^{42}Ca(p,t) 1974Se05,1974De20,1972Sc19

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

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

1974Se05 (also 2002SeZQ,1977SeZR,1974Se04): E=40.27 MeV proton beam was produced from the Michigan State University cyclotron incident on an enriched ^{42}Ca target. Reaction products were momentum-analyzed with an Engel split-pole spectrograph (FWHM=22 keV). Measured $\sigma(\theta)$. Deduced levels, J, π, L, spectroscopic factors from DWBA analysis. Comparisons with shell-model calculations. 1977SeZR includes priv. comm. from K. Seth (2002SeZQ) with details of data that were presented in 1977SeZR, 1974Se05.

1974De20 (also 1972Ad10, 1972DeYF): E=41.7 MeV proton beam was produced from Princeton AVF cyclotron. Target was enriched ^{42}Ca evaporated onto a thin organic backing. Reaction products were detected with ΔE-E telescope of silicon surface-barrier detectors (FWHM=32 keV). Measured $\sigma(\theta)$. Deduced levels, J, π, L from DWBA analysis. Comparisons with shell-model calculations.

1972Sc19: E=40 MeV proton beam was produced from the Grenoble Cyclotron. Target was 95% enriched ^{42}Ca of a 1 mg/cm^2 thickness. Reaction products were detected with ΔE-E counters (FWHM=110 keV). Measured $\sigma(\theta)$. Deduced levels, J, π, L from DWBA analysis. Comparisons with shell-model calculations.

1969Sm02: E=26.5 MeV proton beam was produced from the University of Colorado cyclotron. Reaction products were detected with a ΔE-E telescope of semiconductor detectors. Measured $\sigma(\theta)$. Deduced levels J, π, L, spectroscopic factors from DWBA analysis.

Others:

1983Sa01: E=40 MeV. Measured $\sigma(\theta)$. Deduced L=0 strength.

1979Fr04: E=42,46 MeV. Measured tp and tγ coin for 11980, T=2 state.

1970Mc04, 1970Ha10: E=42-46, 45 MeV. Measured α and proton decay, of 11972, T=2 IAR.

1970He23: E=20 MeV. Measured $\sigma(\theta)$. Deduced L.

Additional information 1.

^{40}Ca Levels

Additional information 2.

E(level)[†]	L[#]	Integrated σ, possibly in mb[@]	Comments
0	0	64	
3358 *5*	0	14.3	E(level): others: 3357 *7* (1974De20), 3352 (1972Sc19).
3740 *5*	3	13.9	T=0 (1972Sc19) E(level): others: 3739 *7* (1974De20), 3734 (1972Sc19).
3899 *5*	2	8.1	E(level): others: 3906 *8* (1974De20), 3903 (1972Sc19).
4490 *5*	5	4.6	T=0 (1972Sc19) E(level): others: 4492 *7* (1974De20), 4487 (1972Sc19).
5212 *10*	0	0.03	
5249 *5*	2	7.1	E(level): others: 5247 *10* for the triplet of 5212, 5249 and 5279 levels in Adopted Levels (1974De20), 5250 *10* (1972Sc19).
5631 *5*	2	0.83	E(level): others: 5617 *6* (1974De20).
5903 *5*	1	0.28	E(level): others: 5900 (1974De20).
6028 *10*		0.62	
6286 *10*	3	0.54	
6508 *5*	4	1.53	E(level): others: 6498 *10* for the doublet of 6508 and 6543 levels in Adopted Levels (1974De20), 6510 *10* (1972Sc19).
6582 *5*	3	2.13	E(level): others: 6573 *10* (1974De20), 6620 *2)* (1972Sc19).
6752 *5*	(2)[‡]	0.44	E(level): others: 6750 (1974De20).
6909 *5*	2	1.87	E(level): others: 6911 *11* for the triplet of 6909, 6931 and 6950 levels in Adopted Levels (1974De20).
6951 *5*	1	0.95	E(level): others: 6945 *15* (1972Sc19).

