^{38}Ar(d,pγ) 1978St16

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 149, 1 (2018)	1-Jan-2018

1978St16: E=4.40 MeV deuteron beam was produced from the 6-MV tandem Van de Graaff accelerator at Fysisch Laboratorium. Target was 95% enriched argon gas. Protons were detected with a annular Si detector and γ rays were detected with two Ge(Li) counters. Measured Eγ, Iγ, $\gamma\gamma$-coin, p$\gamma(\theta)$. Deduced levels, J, π, γ-ray multipolarities, branching and mixing ratios. Comparisons with available data and theoretical calculations. Data are also available from the measurement of (α,nγ).

Data in 1978St16 are mostly for (α,nγ). See that dataset for details.

^{39}Ar Levels

E(level)†	J$^\pi$&	E(level)†	J$^\pi$&	E(level)†	J$^\pi$&
0.0	7/2$^-$	2481.49 *13*	7/2$^-$	2950.1 *2*	(3/2$^+$,5/2)
1267.21#@	3/2$^-$	2503.34 *15*	(5/2)$^+$	3061.9 *2*	5/2$^-$,7/2$^-$
1517.54#	3/2$^+$	2523.74 *17*	(5/2$^-$,7/2,9/2$^-$)	3159.9 *3*	5/2$^-$,7/2$^-$
2092.42 *12*	5/2$^-$	2631.56@ *15*	3/2$^-$	3265.6@ *3*	3/2$^-$
2342.2 *2*	(5/2$^-$,7/2,9/2$^-$)	2651.1‡#	11/2$^-$	3287.0‡ *4*	1/2$^+$
2359.0 *5*	1/2$^+$	2755.5‡ *3*	5/2$^-$	3360.7‡ *3*	5/2$^+$
2433.3 *2*	3/2$^-$	2829.9 *2*	1/2$^+$	3562.6 *4*	3/2$^-$

† From 1978St16, combined with data from (α,nγ) in 1978St16.
‡ Level probably populated in (α,nγ) only and not populated in (d,pγ).
# Rounded off values from Adopted Levels.
@ Strongly populated.
& From Adopted Levels.

$\gamma(^{39}$Ar)

E$_i$(level)	J$_i^\pi$	E$_\gamma$†	I$_\gamma$‡	E$_f$	J$_f^\pi$	Comments
1267.21	3/2$^-$	1267.19	100	0.0	7/2$^-$	A$_2$=−0.028 *14*, −0.091 *10* (d,pγ); the latter for secondary γ In 3266-1267-0 cascade.
1517.54	3/2$^+$	250.33	54.1	1267.21	3/2$^-$	A$_2$=−0.20 *10*.
		1517.51	45.9 *12*	0.0	7/2$^-$	A$_2$=−0.06 *5*.
2092.42	5/2$^-$	574.9#	<0.7	1517.54	3/2$^+$	
		825.2	3.9 *8*	1267.21	3/2$^-$	A$_2$=0.0 *3*.
		2092.36	96.1 *8*	0.0	7/2$^-$	A$_2$=−0.07 *6*, 0.00 *2*, A$_4$=−0.21 *10* (d,pγ); the latter A$_2$ for secondary γ In 2632-2093-0 cascade.
2342.2	(5/2$^-$,7/2,9/2$^-$)	249.8#	<3	2092.42	5/2$^-$	
		2342.1	100	0.0	7/2$^-$	A$_2$=+0.79 *17*.
2359.0	1/2$^+$	266.6#	<0.6	2092.42	5/2$^-$	
		841.4	5 *2*	1517.54	3/2$^+$	
		1091.8	95 *2*	1267.21	3/2$^-$	
		2358.9#	<3	0.0	7/2$^-$	
2433.3	3/2$^-$	340.9#	<10	2092.42	5/2$^-$	
		915.7	5.3 *15*	1517.54	3/2$^+$	
		1166.1	70.9 *9*	1267.21	3/2$^-$	A$_2$=+0.29 *6*.
		2433.2	23.8 *9*	0.0	7/2$^-$	A$_2$=−0.11 *9*.
2481.49	7/2$^-$	389.07	17.5 *6*	2092.42	5/2$^-$	A$_2$=−0.5 *4*.
		963.9#	<3	1517.54	3/2$^+$	
		1214.3#	<3	1267.21	3/2$^-$	

