^{34}S(α,nγ) **1974Ga12,1975No01**

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

1974Ga12,1975No01 (same authors): E=9.0,9.5,11.5 (first REF.); 10.5,16.0 MeV (second REF.); used target 90% ^{34}S and measured $\gamma(\theta$,pol) and $T_{1/2}$ from RDM and DSAM. First/second refs. Give results below/above E(level)=3.8 MeV respectively.
1975Va15: E=10.5 MeV, measured nγ-coin, $\sigma(\theta)$, angular correlation, linear polarization.
1973Ve05: E=7.9 MeV, measured $T_{1/2}$ by RDM.
1972Tu06: E=8.6 MeV, measured linear polarization.
1972Ta10: E=8.00, 8.50, 8.60 MeV, measured $\sigma(\theta)$, linear polarization.
1972Al50: E=10, 12, 14 MeV, measured $\gamma\gamma$-coin, $\sigma(\theta)$.
1971Ra05: E=8.1 MeV, measured $T_{1/2}$ by RDM.
1971Ra03; E=7.6-8.8 MeV, measured $\sigma(\theta)$, $T_{1/2}$ by DSAM.
1967Go09: E=8.36 MeV, measured $T_{1/2}$ by RDM.
Other: 1963Ne05.

^{37}Ar Levels

E(level)[†]	J$^\pi$	$T_{1/2}$[‡]	Comments
0.0	3/2$^+$		J$^\pi$: from Adopted Levels, Gammas dataset.
1409.66 *16*	1/2$^+$	0.75 ps *+12−9*	J$^\pi$: from Adopted Levels, Gammas dataset. $T_{1/2}$: From 1971Ra03. Mean lifetime τ In fs: 1750 *50* (1974Ga12); 1080 *+170−130* (1971Ra03).
1611.45 *14*	7/2$^-$	4.34 ns *11*	J$^\pi$: ΔJ=2, M2+E3 γ to 3/2$^+$, g.s.. $T_{1/2}$: mean lifetime τ In ns: 6.08 *28* (1974Ga12), 6.47 *22* (1973Ve05), 6.02 *29* (1971Ra05), 7.43 *101* (1967Go09, from reported $T_{1/2}$=5.15 *70* ns); weighted average: 6.27 *16*.
2217.58 *23*	7/2$^+$	274 fs *15*	J$^\pi$: ΔJ=2, E2 γ to 3/2$^+$, g.s.. $T_{1/2}$: mean lifetime τ In fs: 400 *25* (1974Ga12), 380 *50* (1971Ra03); weighted average: 396 *22*.
2490.60 *17*	3/2$^-$	0.82 ps *29*	J$^\pi$: 1/2$^-$,3/2$^-$ from L=1 In 1965Ro08 (^{36}Ar(d,p)); 3/2$^-$ from ΔJ=0, E1(+M2) γ to 3/2$^+$, g.s.. $T_{1/2}$: mean lifetime τ In fs: 1620 *100* (1974Ga12), 775 *+105−89* (1971Ra03); weighted average: 1185 *422*.
2796.65 *19*	5/2$^+$	10 fs *8*	J$^\pi$: 1/2$^+$,5/2$^+$ from ΔJ=1, M1+E2 γ to 3/2$^+$, g.s.; 1/2$^+$ rejected by 1975No01 based on the χ^2 fit. $T_{1/2}$: mean lifetime τ In fs: 14 *11* (1971Ra03); other:<15 (1974Ga12).
3172.4 *9*	5/2$^+$	52 fs *7*	J$^\pi$: 1/2$^+$,5/2$^+$ from ΔJ=1, M1+E2 γ to 3/2$^+$, g.s.; 1/2$^+$ rejected by 1975No01 based on the χ^2 fit. $T_{1/2}$: mean lifetime τ In fs: 75 *10* (1974Ga12).
3185.22 *18*	(9/2)$^-$	194 fs *7*	J$^\pi$: 5/2$^-$,9/2$^-$ from ΔJ=1, M1+E2 γ to 7/2$^-$, 1611. 5/2$^-$ less likely from intense γ from 13/2$^-$, 5793. $T_{1/2}$: mean lifetime τ In fs: 280 *10* (1974Ga12).
3273.93 *17*	5/2$^-$	24 fs *2*	J$^\pi$: 1/2$^-$,5/2$^-$ from ΔJ=1, E1(+M2) γ to 3/2$^+$, g.s.; 1/2$^-$ excluded by M1+E2 γ to 7/2$^-$, 1611. $T_{1/2}$: mean lifetime τ In fs: 35 *3* (1974Ga12).
3518.1 *3*		17 fs *3*	$T_{1/2}$: mean lifetime τ In fs: 25 *15* (1974Ga12).
3527.21 *18*	7/2$^-$	409 fs *55*	J$^\pi$: 3/2$^-$,7/2$^-$ from ΔJ=1, E1(+M2) γ to 5/2$^+$, 2796; 7/2$^-$ from ΔJ=0, M1+E2 γ to 7/2$^-$, 1611. $T_{1/2}$: mean lifetime τ In fs: 590 *80* (1974Ga12).
3602.4 *10*	3/2$^+$,5/2$^-$	21 fs *3*	J$^\pi$: 3/2,5/2 based on $\gamma(\theta)$ and 3/2$^+$,5/2$^-$ from polarization measurement (1974Ga12). $T_{1/2}$: mean lifetime τ In fs: 30 *5* (1974Ga12).
3707.03 *23*	11/2$^-$	256 fs *14*	J$^\pi$: 3/2$^-$,11/2$^-$ from ΔJ=2, E2 γ to 7/2$^-$, 1611; 3/2$^-$ excluded from ΔJ=1, M1 γ to (9/2)$^-$, 3185. 7/2$^-$ also tested and found inconsistent with pol(γ) by 1974Ga12. $T_{1/2}$: mean lifetime τ In fs: 370 *20* (1974Ga12).
3936.7 *3*	3/2$^+$	17 fs *10*	J$^\pi$: ΔJ=1, M1+E2 γ to 1/2$^+$, 1410.

