,(9/2$^+$)[@]	42 fs *31*	
4546.5 *6*	11/2$^-$	1.7 ps *4*	$T_{1/2}$: weighted average of 1.5 ps *5* by DSAM and 1.9 ps *4* by RDM (1974No16).
4812.3 *9*	(5/2$^-$,7/2)	>0.35[a] ps	
4855.3 *10*	(5/2$^-$,7/2)[@]	87[a] fs *35*	
4920.9 *17*	9/2[@]	55 fs *31*	E(level): possible doublet of 4923 level.
4923 *4*	(5/2$^-$,7/2)[@]	<0.14[a] ps	E(level): possible doublet of 4920.9 level.
4974 *3*			

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^{34}S(α,pγ),(α,p) 1974No16,1976No05,1986La10 (continued)

^{37}Cl Levels (continued)

E(level)†	Jπ‡	$T_{1/2}$&	Comments
5067 *10*			E(level): from 1975Av03.
5270.8 *6*	13/2$^-$	1.9 ps *3*	
5.31×10^3 *3*			
5379 *4*	(3/2,5/2,9/2)	104 fs *38*	
5407 *20*	(1/2,3/2)		
5547 *3*			
5595 *20*			
5706 *3*	(7/2,9/2)		
5931 *4*	(3/2 to 9/2)		
6050 *3*	(5/2 to 11/2)	>1.4 ps	
6197 *3*		0.22 ps *6*	
6601 *5*	(7/2 to 11/2)		
7020 *3*	(9/2,11/2,15/2)	>1.4 ps	
7200 *4*			
7734 *9*			
7987 *20*			
8678 *5*	(9/2 to 15/2)		

† From least-squares fit to Eγ′s, unless otherwise noted.
‡ From $\gamma(\theta)$ and linear-polarization in 1974No16 and $\gamma(\theta)$ in 1976No05.
# From Adopted Levels.
@ From the comparison of experimental angular distribution with the theoretical prediction of Hauser-Feshbach theory in 1986La10, unless otherwise noted.
& From DSAM and RDM in 1974No16, DSAM in 1976No05, unless otherwise noted.
a From DSAM in 1986La10.

γ(^{37}Cl)

E_i(level)	J_i^π	E_γ†	I_γ	E_f	J_f^π	Mult.	δ@	Comments
1726.5	1/2$^+$	1726.5 *4*	100	0	3/2$^+$			B(M1)(W.u.)=0.03, B(E2)(W.u.)=33 (1974No16).
3086.7	5/2$^+$	3086.6 *10*	100	0	3/2$^+$	D+Q	+1.6 *4*	δ: from 1974No16, +1.2 *8* from 1976No05, −7 *+6−24* from 1972Al51, +1.1 *4* from 1986La10. A_2=+0.69 *2*, A_4=+0.13 *3*, POL=−0.33 *28* (1974No16). A_2=+0.89 *10*, A_4=+0.29 *10* (1986La10). B(M1)(W.u.)>5, B(E2)(W.u.)>5 (1974No16).
3104.6	7/2$^-$	3104.4 *8*	100	0	3/2$^+$	Q(+O)	+0.18 *1*	δ: 0.0 *2* from 1972Al51. E_γ: weighted average of 3105.0 *8* in 1974No16 and 3103.4 *10* in 1972Al51. B(M2)(W.u.)=0.03, B(E3)(W.u.)=33 (1974No16).
3287.2		199‡&		3086.7	5/2$^+$			
		3285‡ *3*		0	3/2$^+$			
3626.3	3/2$^-$	3626.1 *8*	100	0	3/2$^+$			δ: δ(Q/D)=+0.12 *9* or +2.5 *8* for J=3/2, +0.41 *7* or +9 *+20−4* for J=5/2, δ(O/Q)=+0.02 *7* for J=7/2. A_2=+0.31 *5*, A_4=−0.03 *6*, POL=−1.5 *8* (1974No16).
3708.1	(3/2$^+$,5/2$^-$)	3707.9 *8*	100	0	3/2$^+$	D+Q	−0.10 *5*	δ: for J=5/2$^-$, −1.4 *8* for J=3/2$^+$. A_2=−0.44 *4*, A_4=−0.06 *5*, POL=+1.1 *4* (1974No16).

