## $^{44}$Ca(p,p′γ) 1970La09

History

| Type | Author | Citation | Literature Cutoff Date |
|---|---|---|---|
| Full Evaluation | Jun Chen and Balraj Singh | NDS 190,1 (2023) | 20-Jun-2023 |

1970La09: E=6.72, 8.06 MeV proton beam was produced from the Liverpool University tandem accelerator. Target was enriched calcium carbonate (98.6% $^{44}$Ca). Protons were detected with an annular silicon surface barrier detector and γ rays were detected with five NaI(Tl) crystals and a Ge(Li) detector. Measured Eγ, Iγ, γγ-coin, pγ(θ). Deduced levels, J, γ-branching, mixing ratios.

1972Gr04: E=4.235 MeV proton beam was produced from the Groningen 5 MV Van Graaff accelerator. Target was 87 μg/cm$^2$ CaO on a 185 μg/cm$^2$ carbon backing (81% $^{43}$Ca, 5% $^{44}$Ca). Scattered protons were detected with a Si detector and γ rays were detected with a 30 cm$^3$ true-coaxial Ge(Li) detector and a NaI crystal. Measured Eγ, Iγ, pγ-coin, Doppler-shift attenuation. Deduced information mainly for $^{43}$Ca, also $T_{1/2}$ for the levels of 1157 and 1885 keV in $^{44}$Ca using DSAM.

Others:

1966Ma31: Measured pγ(θ). Deduced mixing ratio.

1982Mi06: E=0.775-5.05 MeV. Measured γ-yields.

1982Sh12: E=2.315-2.9903 MeV.

1983Sh22: E=2.8-3.01 MeV. Measured Eγ, Iγ. Deduced resonances for $^{45}$Sc.

### $^{44}$Ca Levels

| E(level)[†] | Jπ[‡] | $T_{1/2}$[#] | Comments |
|---|---|---|---|
| 0 | 0+ | | |
| 1158 *1* | 2+ | 2.0 ps *+8−5* | |
| 1885 *1* | 0 | >1.4 ps | Jπ: pγ(θ) is isotropic. |
| 2285 *1* | 4 | | |
| 2657 *2* | 2 | | |
| 3049 *2* | 4 | | |
| 3303 *2* | 2 | | |
| 3310 *2* | 3 | | |
| 3359 *2* | | | |
| 3587 *3* | (0) | | |
| 3661 *3* | 1 | | |
| 3675 *3* | | | |
| 3775 *4* | 2 | | |
| 4200 | 2 | | E(level): from 1970La09; weakly excited (1970La09). |

† From 1970La09, based on Eγ data.

‡ Spin excited levels from pγ(θ) in 1970La09; parity from deduced multipolarities based on pγ(θ) and RUL where $T_{1/2}$ is measured.

# From DSAM in 1972Gr04.

### γ($^{44}$Ca)

| $E_i$(level) | $J_i^\pi$ | $E_\gamma$[†] | $I_\gamma$[†] | $E_f$ | $J_f^\pi$ | Mult.[‡] | δ[‡] | Comments |
|---|---|---|---|---|---|---|---|---|
| 1158 | 2+ | 1158 *1* | 100 | 0 | 0+ | E2 | | |
| 1885 | 0 | 727 *1* | 100 | 1158 | 2+ | Q | | |
| 2285 | 4 | 1127 *1* | 100 | 1158 | 2+ | Q+O | −0.05 *+4−3* | |
| 2657 | 2 | 1501 *2* | 85.5 *21* | 1158 | 2+ | D+Q | −0.15 *+4−9* | δ: other: −0.14 *7* (1966Ma31). |
| | | 2656 *3* | 14.5 *32* | 0 | 0+ | Q | | |
| 3049 | 4 | 764 *1* | 51 *4* | 2285 | 4 | D+Q | −0.25 *+9−31* | |
| | | 1890 *2* | 48.9 *15* | 1158 | 2+ | Q(+O) | −0.08 *+3−6* | |
| 3303 | 2 | 2144 *2* | 67 *6* | 1158 | 2+ | | | |
| | | 3304 *4* | 33 *5* | 0 | 0+ | Q | | |
| 3310 | 3 | 652 *1* | 5 *3* | 2657 | 2 | | | |
| | | 1026 *1* | 21 *5* | 2285 | 4 | | | |

Continued on next page (footnotes at end of table)

