^{45}K β^- decay 1980Hu10

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	T. W. Burrows	NDS 109, 171 (2008)	30-Oct-2007

Parent: ^{45}K: E=0.0; J$^\pi$=3/2$^+$; $T_{1/2}$=17.81 min *61*; Q(β^-)=4196.5 *7*; %β^- decay=100.0
^{45}K-E,J$^\pi$,$T_{1/2}$: From the ^{45}K Adopted Levels.
^{45}K-Q(β^-): From the ^{45}K Adopted Levels.
Measured $\gamma\gamma$(t) and parent $T_{1/2}$ ($4\pi\beta$,scin). See ^{45}Ar β^- decay for other details.

^{45}Ca Levels

E(level)	J$^\pi$ †	$T_{1/2}$ †‡	Comments
0.0	7/2$^-$	162.61 d *9*	%β^-=100 %β^-: from the Adopted Levels.
174.28 *3*	5/2$^-$		
1434.56 *12*	3/2$^-$		
1879.90 *16*	3/2$^+$		see footnote In the Adopted Levels.
1899.72 *14*	3/2$^-$		
2248.7 *4*	1/2$^-$		
2353.72 *16*	1/2$^+$,3/2$^+$,5/2$^+$	4.7 ns *11*	
2392.13 *16*	1/2$^+$		
2523.0? *4*	(3/2,5/2,7/2)		tentatively proposed by 1980Hu10 on basis of doublet nature of 2354γ In $\gamma\gamma$-coin where a contribution of a 2349γ is assumed.
2771.07 *15*	1/2$^+$,3/2$^+$,5/2$^+$		
2841.0 *5*	3/2$^-$		
2976.8 *5*	5/2$^-$		J$^\pi$: 1980Hu10 note that the second 5/2$^-$ state is At 3084 *2* In the cross-conjugate nucleus ^{51}V.
3023.7 *4*	1/2,3/2,5/2		
3294.5 *3*	(3/2$^+$,5/2$^+$)		
3490.6 *5*	3/2$^-$,5/2$^+$		
3654.1? *5*	1/2,3/2,5/2		tentatively proposed by 1980Hu10 based on the existence of two γ's with ΔE=174 keV.
3705.0 *6*	1/2,3/2,5/2		

† From the Adopted Levels.
‡ From $\gamma\gamma$(t).

β^- radiations

log *ft*(α) log $f^{1u}t\geq$8.5.
log *ft*(E) from the $f^{1u}t$ systematics of 1973Ra10. Δlog $f^{1u}t$ corresponds to the range of $f^{1u}t$ values which includes≈70% of similar known cases.

E(decay)	E(level)	Iβ^- #	Log *ft*	Comments
(491.5 *9*)	3705.0	0.0084 *17*	6.9 *1*	av Eβ=163.04 *36*
(542.4@ *9*)	3654.1?	0.046 *7*	6.31 *7*	av Eβ=182.72 *34*
(705.9 *9*)	3490.6	0.153 *19*	6.20 *6*	av Eβ=248.01 *36*
(902.0 *8*)	3294.5	0.66 *8*	5.97 *6*	av Eβ=329.69 *33*
(1172.8 *8*)	3023.7	0.084 *8*	7.31 *5*	av Eβ=446.93 *36*
(1219.7 *9*)	2976.8	0.46 *3*	6.64 *4*	av Eβ=467.64 *39*
(1355.5 *9*)	2841.0	0.079 *9*	7.59 *6*	av Eβ=528.19 *39*
(1425.4 *7*)	2771.07	6.6 *10*	5.75 *7*	av Eβ=559.67 *33*

Continued on next page (footnotes at end of table)

^{45}K β^- decay 1980Hu10 (continued)

β^- radiations (continued)

E(decay)	E(level)	Iβ^- [#]	Log *ft*	Comments
(1673.5[@] *8*)	2523.0?	<0.064	>8.0	av Eβ=672.68 *37*
(1804.4 *7*)	2392.13	10.0 *8*	5.99 *4*	av Eβ=733.03 *34*
(1842.8 *7*)	2353.72	15.5 *10*	5.84 *4*	av Eβ=750.82 *34*
(1947.8 *8*)	2248.7	0.015 *7*	9.0 *+3−1*	av Eβ=8799.64 *38*
(2296.8 *7*)	1899.72	0.06[†] *4*	8.7 *+5−2*	av Eβ=963.40 *34*
(2316.6 *7*)	1879.90	51 *4*	5.74 *4*	av Eβ=972.76 *34*
(2761.9 *7*)	1434.56	1.4 *8*	7.6 *+4−2*	av Eβ=1184.47 *34*
(4022.2 *7*)	174.28	7.9[†] *8*	7.60 *5*	av Eβ=1792.65 *34* Additional information 1.
(4196.5 *7*)	0.0	5[‡]	9.5^{1u} *+3−2*	av Eβ=1889.32 *34*

