

⁴⁸Ca($\alpha,\alpha'\gamma$) 2014De04

Type	Author	History Citation	Literature Cutoff Date
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2014De04: E=136 MeV α beam was produced from the AGOR cyclotron at Kernfysich Versneller Institute in Groningen, Netherlands. Target was 1.7 mg/cm² 99% enriched self-supporting ⁴⁸Ca. Scattered α particles detected by EUROSUPERNOVA detection system of the QQD-type Big-Bite Spectrometer at $\theta_{lab}=5.8^\circ$ and γ rays were detected with an array of six HPGe detectors. Measured E_α , E_γ , $\alpha\gamma$ -coin, $\alpha\gamma(\theta=80^\circ$ to $280^\circ)$. Deduced levels, J, π , transition strength from DWBA analysis. Comparison with RPA (Random Phase Approximation) calculations. **2014De04** also report data on (γ,γ') and re-analysis of $\sigma(\theta)$ data from (γ,γ') by **2002Ha13**.

⁴⁸Ca Levels

E(level) [†]	J π [‡]	Comments
0.0	0 ⁺	
3831	2	
4506	3	
6600	1	
6800	2	
(7300)	1 ⁻	E(level): 7.3 MeV dominant isovector state was not observed in the $(\alpha,\alpha'\gamma)$. The authors state that α particle in inelastic scattering is selective to the excitation of natural parity, and since the 7.3-MeV state was not observed, it could be a positive parity. However in a separate (pol γ,γ') experiment, the 7.3-MeV state was observed and indicated to have a negative parity. Hence the absence of the 7.3 MeV state in the $(\alpha,\alpha'\gamma)$ experiment cannot be explained by its parity.
7651	1	E(level): 7.6 MeV dominant isoscalar state.
8050	2	
8400	1	
8900	1 ^{-#}	J π : spin=2 from Fig.1 of 2014De04 from $(\alpha,\alpha'\gamma)$, but 1 ⁻ is determined by 2014De04 from re-analysis of $\gamma(\theta)$ of 2002Ha13 in (γ,γ') and a γ asymmetry measurement with (γ,γ') by 2014De04 . This discrepancy could indicate two separate levels with close energies.
9050	1	
9300	1 [#]	
9470	1	
9550	1	

[†] From γ decays to the ground state.

[‡] From $\alpha\gamma(\theta)$ in **2014De04** for excited states, unless otherwise noted.

[#] From reanalysis of $\gamma(\theta)$ of **2002Ha13** in (γ,γ') and additional γ asymmetry measurement by **2014De04**. Previously, J=2 was assigned by **2002Ha13**.

$\gamma(^{48}\text{Ca})$

E_γ [†]	E_i (level)	J π_i	E_f	J π_f	Mult. [#]	Comments
3831 [‡]	3831	2	0.0	0 ⁺	Q	
4506 [‡]	4506	3	0.0	0 ⁺	O	
6600	6600	1	0.0	0 ⁺	D	
6800	6800	2	0.0	0 ⁺	Q	
(7300)	(7300)	1 ⁻	0.0	0 ⁺		E_γ : from (γ,γ') by 2014De04 ; not seen in $(\alpha,\alpha'\gamma)$.
7651 [‡]	7651	1	0.0	0 ⁺	D	
8050	8050	2	0.0	0 ⁺		
8400	8400	1	0.0	0 ⁺	D	
8900	8900	1 ⁻	0.0	0 ⁺	D	
9050	9050	1	0.0	0 ⁺	D	

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 ${}^{48}\text{Ca}(\alpha, \alpha' \gamma)$ **2014De04** (continued) $\gamma({}^{48}\text{Ca})$ (continued)

<u>E_γ</u> [†]	<u>$E_i(\text{level})$</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.</u> [#]
9300	9300	1	0.0	0 ⁺	D
9470	9470	1	0.0	0 ⁺	D
9550	9550	1	0.0	0 ⁺	D

[†] Estimated from Fig. 1 of [2014De04](#), unless otherwise noted.

[‡] From Fig. 4 of [2014De04](#).

[#] From $\alpha\gamma(\theta)$ in [2014De04](#).

$^{48}\text{Ca}(\alpha, \alpha' \gamma)$ 2014De04

Legend

Level Scheme

-----► γ Decay (Uncertain)