

$^{40}\text{Ca}(\mu^-, \nu\gamma)$     **2006Me08**

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

**2006Me08:** The  $\mu^-$  beam was obtained from decay of  $\pi^-$  beam at 90 MeV/c provided by the beamline M9B at TRIUMF. Target was pure natural calcium.  $\gamma$  rays were detected with two HPGe detectors. Measured  $E\gamma$ ,  $I\gamma$ ,  $E(x\text{ ray})$ ,  $I(x\text{ ray})$ . Deduced levels,  $\gamma$ -ray yields.

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Muonic Lyman series for natural Calcium

$\mu$ x ray	Energy	Intensity in percent
2p-1s	783.659 25	83.8 10
3p-1s	940.63 10	6.2 2
4p-1s	995.48 10	2.0 1
5p-1s	1020.81 10	2.0 1
6p-1s	1034.62 10	1.8 1
7p-1s	1042.71 20	1.4 1
(8- $\infty$ )p-1s	1046-1063	2.8 4

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Muonic Balmer series for natural Calcium

$\mu$ x ray	Energy	Intensity in percent
3d-2p	157.35 13	64.5 9
4d-2p	212.03 10	8.85 20
5d-2p	237.31 10	4.34 20
6d-2p	251.06 10	3.29 20
7d-2p	259.45 10	1.37 20
(8- $\infty$ )d-2p	261-277	1.4 3

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

E(level) <sup>†</sup>	J <sup>‡</sup>	Percent Yield per muon capture <sup>#</sup>	Comments
0	4 <sup>-</sup>		
29.83	3 <sup>-</sup>		
800.14	2 <sup>-</sup>	5.0 5	Known cascading=2.8% 5.
891.40	5 <sup>-</sup>	0.2 1	Known cascading=0.03% 2.
1643.64	0 <sup>+</sup>	0.5 4	Known cascading=0.37% 15.
1959.07	2 <sup>+</sup>	1.2 2	Known cascading=0.04% 2.
2047.35	2 <sup>-</sup>	0.9 3	
2069.81	3 <sup>-</sup>	0.7 3	
2103.67	1 <sup>-</sup>	0.7 2	Known cascading=0.43% 6.
2260.40	3 <sup>+</sup>	<0.25	
2289.87	1 <sup>+</sup>	0.5 2	
2290.49	3 <sup>-</sup>	<0.24	
2397.17	4 <sup>-</sup>	<0.3	
2419.17	2 <sup>-</sup>	0.4 3	
2625.99	0 <sup>-</sup>	0.60 8	
2730.37	1	<0.24	
2807.88	(1,2) <sup>-</sup>	0.34 21	
3228.67	2 <sup>-</sup>	<0.8	
3868.66	2 <sup>-</sup>	<0.9	
3887.92	(1 <sup>-</sup> ,2 <sup>-</sup> )	<0.6	

Continued on next page (footnotes at end of table)

$^{40}\text{Ca}(\mu^-, \nu\gamma)$  **2006Me08 (continued)** $^{40}\text{K}$  Levels (continued)

E(level) <sup>†</sup>	$J^\pi$ <sup>‡</sup>	Percent Yield per muon capture <sup>#</sup>
3923.90	(2 <sup>-</sup> ,3 <sup>+</sup> )	<1.0
4537.06	(2 <sup>-</sup> )	0.9 4

<sup>†</sup> As listed in [2006Me08](#) from literature.<sup>‡</sup> From Adopted Levels.