† Uncertain γ's included In calculation As (Iγ+ΔIγ)/2.
‡ Only the presence of non-zero feeding of the g.s. could Be established, using the technique of 1972Wo12. 1980Hu10 conservatively estimated Iβ=5 *+4−2*, based on the $f^{1u}t$ systematics of 1973Ra10.
# Absolute intensity per 100 decays.
@ Existence of this branch is questionable.

γ(^{45}Ca)

Iγ normalization: 0.0532 *12*−23 from Σ Iγ(1+α)(to g.s.)=95 *2*−4. Δ(γ-normalization) includes the 5% systematic uncertainty on Iγ estimated by 1980Hu10 and originally included In their ΔIγ.

Gammas which were not observed In the coincidence spectra, or At their total energy for high energy gammas, were considered to Be direct transitions to the g.s. with the additional assumption of No γ-feeding to the concerned state.

E_γ	I_γ[†f]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	α[‡]	Comments
174.28[#] *3*	1412[@] *14*	174.28	5/2−	0.0	7/2−	(M1)	0.00326 *5*	α=0.00326 *5*; α(K)=0.00297 *5*; α(L)=0.000259 *4*; α(M)=3.08×10^{-5} *5*; α(N+..)=1.727×10^{-6} *25* α(N)=1.727×10^{-6} *25*
349.1 *5*	0.09 *2*	2248.7	1/2−	1899.72	3/2−	(M1)	0.000626 *9*	α=0.000626 *9*; α(K)=0.000570 *8*; α(L)=4.94×10^{-5} *7*; α(M)=5.86×10^{-6} *9* α(N+..)=3.31×10^{-7} *5* α(N)=3.31×10^{-7} *5*
417.4 *3*	7.1 *2*	2771.07	1/2+,3/2+,5/2+	2353.72	1/2+,3/2+,5/2+			
453.9 *3*	0.80 *9*	2353.72	1/2+,3/2+,5/2+	1899.72	3/2−	(M2)		
465.2 *3*	1.80 *5*	1899.72	3/2−	1434.56	3/2−	(M1+E2)	0.0006 *3*	α=0.0006 *3*; α(K)=0.00054 *24*; α(L)=4.6×10^{-5} *21*; α(M)=5.5×10^{-6} *25* α(N+..)=3.1×10^{-7} *14* α(N)=3.1×10^{-7} *14*
492.5 *2*	24	2392.13	1/2+	1899.72	3/2−	(E1)	0.000198 *3*	α=0.000198 *3*; α(K)=0.000180 *3*; α(L)=1.549×10^{-5} *22*; α(M)=1.84×10^{-6} *3* α(N+..)=1.039×10^{-7} *15* α(N)=1.039×10^{-7} *15*
512[&] *1*	23 *8*	2392.13	1/2+	1879.90	3/2+	(M1)	0.000267 *4*	α=0.000267 *4*; α(K)=0.000244 *4*; α(L)=2.10×10^{-5} *3*; α(M)=2.49×10^{-6} *4* α(N+..)=1.413×10^{-7} *21* α(N)=1.413×10^{-7} *21*
522.4 *8*	0.08 *7*	2771.07	1/2+,3/2+,5/2+	2248.7	1/2−			
623.4[ag] *6*	0.14 *7*	2523.0?	(3/2,5/2,7/2)	1899.72	3/2−			
771.4[ag] *8*	2.1 *3*	3294.5	(3/2+,5/2+)	2523.0?	(3/2,5/2,7/2)			
813.4 *12*	0.11 *4*	2248.7	1/2−	1434.56	3/2−	(M1)	0.0001020 *15*	α=0.0001020 *15*; α(K)=9.26×10^{-5} *13*; α(L)=7.96×10^{-6} *12*; α(M)=9.45×10^{-7} *14* α(N+..)=5.37×10^{-8} *8* α(N)=5.37×10^{-8} *8*
[x]834.5 *12*	0.4 *1*							
[x]847.5 *12*	0.4 *1*							
871.3 *5*	2.4 *3*	2771.07	1/2+,3/2+,5/2+	1899.72	3/2−			
891.3 *4*	11 *7*	2771.07	1/2+,3/2+,5/2+	1879.90	3/2+			
919.3 *3*	16.4 *6*	2353.72	1/2+,3/2+,5/2+	1434.56	3/2−	(E1,M2)		

