^{40}Ar(p,p′γ) 1976So05,1976So03

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 140, 1 (2017)	30-Sep-2015

1976So05,1976So03: E=6.75 MeV proton beam was produced from the Auckland University folded tandem accelerator. Target was gaseous argon in a gas cell. Charged particles were detected by an annular silicon surface barrier detector and γ rays were detected by a NaI(Tl) crystal and a Ge(Li) detector. Measured Eγ, Iγ, pγ-coin, pγ(θ), Doppler-shift attenuation (DSA). Deduced levels, J, $T_{1/2}$, γ-ray branching ratios and mixing ratios, transition strengths. Comparisons with shell-model calculations.

1979Be41: E=5.75 MeV proton beam was produced from the Auckland tandem Van de Graaff accelerator. Gaseous argon target. γ-rays were detected by a Ge(Li) detector (FWHM=3 keV at 1.33 MeV). Measured Eγ, Iγ, DSA, γ(θ). Deduced levels for ^{40}K, $T_{1/2}$ of 1461, 2524 and 3209 levels in ^{40}Ar.

Others:

2014Ka35: E=1.0-3.0 MeV. Measured excitation function.

1974Be62: E=3.74 MeV. Measured σ(θ), pγ(θ).

1972He04 (also thesis by 1971HeZQ): E=5.3 MeV. Measured $T_{1/2}$ of 2121 level.

1971Pl04: E=4.7-5.8 MeV. Measured γγ(θ), pγ(θ).

1966Hu05,1966Hu12: E=4.1, 7.3 MeV. Measured pγ(θ).

1962Wa26: E=5.1 MeV. Measured Eγ, Iγ, γγ(θ). Levels reported at 1450, 2130, 2530, 2900, 4300 and 4590.

1961Ba29: E=0.8-3.5 MeV. Measured Eγ, Iγ.

1959Ho96: E=4 MeV. Three γ rays reported in ^{40}Ar.

A 4590 Level with γ rays to 2530 and 2900 levels reported by 1962Wa26 has not been included here due to lack of confirmation in more recent studies.

^{40}Ar Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$[#]	Comments
0	0^+		
1461	2^+	1.35 ps *10*	$T_{1/2}$: other: 0.72 ps *+80−3* (1979Be41).
2121	0^+	104 ps *14*	J^{π}: from γγ(θ) in 1962Wa26. $T_{1/2}$: from pγ(t) in 1972He04. Other: >17 ps (1976So03).
2524	2^+	0.34 ps *6*	$T_{1/2}$: weighted average of 0.37 ps *4* (1976So03) and 0.24 ps 7 (1979Be41).
2893	4^+	3.0 ps *+18−9*	
3208	2^+	<24 fs	$T_{1/2}$: other: <21 fs (1979Be41).
3511	$(1,2)^+$	83 fs *31*	
3681	$(2,3)^-$	0.10 ps *+6−5*	
3919	$(1,2)^+$	0.30 ps *4*	
4042 *2*			
4084 *2*	3^-		
4230 *2*			E(level): Two separate levels near this energy in Adopted Levels: one deexcited by 545 and 1333 γ rays, and the other by 1705 and 2768 γ rays.
4301 *2*	(1 to 4)		
4419 *3*			
4484 *8*	1	<0.07 ps	

[†] From 1976So05. Values without uncertainties are rounded values taken from Adopted Levels by evaluator.

[‡] From 1976So05 based on measured pγ(θ), unless otherwise noted.

[#] From 1976So03 by DSAM.

^{40}Ar(p,p′γ) 1976So05,1976So03 (continued)

γ(^{40}Ar)

A_2 and A_4 are from 1976So05.