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$^{34}S(\alpha,n\gamma)$ 1974Ga12,1975No01 (continued)

^{37}Ar Levels (continued)

E(level)†	J^π	$T_{1/2}$‡	Comments
			$T_{1/2}$: mean lifetime τ In fs: 25 *15* (1975No01).
3980.0 *8*	1/2,3/2,5/2	28 fs *28*	J^π: D+Q γ to $3/2^+$, g.s.. $T_{1/2}$: mean lifetime τ In fs:<40 (1975No01).
4021.5 *3*	$9/2^-$	28 fs *10*	J^π: ΔJ=0 γ to $9/2^-$, 3185, and M1+E1 γ to $7/2^-$, 1611. $T_{1/2}$: mean lifetime τ In fs: 40 *15* (1975No01).
4284.3 *3*	$7/2^+$	28 fs *14*	J^π: ΔJ=0 γ to $7/2^-$, 1611 and M1+E2 γ to $5/2^+$, 2796. $T_{1/2}$: mean lifetime τ In fs: 40 *20* (1975No01).
4396.7 *9*	$(3/2,5/2)^-$	<6.9 fs	J^π: ΔJ=0,1 E1(+M2) γ to $3/2^+$, g.s.; 1/2 excluded by $\gamma(\theta)$ (1975No01). $T_{1/2}$: mean lifetime τ In fs:<10 (1975No01).
4443.8 *10*	1/2,3/2,5/2	<14 fs	J^π: D+Q γ to $3/2^+$, g.s. (1975No01). $T_{1/2}$: mean lifetime τ In fs:<20 (1975No01).
4573.4 *10*	5/2	<14 fs	J^π: 1/2,5/2 from ΔJ=1 D+Q γ to $3/2^+$, g.s.; 1975No01 reject 1/2 based on $\gamma(\theta)$ and suggest $3/2,5/2^+$ which are not adopted here. $T_{1/2}$: mean lifetime τ In fs:<20 (1975No01).
4624.5 *5*	$7/2^+$	<6.9 fs	J^π: ΔJ=2 γ to $3/2^+$ g.s.. $T_{1/2}$: mean lifetime τ In fs:<10 (1975No01).
4634.5 *6*		21 fs *14*	$T_{1/2}$: mean lifetime τ In fs: 30 *20* (1975No01).
4743.3 *10*	$7/2^+$	<6.9 fs	J^π: ΔJ=2, E2 γ to $3/2^+$, g.s.. $T_{1/2}$: mean lifetime τ In fs:<10 (1975No01).
4798.8 *10*	5/2	<6.9 fs	J^π: 1/2,5/2 from ΔJ=1 D+Q γ to $3/2^+$, g.s.; 1/2 excluded by 1975No01 from $\gamma(\theta)$; they also consider J=$3/2^+$ which is not adopted here. $T_{1/2}$: mean lifetime τ In fs:<10 (1975No01).
4886.6 *4*			
4981.2 *7*	$7/2^-,11/2^-$	35 fs *10*	J^π: ΔJ=0,2 E2(+M3) γ to $7/2^-$, 1611; 1975No01 exclude $3/2^-$ from $\gamma(\theta)$. $T_{1/2}$: mean lifetime τ In fs: 50 *15* (1975No01).
5048.6 *6*	5/2	<21 fs	J^π: ΔJ=1 γ's to $3/2^+$ g.s. and $7/2^-$, 1611 respectively; π=− In 1975No01 is not adopted here. $T_{1/2}$: mean lifetime τ In fs:<30 (1975No01).
5089.3 *6*	3/2	<10 fs	J^π: ΔJ=1 γ to $1/2^+$, 1410. $T_{1/2}$: mean lifetime τ In fs:<15 (1975No01).
5102.1 *12*	3/2	<6.9 fs	J^π: ΔJ=0, D+Q γ to $3/2^+$, g.s.. $T_{1/2}$: mean lifetime τ In fs:<10 (1975No01).
5130.2 *12*	5/2	17 fs *7*	J^π: 1/2,5/2 from ΔJ=1 γ to $3/2^+$, g.s.. 1975No01 adopts 3/2,5/2 (and π=+, not adopted here). However 3/2 is not sustained by $\gamma(\theta)$. ADOPTED here is 5/2. $T_{1/2}$: mean lifetime τ In fs: 25 *10* (1975No01).
5213.50 *24*	$11/2^+$	2.50 ps *21*	J^π: $7/2^+,11/2^+$ from ΔJ=1, E1 γ to $9/2^-$, 3185; 7/2 excluded from ΔJ=2, Q γ to $7/2^+$, 2218. $T_{1/2}$: mean lifetime τ In ps: 3.6 *3* (1975No01).
5408.3 *12*		3.5 fs *35*	$T_{1/2}$: mean lifetime τ In fs:<10 (1975No01).
5436.0 *8*	$5/2^+,9/2^+$	87 fs *17*	J^π: ΔJ=1, E1(+M2) γ to $7/2^-$, 1611.
5793.5 *3*	$13/2^-$	35 fs *10*	J^π: $13/2^-,17/2^-$ from ΔJ=1, E1 γ from $15/2^+$, 6473; $17/2^-$ rejected by 1975No01 based on the χ^2 fit. $T_{1/2}$: mean lifetime τ In fs: 50 *15* (1975No01).
6150.60 *25*	$13/2^+$	3.2 ps *4*	J^π: $9/2^+,13/2^+$ from ΔJ=1, M1+E2 γ to $11/2^+$, 5213; $9/2^+$ rejected by 1975No01 based on the χ^2 fit. $T_{1/2}$: mean lifetime τ In ps: 4.6 *6* (1975No01).
6473.4 *3*	$15/2^+$	4.4 ps *4*	J^π: $11/2^+,15/2^+$ from ΔJ=1, M1(+E2) γ to $13/2^+$, 6150; $11/2^+$ rejected by 1975No01 based on the χ^2 fit. $T_{1/2}$: mean lifetime τ In ps: 6.3 *6* (1975No01).
7071.2 *4*	$13/2^+,17/2^+$	381 fs *83*	J^π: ΔJ=1, M1 γ to $15/2^+$, 6473 (both $13/2^+$ and $17/2^+$ are acceptable by the χ^2 fit). $T_{1/2}$: mean lifetime τ In fs: 550 *120* (1975No01).

† From least-squares fit to Eγ's (normalized χ^2=2.0>critical χ^2=1.8).

