^{40}Ar(α,α'),(α,α) 1979Da12,1970Wa17

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

1979Da12: (α,α') E=12-15 MeV alpha beam was produced from the University of Wisconsin EN tandem accelerator. Target was natural gas. Scattered particles were detected with an annular surface barrier detector at a back angle of 176° (FWHM=30-35 keV). Measured σ(Eα). Deduced levels, J, π.

1970Wa17: (α,α') E=21.5, 22.2 MeV alpha beams were produced from Osaka University Cyclotron. Target was purified natural argon gas. Scattered particles were detected with two silicon surface barrier detectors (FWHM=140 keV) covering angles between 15° and 120°. Measured σ(Eα,θ). Deduced levels, J, π, L-transfer, β_L parameter from DWBA analysis. Comparisons with shell model calculations.

Others:

1979Di03: (α,α') E=172.5 MeV. Measured $\sigma(\theta)$, deduced GQR, DWBA analysis, $\sigma(\theta)$ for g.s. and first 2^+ also measured.

1976Yo02, 1975Mo04: (α,α') E=96 MeV. Measured $\sigma(\theta)$, deduced GQR, $\sigma(\theta)$ for g.s. and first 2^+ also measured.

1976Be31: (α,α) E=104 MeV. Deduced nuclear parameters.

1972Oe01: (α,α) E=24, 29 MeV. Measured $\sigma(\theta)$, deduced back-angle enhancement and shell structure effects.

1970Bu25 (also 1970Iv04,1967Iv02): (α,α') E=13-17 MeV. Measured $\sigma(\theta)$, deduced optical-model parameters.

1969Ha14: (α,α) E=104 MeV. Measured $\sigma(\theta)$, deduced optical potentials, phase shifts.

1969Ga22: (α,α) E=18-29 MeV. Measured $\sigma(\theta)$.

1966Lu02: (α,α') E=18 MeV. Deduced optical-model parameters.

1964La14: (α,$\alpha'\gamma$) E=19.6 MeV. Measured $\sigma(\theta)$.

1959Ya01: (α,α') E=40 MeV.

1958Se51: (α,α') E=18 MeV.

^{40}Ar Levels

E(level)[†]	J$^\pi$	L[d]	β_L[d]	Comments
0	0^+ [@]	0		
1461[‡]	2^+ [@c]	2	0.16	β_2R=0.87, B(E2)(W.u.)=6.7 *20* (1976Yo02).
2121[‡]	0^+ [@c]	0	0.014	
2524[‡]	2^+ [@c]	2	0.05	
2893[‡]	4^+ [@c]	4		
3208[‡]	(1^-) [@c]	(1)	0.05	J$^\pi$,L: L=(1) from 1970Wa17 disagrees with $J^\pi=2^+$ in Adopted Levels.
3464	[@]			
3512	$(2^+,1^-)$ [@b]			E(level): 3560 from 1970Wa17 is in disagreement.
3681[‡]	3^- [@c]	3	0.16	
3919[‡#]	[@]			
3942?[#]	[@]			
4041	[@]			J$^\pi$: 0^+,1^-,2^+,3^-,4^+ (1979Da12).
4083	[@]			
4229	3^+ [ab]			
4301[‡#]	[&]			
4325[#]	[&]			
4341?[#]	[&]			E(level): as given in 1979Da12, not observed in other studies.
4358[#]	[&]			
4420[‡]	[@]			
4481	1^- [@b]			
4562[#]	[&]			
4578[#]	[&]			E(level): 4580 quoted by 1979Da12.

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^{40}Ar(α,α'),(α,α) 1979Da12,1970Wa17 (continued)

^{40}Ar Levels (continued)

E(level)[†]	J$^\pi$	L[d]	Comments
4602[#]	&		E(level): 4612 quoted by 1979Da12.
4674	*a*		E(level): 4683 quoted by 1979Da12.
4738[#]	&		
4769[#]	&		
4794[#]	&		E(level): 4808 quoted by 1979Da12.
4876[‡]	@		E(level): 4880 quoted by 1979Da12.
4943[#]	&		
4991[#]	&		E(level): 5004 quoted by 1979Da12.
5166?	(2$^+$)[@ *b*]		E(level): seen by 1979Da12 at 5205.
5270	&		
5310[‡]	&		
5401	@		
5454			E(level): 5465 quoted by 1979Da12.
5508	@		E(level): 5515 quoted by 1979Da12.
5559	@		E(level): 5575 quoted by 1979Da12.
5609[#]	&		
5630[‡#]	&		
5675	&		E(level): 5671 quoted by 1979Da12.
5718			
5885[#]	&		E(level): 5880 quoted by 1979Da12.
5906[‡#]	&		
6054	@		E(level),J$^\pi$: could correspond to the level at 6053.6, J$^\pi$=1$^{(-)}$ or the level at 6054 J$^\pi$=4$^+$ in Adopted Levels.
6138[‡]			
6209	@		
17.7×10^3 *2*		2	E(level): isoscalar giant quadrupole resonance with FWHM=6900 *600* from 1979Di03. Other: 17600 *300* with FWHM=4700 *300* (1976Yo02). L: from 1979Di03 and 1976Yo02. Small admixtures of L=4 and L=0 are not excluded (1979Di03).

[†] Levels are reported in 1979Da12, unless otherwise noted. 1979Da12 has taken values from a previous evaluation of 1978En02 and the quoted energies here are rounded values taken by evaluator from Adopted Levels.
[‡] Group reported by 1970Wa17 also.
[#] 3919+3942, 4301+4325+4341+4358, 4562+4578+4602, 4738+4769+4794, 4943+4991, 5608+5630 and 5885+5906 are unresolved peaks.
[@] Natural parity states (1979Da12).
[&] Possible natural parity state (1979Da12).
[*a*] Possible unnatural parity state (1979Da12).
[*b*] Assignments by 1979Da12.
[*c*] From L-value in 1970Wa17.
[*d*] From 1970Wa17, deduced from comparisons of measured differential cross sections with DWBA calculations.