^{36}Ar(p,d) 1968Jo04,1968Ko11

$J^\pi=0^+$ for ^{36}Ar ground state.

1968Jo04: a 27.5(1)-MeV proton beam was produced by the 1.3-m FFAG cyclotron at the Nuclear Physics Laboratory at the University of Colorado. Targets were natural argon gas (99.6% ^{40}Ar) and 99.0% enriched ^{36}Ar gas. Deuterons were detected using a telescope of a 0.228-mm transmission surface barrier detector and a 0.37-cm lithium-drifted stopping counter with FWHM=120 keV. Measured $\sigma(E_d,\theta)$. Deduced levels, L, and spectroscopic factors from finite-range DWUCK-DWBA analysis of the measured $\sigma(\theta)$.

1968Ko11: a 33.6-MeV proton beam was produced by the 64-in. sector-focusing cyclotron at Michigan State University. The target was >99% isotropically enriched ^{36}Ar gas. Deuterons were detected using a telescope of a 279−μm silicon surface barrier detector and a 3-mm lithium-drifted silicon counter with FWHM=130 keV. Measured $\sigma(E_d,\theta)$. Deduced levels, J, π, L, and spectroscopic factors from zero-range Macefield-DWBA analysis of the measured $\sigma(\theta)$.

^{35}Ar Levels

Spectroscopic factor $C^2S=\sigma(\theta)_{exp}/\sigma(\theta)_{DWBA}/N$, where N=1.65*3/2 is a normalization factor adopted by 1968Jo04. The DWBA calculation in 1968Ko11 assumed neutron-well radius parameter r_{0n}=1.15 F ($d_{5/2}$) and 1.35 F ($d_{3/2}$), respectively, to fit the forward-angle J dependence observed in the l_n=2 angular distributions. 1968Ko11 states that a large change in radius results in a large change in the magnitude of the calculated DWBA cross-section and this gives rise to problems in extracting absolute spectroscopic factors. However, there is some evidence that the radius parameter corresponding to the best DWBA fit to the data might also result in the most trustworthy value for the spectroscopic factor.

E(level)	J^π	L†	C^2S‡	Comments
0	3/2$^+$	2	2.92	C^2S: other: 3.03 for 1.15 F and 1.76 for 1.35 F (better fit) (1968Ko11).
1180 *20*	1/2$^+$	0	2.50	E(level): from 1968Jo04 and 1968Ko11. C^2S: other: 1.29 for 1.15 F and 1.05 for 1.35 F (1968Ko11).
1700 *30*	5/2$^+$			E(level): from 1968Ko11. C^2S: 0.1 for 1.15 F from 1968Ko11.
2615 *20*	(3/2$^+$)	2		E(level): weighted average of 2630 *20* (1968Jo04) and 2600 *20* (1968Ko11). C^2S: 0.42 for 1.15 F and 0.28 for 1.35 F (better fit) from 1968Ko11 that assumed L=2. Other: S=0.12 from 1968Jo04 that assumed L=1. 1973Be26 obtained L=2 from ^{36}Ar(^{3}He,α)^{35}Ar and states that L=1 is probably in error as this level corresponds well with the known 3/2$^+$ state at 2695 keV in ^{35}Cl and there are no nearby negative-parity states in ^{35}Cl.
2970 *20*	(5/2$^+$)	2	2.47	E(level): weighted average of 2990 *20* (1968Jo04) and 2950 *20* (1968Ko11). C^2S: assuming 5/2$^+$ (1968Jo04). Other: 3.10 assuming 3/2$^+$ (1968Jo04). 2.31 for 1.15 F (better fit) and 1.53 for 1.35 F from 1968Ko11.
3200 *20*	7/2$^-$	3	0.63	E(level): weighted average of 3210 *20* (1968Jo04) and 3190 *20* (1968Ko11). C^2S: other: 0.64 for 1.15 F and 0.37 for 1.35 F (better fit) (1968Ko11).
4756 *28*	1/2$^+$	0	0.172	E(level): weighted average of 4770 *20* (1968Jo04) and 4700 *40* (1968Ko11). C^2S: other: 0.05 for 1.15 F and 0.04 for 1.35 F (1968Ko11).
5102 *20*	7/2$^-$	3	0.46	E(level): weighted average of 5110 *20* (1968Jo04) and 5070 *40* (1968Ko11). L: from 1968Jo04. L is not reported in 1968Ko11. 1973Be26 obtained L=2 from ^{36}Ar(^{3}He,α)^{35}Ar and states that L=2 gives a much better account of the data than does L=3.
5400 *50*				E(level): from 1968Ko11. L is not reported in 1968Ko11.
5598 *20*	(3/2,5/2)$^+$	2	2.93,2.37	E(level): weighted average of 5610 *20* (1968Jo04) and 5570 *30* (1968Ko11). C^2S: for 3/2$^+$ and 5/2$^+$, respectively (1968Jo04). Other: 1.77 for 1.15 F (better fit) and 1.25 for 1.35 F (1968Ko11).
6024 *20*	(3/2,5/2)$^+$	2	1.58,1.31	E(level): weighted average of 6030 *20* (1968Jo04) and 6010 *30* (1968Ko11). C^2S: for 3/2$^+$ and 5/2$^+$, respectively (1968Jo04). Other: 1.18 for 1.15 F and 0.83 for 1.35 F (better fit) (1968Ko11).
6620 *30*	(1/2$^+$)	0		E(level),L: from 1968Ko11. C^2S: 0.24 for 1.15 F and 0.19 for 1.35 F (1968Ko11).
6700 *20*	7/2$^-$	3	2.60	E(level),L,C^2S: from 1968Jo04.

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^{36}Ar(p,d) 1968Jo04,1968Ko11 (continued)

^{35}Ar Levels (continued)

E(level)	J$^{\pi}$	L†	C^{2}S‡	Comments
6820 *30*	$(3/2,5/2)^+$	2		E(level),L,C^{2}S: from 1968Ko11 only. C^{2}S: 0.72 for 1.15 F (better fit) and 0.51 for 1.35 F (1968Ko11).
7030 *20*	$(3/2,5/2)^+$	2	2.20,1.79	C^{2}S: for $3/2^+$ and $5/2^+$, respectively (1968Jo04).

† From 1968Jo04 and 1968Ko11, unless otherwise noted.
‡ From 1968Jo04, unless otherwise noted.