‡ The weighted average values including asymmetrical uncertainties were calculated with symmetrized uncertainties (the mean value of asymmetrical values). The bigger value of either the internal or the external uncertainty of the weighted average is reported.

$^{34}S(\alpha,n\gamma)$ 1974Ga12,1975No01 (continued)

$\gamma(^{37}Ar)$

For polarization from 1974Ga12 and 1975No01 positive (negative) values mean electric (magnetic) character respectively. The A_2,A_4 and polarization values from 1972Ta10 are weighted of several independent measurements; polarization values>1 (<1) mean electric (magnetic) character, respectively. Polarization values from 1975Va15 satisfy same criteria those from 1972Ta10.

1975Va15 angular correlation coefficients are denoted As C_2 and C_4 (the normal A_2,A_4 notation is used for angular distribution coefficients).

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.	δ	Comments
1409.66	1/2+	1409.77 *18*	100	0.0	3/2+			E_γ: weighted average of: 1409.8 *3*, 1409.9 *3* (1974Ga12); 1408.5 *10* (1972Al50); 1409.7 *4* (1972Ta10). I_γ: 7.1 (1972Al50, rel. int.).
1611.45	7/2−	1611.26 *18*	100	0.0	3/2+	M2+E3	−0.11 *2*	E_γ: weighted average of: 1611.2 *3*, 1611.2 *3* (1974Ga12); 1611.0 *10* (1972Al50); 1611.5 *4* (1972Ta10). I_γ: 100.0 (1972Al50, rel. int.). Mult.,δ: ΔJ=2, M2+E3 γ, δ=−0.11 *2* (1972Ta10); δ=−0.09 *3* or δ=−4.54 *+60−79* (1971Ra03). A_2=+0.31 *2*, A_4=−0.27 *1*, P=0.22 *6* (1972Ta10).
2217.58	7/2+	2217.7 *3*	100	0.0	3/2+	E2		E_γ: weighted average of: 2217.4 *4*, 2217.9 *4* (1974Ga12); 2217.0 *15* (1972Al50); 2217.8 *8* (1972Ta10). I_γ: 32.8 (1972Al50, rel. int.). Mult.,δ: ΔJ=2, E2(+M3) γ with δ=0.0 *2* (1972Ta10); δ=+0.03 *4* or δ=−5.49 *+105−166* (1971Ra03). A_2=+0.50 *4*, A_4=−0.36 *2*, P=12 *10* (1972Ta10).
2490.60	3/2−	879.75 *25*	7.0 *5*	1611.45	7/2−			E_γ: weighted average of: 879.5 *2*, 880.0 *2* (1974Ga12).
		2490.4 *3*	93.0 *5*	0.0	3/2+	E1(+M2)	−0.08 *+12−5*	E_γ: weighted average of: 2490.1 *5*, 2490.4 *5* (1974Ga12); 2489.0 *15* (1972Al50); 2491.4 *8* (1972Ta10). I_γ: 3.8 (1972Al50, rel. int.). Mult.,δ: ΔJ=0, E1(+M2) γ with δ =−0.08 *+12−5* (1972Ta10); δ=−0.02 *4* or δ=+3.57 *+64−48* (1971Ra03). A_2=+0.15 *7*, P=0.34 *10* (1972Ta10).
2796.65	5/2+	2796.6 *3*	100	0.0	3/2+	M1+E2	+0.16 *1*	E_γ: weighted average of: 2797.0 *8* (1975Va15), 2796.2 *6*, 2796.6 *6* (1974Ga12); 2795.0 *20* (1972Al50); 2797.0 *8* (1972Ta10). Mult.,δ: ΔJ=1, M1+E2 γ with δ=+0.16 *1* (1974Ga12); δ=+0.16 *3* or δ=−8.0 *15* (1972Ta10); δ=+0.16 *2* (1975Va15). I_γ: 6.7 (1972Al50, rel. int.). C_2=−0.06 *3*, P=0.89 *11* (1975Va15). A_2=−0.05 *2*, A_4=+0.01 *0*, P=−0.45 *13* (1974Ga12). A_2=−0.04 *3*, A_4=−0.06 *4*, P=0.20 *14* (1972Ta10).
3172.4	5/2+	3172.3 *9*	100	0.0	3/2+	M1+E2	−0.52 *9*	E_γ: weighted average of: 3172.6 *7* (1974Ga12), 3169.8 *20* (1975Va15). Mult.,δ: ΔJ=1, M1+E2 γ, δ=−0.52 *9*

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^{34}S(α,nγ) 1974Ga12,1975No01 (continued)

γ(^{37}Ar) (continued)

