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

| Type | Author | History Citation | Literature Cutoff Date |
|---|---|---|---|
| Full Evaluation | Jun Chen | NDS 149, 1 (2018) | 1-Jan-2018 |

2006Me08: the $\mu^-$ beam was obtained from decay of $\pi^-$ beam at 90 MeV/c provided by the beamline M9B at TRIUMF. Targets were pure natural calcium turnings with some oxide on the surface. $\gamma$ rays were detected with two HPGe detectors. Measured E$\gamma$, I$\gamma$, E(x ray), I(x ray), $\gamma\gamma$-coin,. Deduced levels, muon capture yields.

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-∞)p-1s | 1046-1063 | 2.8 *4* |

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-∞)d-2p | 261-277 | 1.4 *3* |

### $^{39}$K Levels

| E(level)[†] | J$^\pi$[†] | Percent Yield per muon capture[‡] | Comments |
|---|---|---|---|
| 0 | $3/2^+$ | | |
| 2522.8 | $1/2^+$ | 5.5 *5* | known cascading=1.21% *24*. |
| 2814.2 | $7/2^-$ | 3.3 *3* | known cascading=0.72% *23*. |
| 3018.7 | $3/2^-$ | 2.6 *3* | known cascading=0.20% *5*. |
| 3597.4 | $9/2^-$ | 0.6 *2* | known cascading=0.07% *3*. |
| 3883.2 | $5/2^-$ | 0.7 *3* | |
| 3938.9 | $3/2^+$ | 1.1 *3* | |
| 3944.1 | $11/2^-$ | 0.2 *1* | |
| 4081.9 | $3/2^-$ | 1.1 *3* | |
| 4095.6 | $1/2^+$ | 0.89 *24* | |
| 4126.5 | $7/2^-$ | 0.3 *2* | |
| 4474.3 | $1/2^-$,$3/2^-$ | 0.43 *22* | |
| 4930.3 | $3/2^+$ | <0.8 | |
| 5164.2 | $9/2^-$ | <1.3[#] | |
| 5165.7 | $5/2^-$,$7/2^-$,$9/2^-$ | <1.3[#] | |
| 5174.1 | (1/2,3/2,5/2) | <1.3[#] | |
| 5264.3 | $5/2^+$ | 1.0 *2* | |
| 5319.6 | $3/2^+$ | 0.55 *20* | |
| 5599.0 | $5/2^+$ | 0.4 *2* | |

Continued on next page (footnotes at end of table)

## $^{40}$Ca($\mu^-$,$\nu$n$\gamma$) 2006Me08 (continued)

### $^{39}$K Levels (continued)

| E(level)† | Jπ† | Percent Yield per muon capture‡ | Comments |
|---|---|---|---|
| 5826.3 | 1/2⁻,3/2⁻ | | Percent Yield per muon capture: spectroscopic strength not listed by 2006Me08, the peak is overlapped by other transitions. |
| 5891 | (5/2,7/2)⁻ | <0.6 | |
| 5939.4 | 5/2⁺ | <0.5 | |
| 6330.7 | 3/2⁺ | 1.1 *3* | |
| 6356 | 5/2⁺ | <1 | |
| >6381 | | | E(level): proton unbound. |
| >13077 | | | E(level): neutron unbound. |

† From Adopted Levels. Energies are rounded-off values.
‡ Corrected for known cascading (2006Me08).
# Combined for 5163.9+5165.5+5173.4 levels.