From ENSDF

γ(^{45}Ca) (continued)

E_γ	I_γ[†f]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	α[‡]	Comments
957.5[@] 2	144[@]	2392.13	1/2$^+$	1434.56	3/2$^-$	(E1)		4.37×10^{-5} 7	α=4.37×10^{-5} 7; α(K)=3.98×10^{-5} 6; α(L)=3.41×10^{-6} 5; α(M)=4.05×10^{-7} 6; α(N+..)=2.30×10^{-8} 4 α(N)=2.30×10^{-8} 4
1098.0 6	1.6 3	3490.6	3/2$^-$,5/2$^+$	2392.13	1/2$^+$				
1260.3[@] 2	161[@]	1434.56	3/2$^-$	174.28	5/2$^-$	M1+E2		6.6×10^{-5} 8	α=6.6×10^{-5} 8; α(K)=4.4×10^{-5} 5; α(L)=3.8×10^{-6} 4; α(M)=4.5×10^{-7} 5; α(N+..)=1.7×10^{-5} 4 α(N)=2.6×10^{-8} 3; α(IPF)=1.7×10^{-5} 4
1336.4 8	52 14	2771.07	1/2$^+$,3/2$^+$,5/2$^+$	1434.56	3/2$^-$				
1434.5 2	80	1434.56	3/2$^-$	0.0	7/2$^-$	(E2)		0.0001060 15	α=0.0001060 15; α(K)=3.70×10^{-5} 6; α(L)=3.18×10^{-6} 5; α(M)=3.77×10^{-7} 6 α(N+..)=6.53×10^{-5} 10 α(N)=2.14×10^{-8} 3; α(IPF)=6.53×10^{-5} 10
1705.6[@] 2	1000[@]	1879.90	3/2$^+$	174.28	5/2$^-$	(E1)		0.000441 7	α=0.000441 7; α(K)=1.457×10^{-5} 21; α(L)=1.247×10^{-6} 18; α(M)=1.481×10^{-7} 21 α(N+..)=0.000425 6 α(N)=8.42×10^{-9} 12; α(IPF)=0.000425 6
1725.5 3	18.0 5	1899.72	3/2$^-$	174.28	5/2$^-$	M1+E2	+0.34 4	1.70×10^{-4} 3	α=1.70×10^{-4} 3; α(K)=2.31×10^{-5} 4; α(L)=1.98×10^{-6} 3; α(M)=2.35×10^{-7} 4 α(N+..)=0.0001449 23 α(N)=1.338×10^{-8} 19; α(IPF)=0.0001448 23
[x]1750.9[b] 6	0.7 1								
1860.4 12	1.00 9	3294.5	(3/2$^+$,5/2$^+$)	1434.56	3/2$^-$				
1879.9[@] 3	3.8[c] 2	1879.90	3/2$^+$	0.0	7/2$^-$	(M2)		0.0001380 20	α=0.0001380 20; α(K)=3.35×10^{-5} 5; α(L)=2.88×10^{-6} 4; α(M)=3.42×10^{-7} 5 α(N+..)=0.0001011 15 α(N)=1.94×10^{-8} 3; α(IPF)=0.0001011 15
1899.7 3	8.8 5	1899.72	3/2$^-$	0.0	7/2$^-$	(E2)		0.000289 5	α=0.000289 5; α(K)=2.13×10^{-5} 3; α(L)=1.82×10^{-6} 3; α(M)=2.17×10^{-7} 3 α(N+..)=0.000265 4 α(N)=1.232×10^{-8} 18; α(IPF)=0.000265 4
[x]1940.5[b] 8	0.2 1								
2074.8 20	0.16 10	2248.7	1/2$^-$	174.28	5/2$^-$	(E2)		0.000371 6	α=0.000371 6; α(K)=1.81×10^{-5} 3; α(L)=1.553×10^{-6} 22; α(M)=1.84×10^{-7} 3 α(N+..)=0.000351 5 α(N)=1.049×10^{-8} 15; α(IPF)=0.000351 5
2179.4 3	18.0 5	2353.72	1/2$^+$,3/2$^+$,5/2$^+$	174.28	5/2$^-$	(M2)			
2217.3[e] 6	0.4 1	2392.13	1/2$^+$	174.28	5/2$^-$	(M2)		0.000225 4	α=0.000225 4; α(K)=2.41×10^{-5} 4;