E_i(level)	J^π_i	E_γ†	I_γ‡	E_f	J^π_f	Mult.	δ	Comments
								(1974Ga12); δ=−0.29 +12−22 (1975Va15). C_2=−0.93 7, P=0.90 7 (1975Va15). A_2=−0.95 4, A_4=+0.08 4, P=−0.22 20 (1974Ga12).
3185.22	(9/2)$^-$	1573.90 19	100	1611.45	7/2$^-$	M1+E2	+0.64 5	E_γ: weighted average of: 1573.5 5 (1975Va15), 1574.0 3, 1574.0 3 (1974Ga12); 1573.3 10 (1972Al50). I_γ: 32.3 (1972Al50, rel. int.). Mult.,δ: ΔJ=1, M1+E2 γ, δ=+0.64 5 (1974Ga12); δ=+0.62 12 (1975Va15). A_2=0.66 2, C_2=+0.58 7, P=0.70 10 (1975Va15). A_2=+0.65 1, A_4=+0.14 1, P=−0.80 9 (1974Ga12).
3273.93	5/2$^-$	783.73 19	8 1	2490.60	3/2$^-$	M1		E_γ: weighted average of: 783.2 4 (1975Va15), 784.0 2, 783.6 2 (1974Ga12). I_γ: 7 4 (1975Va15), 8 1 (1974Ga12). Mult.,δ: ΔJ=1, M1 γ, δ=+0.06 10 (1974Ga12); δ=0.00 4 (1975Va15). A_2=−0.35 2 (1975Va15). A_2=+0.23 6, A_4=0.00 6, P=−0.44 23 (1974Ga12).
		1661.81 20	47 2	1611.45	7/2$^-$	M1+E2	−0.32 7	E_γ: weighted average of: 1662.0 6 (1975Va15), 1661.8 3, 1661.8 3 (1974Ga12); 1660.7 20 (1972Al50). E_γ: differs by 3σ or more from ΔE(levels). I_γ: 49 3 (1975Va15), 47 2 (1974Ga12). I_γ: 2.5 (1972Al50, rel. int.). Mult.,δ: ΔJ=1, M1+E2 γ, δ=−0.32 7 (1974Ga12); δ=−0.25 5 (1975Va15). A_2=+0.16 1, C_2=+0.19 3 (1975Va15). A_2=+0.22 2, A_4=0.00 2, P=−0.44 18 (1974Ga12).
		3273.8 5	45 2	0.0	3/2$^+$	E1(+M2)	+0.07 5	E_γ: weighted average of: 3275.0 15 (1975Va15), 3273.8 7, 3273.6 7 (1974Ga12); 3272 3 (1972Al50). I_γ: 44 3 (1975Va15), 45 2 (1974Ga12). I_γ: ≈2.5 (1972Al50, rel. int.). Mult.,δ: ΔJ=1, E1(+M2), δ=+0.07 5 γ (1974Ga12); δ=+0.09 7 (1975Va15). C_2=−0.20 5, C_4=−0.11 8, P=1.41 18 (1975Va15). A_2=−0.22 3, A_4=0.00 3, P=+0.75 29 (1974Ga12).
3518.1		1027.2 3	10	2490.60	3/2$^-$			E_γ: weighted average of: 1026.0 14 (1975Va15), 1027.2 3 (1974Ga12). I_γ: 12 (1975Va15), 10 (1974Ga12).
		2108.9 4	90	1409.66	1/2$^+$			E_γ: weighted average of: 2107.8 20 (1975Va15), 2108.9 4 (1974Ga12). I_γ: 88 (1975Va15), 90 (1974Ga12).
3527.21	7/2$^-$	253.1 2	4.0 5	3273.93	5/2$^-$	D		Mult.,δ: ΔJ=1, D(+Q) γ, δ=−0.03 +17−102 (1974Ga12). A_2=−0.28 8, A_4=0.00 11 (1974Ga12).
		342.28 20	21 2	3185.22	(9/2)$^-$	D+Q	+0.10 14	E_γ: weighted average of: 342.3 2 (1974Ga12); 341.3 15 (1972Al50). I_γ: 0.9 (1972Al50, rel. int.).

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^{34}S(α,nγ) 1974Ga12,1975No01 (continued)

γ(^{37}Ar) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[‡]	E_f	J^π_f	Mult.	δ	Comments
								Mult.,δ: ΔJ=1, D+Q γ (1974Ga12). A_2=−0.01 *2*, A_4=0.00 *3* (1974Ga12).
3527.21	7/2$^-$	730.41 *17*	8 *1*	2796.65	5/2$^+$	E1(+M2)	+0.06 *6*	E_γ: weighted average of: 730.2 *3* (1975Va15), 730.5 *2* (1974Ga12). I_γ: 11 (1975Va15), 8 *1* (1974Ga12). Mult.,δ: ΔJ=1, E1(+M2) γ, δ=+0.06 *6* (1974Ga12); δ=+0.07 *5* (1975Va15). A_2=−0.19 *1* (1975Va15). A_2=−0.21 *9*, A_4=0.00 *10*, P=−0.03 *23* (1974Ga12).
		1916.1 *5*	67 *1*	1611.45	7/2$^-$	M1+E2	−3.5 *13*	E_γ: weighted average of: 1915.0 *7* (1975Va15), 1916.5 *4* (1974Ga12); 1914.6 *15* (1972Al50). I_γ: 89 (1975Va15), 67 *1* (1974Ga12). I_γ: 2.6 (1972Al50, rel. int.). Mult.,δ: ΔJ=0, M1+E2 γ, δ=−3.5 *13* (1974Ga12); δ=−1.26 *28* (1975Va15). A_2=−0.36 *2*, A_4=−0.19 *2*, C_2=−0.35 *8*, C_4=−0.48 *11*, P=−0.31 *31* (1974Ga12). A_2=−0.39 *3*, A_4=−0.32 *4*, P=−0.31 *31* (1974Ga12).
3602.4	3/2$^+$,5/2$^-$	3602.2 *10*	100	0.0	3/2$^+$			E_γ: weighted average of: 3604.7 *20* (1975Va15), 3601.8 *8* (1974Ga12). Mult.,δ: ΔJ=0, M1+E2 γ with δ=−0.24 *8* (1974Ga12, from J=3/2$^+$); or ΔJ=1, E1+M2 γ with δ=+0.19 *5* (1974Ga12, from J=5/2$^-$); δ=−0.25 *6* (1975Va15, from 3/2$^+$), or δ=+0.19 *+5−2* (1975Va15, from 5/2). A_2=+0.04 *3*, A_4=−0.05 *4*, C_2=−0.04 *3*, P=0.86 *22* (1975Va15). A_2=+0.03 *3*, A_4=−0.09 *3*, P=+0.96 *45* (1974Ga12).
3707.03	11/2$^-$	521.74 *20*	15 *1*	3185.22	(9/2)$^-$	M1		E_γ: weighted average of: 521.1 *7* (1975Va15), 521.8 *2* (1974Ga12); 521.2 *15* (1972Al50). I_γ: 21 *5* (1975Va15), 15 *1* (1974Ga12). I_γ: 4.5 (1972Al50, rel. int.). Mult.,δ: ΔJ=1, M1 γ, δ=−0.01 *5* (1974Ga12); δ=0.00 *3* (1975Va15). A_2=−0.16 *2* (1975Va15). A_2=−0.29 *6*, A_4=0.00 *6*, P=−0.37 *25* (1974Ga12).
		2096.1 *4*	85 *1*	1611.45	7/2$^-$	E2		E_γ: weighted average of: 2095.0 *8* (1975Va15), 2096.4 *4* (1974Ga12); 2095.0 *15* (1972Al50). I_γ: 79 *5* (1975Va15), 85 *1* (1974Ga12). I_γ: 26.8 (1972Al50, rel. int.). Mult.,δ: ΔJ=2, E2 γ, δ=−0.04 *4* (1974Ga12); δ=+2.1 *+19−8* (1975Va15). C_2=+0.21 *5*, C_4=−0.44 *6* (1974Ga12). A_2=+0.37 *2*, A_4=−0.29 *2*, P=+1.02 *28* (1974Ga12).
3936.7	3/2$^+$	2527.2 *4*	16 *1*	1409.66	1/2$^+$	M1+E2	−3.0 *15*	Mult.,δ: ΔJ=1 M1+E2 with δ=−3.0 *15* (1975No01), or tentative δ=+0.20 *8*. A_2=−0.04 *8*, A_4=−0.06 *3*, P=+1.05 *68* (1975No01).