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
1461	2^+	1461	100	0	0^+	E2		A_2=+0.40 *2*, A_4=−0.42 *3*. Additional information 1.
2121	0^+	660	100	1461	2^+			A_2=−0.03 *3*, A_4=−0.04 *4*.
		2121[@]	<3	0	0^+			E_γ: this transition is from 0^+ to 0^+ and can not be observed as γ-ray transition.
2524	2^+	403[@]	<1	2121	0^+			
		1063	59 *2*	1461	2^+	M1+E2	−0.41 *+6−13*	I_γ: other: 55 *5* (1971Pl04). A_2=−0.09 *4*, A_4=−0.04 *5*. δ: other: −0.24 (1971Pl04).
		2524	41 *2*	0	0^+	E2		I_γ: other: 45 *5* (1971Pl04). A_2=+0.53 *5*, A_4=−0.43 *8*.
2893	4^+	369[@]	2 *2*	2524	2^+			I_γ: from 1971Pl04. Other: <1 (1976So05).
		772[@]	<2	2121	0^+			E_γ: this transition is unlikely, since it would feed 0^+ level with multipolarity=E4.
		1432	98 *3*	1461	2^+	E2		I_γ: from 1971Pl04. Other: 100 (1976So05). δ(O/Q)=−0.08 7 from A_2=+0.37 *3*, A_4=−0.19 *5*.
		2893[@]	<2	0	0^+			E_γ: this transition is unlikely, since it would feed 0^+ level with multipolarity=E4.
3208	2^+	315[@]	2 *2*	2893	4^+			I_γ: from 1971Pl04. Other: <1 (1976So05).
		684[@]	<2	2524	2^+			
		1087[@]	2 *2*	2121	0^+			I_γ: from 1971Pl04. Other: <2 (1976So05).
		1747	91 *3*	1461	2^+	M1+E2	+0.11 *7*	I_γ: other: 84 *2* (1971Pl04). A_2=+0.47 *2*, A_4=−0.06 *4*. δ: other: +0.20 for J=2, 0 for J=1 (1971Pl04).
		3208	9 *3*	0	0^+			I_γ: Other: 12 *5* (1971Pl04).
3511	$(1,2)^+$	303[@]	2 *2*	3208	2^+			I_γ: from 1971Pl04. Other: <3 (1976So05).
		618[@]	2 *2*	2893	4^+			I_γ: from 1971Pl04. Other: <5 (1976So05).
		987[@]	<5	2524	2^+			
		1390[@]	<5	2121	0^+			
		2050	89 *2*	1461	2^+	M1(+E2)	−0.05 *11*	I_γ: other: 84 *2* (1971Pl04). A_2=+0.34 *7*, A_4=+0.04 *8*. δ: for J=2 (1976So05).
		3511	11 *2*	0	0^+			I_γ: other: 12 *5* (1971Pl04).
3681	$(2,3)^-$	170[@]	<7	3511	$(1,2)^+$			
		473[@]	<10	3208	2^+			
		788	15 *3*	2893	4^+			I_γ: other: 24 *6* (1971Pl04).
		1157	6 *3*	2524	2^+			I_γ: from 1971Pl04. Other: <6 (1976So05).
		1560[@]	<5	2121	0^+			
		2220	85 *3*	1461	2^+	E1(+M2)	−0.07 *+5−11*	I_γ: other: 70 *3* (1971Pl04). A_2=−0.43 *8*, A_4=+0.08 *10*. δ: for J=3 (1976So05).
		3681[@]	<5	0	0^+			
3919	$(1,2)^+$	238[@]	<2	3681	$(2,3)^-$			
		408[@]	<2	3511	$(1,2)^+$			
		711[@]	<2	3208	2^+			
		1026[@]	<2	2893	4^+			
		1395	8 *1*	2524	2^+			

Continued on next page (footnotes at end of table)

^{40}Ar(p,p′γ) 1976So05,1976So03 (continued)

γ(^{40}Ar) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[#]	Comments
3919	$(1,2)^+$	1798	12 *2*	2121	0^+		
		2458	21 *3*	1461	2^+	M1+E2	A_2=−0.18 *9*, A_4=+0.02 *13*. δ: <−0.3 or >+6.
		3919	59 *3*	0	0^+	E2	A_2=+0.47 *8*, A_4=−0.27 *13*.
4042		1149[@]	<10	2893	4^+		
		1518 *2*	60 *13*	2524	2^+		
		1921[@]	<10	2121	0^+		
		2581	40 *13*	1461	2^+		
		4042[@]	<10	0	0^+		
4084	3^-	1191[@]	<10	2893	4^+		
		2623 *2*	100	1461	2^+		
		4084[@]	<10	0	0^+		
4230		547 *2*	31 *5*	3681	$(2,3)^-$		
		719[@]	<10	3511	$(1,2)^+$		
		1022[@]	<10	3208	2^+		
		1338 *2*	32 *5*	2893	4^+		A_2=+0.63 *14*, A_4=+0.17 *19*.
		1708 *2*	37 *5*	2524	2^+		A_2=+0.50 *15*, A_4=+0.23 *19*.
		2109[@]	<15	2121	0^+		
		2769[@]	<10	1461	2^+		
		4230[@]	<10	0	0^+		
4301	(1 to 4)	2840 *2*	100	1461	2^+		A_2=+0.24 *9*, A_4=−0.15 *13*.
4419		1895	20 *10*	2524	2^+		
		2298[@]	<15	2121	0^+		
		2958 *3*	80 *10*	1461	2^+		
4484	1	2363[@]	<10	2121	0^+		
		3023[@]	<10	1461	2^+		
		4484	100	0	0^+	D	A_2=−0.29 *5*, A_4=−0.10 *7*.