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^{34}S(α,pγ),(α,p) 1974No16,1976No05,1986La10 (continued)

$\gamma(^{37}Cl)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ	E_f	J_f^π	Mult.	δ[@]	Comments
								B(M1)(W.u.)>0.0035, B(E2)(W.u.)>2.5 for J^π=3/2$^+$ or. B(E1)(W.u.)>7×10^{-4}, B(M2)(W.u.)>0.5 for J^π=5/2$^-$ (1974No16).
3740.9	5/2$^-$	3740.5 *8*	100	0	3/2$^+$	D+Q	+0.07 *3*	A_2=−0.18 *2*, A_4=−0.07 *3*, POL=+0.8 *3* (1974No16). B(E1)(W.u.)>7×10^{-4}, B(M2)(W.u.)>0.4 (1974No16).
4011.0	9/2$^-$	723.6[‡] *10*		3287.2				
		906.4 *2*	69 *1*	3104.6	7/2$^-$	M1+E2	+0.73 *4*	δ: from 1974No16, +0.47 *8* from 1976No05, −3.5 *+5−7*, from 1972Al51, +1.1 *3* from 1986La10. A_2=+0.70 *1*, A_4=+0.19 *1*, POL=−0.95 *4* (1974No16). A_2=+0.86 *8*, A_4=+0.3 *1* (1986La10). B(M1)(W.u.)=6×10^{-4} *1*, B(E2)(W.u.)=1.4 *2* (1974No16).
		4011.1 *8*	31 *1*	0	3/2$^+$	E3		δ: δ(O/Q)=+0.22 *2* from 1986La10. A_2=+0.78 *4*, A_4=+0.11 *4*, POL=+0.5 *3* (1974No16). A_2=+0.94 *11*, A_4=+0.43 *25*, A_6=+0.06 *20* (1986La10). B(E3)(W.u.)=13 *1* (1974No16).
4016.7	1/2	930		3086.7	5/2$^+$			E_γ: from 1986La10. δ: δ(O/Q)=+0.04 *12* (1986La10). A_2=−0.13 *12* (1986La10).
4179.6	(3/2,5/2$^+$)	1090 *10*	100	3086.7	5/2$^+$			
4269.7	(1/2,3/2)	1183 *3*	30 *5*	3086.7	5/2$^+$			δ: δ(Q/D)=−0.25 *15* or −2.1 *8* for J=3/2.
		2543 *4*	70 *5*	1726.5	1/2$^+$			δ: δ(Q/D)=+0.25 *6* or −3.7 *7* for J=3/2.
4461	7/2$^+$,(9/2$^+$)	1356 *3*	100	3104.6	7/2$^-$			δ: δ(O/Q)=−2.1 *7* for J=3/2, δ(Q/D)>+9 for J=5/2, +1.7 *7* for J=7/2, +0.1 *2* for J=9/2.
4546.5	11/2$^-$	535.5 *2*	100	4011.0	9/2$^-$	M1+E2	+0.04 *2*	δ: 2.7 *+8−6* from 1972Al51. A_2=−0.30, A_4=0.00 *1*, POL=−0.49 *3* (1974No16).
		1442	<5	3104.6	7/2$^-$			
4812.3	(5/2$^-$,7/2)	1071[#]	<2[#]	3740.9	5/2$^-$			
		1708[#]	<2[#]	3104.6	7/2$^-$			
		4820 *15*	100	0	3/2$^+$			
4855.3	(5/2$^-$,7/2)	4855[#]	100[#]	0	3/2$^+$			
4920.9	9/2	910 *2*	26 *10*	4011.0	9/2$^-$			I_γ: from 1986La10.
		1816 *3*	74 *10*	3104.6	7/2$^-$			I_γ: from 1986La10.
4923	(5/2$^-$,7/2)	4923		0	3/2$^+$			
4974		962 *4*	45	4011.0	9/2$^-$			
		1870 *4*	55	3104.6	7/2$^-$			
5270.8	13/2$^-$	724.3 *2*	100	4546.5	11/2$^-$	M1+E2	+0.07 *4*	A_2=−0.13 *2*, A_4=−0.07 *2*, POL=−0.55 *10* (1974No16). B(M1)(W.u.)=0.031 *5*, B(E2)(W.u.)=1.0 *+20−8* (1974No16).
		1260	<5	4011.0	9/2$^-$			B(E2)(W.u.)<0.6 (1974No16).
5.31×10^3		5310 *30*	100	0	3/2$^+$			
5379	(3/2,5/2,9/2)	2274 *4*	100	3104.6	7/2$^-$			δ: δ(O/Q)=+0.4 *1* for J=3/2, δ(Q/D)<−7 for J=5/2, −0.09 *3* for J=9/2.
5407	(1/2,3/2)	3680 *20*	100	1726.5	1/2$^+$			δ: δ(Q/D)=+0.3 *1* or −3.7 *11* for J=3/2.
5547		999 *4*	50 *5*	4546.5	11/2$^-$			