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$^{34}S(\alpha,n\gamma)$ 1974Ga12,1975No01 (continued)

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

E_i(level)	J_i^π	E_γ†	I_γ‡	E_f	J_f^π	Mult.	δ	Comments
3936.7	3/2+	3936.2 *4*	84 *1*	0.0	3/2+	M1+E2	+0.6 *+2−7*	Mult.,δ: ΔJ=0, M1+E2 γ with tentative δ=+0.6 *+2−7* (1975No01). A_2=+0.63 *2*, A_4=−0.06 *3*, P=+0.36 *32* (1975No01).
3980.0	1/2,3/2,5/2	3979.8 *8*	100	0.0	3/2+	D+Q	−0.16 *16*	Mult.: D+Q γ (1975No01). δ: for J=3/2; +0.25 *11* for J=5/2 (1975No01). A_2=−0.02 *9*, A_4=−0.22 *11*, P=+0.16 *50* (1975No01).
4021.5	9/2−	837.4 *7*	26 *2*	3185.22	(9/2)−			Mult.,δ: ΔJ=0, electric transition, δ=−0.02 *7* (1975No01). A_2=+0.75 *7*, A_4=−0.17 *6*, P=+0.41 *16* (1975No01).
		1803.9 *3*	68 *1*	2217.58	7/2+	E1		E_γ: weighted average of: 1803.9 *3* (1975No01); 1804.3 *15* (1972Al50). I_γ: 6.4 (1972Al50, rel. int.). Mult.,δ: ΔJ=1, E1 γ, δ=0.00 *2* (1975No01). A_2=−0.30 *2*, A_4=−0.06 *2*, P=+0.49 *3* (1975No01).
		2409.3 *4*	6.0 *2*	1611.45	7/2−	M1+E2	+1.9 *4*	E_γ: weighted average of: 2409.3 *4* (1975No01). Mult.,δ: ΔJ=1, M1+E2 γ with tentative δ (1975No01). A_2=+0.77 *6*, A_4=+0.47 *6*, P=−0.51 *54* (1975No01).
4284.3	7/2+	1488.1 *3*	10 *2*	2796.65	5/2+	M1+E2	+0.17 *10*	Mult.,δ: ΔJ=1, M1+E2 γ (1975No01). A_2=0.00 *20*, A_4=+0.14 *24*, P=−0.58 *41* (1975No01).
		2066.3 *6*	25 *3*	2217.58	7/2+			
		2671.7 *5*	65 *3*	1611.45	7/2−	D+Q	+0.45 *15*	Mult.,δ: ΔJ=0, D+Q γ (1975No01). A_2=+0.76 *6*, A_4=−0.11 *6*, P=+0.1 *4* (1975No01).
4396.7	(3/2,5/2)−	4396.4 *9*	100	0.0	3/2+	E1(+M2)		Mult.,δ: ΔJ=0 for E1+M2 γ, δ=−2.0 *5*; or ΔJ=1, E1(+M2) γ, δ=−0.02 *2* (1975No01). A_2=−0.39 *3*, A_4=0.00 *4*, P=+0.35 *25* (1975No01).
4443.8	1/2,3/2,5/2	4443.5 *10*	100	0.0	3/2+	D+Q	−0.27 *15*	Mult.,δ: D+Q γ (1975No01). δ: from J=3/2− from γ(θ) (1975No01). A_2=+0.03 *6*, A_4=−0.16 *10*, P=+0.1 *7* (1975No01).
4573.4	5/2	4573.1 *10*	100	0.0	3/2+	D+Q	+0.65 *3*	Mult.,δ: ΔJ=1 D+Q, tentative δ=+0.65 *3* seems best supported by γ(θ); 1975No01 consider it rather a M1+E2 γ, which is not adopted here. Also they tested the hypotheses J=3/2+, with tentative δ=+1.4 *4*, or tentative δ=+0.4 *+1−2*; and J=3/2− with tentative δ=δ=+0.4 *+1−2*. A_2=+0.65 *4*, A_4=+0.10 *4*, P=+0.4 *9* (1975No01).
4624.5	7/2+	3013.0 *5*	65 *1*	1611.45	7/2−			Mult.,δ: magnetic transition with δ=−0.08 *5* (1975No01). A_2=+0.34 *3*, A_4=+0.01 *3*, P=−0.56 *16* (1975No01).

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$^{34}S(\alpha,n\gamma)$ 1974Ga12,1975No01 (continued)