## $^{44}$Ca(p,p′γ) 1970La09 (continued)

### γ($^{44}$Ca) (continued)

| $E_i$(level) | $J_i^\pi$ | $E_\gamma$[†] | $I_\gamma$[†] | $E_f$ | $J_f^\pi$ | Mult.[‡] | δ[‡] |
|---|---|---|---|---|---|---|---|
| 3310 | 3 | 2150 *2* | 74 *6* | 1158 | $2^+$ | | |
| 3359 | | 1074 *1* | 100 | 2285 | 4 | | |
| | | 2201[#] | <5 | 1158 | $2^+$ | | |
| 3587 | (0) | 2429 *2* | 100 | 1158 | $2^+$ | (Q) | |
| 3661 | 1 | 1780 *2* | | 1885 | 0 | D | |
| | | 2508 *3* | | 1158 | $2^+$ | | |
| | | 3659 *4* | | 0 | $0^+$ | D | |
| 3675 | | 367 *1* | | 3310 | 3 | | |
| | | 1015 *1* | | 2657 | 2 | | |
| | | 2520 *3* | | 1158 | $2^+$ | | |
| 3775 | 2 | 1118 | 7.2 *35* | 2657 | 2 | | |
| | | 2617 *4* | 93 *4* | 1158 | $2^+$ | D+Q | −0.62 *+7−8* |
| 4200 | 2 | 3040 | 23 *5* | 1158 | $2^+$ | | |
| | | 4200 | 77 *3* | 0 | $0^+$ | Q | |

[†] From 1970La09.
[‡] From pγ(θ) in 1970La09. Magnetic or electric natures are determined based on RUL where $T_{1/2}$ is measured.
[#] Placement of transition in the level scheme is uncertain.

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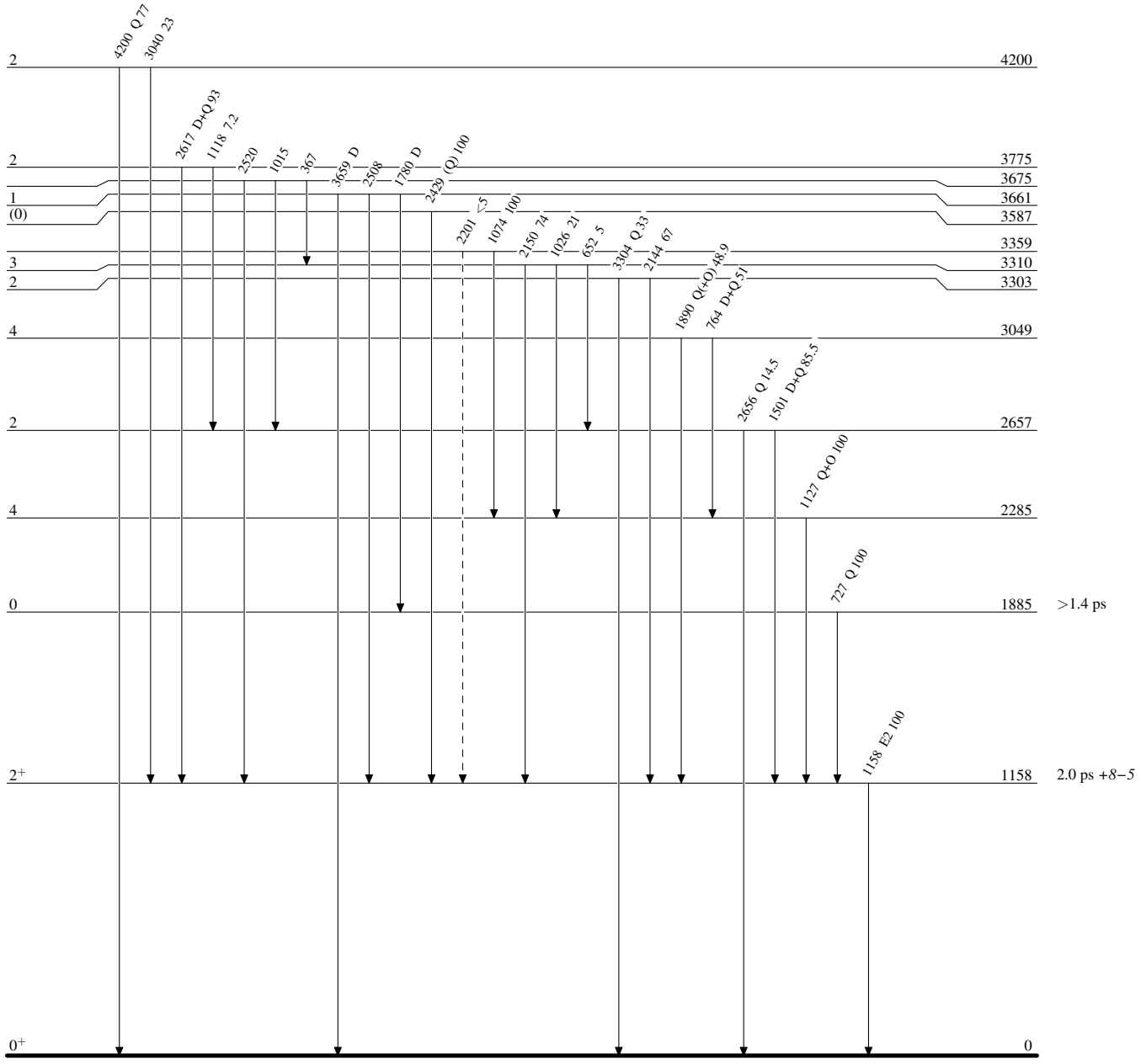
Legend

### Level Scheme

Intensities: % photon branching from each level

γ Decay (Uncertain)




$^{44}_{20}Ca_{24}$