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^{34}S(α,pγ),(α,p) 1974No16,1976No05,1986La10 (continued)

$\gamma(^{37}Cl)$ (continued)

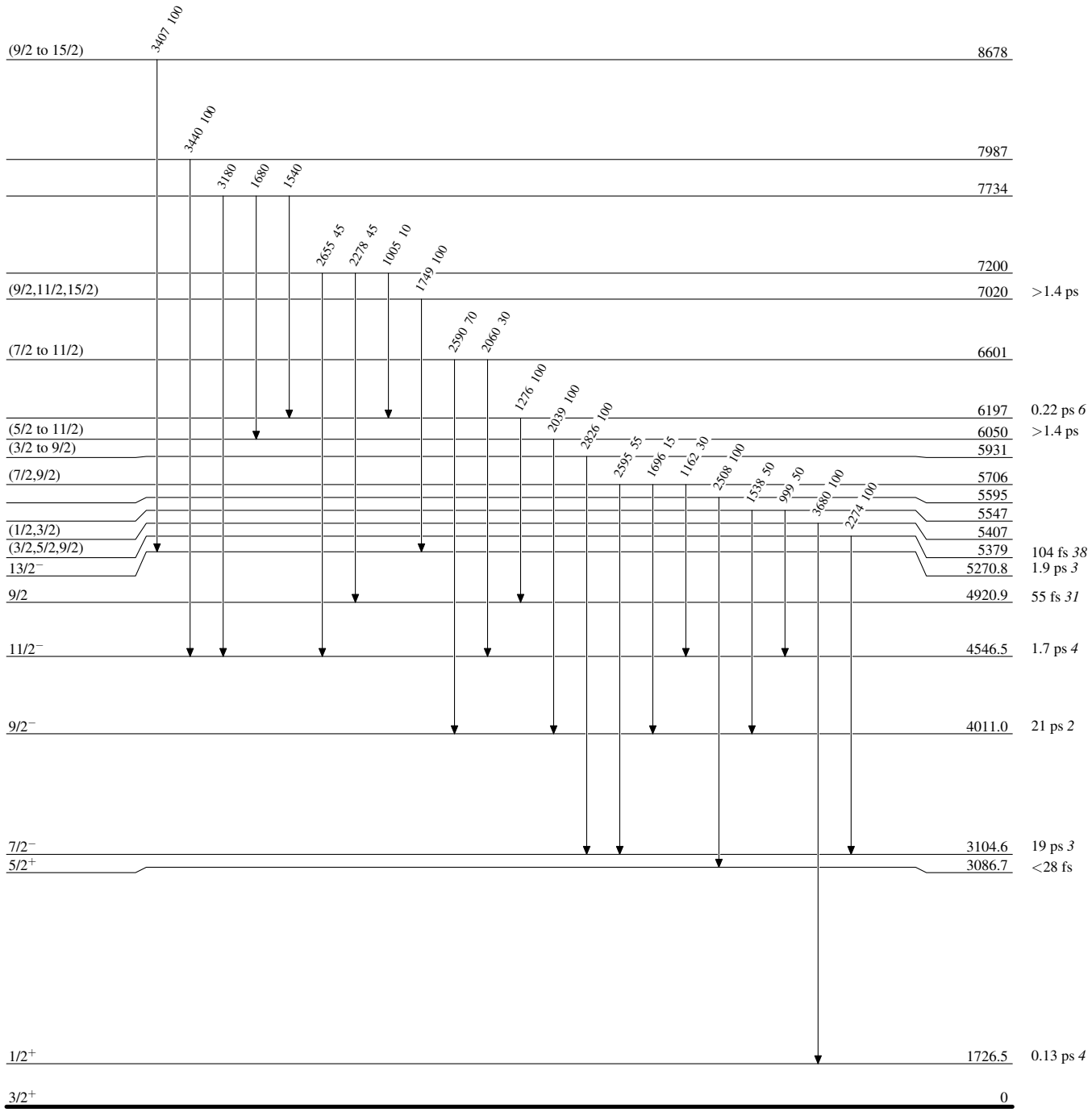
E_i(level)	J_i^π	E_γ †	I_γ	E_f	J_f^π	Comments
5547		1538 *4*	50 *5*	4011.0	$9/2^-$	
5595		2508 *20*	100	3086.7	$5/2^+$	
5706	(7/2,9/2)	1162 *4*	30 *2*	4546.5	$11/2^-$	δ: δ(O/Q)=0.0 *1* or −2.1 *2* for J=7/2, δ(Q/D)=−0.27 *3* for J=9/2.
		1696 *4*	15 *1*	4011.0	$9/2^-$	δ: δ(Q/D)=0.0 *1* for J=7/2, −0.7 *1* for J=9/2.
		2595 *5*	55 *2*	3104.6	$7/2^-$	δ: δ(Q/D)=−0.4 *1* for J=7/2, +0.2 *1* for J=9/2.
5931	(3/2 to 9/2)	2826 *4*	100	3104.6	$7/2^-$	δ: δ(O/Q)=+0.3 *1* for J=3/2, δ(Q/D)=0.0 *1* for J=5/2, −0.6 *1* for J=7/2, +0.09 *7* for J=9/2.
6050	(5/2 to 11/2)	2039 *3*	100	4011.0	$9/2^-$	δ: δ(O/Q)=+0.14 *9* or −2.7 *5* for J=5/2, δ(Q/D)=−5.7 *12* for J=7/2, −0.5 *2* for J=9/2, +0.18 *4* for J=11/2.