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^{38}Ar(d,pγ) 1978St16 (continued)

$\gamma(^{39}Ar)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Comments
2481.49	7/2$^-$	2481.4	82.5 *6*	0.0	7/2$^-$	A_2=−0.41 *6*.
2503.34	(5/2)$^+$	410.9[#]	<10	2092.42	5/2$^-$	
		985.79	91 *3*	1517.54	3/2$^+$	A_2=−0.02 *7*.
		1236.1	9 *3*	1267.21	3/2$^-$	
2523.74	(5/2$^-$,7/2,9/2$^-$)	1006.2[#]	<5	1517.54	3/2$^+$	
		2523.65	100	0.0	7/2$^-$	A_2=+0.20 *9*.
2631.56	3/2$^-$	198.3[#]	<2	2433.3	3/2$^-$	
		272.6[#]	<2	2359.0	1/2$^+$	
		289.4[#]	<1.0	2342.2	(5/2$^-$,7/2,9/2$^-$)	
		539.14	81 *2*	2092.42	5/2$^-$	A_2=−0.190 *21*.
		1114.00	13.4 *17*	1517.54	3/2$^+$	
		1364.3	5.7 *8*	1267.21	3/2$^-$	
		2631.5[#]	<0.7	0.0	7/2$^-$	
2651.1	11/2$^-$	292.1[#]	<0.4	2359.0	1/2$^+$	
		308.9[#]	<8	2342.2	(5/2$^-$,7/2,9/2$^-$)	
		558.7[#]	<8	2092.42	5/2$^-$	
		1383.9[#]	<0.7	1267.21	3/2$^-$	
		2651.0	100	0.0	7/2$^-$	
2755.5	5/2$^-$	231.8[#]	<0.5	2523.74	(5/2$^-$,7/2,9/2$^-$)	
		274.0[#]	<6	2481.49	7/2$^-$	
		322.2[#]	<6	2433.3	3/2$^-$	
		663.1[#]	<8	2092.42	5/2$^-$	
		1237.9[#]	<4	1517.54	3/2$^+$	
		1488.3	43.7 *14*	1267.21	3/2$^-$	
		2755.4	56.3 *14*	0.0	7/2$^-$	
2829.9	1/2$^+$	306.2[#]	<10	2523.74	(5/2$^-$,7/2,9/2$^-$)	
		326.6[#]	<1.1	2503.34	(5/2)$^+$	
		348.4[#]	<0.8	2481.49	7/2$^-$	
		396.6[#]	<7	2433.3	3/2$^-$	
		470.9[#]	<7	2359.0	1/2$^+$	
		487.7[#]	<7	2342.2	(5/2$^-$,7/2,9/2$^-$)	
		737.5[#]	<4	2092.42	5/2$^-$	
		1312.3	46.3 *13*	1517.54	3/2$^+$	A_2=−0.21 *18*.
		1562.7	53.7 *13*	1267.21	3/2$^-$	A_2=+0.01 *12*.
		2829.8[#]	<1.3	0.0	7/2$^-$	
2950.1	(3/2$^+$,5/2)	300.1[#]	<10	2651.1	11/2$^-$	
		318.5[#]	<7	2631.56	3/2$^-$	
		426.4[#]	<5	2523.74	(5/2$^-$,7/2,9/2$^-$)	
		446.8	51.4 *10*	2503.34	(5/2)$^+$	A_2=−0.12 *12*.
		468.6[#]	<4	2481.49	7/2$^-$	
		591.1[#]	<5	2359.0	1/2$^+$	
		607.9[#]	<3	2342.2	(5/2$^-$,7/2,9/2$^-$)	
		857.7[#]	<4	2092.42	5/2$^-$	
		1432.5	48.6 *10*	1517.54	3/2$^+$	A_2=−0.28 *9*.
		1682.9[#]	<5	1267.21	3/2$^-$	
		2950.0[#]	<2	0.0	7/2$^-$	
3061.9	5/2$^-$,7/2$^-$	306.4[#]	<10	2755.5	5/2$^-$	