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

E_i(level)	J^π_i	E_γ †	I_γ ‡	E_f	J^π_f	Mult.	δ	Comments
								A_2=+0.34 *3*, A_4=+0.01 *3*, P=−0.56 *16* (1975No01).
4624.5	7/2$^+$	4624.0 *10*	35 *1*	0.0	3/2$^+$	E2		Mult.,δ: ΔJ=2, E2(+M3) γ with δ=−0.01 *3* (1975No01). A_2=+0.36 *2*, A_4=−0.13 *2*, P=+1.1 *5* (1975No01).
4634.5		2144	17 *3*	2490.60	3/2$^-$			E_γ: from fig. 2 "THE decay scheme of 37AR" (1975No01; 2114 In tab. 5 is wrong).
		3224.6 *6*	83 *3*	1409.66	1/2$^+$			
4743.3	7/2$^+$	4743.1 *10*	100	0.0	3/2$^+$	E2		Mult.,δ: ΔJ=2, E2(+M3) γ with δ =−0.01 *3* (1975No01). A_2=+0.39 *3*, A_4=−0.11 *3* (1975No01).
4798.8	5/2	4798.5 *10*	100	0.0	3/2$^+$	D+Q	−0.7 *+7−26*	δ: ΔJ=1, D+Q γ with δ=−0.7 *+7−26* for J=5/2 based on $\gamma(\theta)$ In 1975No01; they also tested J=3/2$^+$ hypothesis with δ=−1.4 *7* for J=3/2$^+$; −0.7+7-26 for J=5/2$^+$. A_2=−0.61 *8*, A_4=+0.09 *9* (1975No01).
4886.6		1179.0 *10*	100	3707.03	11/2$^-$			
4981.2	7/2$^-$,11/2$^-$	3369.6 *6*	100	1611.45	7/2$^-$	E2		Mult.,δ: ΔJ=2, E2(+M3) γ with δ=+0.02 *3* In 1975No01; they consider ΔJ=0 too, with δ=−0.21 *5*. A_2=+0.23 *10*, A_4=0.00 *8*, P=+1.2 *4* (1975No01).
5048.6	5/2	3436.7 *6*	67 *2*	1611.45	7/2$^-$	D+Q	−0.16 *4*	Mult.,δ: ΔJ=1, D+Q γ with δ=−0.16 *4* or −3.4 *5*. A_2=+0.09 *4*, A_4=−0.09 *5* (1975No01).
		5049.0 *11*	33 *2*	0.0	3/2$^+$	D(+Q)	+0.04 *4*	Mult.,δ: ΔJ=1, D(+Q) γ with δ=+0.04 *4* (1975No01). A_2=−0.34 *7*, A_4=+0.10 *7* (1975No01).
5089.3	3/2	2599	28 *2*	2490.60	3/2$^-$			Mult.,δ: likely D+Q γ with δ=+0.18 *8* (1975No01).
		3679.2 *7*	72 *2*	1409.66	1/2$^+$	D+Q	+0.18 *8*	Mult.,δ: ΔJ=1, D+Q γ (1975No01). A_2=−0.15 *8*, A_4=+0.10 *8* (1975No01).
5102.1	3/2	5101.7 *12*	100	0.0	3/2$^+$	D+Q	+0.09 *7*	Mult.,δ: ΔJ=2 Q, or ΔJ=0 D+Q γ based on $\gamma(\theta)$ shown below As from 1975No01. However they give ΔJ=1, D+Q γ with tentative δ=+0.37 *4* which however is not sustained by negative A_4, so it is rejected here; and they did not consider the ΔJ=2, Q possibility. For ΔJ=0, D+Q γ 1975No01 propose tentative δ=+2.8 *6* or +0.09 *7* for J=3/2$^+$; or tentative δ=+0.09 *9* from J=3/2$^-$. ADOPTED here is only ΔJ=0, D+Q with tentative δ=+0.09 *7*.
5130.2	5/2	5129.8 *12*	100	0.0	3/2$^+$	D+Q	+1.3 *+8−37*	Mult.,δ: ΔJ=1, D+Q γ with tentative δ; 1975No01 also consider ΔJ=0, which is not sustained by $\gamma(\theta)$ shown below. A_2=+0.63 *6*, A_4=+0.18 *6* (1975No01).
5213.50	11/2$^+$	1191.4 *5*	11 *2*	4021.5	9/2$^-$			Mult.,δ: ΔJ=1, E1(+M2) γ from level scheme with tentative δ=+0.14 *20* (1975No01).
		1506.7 *3*	41 *2*	3707.03	11/2$^-$	E1(+M2)	−0.08 *4*	E_γ: weighted average of: 1506.7 *3*

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$^{34}S(\alpha,n\gamma)$ 1974Ga12,1975No01 (continued)

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

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.	δ	Comments
								(1975No01); 1506.3 *15* (1972Al50). I_γ: 4.3 (1972Al50, rel. int.). Mult.,δ: ΔJ=0,2 magnetic transition; ΔJ=0 from level scheme and E1+M2 from RUL. A_2=+0.39 *2*, A_4=+0.07 *2*, P=−0.76 *7* (1975No01).
5213.50	11/2$^+$	2028.0 *3*	19 *1*	3185.22	(9/2)$^-$	E1(+M2)	−0.08 *2*	E_γ: weighted average of: 2028.0 *3* (1975No01); 2028.1 *20* (1972Al50). I_γ: 1.4 (1972Al50, rel. int.). Mult.,δ: ΔJ=1, E1(+M2) γ (1975No01). A_2=−0.45 *4*, A_4=−0.01 *4*, P=+0.41 *13* (1975No01).
		2996.6 *5*	20 *2*	2217.58	7/2$^+$	Q		E_γ: weighted average of: 2996.7 *5* (1975No01); 2995.7 *15* (1972Al50). I_γ: 2.7 (1972Al50, rel. int.). Mult.,δ: ΔJ=2, Q γ with tentative δ=+0.02 *2* (1975No01). A_2=+0.58 *6*, A_4=−0.26 *5* (1975No01).
		3601.9 *7*	9 *4*	1611.45	7/2$^-$			Mult.,δ: ΔJ=2, M2+E3 with tentative δ=+0.16 *9* based on level scheme In 1975No01.
5408.3		5407.9 *12*		0.0	3/2$^+$			E_γ: weighted average of: 5407.9 *12* (1975No01).
5436.0	5/2$^+$,9/2$^+$	3824.3 *7*	100	1611.45	7/2$^-$	E1(+M2)	+0.06 *3*	Mult.,δ: ΔJ=1, E1(+M2) γ with tentative δ=+0.06 *3*. 1975No01 also consider E2 γ (from J=5/2$^-$ and J=7/2$^-$), but negative A_2 excludes Q. A_2=−0.19 *3*, A_4=−0.07 *3*, P=+0.41 *31* (1975No01).
5793.5	13/2$^-$	2086	45[#]	3707.03	11/2$^-$			
		2607.7 *8*	55[#]	3185.22	(9/2)$^-$			
6150.60	13/2$^+$	937.1 *1*	75[#]	5213.50	11/2$^+$	M1+E2	+0.10 *1*	E_γ: weighted average of: 937.1 *1* (1975No01); 937.0 *10* (1972Al50). I_γ: 2.6 (1972Al50, rel. int.). Mult.,δ: ΔJ=1, M1+E2 γ (1975No01). A_2=−0.09 *1*, A_4=0.00 *2*, P=−0.46 *3* (1975No01).
		1264.0 *2*	25[#]	4886.6				I_γ: 5.1 (1972Al50, rel. int.).
6473.4	15/2$^+$	322.8 *1*	45.8[@] *22*	6150.60	13/2$^+$	M1(+E2)	−0.05 *2*	E_γ: weighted average of: 322.8 *1* (1975No01); 323.5 *10* (1972Al50). I_γ: 3.0 (1972Al50, rel. int.). Mult.,δ: ΔJ=1, M1(+E2) γ (1975No01). A_2=−0.38 *1*,A_4=−0.02 *2*,P=−0.36 *3* (1975No01).
		679.9 *1*	23.6[@] *22*	5793.5	13/2$^-$	E1		Mult.,δ: ΔJ=1, E1(+M2) γ with δ=−0.03 *4* (1975No01). A_2=−0.39 *4*, A_4=+0.07 *5*, P=+0.43 *8* (1975No01).
		1261.4 *20*	30.6[@] *22*	5213.50	11/2$^+$			E_γ: from 1972Al50. I_γ: 2.0 (1972Al50, rel. int.).

