

$^{40}\text{Ca}(\text{d}, ^3\text{He}), (\text{pol d}, ^3\text{He})$ 1981De19, 1976Do05, 1977Be70

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1981De19: ($\text{d}, ^3\text{He}$) $E=76$ MeV deuteron beam was produced from the Indiana University multistage cyclotron. Targets were self-supporting 99.9% enriched ^{40}Ca foils of 1.5 mg/cm^2 and 0.5 mg/cm^2 thicknesses. Reaction products were momentum-analyzed with a QDDM magnetic spectrograph (FWHM=55 keV) and detected with two plastic scintillators. Measured $\sigma(\theta)$. Deduced levels, J, π , L-transfers, spectroscopic factors from DWBA and CCBA analyses.

1976Do05 (also **1975Wa17**): ($\text{d}, ^3\text{He}$) $E=52$ MeV deuteron beam was produced from the Karlsruhe isochronous cyclotron. Target was a self-supporting 99.97% enriched ^{40}Ca foil. Reaction products were detected with counter telescopes of ΔE -E surface barrier counters (FWHM ≈ 120 keV). Measured $\sigma(\theta)$. Deduced levels, J, π , L-transfers, spectroscopic factors from DWBA analysis.

Uncertainty in absolute cross sections=12-20%.

1977Be70 (also **1978Be14**): ($\text{pol d}, ^3\text{He}$) $E=52$ MeV polarized deuteron beam was produced from the Lamb-shift source at the Karlsruhe cyclotron. Target was 1 mg/cm^2 isotopically enriched ^{40}Ca . Reaction products were detected with ΔE -E telescopes of surface barrier counters. Measured $\sigma(\theta)$, $A_y(\theta)$, iT_{11} term. Deduced J, π , L-transfers, for g.s., 5270, 5610 and 6340 levels.

1967Hi06 (also **1965Hi11**): ($\text{d}, ^3\text{He}$) $E=34.4$ MeV; measured $\sigma(\theta)$, DWBA analysis; ten groups reported at 0, 2530, 2820, 3020, 4140, 5320, 5750, 6670, 7470, 8090. Above 3020, energy agreement is poor as compared to values from **1981De19** and **1976Do05**.

Others: data for selected levels only.

1987Me01: ($\text{pol d}, ^3\text{He}$) $E=20$ MeV; measured $\sigma(\theta)$, iT_{11} , T_{20} , T_{21} , T_{22} analyzing powers, DWBA. Study of g.s.

1978Co13: ($\text{pol d}, ^3\text{He}$) $E=29$ MeV; measured $\sigma(\theta)$, $A_y(\theta)$ DWBA analysis, study of L=0 transition at 2520.

1976Fr22: ($\text{d}, ^3\text{He}$) $E=11$ MeV; measured $\sigma(\theta)$, deduced normalization constants; data for g.s.

1969Do04: ($\text{d}, ^3\text{He}$) $E=82$ MeV; measured $\sigma(\theta)$; six groups reported at 0, 2530, 2820, 4080, 5340, 6290.

1968Ga13: ($\text{d}, ^3\text{He}$) $E=28$ MeV; measured $\sigma(\theta)$, DWBA analysis for g.s.

1965Is04: ($\text{d}, ^3\text{He}$) $E=15.14$ MeV; measured σ at $\theta=45^\circ$ and 60° for four groups at 0, 2530, 2820 and 3020.

1964Yn03: ($\text{d}, ^3\text{He}$) $E=21$ MeV; measured $\sigma(\theta)$ for g.s. and 2580.

1962Cu07: ($\text{d}, ^3\text{He}$) $E=15$ MeV; measured σ at $\theta=20^\circ$ for g.s. 2530.

