

$^{40}\text{Ar}(^3\text{He},t)$ 1968We09,2014Ka27

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

$J^\pi(^{40}\text{Ar g.s.})=0^+$.

1968We09: E=17.9 MeV ^3He beam was produced from the Livermore variable-energy cyclotron incident on an argon gas target.

Charged particles were detected with ΔE -E surface-barrier counter telescopes (FWHM=150 keV). Measured $\sigma(\theta)$. Deduced levels, L-transfers from DWBA analysis.

2014Ka27: E=140 MeV/nucleon ^3He beam was produced at RCNP and impinged on a ^{40}Ar gas target contained by Aramid foils.

Tritons were detected with the Grand Raiden Spectrometer. Measured $\sigma(E_t)$. Deduced levels, B(GT). Comparisons with available data and with shell-model and DWBA calculations. Relevance to neutrino capture rates.

Others:

1972FaZT: E=35 MeV. Measured $\sigma(\theta)$ for 1650 and 4380 levels.

1970Hi06: E=35 MeV. Measured $\sigma(\theta)$ for 0^+ analog and anti-analog states.

1970No05: Analyzed shapes of $\sigma(\theta)$ distributions.

Data are from 1968We09, unless otherwise noted.

 ^{40}K Levels

E(level)	J^π	L	Comments
0		3+5	E(level): 0+30 doublet (1968We09).
840 20		3+5	E(level): 800+891 doublet (1968We09).
1650 20		#	anti-analog state.
1960 20		2+4	
2290 20	$1^{+\ddagger}$		
2730 [†]	$1^{+\ddagger}$		B(GT)(2730 level)/B(GT)(2290 level)=0.73 5 (2014Ka27). Others quoted in 2014Ka27: 0.911 5 from (p,n) reaction (2009Bh09), 1.65 11 from analog states in ^{40}Ti β decay (1998Bh12).
2770 20			
3080 20			
3440 20			
3730 20			
3840 [†]			
4380 20		0	E(level): analog state.
5870 20			

[†] From 2014Ka27.

[‡] From 2014Ka27, based on $\Delta J=1$, 0^+ to 1^+ excitation in charge-exchange reactions.

$\sigma(\theta)$ and DWBA comparisons fit L=1 (1968We09,1970Hi06), rather than L=0 shape. The shapes of the $\sigma(\theta)$ distributions for the 1650 (anti-analog state) and 4380 (analog state) are in anti-shape (1970Hi06,1972FaZT). 1970Hi06 suggests that modifications were needed in the conventional description of the ($^3\text{He},t$) reaction, but 1970No05 points out that the observed $\sigma(\theta)$ shape for anti-analog states can be understood on the basis of structural relation between analog and anti-analog states together with the assumption of a pure charge-exchange mechanism.