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^{34}S(α,nγ) 1974Ga12,1975No01 (continued)

γ(^{37}Ar) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.	Comments
7071.2	13/2+,17/2+	597.8 *2*	100	6473.4	15/2+	M1	E_γ: weighted average of: 597.8 *2* (1975No01); 597.9 *15* (1972Al50). I_γ: 0.8 (1972Al50, rel. int.). Mult.,δ: ΔJ=1, M1(+E2) γ with tentative δ=+0.03 *2* for J=13/2+, and tentative δ=+0.01 *1* for J=17/2+. A_2=−0.27 *2*, A_4=+0.02 *2*, P=−0.39 *8* (1975No01).

[†] From 1974Ga12 for gammas from levels below 3.8 MeV, and from 1975No01 for gammas from levels above 3.8 MeV, unless noted otherwise.

[‡] Branching ratios from 1974Ga12 below E(level)<3.8 MeV and from 1975No01 above this energy, unless noted otherwise. Other branching ratio values from different references are given In comments. 1972Al50 give intensities relative to Iγ(1611γ)=100 (also In comments).

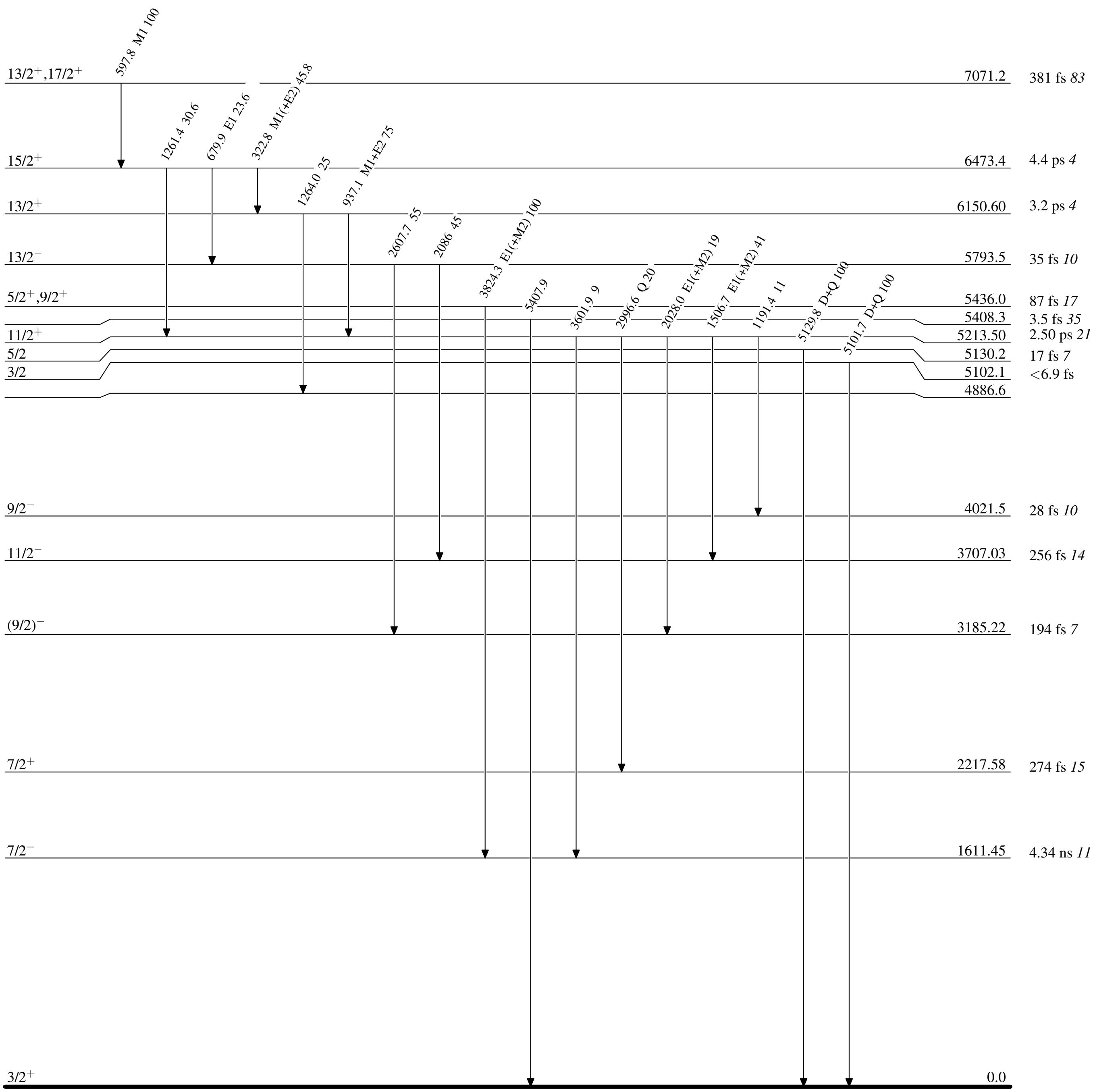
[#] Approximate branching ratios derived from γ-γ coin (1975No01).