### γ($^{39}$K)

| Eγ† | Percent γ-ray yield | Ei(level) | $J_i^\pi$ | $E_f$ | $J_f^\pi$ |
|---|---|---|---|---|---|
| 346.7 | ‡ | 3944.1 | 11/2⁻ | 3597.4 | 9/2⁻ |
| 783.3 | ‡ | 3597.4 | 9/2⁻ | 2814.2 | 7/2⁻ |
| 1063.1 | <0.1 | 4081.9 | 3/2⁻ | 3018.7 | 3/2⁻ |
| 1129.9 | 0.12 *6* | 3944.1 | 11/2⁻ | 2814.2 | 7/2⁻ |
| 1220.1 | <0.35 | 5164.2 | 9/2⁻ | 3944.1 | 11/2⁻ |
| 1312.2 | 0.3 *2* | 4126.5 | 7/2⁻ | 2814.2 | 7/2⁻ |
| 1416.2 | <0.1 | 3938.9 | 3/2⁺ | 2522.8 | 1/2⁺ |
| 1455.6 | 0.07 *4* | 4474.3 | 1/2⁻,3/2⁻ | 3018.7 | 3/2⁻ |
| 1559.1 | 0.16 *8* | 4081.9 | 3/2⁻ | 2522.8 | 1/2⁺ |
| 1572.5 | 0.76 *20* | 4095.6 | 1/2⁺ | 2522.8 | 1/2⁺ |
| 1951.5 | 0.2 *1* | 4474.3 | 1/2⁻,3/2⁻ | 2522.8 | 1/2⁺ |
| 2351.5 | <0.3 | 5165.7 | 5/2⁻,7/2⁻,9/2⁻ | 2814.2 | 7/2⁻ |
| 2407.4 | <0.3 | 4930.3 | 3/2⁺ | 2522.8 | 1/2⁺ |
| 2473 | <0.2 | 6356 | 5/2⁺ | 3883.2 | 5/2⁻ |
| 2522.4 | 6.7 *5* | 2522.8 | 1/2⁺ | 0 | 3/2⁺ |
| 2814.1 | 4.0 *2* | 2814.2 | 7/2⁻ | 0 | 3/2⁺ |
| 3018.8 | 2.8 *3* | 3018.7 | 3/2⁻ | 0 | 3/2⁺ |
| 3077 | <0.4 | 5891 | (5/2,7/2)⁻ | 2814.2 | 7/2⁻ |
| 3597.3 | 0.35 *11* | 3597.4 | 9/2⁻ | 0 | 3/2⁺ |
| 3883.0 | 0.7 *3* | 3883.2 | 5/2⁻ | 0 | 3/2⁺ |
| 3938.3 | 1.0 *3* | 3938.9 | 3/2⁺ | 0 | 3/2⁺ |
| 4082.4 | 0.80 *25* | 4081.9 | 3/2⁻ | 0 | 3/2⁺ |
| 4474.0 | <0.5 | 4474.3 | 1/2⁻,3/2⁻ | 0 | 3/2⁺ |
| 4931.4 | <0.6 | 4930.3 | 3/2⁺ | 0 | 3/2⁺ |
| 5173.7 | <0.4 | 5174.1 | (1/2,3/2,5/2) | 0 | 3/2⁺ |
| 5263.8 | 1.0 *2* | 5264.3 | 5/2⁺ | 0 | 3/2⁺ |
| 5319.2 | 0.55 *20* | 5319.6 | 3/2⁺ | 0 | 3/2⁺ |
| 5598.3 | 0.4 *2* | 5599.0 | 5/2⁺ | 0 | 3/2⁺ |
| 5825.6 | ‡ | 5826.3 | 1/2⁻,3/2⁻ | 0 | 3/2⁺ |
| 5938.8 | <0.5 | 5939.4 | 5/2⁺ | 0 | 3/2⁺ |
| 6332 | 1.1 *3* | 6330.7 | 3/2⁺ | 0 | 3/2⁺ |
| 6355 | <0.5 | 6356 | 5/2⁺ | 0 | 3/2⁺ |

† Rounded-off values from Adopted Gammas.
‡ Intensity not listed by 2006Me08, the peak is overlapped by other transitions.