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^{38}Ar(d,pγ) 1978St16 (continued)

$\gamma(^{39}Ar)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.	δ	Comments
3061.9	5/2$^-$,7/2$^-$	430.3[#]	<8	2631.56	3/2$^-$			
		558.6[#]	<6	2503.34	(5/2)$^+$			
		580.4[#]	<6	2481.49	7/2$^-$			
		628.6[#]	<8	2433.3	3/2$^-$			
		702.9[#]	<6	2359.0	1/2$^+$			
		969.5	23.5 *13*	2092.42	5/2$^-$			
		1794.6[#]	<6	1267.21	3/2$^-$			
		3061.8	76.5 *13*	0.0	7/2$^-$			
3159.9	5/2$^-$,7/2$^-$	404.4[#]	<8	2755.5	5/2$^-$			
		528.3[#]	<6	2631.56	3/2$^-$			
		636.2	23.7 *12*	2523.74	(5/2$^-$,7/2,9/2$^-$)			
		656.6[#]	<6	2503.34	(5/2)$^+$			
		678.4	17.1 *10*	2481.49	7/2$^-$			
		726.6[#]	<6	2433.3	3/2$^-$			
		800.9[#]	<8	2359.0	1/2$^+$			
		1067.5[#]	<8	2092.42	5/2$^-$			
		1642.3[#]	<6	1517.54	3/2$^+$			
		1892.6[#]	<6	1267.21	3/2$^-$			
		3159.8	59.2 *14*	0.0	7/2$^-$			
3265.6	3/2$^-$	315.5[#]	<1.2	2950.1	(3/2$^+$,5/2)			
		435.7[#]	<1.0	2829.9	1/2$^+$			
		615.6[#]	<0.3	2651.1	11/2$^-$			
		634.0	1.5 *2*	2631.56	3/2$^-$			
		741.9[#]	<0.3	2523.74	(5/2$^-$,7/2,9/2$^-$)			
		762.3[#]	<0.4	2503.34	(5/2)$^+$			
		784.1[#]	<0.3	2481.49	7/2$^-$			
		832.3	0.7 *2*	2433.3	3/2$^-$			
		906.6[#]	<0.4	2359.0	1/2$^+$			
		923.4[#]	<0.4	2342.2	(5/2$^-$,7/2,9/2$^-$)			
		1173.2[#]	<0.4	2092.42	5/2$^-$			
		1748.0[#]	<1.8	1517.54	3/2$^+$			
		1998.3	97.8 *4*	1267.21	3/2$^-$	D+Q	−16 *6*	A_2=−0.093 *11*. Mult.,δ: based on p$\gamma(\theta)$ in 1978St16.
		3265.5[#]	<0.4	0.0	7/2$^-$			
3287.0	1/2$^+$	2019.7	100	1267.21	3/2$^-$			
3360.7	5/2$^+$	1843.1	100	1517.54	3/2$^+$			
3562.6	3/2$^-$	3562.4	100	0.0	7/2$^-$			

[†] From level-energy differences. Those γ rays with questionable placements have not been seen by 1978St16; only upper limits of intensities are given. Such γ rays have not been included in Adopted Gammas, unless confirmed in another reaction.

[‡] From data combined from (α,nγ) and (d,pγ) in 1978St16.

[#] Placement of transition in the level scheme is uncertain.