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^{42}Ca(p,t) 1974Se05,1974De20,1972Sc19 (continued)

^{40}Ca Levels (continued)

E(level)[†]	L[#]	Integrated σ, possibly in mb[@]	Comments
7113 *5*	(3)[‡]	0.79	E(level): possibly 7113.1, 1^- and 7113.7, 4^- levels in Adopted Levels. Others: 7105 *8* (1974De20).
7304 *5*	0	0.42	E(level): others: 7285 *16* (1974De20).
7433 *5*		0.30	E(level): others: 7400 (1974De20). L: 1974De20 quote L=6 from previous work for a 7400 level but no reference for that assignment is found.
7477 *5*	2	0.89	E(level): The 7453 *9* reported in 1974De20 is considered as the same level as the 7477 level based on the fact that many levels above 6000 in 1974De20 are about 10 keV lower than values in 1974Se05.
7563 *5*	(2)[‡]	2.68	E(level): others: 7550 *9* (1974De20), 7575 *15* (1972Sc19).
7625 *5*	(0)	1.21	E(level): others: 7619 *15* (1974De20). L: from 1977SeZR. Brackets are added by the evaluator since it is inconsistent with $J^\pi=(2^-,3,4^+)$ for the 7623.1 level from γ decay modes in (p,p′γ); however, if this assignment is correct it could indicate they are two separate levels.
7653[‡] *10*		0.53	
7698 *5*	0	3.0	E(level): this level corresponds to the 7702, 0^+ level in Adopted Levels. Others: 7685 *12* (1974De20); 1972Sc19 report a 3^- level at 7690 *30*, but 1974Se05 point out that it was misassigned by 1972Sc19 as the 3^- level seen in ^{3}He,d) at 7695 and is considered as the same level as the 7698 level.
7757[‡] *10*		0.06	
7813 *10*		0.08	
7872 *5*	2	0.64	E(level): other: 7850 *12* (1974De20).
7932 *5*	(3)[‡]	0.76	E(level): other: 7919 *15* (1974De20).
7978[‡] *10*		0.26	
8013 *10*	0[‡]	0.22	
8090 *5*	4[‡]	1.05	E(level): other: 8079 *10* (1974De20).
8113[‡] *10*			
8199 *10*	(2)[‡]	0.59	E(level): other: 8181 *10* (1974De20).
8284 *5*	0	0.29	
8338[‡] *10*		0.26	
8378 *5*	4[‡]	0.95	
8438 *5*	0	1.40	E(level): other: 8418 *10* (1974De20), 8410 *30* (1972Sc19).
8483[‡] *10*	0	0.28	L: from 1977SeZR, inconsistent with the assignment of $J^\pi=(1^-,2^-,3^-)$ in Adopted Levels, see comments for this assignment.
8554 *5*	5	3.2	E(level): other: 8544 *11* (1974De20).
8578 *5*		0.57	
8669 *10*	4[‡]	0.18	
8752 *10*	3[‡]	0.28	
8860 *10*		0.18	
8905[‡] *10*	(6)[‡]	0.48	
8943 *5*	0[‡]	0.19	
8988 *10*			
9036 *5*		1.22	
9157[‡] *5*		0.46	
9250[‡] *10*		0.12	
9263[‡] *10*	(2)[‡]	0.31	
9304 *5*	0	0.52	T=1 (1972Sc19) E(level): other: 9300 *30* (1972Sc19).
9366[‡] *10*	2[‡]	0.55	

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^{42}Ca(p,t) 1974Se05,1974De20,1972Sc19 (continued)

^{40}Ca Levels (continued)

E(level)[†]	L[#]	Integrated σ, possibly in mb[@]	Comments
9405 *5*	0	3.8	T=1 (1974Se05) E(level): other: 9386 *13* (1974De20).
9561 *10*		0.13	
9592[‡] *10*			
9629 *15*			E(level): from 1974De20 only.
9672 *5*		0.88	
11970 *12*			%$\alpha\approx$100 (1979Fr04,1970Mc04) T=2 IAR state (1979Fr04,1970Mc04). E(level): from 1974De20. 93% *9* α decay to ^{36}Ar g.s.; <3% α decay to first 2^+ in ^{36}Ar; <5% p decay to ^{39}K g.s. (1979Fr04). Others: 1970Mc04, 1970Ha10.

[†] From 1974Se05, unless otherwise noted.
[‡] From 1977SeZR.
[#] From DWBA fits to measured differential cross sections (1977SeZR, 1974Se05, and 1974De20). Some values are only from 1977SeZR, as noted.
[@] From 2002SeZQ.