[†] From 1976So05. Values without uncertainties are taken by the evaluator from level-energy differences by evaluator.
[‡] From 1976So05, unless otherwise noted. Values from 1971Pl04 are given under comments. Quoted values are % branching from each level.
[#] From 1976So05 based on measured pγ(θ).
[@] Placement of transition in the level scheme is uncertain.

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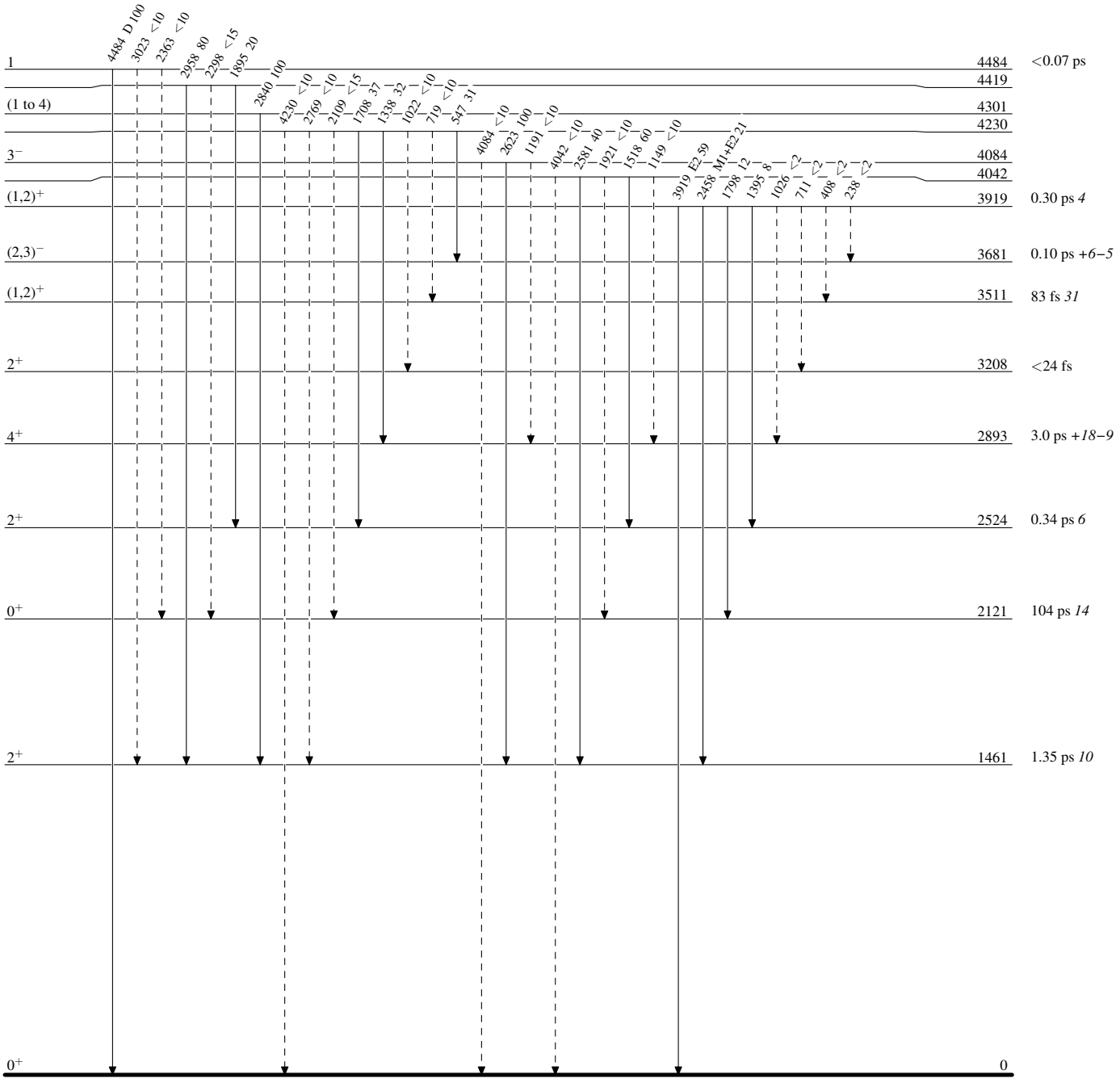
Legend

