

**<sup>39</sup>K(d,p) 1974Fi08,1959En57**

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

$J^\pi(^{39}\text{K g.s.})=3/2^+$ .

**1974Fi08:** E=12 MeV deuteron beam was produced from the Argonne FN tandem Van de Graaff accelerator. Target was about 100  $\mu\text{g}/\text{cm}^2$  <sup>39</sup>K made by evaporation of KNO<sub>3</sub> (99.9% enriched in <sup>39</sup>K). Reaction products were momentum analyzed with an Engel split-pole magnetic spectrograph (FWHM=15 keV) and detected in nuclear emulsions. Measured  $\sigma(\theta)$ . Deduced levels, J,  $\pi$ , L-transfers, spectroscopic factors from DWBA analysis.

**1959En57:** E=6 MeV deuteron beam was produced from the MIT-ONR electrostatic generator and impinged on a natural KI target on a Formvar backing. Reaction products were momentum analyzed with a broad- range magnetic spectrograph. Measured  $\sigma(\theta)$ . Deduced levels, L- transfers from fits of theoretical stripping curves to measured differential cross sections. A total of 52 groups identified which are in agreement with data from **1974Fi08**.

Others:

**1959Da02:** E=8.9 MeV. Measured  $\sigma(\theta)$  for 23 groups.

**1957Te01:** E=4 MeV. Measured  $\sigma(\theta)$  for three groups at 0, 820 and 2080.

**1953Bu98:** E=4.8-5.7 MeV. Four groups reported at 0, 32, 800 and 893.

**1950Sa03:** E=3.90 MeV. Measured energies and relative yields of eight groups up to 4800.

**Additional information 1.**

Differential cross section data in lab coordinate system are also available from **1959En57** for a total of 52 levels.

Cross section data in c.m. (**1974Fi08**, accurate to 15%)

Level*	d $\sigma$ /d $\Omega$ (max.) mb/sr	Level	d $\sigma$ /d $\Omega$ (max.) mb/sr
--------	----------------------------------------	-------	----------------------------------------

0	3.0	3720	0.40
30	2.4	3773	≈0.50
801	1.8	3792	0.54
891	3.6	3827	0.53
1646	0.07	3870	3.8
1962	≈0.20	3928	≈0.26
2048	13	4025	2.6
2072	13	4080	0.15
2105	11	4109	4.2
2262	0.18	4211	0.15
2292	0.08 a	4263	8.3
2397	0.32	4298	0.60
2420	0.46	4356	0.13
2578	0.20	4401	3.6
2628	4.0	4467	4.2
2751	1.4	4546	4.0
2789	0.065	4592	2.2
2810	0.28	4663	1.2
2951	≈0.07	4765	≈0.90
2987	≈0.10	4794	1.6
3027	≈0.04	4811	2.8
3113	≈0.09	4878	0.36
3127	≈0.05	4912	2.5
3149	≈0.04	4948	0.70
3229	4.6	4997	0.10
3370	1.7	5030	0.10
3393	0.50	5081	0.38
3416	0.52	5116	0.46
3486	0.90	5136	1.1
3601	0.19	5158	0.44
3631	6.0	5210	0.80

\*: Energy values in **1974Fi08**

a: 0.80 in Table 3 of **1974Fi08** seems a type error in

view of the value shown in  $\sigma(\theta)$  plot in figure 4.

 ${}^{40}\text{K}$  Levels

Spectroscopic factor  $C^2S$  is defined by  $(2J+1) \times C^2S = (2J_i+1)/N \times \sigma_{\text{exp}}/\sigma_{\text{DWBA}}$  with  $N=1.53$ ,  $J_i$  and  $J$  the spins of the initial and final states, respectively (1974Fi08).