 ^{39}K Levels

E(level) [†]	J ^π [‡]	L [#]	C ² S [@]	Comments
0	3/2 ⁺	2	2.20	J ^π : from analyzing powers in 1987Me01 , 1978Co13 , 1977Be70 . C ² S: others: 3.70 (1976Do05), 3.8 (1976Fr22), 3.6 (1969Do04), 3.93 (1968Ga13), 3.53 (1967Hi06), 3.8 (1962Cu07).
2520 10	1/2 ⁺	0	1.66	E(level): weighted average of 2520 10 (1981De19) and 2520 15 (1976Do05). Note that 2550 in Table 1 of 1981De19 is a misprint. J ^π : from analyzing powers in 1978Co13 . C ² S: others: 1.0 (1978Co13), 1.65 (1976Do05), 1.1 (1969Do04), 1.35 (1967Hi06), 0.67 (1962Cu07).
2815 10		3	0.32	E(level): weighted average of 2813 10 (1981De19) and 2820 15 (1976Do05). C ² S: for 1f _{7/2} . Other: 0.58 (1976Do05).
3020 10		1&	0.05&	E(level): weighted average of 3020 10 (1981De19) and 3020 15 (1976Do05). C ² S: other: 0.038 (1967Hi06).
3600 10				E(level): weighted average of 3600 10 (1981De19) and 3600 15 (1976Do05).
3874 15		1&	0.02&	E(level): weighted average of 3880 20 (1981De19) and 3870 15 (1976Do05).
3941 ^a 20				
4098 15		0	0.2	E(level): weighted average of 4090 30 (1981De19) and 4100 15 (1976Do05). C ² S: others: <0.10 (1976Do05), 0.7 (1969Do04), 0.12 (1967Hi06).
4124 ^a 30				
4515 15		(3)	0.01	E(level): weighted average of 4509 15 (1981De19) and 4520 15 (1976Do05). C ² S: for 1f _{5/2} .
4679 15		(3)	0.01	E(level): weighted average of 4677 15 (1981De19) and 4680 15 (1976Do05). C ² S: for 1f _{7/2} .
4737 ^a 20				

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$^{40}\text{Ca}(\text{d}, ^3\text{He}), (\text{pol d}, ^3\text{He})$ 1981De19, 1976Do05, 1977Be70 (continued) ^{39}K Levels (continued)