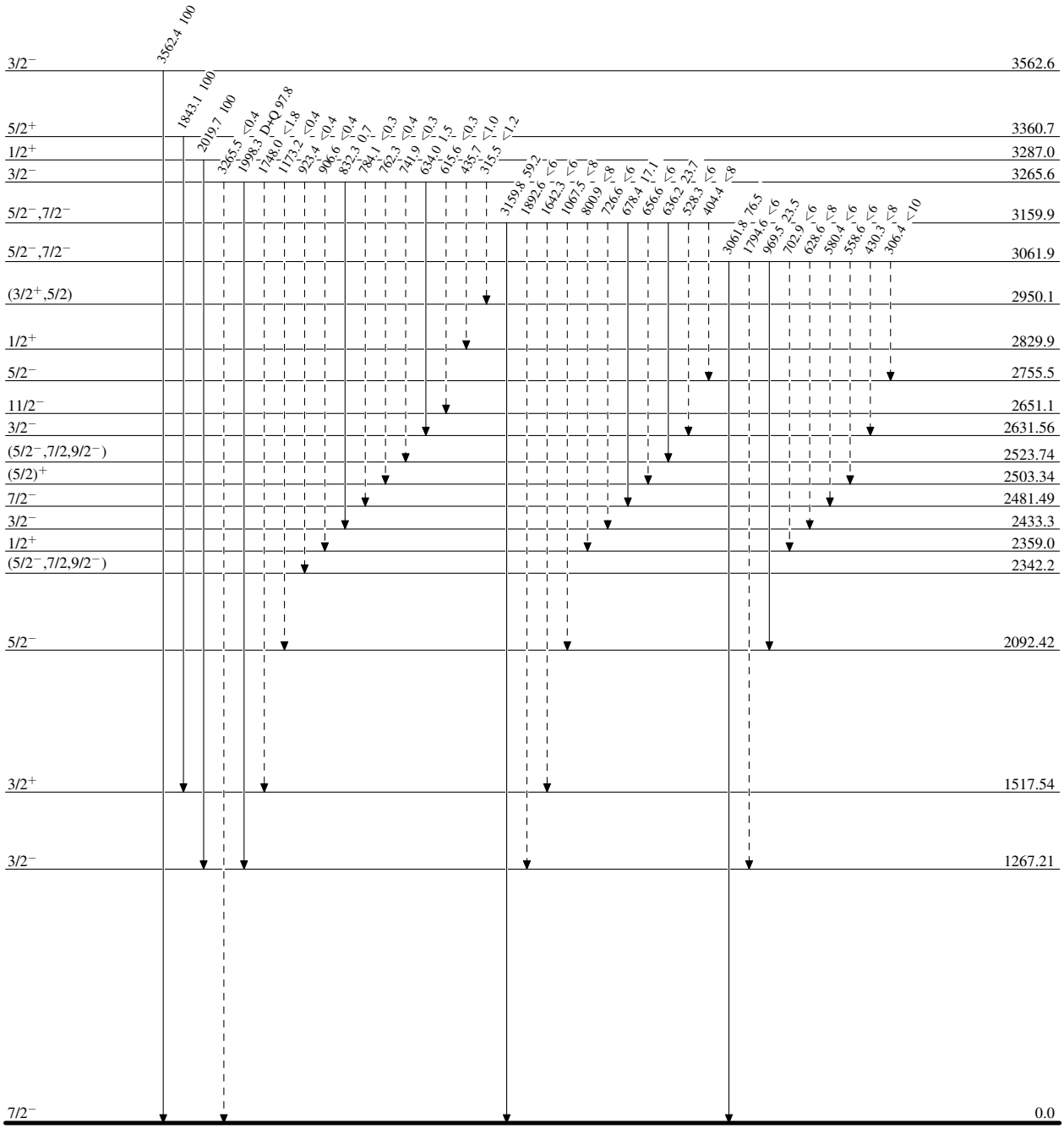
^{38}Ar(d,pγ) 1978St16

Legend

Level Scheme

Intensities: % photon branching from each level

– – – – – – ► γ Decay (Uncertain)



