^{48}Ca(^{3}He,p) 1969La02,1969Oh01,1970Sc22

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 157, 1 (2019)	15-Apr-2019

All experiments employed DWBA analysis for $\sigma(\theta)$ distributions.

1969La02: E=18.5 MeV beam from the Saclay variable-energy cyclotron. Enriched target. Measured $\sigma(\theta)$ with a ΔE-E telescopes (FWHM=70 keV). Deduced levels, J, π, L-transfers from DWBA analysis. Report 27 levels up to 6618.

1969Oh01: E=12 MeV beam from the Argonne tandem Van de Graaff. Measured $\sigma(\theta)$ from 10°−45° (c.m.) with a magnetic spectrograph (FWHM=20-30 keV). Deduced levels, J, π, L-transfers from DWBA analysis. Report levels up to 11195.

1970Sc22: E=18 MeV beam from a EN tandem Van de Graaff. Measured $\sigma(\theta)$ from 5° to 55° with a broad-range magnetic spectrograph. Deduced levels, J, π, L-transfers from DWBA analysis. report 36 levels up to 5890.

1972Fl01: E=18 MeV beam from the University of Pennsylvania tandem. Measured $\sigma(\theta)$ from 3.75° to 101.25° with a magnetic spectrograph (FWHM=40 keV). Deduced levels, J, π, L-transfers from DW analysis. Report 34 levels up to 5600.

See 1980Dr02 for comparison of experimental $\sigma(^3He,p)/\sigma(^3He,n)$ to theory for ^{50}Sc(3.09 MeV)/^{50}Ti(16.58 MeV).

^{50}Sc Levels

E(level)[†]	L[‡]	σ(μb)[e]	Comments
0.0	4[@]	166 *30*	Jπ: 5+ (1969Oh01,1972Fl01).
256 *5*	2[@]	146 *25*	E(level): 258 *5* (1969Oh01), 330 *30* (1969La02,doublet 258+330), 230 *20* (1970Sc22), 255 *10* (1972Fl01). Jπ: 2+ (1969Oh01,1972Fl01).
338 *5*	2[@]	280 *40*	E(level): 330 *5* (1969Oh01), 330 *30* (1969La02,doublet 258+330), 300 *20* (1970Sc22), 325 *10* (1972Fl01). Jπ: (3+) (1969Oh01,1972Fl01).
755 *6*	4[@]	86 *14*	E(level): 756 *8* (1969Oh01), 773 *30* (1969La02), 740 *20* (1970Sc22), 755 *10* (1972Fl01). Jπ: (4+) (1969Oh01).
1853 *5*	0+2[@]	610 *60*	E(level): 1854 *5* (1969Oh01), 1848 *30* (1969La02), 1840 *20* (1970Sc22), 1850 *10* (1972Fl01). Jπ: 1+ (1969Oh01,1972Fl01).
2225 *5*	2[@]	250 *25*	E(level): 2227 *5* (1969Oh01), 2211 *30* (1969La02), 2220 *20* (1970Sc22), 2222 *10* (1972Fl01). Jπ: (3+) (1969Oh01).
2326 *6*	4[@]	124 *12*	E(level): 2331 *8* (1969Oh01), 2331 *30* (1969La02), 2320 *20* (1970Sc22), 2320 *10* (1972Fl01). Jπ: (4+) (1969Oh01,1972Fl01).
3089 *5*	0[@]	110 *25*	E(level): 3090 *5* (1969Oh01), 3065 *30* (1969La02), 3090 *20* (1970Sc22), 3085 *10* (1972Fl01). E(level): anti-analog state (1971Ha55). Jπ: 0+ (1969Oh01,1972Fl01).
3259 *6*	2[#@]	318 *32*	E(level): 3259 *7* (1969Oh01), 3264 *30* (1969La02, doublet 3259+3287), 3260 *20* (1970Sc22), 3260 *20* (1972Fl01). Jπ: (2+) (1969Oh01).
3287 *5*	2[#@]		E(level): 3287 *5* (1969Oh01), 3264 *30* (1969La02, doublet 3259+3287), 3290 *20* (1970Sc22), 3290 *20* (1972Fl01).
3380[a] *20*			E(level): 3380 *20* (1972Fl01).
3500 *20*			E(level): (3497 *15*) (1969Oh01), 3510 *20* (1970Sc22), 3490 *20* (1972Fl01).
3611 *15*			E(level): 3617 *15* (1969Oh01), 3600 *20* (1970Sc22), 3610 *20* (1972Fl01).
3681 *5*	2+0[&]	378 *38*	Jπ: 1+ (1972Fl01). E(level): 3682 *5* (1969Oh01), 3658 *30* (1969La02, triplet 3617+3682+3731), 3680 *20* (1970Sc22), 3670 *20* (1972Fl01).
3731[b] *10*			E(level): 3731 *10* (1969Oh01).
3927 *13*	2+0[&]	378 *38*	Jπ: 1+ (1972Fl01). E(level): (3943 *10*) (1969Oh01), 3913 *30* (1969La02), 3940 *20* (1970Sc22), 3920 *20* (1972Fl01). E(level): 3913 *30* group in 1969La02 and 3940 *20* group in 1970Sc22 are associated with 3920 *20* in 1972Fl01 based on $\sigma(\theta)$ data.
3950[a] *20*			E(level): 3950 *20* (1972Fl01).