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

Level Scheme

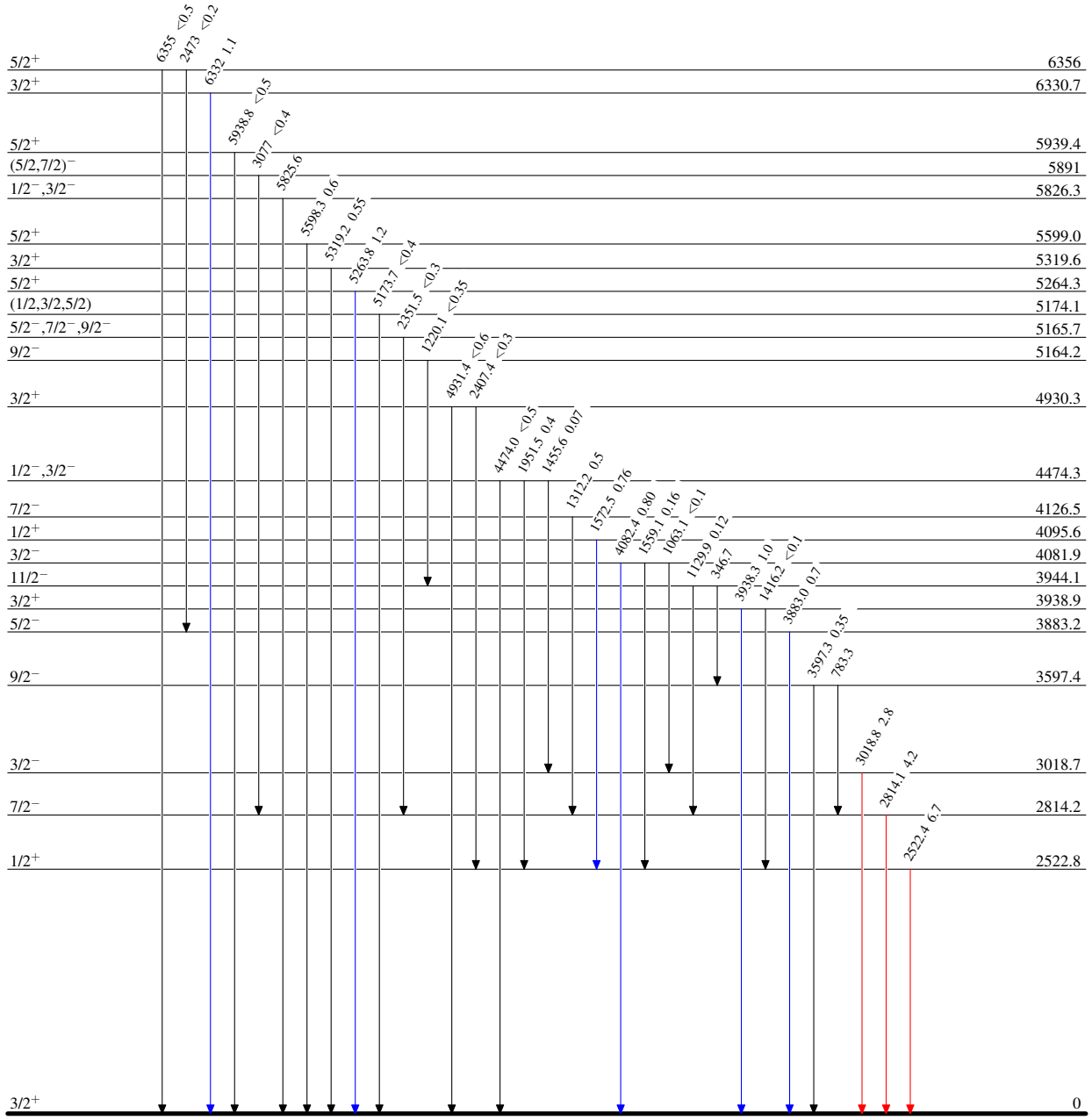
Intensities: Percent $\gamma$-ray yield/muon capture

Legend

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

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

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




$^{39}_{19}K_{20}$