6197		1276 *2*	100	4920.9	9/2	
6601	(7/2 to 11/2)	2060 *20*	30 *5*	4546.5	$11/2^-$	
		2590 *5*	70 *5*	4011.0	$9/2^-$	δ: δ(Q/D)=−3.7 *6* for J=7/2, −0.4 *1* for J=9/2, +0.3 *1* for J=11/2.
7020	(9/2,11/2,15/2)	1749 *3*	100	5270.8	$13/2^-$	δ: δ(O/Q)=+0.4 *1* for J=9/2, δ(Q/D)=+0.09 *2* for J=11/2, 0.00 *2* for J=15/2.
7200		1005 *15*	10 *5*	6197		
		2278 *5*	45 *8*	4920.9	9/2	
		2655 *5*	45 *8*	4546.5	$11/2^-$	
7734		1540 *10*		6197		
		1680 *20*		6050	(5/2 to 11/2)	
		3180 *20*		4546.5	$11/2^-$	
7987		3440 *20*	100	4546.5	$11/2^-$	
8678	(9/2 to 15/2)	3407 *5*	100	5270.8	$13/2^-$	δ: δ(O/Q)+11 *5* for J=9/2, δ(Q/D)=+0.18 *4* for J=11/2, −1.2 *3* for J=13/2, −0.09 *3* for J=15/2.

† From 1974No16 and 1976No05, unless otherwise noted.
‡ From 1972Al51.
# From 1986La10.
@ From $\gamma(\theta)$ in 1974No16 and 1976No05.
& Placement of transition in the level scheme is uncertain.

