^{48}Ca β^- decay: ? 2002Bb03,2000HuZZ,1985Al17

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 179, 1 (2022)	30-Nov-2021

Parent: ^{48}Ca: E=0.0; $J^\pi=0^+$; $T_{1/2}=2.9\times10^{19}$ y *+42−11*; $Q(\beta^-)=279$ *5*; $\%\beta^-$ decay≤63.0

^{48}Ca-$T_{1/2}$: From ^{48}Ca Adopted Levels. $T_{1/2}(2\beta^-)=2.5\times10^{19}$ y *+39−10* estimated by evaluator from partial $T_{1/2}(2\beta^-)$'s to g.s., 984, 2421, and 2997. Other: $T_{1/2}(2\nu2\beta^-)=2.87\times10^{19}$ y *51* (2004Ra26, from analysis of Gamow-Teller strengths in ^{48}Ti(d,2p) and ^{48}Ca(p,n)) and 3.55×10^{19} y *75* (2006Fr03, preliminary, from analysis of Gamow-Teller strengths in ^{48}Ti(d,2p) and ^{48}Ca(^{3}He,t)).

^{48}Ca-$Q(\beta^-)$: From 2021Wa16.

^{48}Ca-$\%\beta^-$ decay: 25% *+38−25* from ^{48}Ca Adopted Levels.

1985Al17 searched for ^{48}Ca β^- decay in a 3.71-g ^{48}Ca sample; $\gamma\gamma$ coincidences were measured in HPGE (well-type) and NaI detectors. ^{48}Sc 252, 4^+, state assumed not to be fed since the feeding would be fourth-forbidden nonunique with a $Q(\beta^-)$ of only 26 *5*.

2000HuZZ searched for ^{48}Ca β^- decay in the Modane Underground Laboratory using 64-g of $^{48}CaCo_3$ powder (73% enriched). No event associated with the cascade γ's of 984, 1038, and 1312 keV from 44-h ^{48}Sc β^- decay was found in a spectrum accumulated for 797 hours; HPGe.

2002Bb03,2002Ba33: source was a powder of $^{48}CaCO_3$ (73% ^{48}Ca) at Modane Underground Laboratory. Measured Eγ, Iγ with low-background 400 cm^3 HPGe with a passive shield of 6 cm lead, 10 cm of OFHC copper, and 15 cm of ordinary lead. 2002Bb03 repeat the measurement by 2002Ba33 since large impurities were found in the latter. Results in 2002Bb03 supersede those in 2002Ba33. $T_{1/2}(\beta^-)>1.6\times10^{20}$ y, $>2.5\times10^{20}$ y, $>1.9\times10^{20}$ y for single β^- decay to g.s., 131 and 152 levels, respectively, all with 90% C.L.

No event from ^{48}Ca β^- decay has been observed.

^{48}Sc Levels

All data except for comments on partial β^- decay half-lives are from Adopted Levels.

E(level)	J^π	$T_{1/2}$	Comments
(0.)	6^+	43.67 h *9*	$T_{1/2}(\beta^-)>1.6\times10^{20}$ y (2002Bb03; 90% C.L.) to this state. Theory: 1.5×10^{29} y≤$T_{1/2}(\beta^-)$≤1.3×10^{31} y (1999Au05).
(130.94 *4*)	5^+		$T_{1/2}(\beta^-)>2.5\times10^{20}$ y (2002Bb03; 90% C.L.) to this state. Theory: 1.1×10^{21} y *+8−6* (1999Au05). 7.6×10^{20} y *53* (1985Wa14).
(252.35 *6*)	4^+		$T_{1/2}(\beta^-)>1.9\times10^{20}$ y (2002Bb03; 90% C.L.) to this state? unlikely to be fed since the feeding would be fourth-forbidden nonunique with $Q(\beta^-)=30$ *5* (evaluator). Theory: 8.8×10^{23} y≤$T_{1/2}(\beta^-)$≤5.2×10^{28} y (1999Au05).

$\gamma(^{48}Sc)$

E_γ [†]	E_i(level)	J^π_i	E_f	J^π_f
(121.41 *4*)	(252.35)	4^+	130.94?	5^+
(130.94 *4*)	(130.94)	5^+	0.?	6^+

[†] From Adopted Gammas.

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Decay Scheme