Level Scheme

Intensities: % photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{40}_{18}Ar_{22}$

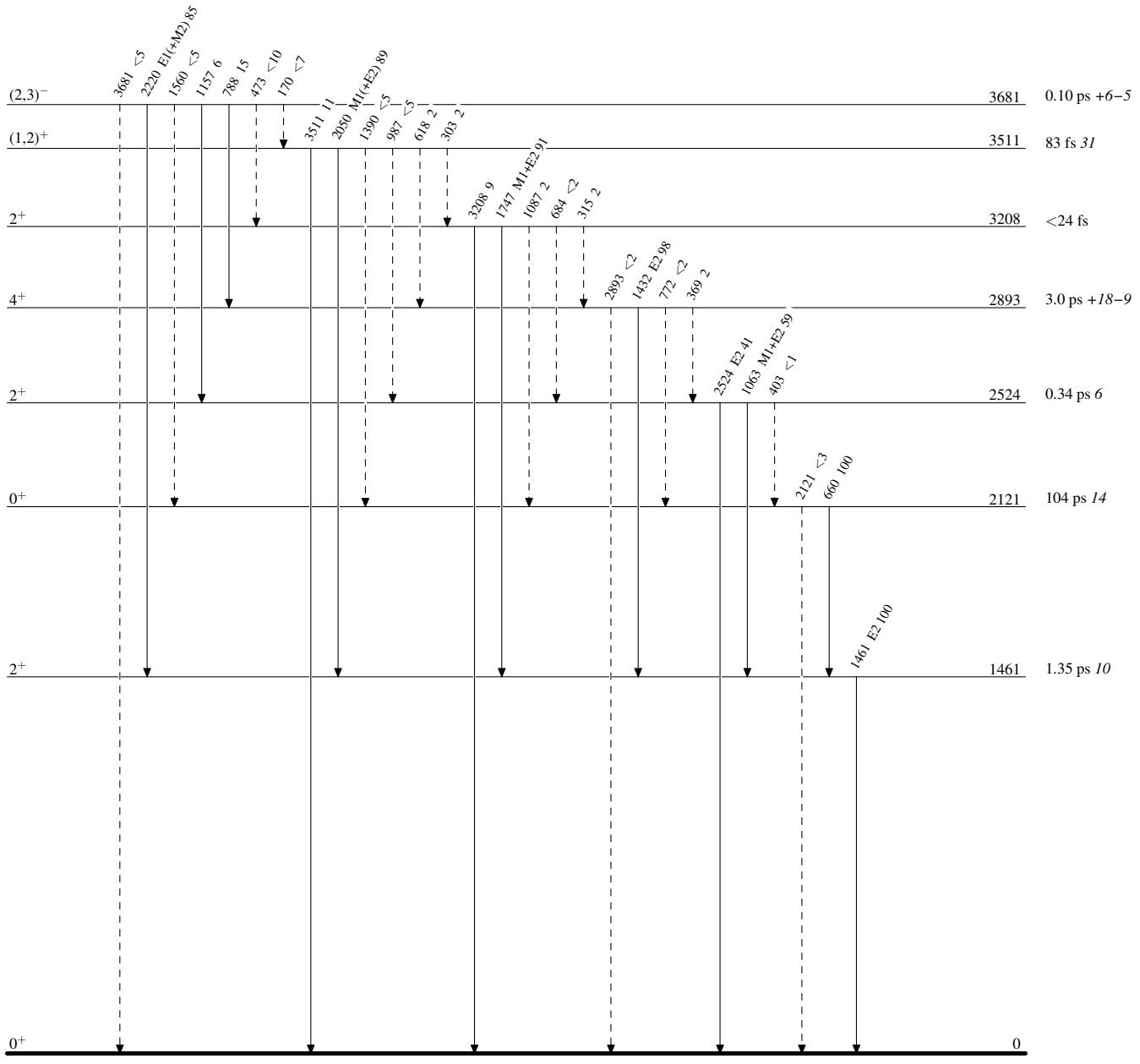
^{40}Ar(p,p′γ) 1976So05,1976So03

Legend

Level Scheme (continued)

Intensities: % photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{40}_{18}Ar_{22}$