**Coulomb excitation** **2016Ca17,2003Sc21,1973To07**

History

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

2016Ca17: $^{208}$Pb($^{44}$Ca,$^{44}$Ca′$\gamma$),E=36.8 MeV/nucleon. $^{44}$Ca beam was produced by fragmentation of 60 MeV/nucleon $^{48}$Ca primary beam on a $^{9}$Be production target at LISE/GANIL facility. Fragments were separated by the LISE3 spectrometer. The secondary target was 200 mg/cm$^2$ $^{208}$Pb. Scattered particles were detected with a DSSSD detector and $\gamma$ rays were detected with the Chateau de Cristal of 64 Hexagonal $BaF_2$ detectors. Measured E$\gamma$, I$\gamma$, (particle)$\gamma$-coin, $\gamma(\theta)$, $\sigma$(E$\gamma$). Deduced levels, B(E2). See also 2014Ca10.

2003Sc21: C($^{44}$Ca,$^{44}$Ca′$\gamma$) E=95 MeV $^{44}$Ca beam was produced from the Cologne tandem accelerator. Target was 0.45 mg/cm$^2$ natural carbon deposited in Gd evaporated on tantalum and copper backings. Scattered particles were detected with a Si detector and $\gamma$ rays were detected with four NaI(Tl) scintillators and a Ge detector. Measured E$\gamma$, I$\gamma$, (particle)$\gamma$-coin, Doppler-shift attenuation. Deduced levels, g-factors, $T_{1/2}$, B(E2).

1973To07: $^{44}$Ca($^{32}$S,$^{32}$S′$\gamma$) E=55 MeV $^{32}$S beam produced from the University of Rochester MP tandem Van de Graaff accelerator. Target was 98.6% enriched $^{44}$Ca. Scattered particles were detected with four particle detectors and $\gamma$ rays were detected with four NaI(Tl) detectors. Measured E$\gamma$, particle-$\gamma$-coin. Deduced B(E2).

2003Ta05: C,Cu,Gd($^{44}$Ca,$^{44}$Ca′$\gamma$) E=85,90,95 MeV $^{44}$Ca beam was produced from the Wright Nuclear Structure Laboratory (WNSL) at Yale. Targets were carbon, gadolinium and copper. $\gamma$ rays were detected with four NaI(Tl) scintillators and a 70% efficient Ge for detecting $\gamma$-rays. Measured E$\gamma$, I$\gamma$, (particle)$\gamma$-coin. Deduced g-factor for the level of 1157 keV.

Others:

1972Bi17: ($\alpha$,$\alpha'\gamma$) E($\alpha$)=4.5, 4.75, 5 MeV. Measured B(E2).

1973Fi15: ($^{35}$Cl,$^{35}$Cl′$\gamma$) E=55-68 MeV. Measured DSA.

1961An07: ($^{14}$N,$^{14}$N′$\gamma$) E=16.8, 21.5 MeV; ($^{20}$Ne,$^{20}$Ne′$\gamma$) E=26 MeV.

## $^{44}$Ca Levels

| E(level) | $J^\pi$ † | $T_{1/2}$ | Comments |
|---|---|---|---|
| 0 | $0^+$ | | |
| 1157 | $2^+$ | 3.12 ps *27* | B(E2)↑=0.0475 *20*<br>Q=−0.14 *7* (1973To07)<br>$T_{1/2}$: weighted average of 3.05 ps *28* (2003Sc21) and 3.19 ps *27* (1973Fi15), both by DSA. Other: 2.88 ps *12* from B(E2)↑=0.0475 *20*.<br>B(E2)↑: weighted average of 0.0475 *36* (2016Ca17), 0.0473 *20* (1973To07), and 0.049 *5* (1972Bi17). Other: 0.035 (1961An07).<br>g−factor=+0.17 *3* (2003Sc21), +0.12 *5* (2003Ta05).<br>Experimental $\sigma$=53 mb *4* (2016Ca17). |
| 2283 | $4^+$ | | |
| 2657? | $2^+$ | | B(E2)↑<0.0041 (2016Ca17)<br>E(level): rounded value from the Adopted Levels. |

† From the Adopted Levels.

## $\gamma$($^{44}$Ca)

| $E_\gamma$ † | $E_i$(level) | $J^\pi_i$ | $E_f$ | $J^\pi_f$ | Mult. | Comments |
|---|---|---|---|---|---|---|
| 1126.1 | 2283 | $4^+$ | 1157 | $2^+$ | | |
| 1157.0 | 1157 | $2^+$ | 0 | $0^+$ | E2 | $E_\gamma$: other: 1159 *3* from 2016Ca17.<br>Mult.: from the Adopted Levels, Gammas dataset.<br>B(E2)(W.u.)=9.7 *9* (2003Sc21), from measured lifetime. |
| 1499‡ | 2657? | $2^+$ | 1157 | $2^+$ | | $E_\gamma$: rounded value from the Adopted Gammas. This $\gamma$ with a branching of 90% was not seen by 2016Ca17, but an upper limit of 95 counts was stated by the authors from the detection sensitivity in their $\gamma$-ray spectrum. |

Continued on next page (footnotes at end of table)

**Coulomb excitation** **2016Ca17,2003Sc21,1973To07** **(continued)**

$\gamma(^{44}Ca)$ (continued)

† From 2003Sc21.
‡ Placement of transition in the level scheme is uncertain.

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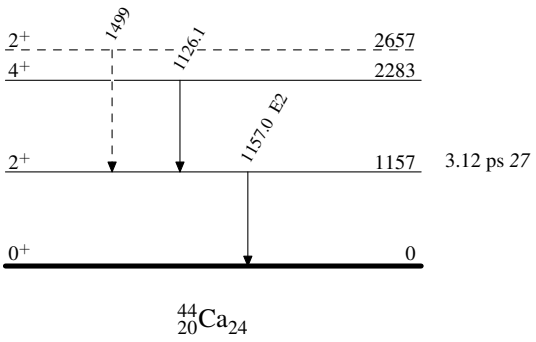
Level Scheme




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