$^{42}\text{Ca}(\alpha,^3\text{He})$ 1982Ho17

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen[#]	NDS 126, 1 (2015)	31-Mar-2015

Target ^{42}Ca $J^{\pi}=0^+$.

1982Ho17: E=36 MeV α beam was produced from the Orsay MP tandem. Target of 95% enriched ^{42}Ca backed by a 10 μg/cm^2 carbon film, thickness of 160 μg/cm^2. ^{3}He particles were analyzed by a split-pole magnetic spectrograph and detected by six position sensitive silicon detectors in the focal plane, FWHM=20 keV. Measured $\sigma(\text{E}(^3\text{He}),\theta)$ from 4° to 42°. Uncertainty in cross sections ≈15%. Deduced levels, L, spectroscopic factors from DWBA and coupled-reaction-channel (CRC) analysis.

```
------------------------------------------------------------------
                     Cross section values
  Level energy    dσ/dΩ  (mb/sr)    Level energy    dσ/dΩ  (mb/sr)
        0            7.0              3645            0.019
      373            0.105            3803            0.030
      593            0.011            3913            0.062
      990            0.180            4041            0.029
     1395            0.013            4123            0.017
     1678            0.014            4193            0.004
     1957            0.023            4463            0.094
     2046            0.093            4569
     2249            0.023            4826            0.037
     2611            0.007            4880            0.022
     2674            0.068            5001            0.052
     2741            0.008            5040            0.018
     2850            0.019            5200            0.120
     2948            0.016            5251            0.018
     3044            0.023            5410            0.006
     3085            0.031            5548            0.035
     3193            0.067            5647            0.012
     3278            0.080            5727            0.025
     3371            0.018            5805            0.022
     3413            0.065            5889            0.027
     3504            0.025            5991            0.049
------------------------------------------------------------------
```

^{43}Ca Levels

E(level)	L	(2J+1)S[†]	Comments
0	3	5.40	
373 8	3	0.15	
593 8	1	0.17	
990[#] 8	2	0.87	$\sigma(\text{exp})/\sigma(\text{theory-CRC})=8.5$.
1395 8	2	0.06	
1678[#] 8			$\sigma(\text{exp})/\sigma(\text{theory-CRC})=0.04$.
1957[#] 8	(0)		$\sigma(\text{exp})/\sigma(\text{theory-CRC})=3$.
2046 8	1	4.26	
2249[#] 8			$\sigma(\text{exp})/\sigma(\text{theory-CRC})=0.70$.
2611 8	1	0.33	
2674 8	3	0.28,0.18	
2741[#] 8			$\sigma(\text{exp})/\sigma(\text{theory-CRC})=1$.
2850[#] 8	2	0.32,0.27	$\sigma(\text{exp})/\sigma(\text{theory-CRC})=2.1$.
2948[‡] 8	(1)	0.74	$11/2^+$ component considered in CRC calculations. $\sigma(\text{exp})/\sigma(\text{theory-CRC})=0.5$ (for $11/2^+$ component).
3044[#] 8			$\sigma(\text{exp})/\sigma(\text{theory-CRC})=0.06$.

<div align="center">^{42}Ca(α,^{3}He)   **1982Ho17 (continued)**</div>

<div align="center">^{43}Ca Levels (continued)</div>

E(level)	L	(2J+1)S†	Comments
3085 8	2	0.70,0.55	
3193 8	4	0.10	
3278‡ 8	(4)	0.13	
3371$^{\#}$ 8			σ(exp)/σ(theory-CRC)=0.11.
3413 8	3	0.43,0.29	
3504$^{\#}$ 8			σ(exp)/σ(theory-CRC)=0.13.
3645$^{\#}$ 8			σ(exp)/σ(theory-CRC)=3.
3803 8	(3)	0.20	
3913‡ 8	(4)	0.14	
4041 8			
4123 8	(4)	0.04	
4193 8	1	0.44	
4463 8	(3)	1.45	
4569 8			
4826 8	(3)	0.90	
4880 8			
5001 8	(3)	1.16	
5040 8			
5200 8	(3)	2.80	
5251$^{\#}$ 8			σ(exp)/σ(theory-CRC)=3.2.
5410 8			
5548‡ 8			
5647‡ 8			
5727‡ 8			
5805 8			
5889‡ 8			
5991 8	(3)	2.75	

† Normalization factor N=46 used in the DWBA formula relating experimental and DW cross sections. When two values are quoted, these correspond to J=L−1/2 and J=L+1/2, respectively.

‡ Doublet.

$^{\#}$ Considered in coupled-reaction-channel (CRC) analysis. Multiplets considered are: f7/2 neutron coupled to 2^{+} at 1520, 4^{+} at 2750 and 3^{-} at 3440 in ^{42}Ca.