<u>E(level)[†]</u>	<u>J^{π‡}</u>	<u>L[#]</u>	<u>C²S[@]</u>	<u>Comments</u>
4941 ^a 20				
5171 ^a 15				
5262 10	5/2 ⁺	2	1.38	E(level): weighted average of 5258 10 (1981De19) and 5270 15 (1976Do05). C ² S: others: 0.91 (1976Do05), 1.52 (1969Do04), 0.98 (1967Hi06).
5499 ^a 15		(3)	0.01	C ² S: for 1f _{7/2} .
5600 10	5/2 ⁺	2	0.98	E(level): weighted average of 5595 10 (1981De19) and 5610 15 (1976Do05). C ² S: others: 0.64 (1976Do05), 0.66 (1967Hi06).
5800 ^a 25				
5830 15		1&	0.05&	E(level): weighted average of 5829 15 (1981De19) and 5830 15 (1976Do05).
5942 10		2	0.30	E(level): weighted average of 5943 10 (1981De19) and 5940 15 (1976Do05). C ² S: for d _{3/2} . L,C ² S: other: L=1, C ² S=0.03 (1976Do05).
6099 ^a 15		3	0.01	C ² S: for 1f _{5/2} .
6192 ^a 25				
6263 ^a 25		0	0.01	
6334 15	5/2 ⁺	2	1.57	E(level): weighted average of 6328 15 (1981De19) and 6340 15 (1976Do05). C ² S: others: 1.25 (1976Do05), 1.49 (1969Do04), 1.31 (1967Hi06).
6502 20		2&	0.1&	E(level): weighted average of 6503 20 (1981De19) and 6500 30 (1976Do05).
6653 ^a 20		2	0.07	
6736 ^a 25		(2)	0.03	
6785 25		2	0.03	E(level): weighted average of 6795 25 (1981De19) and 6770 30 (1976Do05). C ² S: other: 0.1 (1976Do05).
6930 ^a 25		2	0.08	
6976 25		2	0.10	E(level): weighted average of 6987 25 (1981De19) and 6960 30 (1976Do05). C ² S: other: 0.18 (1976Do05).
7195 25		(3)	0.01	E(level): weighted average of 7191 25 (1981De19) and 7200 30 (1976Do05). C ² S: for 1f _{5/2} . L,C ² S: other: L=2, C ² S=0.1 (1976Do05).
7341 ^a 25				
7425 20		2	0.23	E(level): weighted average of 7423 20 (1981De19) and 7430 30 (1976Do05). C ² S: other: 0.47 (1976Do05).
7502 ^a 20		2	0.63	C ² S: for d _{3/2} . Other: 0.29 (1967Hi06) for d _{5/2} .
7606 ^a 25		2	0.18	C ² S: for d _{3/2} .
7780 30		2&	0.1&	E(level): from 1976Do05, not reported by 1981De19.
8004 30		3	0.01	E(level): weighted average of 8017 30 (1981De19) and 7900 30 (1976Do05). C ² S: for 1f _{5/2} . L,C ² S: other: L=1, C ² S=0.01 for 2p _{3/2} , 0.2 for 1p _{1/2} (1976Do05).
8187 30		2	0.23	E(level): weighted average of 8204 30 (1981De19) and 8170 30 (1976Do05). C ² S: others: 0.35 (1976Do05), 0.56 (1967Hi06).
8292 ^a 30		2	0.32	
8411 30		2	0.04	E(level): weighted average of 8391 30 (1981De19) and 8430 30 (1976Do05). C ² S: other: 0.24 (1976Do05).
8534 30		2	0.17	E(level): weighted average of 8518 30 (1981De19) and 8550 30 (1976Do05). C ² S: other: 0.22 (1976Do05).
8703 ^a 30		2	0.20	
8893 30		2&	0.1&	E(level): weighted average of 8880 40 (1981De19) and 8900 30 (1976Do05).
9012 ^a 50		2	0.24	
9107 30		(2)&	0.1&	E(level): weighted average of 9127 50 (1981De19) and 9100 30 (1976Do05).
9265 ^a 50				
9405 ^a 50				
9586 ^a 50				

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${}^{40}\text{Ca}(\text{d}, {}^3\text{He}), (\text{pol d}, {}^3\text{He})$ [1981De19](#), [1976Do05](#), [1977Be70](#) (continued) ${}^{39}\text{K}$ Levels (continued)

<u>E(level)[†]</u>	<u>L[#]</u>	<u>C²S[@]</u>	<u>Comments</u>
9733 <i>30</i>	(2) ^{&}	0.1 ^{&}	E(level): weighted average of 9699 <i>50</i> (1981De19) and 9750 <i>30</i> (1976Do05).
9808 ^a <i>50</i>			
9935 ^a <i>50</i>			
10704 ^a <i>50</i>			
10864 ^a <i>50</i>			
11034 ^a <i>50</i>			
11156 ^a <i>50</i>			

[†] Weighted average of [1981De19](#) and [1976Do05](#), unless reported in only one of the studies.

[‡] From analyzing powers in [1977Be70](#), unless otherwise noted.

[#] From [1981De19](#), unless otherwise noted. Data are also available in [1976Do05](#) but less complete.

[@] From [1981De19](#), unless otherwise stated. For L=0, 2s_{1/2} orbital; for L=1, 2p_{3/2}; for L=2, 1d_{5/2} orbital (except 1d_{3/2} for g.s., 5942, 7502 and 7606 levels); for L=3, 1f_{7/2} or 1f_{5/2} orbitals are assumed in DWBA calculations.

[&] From [1976Do05](#).

^a From [1981De19](#) only.