$^{39}_{18}Ar_{21}$

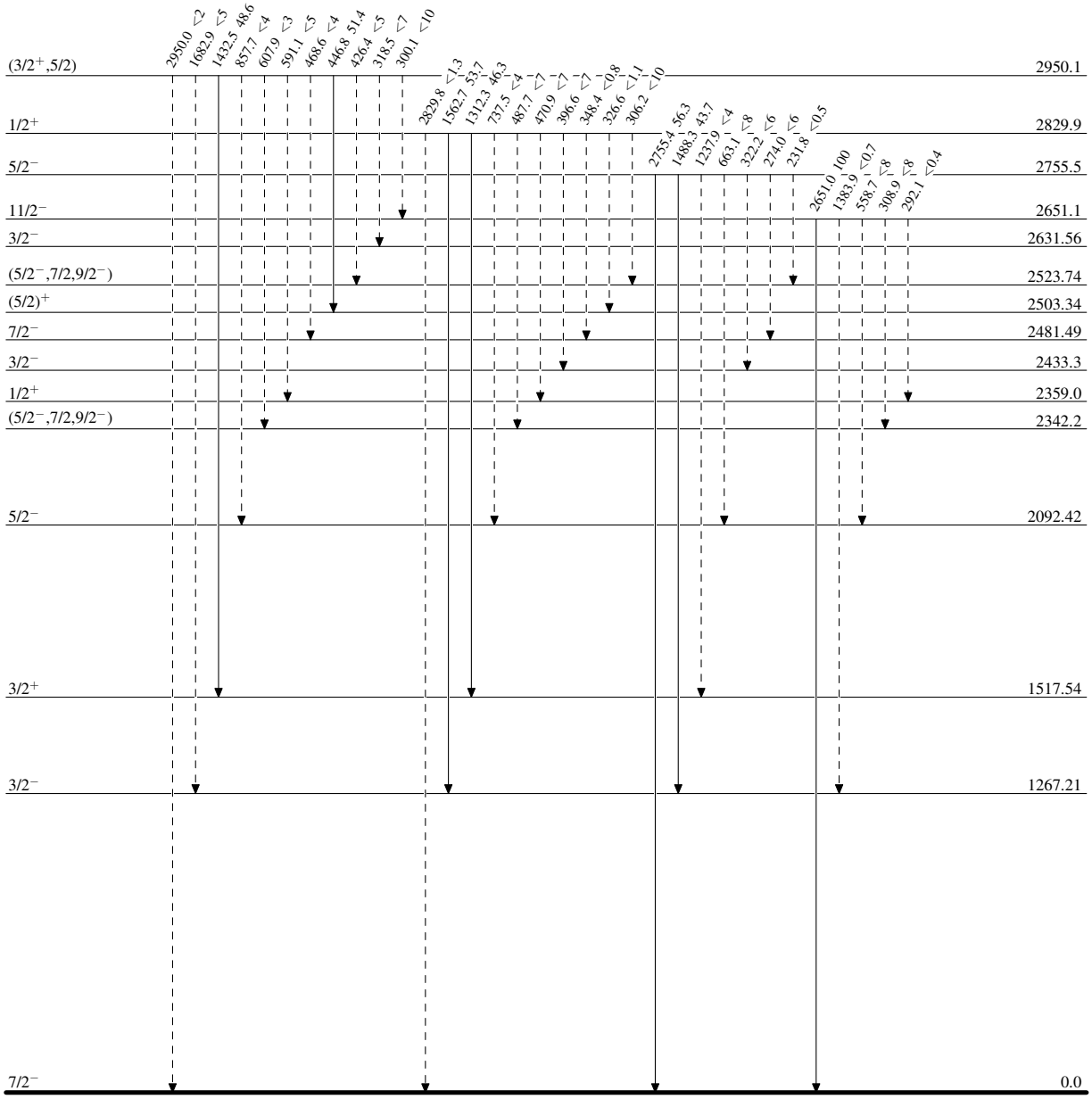
^{38}Ar(d,pγ) 1978St16

Legend

Level Scheme (continued)

Intensities: % photon branching from each level

γ Decay (Uncertain)