# Corrected for known cascading.

 $\gamma(^{40}\text{K})$ 

$E_\gamma$ <sup>†</sup>	Percent $\gamma$ -ray yield	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult.
522.32	0.43 6	2625.99	0 <sup>-</sup>	2103.67	1 <sup>-</sup>	
646.22	0.37 15	2289.87	1 <sup>+</sup>	1643.64	0 <sup>+</sup>	
770.31	7.8 3	800.14	2 <sup>-</sup>	29.83	3 <sup>-</sup>	
843.49	0.3 2	1643.64	0 <sup>+</sup>	800.14	2 <sup>-</sup>	
891.37	0.23 10	891.40	5 <sup>-</sup>	0	4 <sup>-</sup>	
938.72	<sup>‡</sup>	3228.67	2 <sup>-</sup>	2289.87	1 <sup>+</sup>	
1086.71	<0.2	2730.37	1	1643.64	0 <sup>+</sup>	
1158.90	0.85 15	1959.07	2 <sup>+</sup>	800.14	2 <sup>-</sup>	
1247.17	0.35 12	2047.35	2 <sup>-</sup>	800.14	2 <sup>-</sup>	
1303.53	0.30 8	2103.67	1 <sup>-</sup>	800.14	2 <sup>-</sup>	
1399.03	<0.1	2290.49	3 <sup>-</sup>	891.40	5 <sup>-</sup>	
1489.77	0.11 8	2289.87	1 <sup>+</sup>	800.14	2 <sup>-</sup>	
1613.84	0.5 2	1643.64	0 <sup>+</sup>	29.83	3 <sup>-</sup>	[E3]
1619.00	0.3 2	2419.17	2 <sup>-</sup>	800.14	2 <sup>-</sup>	
1765.24	<0.25	3868.66	2 <sup>-</sup>	2103.67	1 <sup>-</sup>	
1825.77	0.16 6	2625.99	0 <sup>-</sup>	800.14	2 <sup>-</sup>	
1929.34	0.31 15	1959.07	2 <sup>+</sup>	29.83	3 <sup>-</sup>	
2007.71	0.32 20	2807.88	(1,2) <sup>-</sup>	800.14	2 <sup>-</sup>	
2017.53	0.29 14	2047.35	2 <sup>-</sup>	29.83	3 <sup>-</sup>	
2039.94	0.35 17	2069.81	3 <sup>-</sup>	29.83	3 <sup>-</sup>	
2047.28	0.26 10	2047.35	2 <sup>-</sup>	0	4 <sup>-</sup>	
2070.08	0.27 10	2069.81	3 <sup>-</sup>	0	4 <sup>-</sup>	
2073.74	0.76 18	2103.67	1 <sup>-</sup>	29.83	3 <sup>-</sup>	
2230.54	<0.2	2260.40	3 <sup>+</sup>	29.83	3 <sup>-</sup>	
2290.58	<0.2	2290.49	3 <sup>-</sup>	0	4 <sup>-</sup>	
2367.17	<0.2	2397.17	4 <sup>-</sup>	29.83	3 <sup>-</sup>	
2389.18	0.1 I	2419.17	2 <sup>-</sup>	29.83	3 <sup>-</sup>	
2397.12	<0.4	2397.17	4 <sup>-</sup>	0	4 <sup>-</sup>	
2428.28	<0.3	3228.67	2 <sup>-</sup>	800.14	2 <sup>-</sup>	
3068.7	<0.4	3868.66	2 <sup>-</sup>	800.14	2 <sup>-</sup>	
3088.3 5	<0.3	3887.92	(1 <sup>-</sup> ,2 <sup>-</sup> )	800.14	2 <sup>-</sup>	
3198.6	<0.25	3228.67	2 <sup>-</sup>	29.83	3 <sup>-</sup>	
3737.01	0.4 2	4537.06	(2 <sup>-</sup> )	800.14	2 <sup>-</sup>	
3838.50	<0.4	3868.66	2 <sup>-</sup>	29.83	3 <sup>-</sup>	
3857.97	<0.3	3887.92	(1 <sup>-</sup> ,2 <sup>-</sup> )	29.83	3 <sup>-</sup>	
3895.7	<0.4	3923.90	(2 <sup>-</sup> ,3 <sup>+</sup> )	29.83	3 <sup>-</sup>	
4506.96	<1	4537.06	(2 <sup>-</sup> )	29.83	3 <sup>-</sup>	

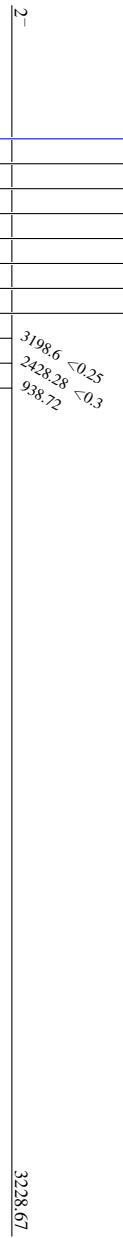
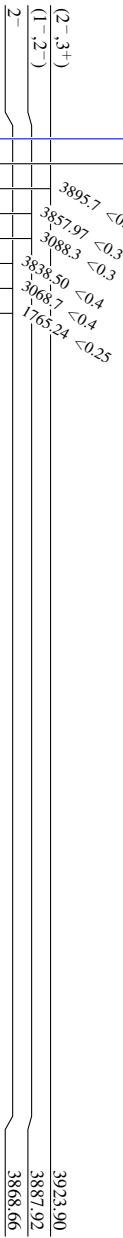
<sup>†</sup> As listed in [2006Me08](#) from literature.<sup>‡</sup> Intensity not listed by [2006Me08](#), the peak is overlapped by other transitions.

$^{40}\text{Ca}(\mu^-, \nu\gamma) \quad 2006\text{Me08}$ 

## Level Scheme

Legend  
 $I_\gamma < 2\%$   
 $I_\gamma < 10\% \times I_\gamma^{\max}$   
 $I_\gamma > 10\% \times I_\gamma^{\max}$

Intensities: Percent  $\gamma$ -ray yield/muon capture



2-

(1,2)<sup>-</sup>

1

0-

2-

4-

3-

1+

3+

1-

3-

2-

2+

0+