E(level) <sup>†</sup>	L <sup>b</sup>	(2J+1)C <sup>2</sup> S <sup>b</sup>	Comments
0	3	8.1	
30 2	1+3	0.12,6.3	E(level): weighted average of 32 2 (1953Bu98), 28 2 (1959En57) and 30 5 (1974Fi08). L: 3 (1959En57). <a href="#">Additional information 2.</a> <a href="#">Additional information 3.</a> L: 3 (1959En57).
799 5	1+3	0.07,4.6	<a href="#">Additional information 4.</a> <a href="#">Additional information 5.</a> L: 1 (1959En57).
889 5	3	8.9	<a href="#">Additional information 6.</a>
1644 5	(2)	0.10	<a href="#">Additional information 7.</a> L: 1 (1959En57).
1960 5	0+2	0.012,0.076	<a href="#">Additional information 8.</a> L: isotropic (1959En57).
2046 5	1	2.6	<a href="#">Additional information 9.</a>
2070 5	1	2.6	<a href="#">Additional information 10.</a>
2103 5	1	2.2	<a href="#">Additional information 11.</a>
2260 5	(2)	0.26	<a href="#">Additional information 12.</a>
2290 5	(2,3)	0.13,0.18	E(level): probable doublet: 2290+2291 (1974Fi08). <a href="#">Additional information 13.</a> L: (1) (1959En57).
2396 5	1	0.064	<a href="#">Additional information 14.</a>
2419 5	1	0.092	<a href="#">Additional information 15.</a>
2574 6	2	0.26	<a href="#">Additional information 16.</a>
2626 5	1	0.76	<a href="#">Additional information 17.</a>
2664?			E(level): from 1959Da02 only.
2749 5	1	0.25	<a href="#">Additional information 18.</a>
2787 5	&		<a href="#">Additional information 19.</a> L: isotropic (1959En57).
2808 5	1	0.048	<a href="#">Additional information 20.</a>
2950 5	&		<a href="#">Additional information 21.</a>
2986 5			<a href="#">Additional information 22.</a>
3027 5			E(level): From 1974Fi08. 1959En57 report an uncertain level at 3021 8. L: 1 for an uncertain level at 3021 from 1959En57.
3111 5	0 <sup>a</sup>		<a href="#">Additional information 23.</a>
3126 5			<a href="#">Additional information 24.</a> L: isotropic (1959En57).
3148 5	(1) <sup>a</sup>		<a href="#">Additional information 25.</a>
3228 5	1	0.92	<a href="#">Additional information 26.</a>
3369 5	1	0.31	<a href="#">Additional information 27.</a>
3391 5	1	0.088	<a href="#">Additional information 28.</a>
3415 5	0+2	0.036,0.11	<a href="#">Additional information 29.</a> L: 0 (1959En57).
3484 5	1	0.17	<a href="#">Additional information 30.</a>
3600 5	1	0.034	<a href="#">Additional information 31.</a>
3630 5	1	1.1	<a href="#">Additional information 32.</a>
3657 <sup>‡</sup> 8			
3719 5	1		<a href="#">Additional information 33.</a> L: isotropic (1959En57).
3738? <sup>#</sup> 8			
3771 5	(0,1)	0.08,0.072	<a href="#">Additional information 34.</a> L: 1 (1959En57).

Continued on next page (footnotes at end of table)

$^{39}\text{K}(\text{d,p})$  **1974Fi08,1959En57** (continued) $^{40}\text{K}$  Levels (continued)

E(level) <sup>†</sup>	L <sup>b</sup>	(2J+1)C <sup>2</sup> S <sup>b</sup>	Comments
3791 5	1	0.084	Additional information 33. L: 0 (1959En57).
3825 5	1	0.080	Additional information 34.
3838?# 8			
3870 5	1	0.61	Additional information 35.
3883‡ 8			
3898‡ 8			
3926 5			Additional information 36.
4023 5	1	0.40	Additional information 37.
4080@ 5	&		
4107 5	1	0.656	Additional information 38.
4211@ 5	&		
4260 5	1	1.3	Additional information 39.
4298@ 5	1	0.12	
4356@ 5	&		Additional information 40.
4400 5	1	0.58	Additional information 41.
4466 5	1	0.68	Additional information 42.
4544 5	1	0.63	Additional information 43.
4589 5	1	0.30	Additional information 44.
4662 5	1	0.16	Additional information 45.
4765@ 5	0	0.056	
4792 5	1	0.20	Additional information 46.
4808 5	1	0.35	Additional information 47.
4878@ 5	1	0.044	
4909 5	1	0.35	Additional information 48.
4948@ 4	1	0.084	
4997@ 5	&		
5030@ 5	&		
5080@ 5	1	0.046	
5116@ 5	1	0.056	
5136@ 5	1	0.12	Additional information 49.
5158@ 5	1	0.054	
5210@ 5	1	0.10	
5340? 40			E(level): from 1959Da02 only.

<sup>†</sup> Weighted average of values from 1974Fi08 and 1959En57 if data are available from both, unless otherwise noted.

<sup>‡</sup> From 1959En57, not resolved in 1974Fi08.

# Reported by 1959En57 only as a weak group.

@ From 1974Fi08.

& Isotropic distribution from  $\sigma(\theta)$  (1974Fi08).

<sup>a</sup> From 1959En57.

<sup>b</sup> Extracted from DWBA fits to measured differential cross sections (1974Fi08).