[@] Branching ratios obtained by evaluators from combining branching ratios 66 *3* for 323γ and 34 *3* for 680γ (1975No01), with relative intensities 3.0 for 323γ and 2.0 for 1261γ (1972Al50).

$^{34}S(\alpha,n\gamma)$ 1974Ga12,1975No01

Level Scheme

Intensities: % photon branching from each level

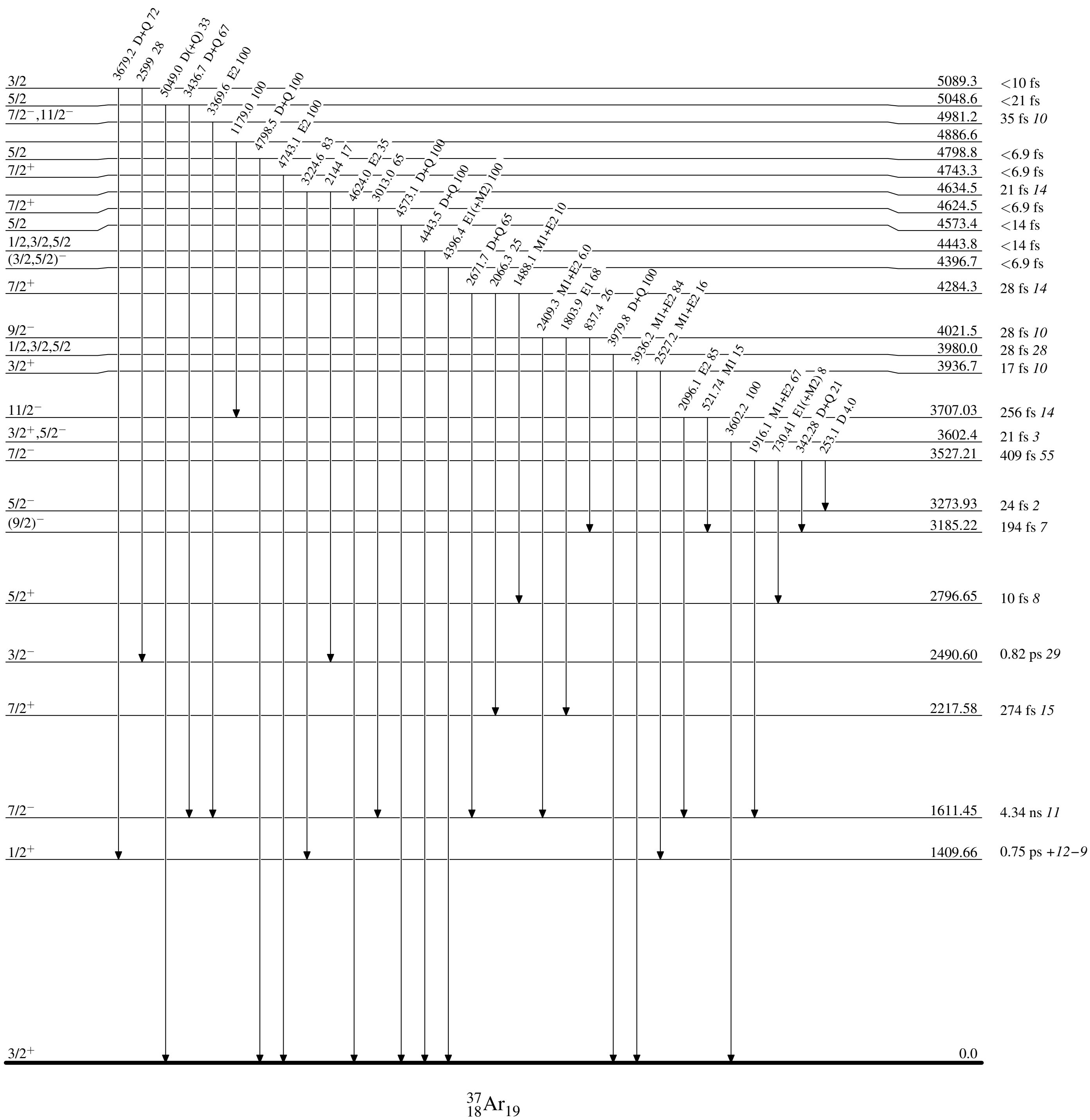


$^{37}_{18}Ar_{19}$

$^{34}S(\alpha,n\gamma)$ 1974Ga12,1975No01

Level Scheme (continued)

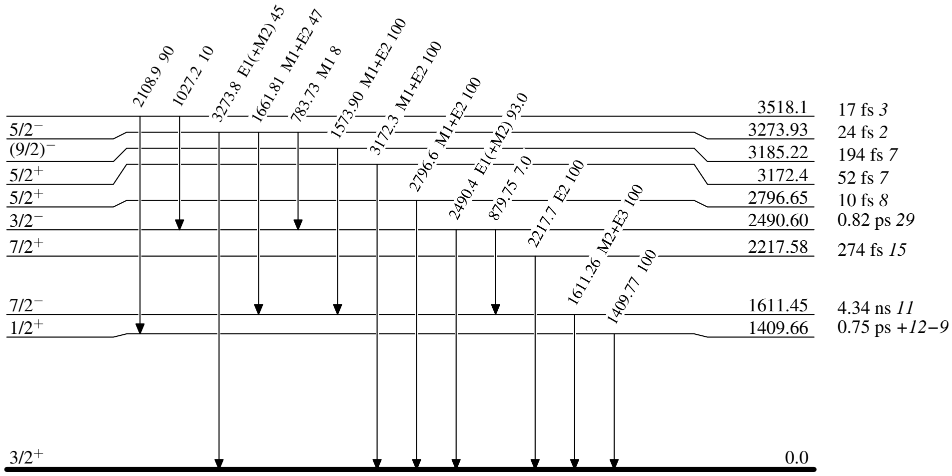
Intensities: % photon branching from each level



$^{34}S(\alpha,n\gamma)$ 1974Ga12,1975No01

Level Scheme (continued)

Intensities: % photon branching from each level



$^{37}_{18}Ar_{19}$