

³⁶Ar(α,γ):resonances 1973Wa08,1987He05,1982Pr05

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

1973Wa08, 1973Br34: E=5.3-16.8 MeV α beams were produced from the Australian National University tandem Van de Graaff accelerator incident on an argon gas target. γ rays were detected with a NaI detector. Measured γ -ray yields, $\sigma(\theta)$ in giant-resonance region. Deduced levels, resonance widths.

1987He05: E=5.48-5.515 MeV α beams were produced from the Oxford folded tandem accelerator incident on a gas target of ³⁶Ar. γ rays were detected with a NaI crystal and charged particles were detected with silicon detectors. Measured yields of 2814 γ from first 2⁺ level of ³⁹K and 2120 γ from 11988 level of ⁴⁰Ca; also measured yields of elastically scattered α particles. Deduced levels, resonance widths.

1982Pr05: E=5.495-5.505 MeV α beams were produced from the Oxford folded tandem accelerator. γ rays were detected with a NaI detector and a Ge(Li) detector. Measured E γ , I γ , γ -ray yields ($\Delta E=1$ keV). Deduced levels, resonance widths.

1967Na10: E=3-5.7 MeV. Measured σ to search for 5619 resonance. The authors made a search for 4 possible resonances at E α =5619, 5736, 5880 and 5979 keV indicated by experiments on ³⁹K(p, γ) and (α,γ) performed by 1968Ba22 and they claimed that the strongest resonance of 5619 may have been detected but too weak for a meaningful angular distribution measurement.

⁴⁰Ca Levels

E(level) [†]	J π &	E α (lab) [‡]	(2J+1) $\Gamma_\alpha\Gamma_{\gamma 0}/\Gamma$ (eV) [‡]	Comments
0	0 ⁺			
9868.0 17	1 ⁺		0.42 5	T=1 E(level),(2J+1) $\Gamma_\alpha\Gamma_{\gamma 0}/\Gamma$ (eV): from 1982Pr05.
10321.0 16	1 ⁺			T=1 E(level): from 1982Pr05.
11977		5486 [#]		
11988 2	0 ⁺	5497 [#]		T=2 E(level): from 1982Pr05. J π : isotropic angular distribution of capture γ rays (1982Pr05). $\Gamma_{\alpha 0}=80$ ev 10, $\Gamma=81$ ev 10 (1987He05). Proton decay to 2522 level in ³⁹ K based on observed 2522.4 2 γ ray in 1982Pr05; α decay to 2814 level in ³⁹ K based on observed 2814 γ ray in 1987He05.
11989		5499 [#]		
11997		5508 [#]		
12971		6590	3.4	
13249 [@]		6900 [@]	9.7	
13484		7160	3.4	
13718		7420	3.7	
13952 [@]		7680 [@]	14.6	
14096		7840	14.4	
14419		8200	4.7	
14509		8300	4.5	
14869		8700	6.3	
17669		11810	5.8	
17858		12020	5.4	
18146 [@]		12340 [@]	11.3	
18326		12540	9.4	
18452		12680	6.9	
18731 [@]		12990 [@]	10.3	
19037		13330	4.9	

Continued on next page (footnotes at end of table)

${}^{36}\text{Ar}(\alpha,\gamma)$:resonances 1973Wa08,1987He05,1982Pr05 (continued) ${}^{40}\text{Ca}$ Levels (continued)

† Deduced by evaluator based on $E(\text{level})=E\alpha(\text{c.m.})+S(\alpha)$ (for ${}^{40}\text{Ca}$), with $S(\alpha)({}^{40}\text{Ca})=7039.76$ 3 (2012Wa38) and $E\alpha(\text{c.m.})=(36/40)E\alpha(\text{lab})$, unless otherwise noted.

‡ From 1973Wa08 for levels above 12500.

Read from the γ -ray yield curves in Fig.2 in 1987He05 by evaluator.

@ Unresolved doublet in 1973Wa08, of resonances resolved in ${}^{39}\text{K}(p,\gamma)$ dataset.

& From Adopted Levels.

 $\gamma({}^{40}\text{Ca})$

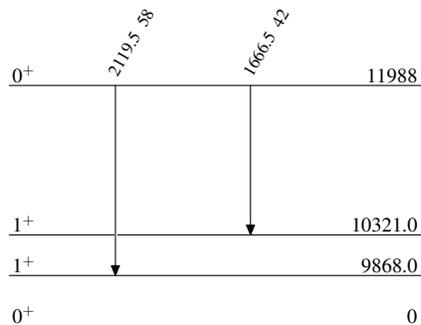
$E_i(\text{level})$	J_i^π	E_γ ‡	I_γ ‡	E_f	J_f^π	Γ_γ †
11988	0^+	1666.5 4	42	10321.0	1^+	0.34 5
		2119.5 4	58	9868.0	1^+	0.45 7

† From 1982Pr05, with $\Gamma_{\alpha 0}/\Gamma=0.93$ 9 from 1979Fr04 assumed, unless otherwise noted.

‡ From 1982Pr05.

 ${}^{36}\text{Ar}(\alpha,\gamma)$:resonances 1973Wa08,1987He05,1982Pr05Level Scheme

Intensities: % photon branching from each level



${}^{40}_{20}\text{Ca}_{20}$