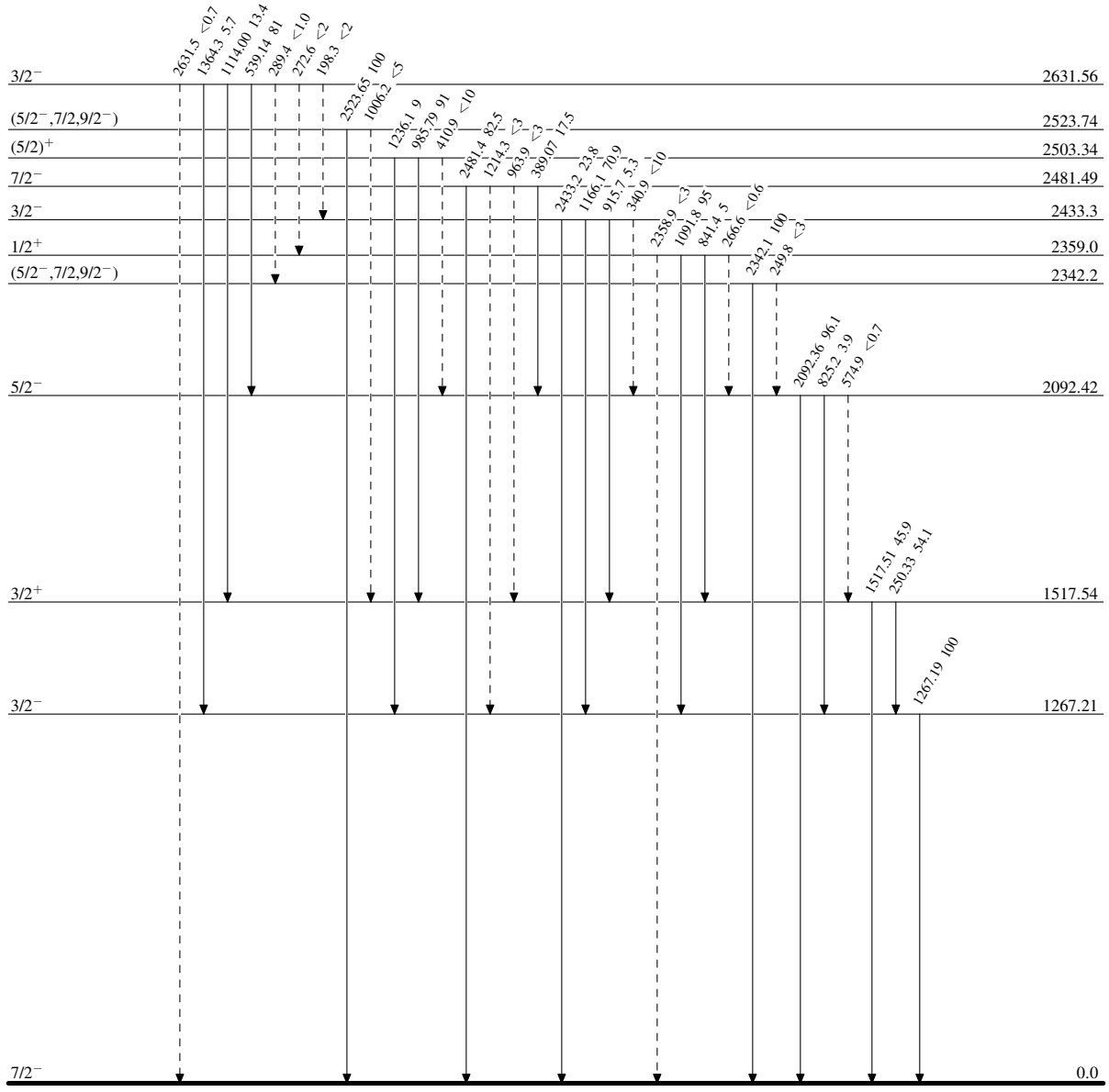
$^{39}_{18}Ar_{21}$

^{38}Ar(d,pγ) 1978St16 Legend

Level Scheme (continued)

Intensities: % photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{39}_{18}Ar_{21}$