^{34}S(α,pγ),(α,p) 1974No16,1976No05,1986La10

Level Scheme

Intensities: % photon branching from each level



$^{37}_{17}Cl_{20}$

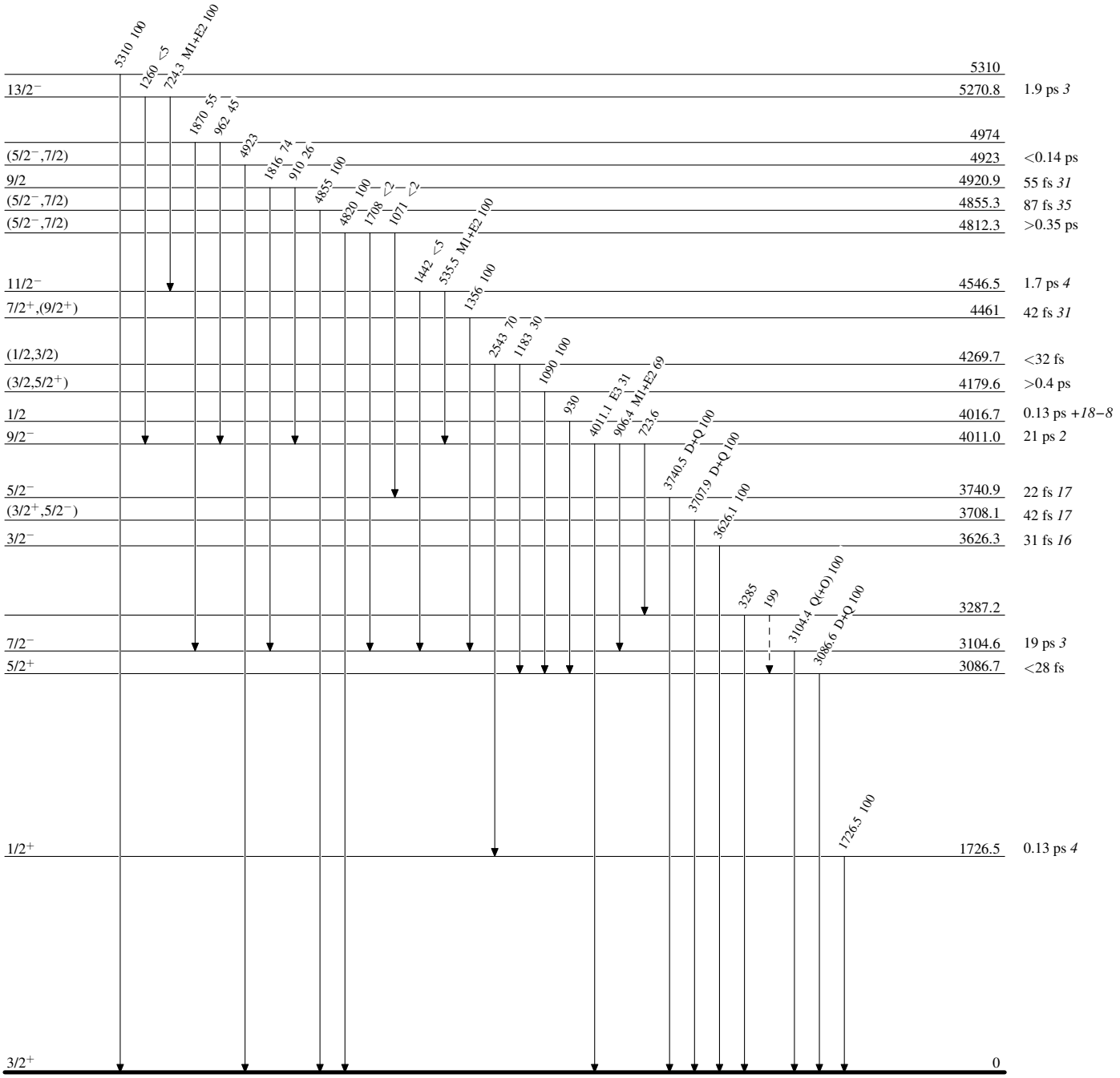
^{34}S(α,pγ),(α,p) **1974No16,1976No05,1986La10**

Legend

Level Scheme (continued)

Intensities: % photon branching from each level

γ Decay (Uncertain)



$^{37}_{17}Cl_{20}$