Continued on next page (footnotes at end of table)

^{48}Ca(^{3}He,p) 1969La02,1969Oh01,1970Sc22 (continued)

^{50}Sc Levels (continued)

E(level)[†]	L[‡]	$\sigma(\mu b)$[e]	Comments
4135 *20*	2		E(level): 4140 *20* (1970Sc22), 4130 *20* (1972Fl01). L: from 1970Sc22.
4232 *20*	2[#]	310 *31*	E(level): 4236 *30* (1969La02), (4240 *20*) (1970Sc22), 4230 *20* (1972Fl01). Total cross section for 4232+4311 groups.
4311 *13*	2[#@]		E(level): 4336 *30* (1969La02), 4320 *20* (1970Sc22), 4290 *20* (1972Fl01).
4456 *13*	2[@]	182 *30*	E(level): 4462 *30* (1969La02), 4460 *20* (1970Sc22), 4450 *20* (1972Fl01).
4530?[c] *20*			E(level): (4530 *20*) (1970Sc22).
4590?[c] *20*			E(level): (4590 *20*) (1970Sc22).
4638 *6*	2+0[&]	548 *55*	J^{π}: 1^+ (1972Fl01). E(level): 4640 *7* (1969Oh01), 4641 *30* (1969La02), 4630 *20* (1970Sc22), 4630 *20* (1972Fl01). L: 2 (1969La02) for 4641+4748. Total cross section for 4638+4729 groups.
4660 *20*			E(level): (4675 *15*) (1969Oh01), 4660 *20* (1970Sc22), 4660 *20* (1972Fl01).
4729? *20*			E(level): 4748 *30* (1969La02), (4740 *20*) (1970Sc22), 4720 *20* (1972Fl01).
4820 *20*	2		E(level): 4830 *20* (1970Sc22), 4810 *20* (1972Fl01). L: from 1970Sc22.
4876 *6*	2+0[&]	276 *40*	J^{π}: 1^+ (1972Fl01). E(level): 4879 *7* (1969Oh01), 4880 *30* (1969La02), 4870 *20* (1970Sc22), 4860 *20* (1972Fl01).
4976 *6*	2+0[&]		J^{π}: 1^+ (1972Fl01). E(level): 4980 *7* (1969Oh01), 4980 *20* (1970Sc22), 4970 *20* (1972Fl01).
5072 *8*	2[@]	540 *54*	E(level): 5073 *10* (1969Oh01), 5066 *30* (1969La02, doublet 4980+5073), 5080 *20* (1970Sc22), 5060 *20* (1972Fl01).
5135 *20*			E(level): 5160 *20* (1970Sc22), 5140 *20* (1972Fl01).
5195 *20*			E(level): 5220 *20* (1970Sc22), 5200 *20* (1972Fl01).
5265 *20*			E(level): 5290 *20* (1970Sc22), 5270 *20* (1972Fl01, doublet). J^{π}: $\sigma(\theta)$ shows forward-angle dependence typical of 1^+ transitions (1972Fl01).
5338 *13*	2	730 *73*	E(level): 5330 *30* (1969La02), 5370 *20* (1970Sc22), 5340 *20* (1972Fl01).
5430 *12*	2	372 *70*	E(level): 5429 *30* (1969La02), 5460 *20* (1970Sc22), 5430 *20* (1972Fl01).
5540 *20*			E(level): 5570 *20* (1970Sc22), 5540 *20* (1972Fl01).
5600 *13*	2	264 *50*	E(level): 5599 *30* (1969La02), 5630 *20* (1970Sc22), 5600 *20* (1972Fl01). J^{π}: 0^+ or 1^+ (1972Fl01).
5699 *17*	(0)		E(level): 5697 *30* (1969La02), 5730 *20* (1970Sc22). $d\sigma/d\Omega(39°)$=72 μb/sr *18* (1969La02).
5810[c] *20*	(2+4)		L: from 1970Sc22. E(level): 5840 *20* (1970Sc22).
5853[d] *30*	2	242 *70*	E(level): 5853 *30* (1969La02), (5890 *20*) (1970Sc22).
6014[d] *30*	4	488 *50*	E(level): 6014 *30* (1969La02).
6118[d] *30*	2	400 *80*	E(level): 6118 *30* (1969La02).
6285[d] *30*	2	302 *70*	E(level): 6285 *30* (1969La02).
6447[d] *30*			E(level): 6447 *30* (1969La02). $d\sigma/d\Omega(39°)$=80 μb/sr *22* (1969La02).
6618[d] *30*			E(level): 6618 *30* (1969La02). $d\sigma/d\Omega(39°)$=114 μb/sr *26* (1969La02).
11195[b] *20*	(0)		E(level): IAS of ^{50}Ca g.s. See also 1967No01 and 1971Ha55.

[†] Weighted averages of values from 1969La02, 1969Oh01, 1970Sc22 and 1972Fl01. Between 5.1 and 5.9 MeV, energies in 1970Sc22 were adjusted downwards by 30 keV due to a consistent difference when compared to values from other authors.
[‡] From DWBA fit to measured $\sigma(\theta)$ (1969La02), unless otherwise indicated.
[#] From combined $\sigma(\theta)$ for 3259+3287 and 4240+4320 doublets.
[@] Same L value given in 1970Sc22.

Continued on next page (footnotes at end of table)

^{48}Ca(^{3}He,p) 1969La02,1969Oh01,1970Sc22 (continued)

^{50}Sc Levels (continued)

& L=2 in 1969La02 and/or 1970Sc22; L=0 component in $\sigma(\theta)$ data (1972Fl01) at forward angles.
[a] Seen only in 1972Fl01.
[b] Seen only in 1969Oh01.
[c] Seen only in 1970Sc22.
[d] Seen only in 1969La02.
[e] Integral cross section from 13° to 91° from 1969La02. Refer to table I of 1972Fl01 for a list of relative cross sections.