γ(^{45}Ca) (continued)

E_γ	I_γ [†f]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	α[‡]	Comments
								α(L)=2.07×10^{-6} *3*; α(M)=2.46×10^{-7} *4* α(N+..)=0.000198 *3* α(N)=1.398×10^{-8} *20*; α(IPF)=0.000198 *3*
[x]2231.0 *8*	0.21 *7*							
2349[dg] *1*	2.0 *7*	2523.0?	(3/2,5/2,7/2)	174.28	5/2$^-$			
2353.6[@] *5*	268[@] *4*	2353.72	1/2$^+$,3/2$^+$,5/2$^+$	0.0	7/2$^-$	(E1,M2,E3)		
2392.0[e] *4*	0.21 *8*	2392.13	1/2$^+$	0.0	7/2$^-$	[E3]	0.000336 *5*	α=0.000336 *5*; α(K)=2.14×10^{-5} *3*; α(L)=1.84×10^{-6} *3*; α(M)=2.18×10^{-7} *3* α(N+..)=0.000313 *5* α(N)=1.240×10^{-8} *18*; α(IPF)=0.000313 *5*
2522.7[ag] *6*	0.4 *1*	2523.0?	(3/2,5/2,7/2)	0.0	7/2$^-$			
2596.7[#] *2*	52.0[@] *15*	2771.07	1/2$^+$,3/2$^+$,5/2$^+$	174.28	5/2$^-$			
2666.3 *6*	0.8 *1*	2841.0	3/2$^-$	174.28	5/2$^-$	D,E2		
2769.9 *10*	0.41 *8*	2771.07	1/2$^+$,3/2$^+$,5/2$^+$	0.0	7/2$^-$			
2802.4 *6*	6.8 *2*	2976.8	5/2$^-$	174.28	5/2$^-$	D,E2		
2841.5 *8*	0.7 *1*	2841.0	3/2$^-$	0.0	7/2$^-$	(E2)	0.000726 *11*	α=0.000726 *11*; α(K)=1.061×10^{-5} *15*; α(L)=9.07×10^{-7} *13*; α(M)=1.078×10^{-7} *15* α(N+..)=0.000714 *10* α(N)=6.14×10^{-9} *9*; α(IPF)=0.000714 *10*
2849.3 *4*	1.6 *1*	3023.7	1/2,3/2,5/2	174.28	5/2$^-$			
2976.7 *6*	2.0	2976.8	5/2$^-$	0.0	7/2$^-$	(E2)	0.000785 *11*	α=0.000785 *11*; α(K)=9.85×10^{-6} *14*; α(L)=8.42×10^{-7} *12*; α(M)=1.001×10^{-7} *14* α(N+..)=0.000774 *11* α(N)=5.70×10^{-9} *8*; α(IPF)=0.000774 *11*
3120.2 *4*	6.2 *3*	3294.5	(3/2$^+$,5/2$^+$)	174.28	5/2$^-$			
3294.3 *4*	4.2 *2*	3294.5	(3/2$^+$,5/2$^+$)	0.0	7/2$^-$			
[x]3367.4 *8*	0.07 *1*							
[x]3406.4 *8*	0.07 *1*							
3479.9[dg] *8*	0.7 *1*	3654.1?	1/2,3/2,5/2	174.28	5/2$^-$			
3491.0 *6*	1.30 *8*	3490.6	3/2$^-$,5/2$^+$	0.0	7/2$^-$			
3653.8[dg] *6*	0.18 *4*	3654.1?	1/2,3/2,5/2	0.0	7/2$^-$			
3704.8 *6*	0.16 *3*	3705.0	1/2,3/2,5/2	0.0	7/2$^-$			

[†] See comment on Iγ normalization. Also see Table IV of 1980Hu10 for % branching ratios.

[‡] From the Adopted Gammas.

[#] 173.26 *5* and 2597.8 *1*, respectively, from 1975TiZY and PRIV.COMM. (L.G. Multhauf and S. Raman) to 1980Hu10. 1980Hu10 obtained a precise value for the 174γ by a separate high-gain run with simultaneous storage of ^{133}Ba and ^{152}Eu sources; this measurement was used As a low energy calibration point.

[@] Consistent with results of 1975TiZY and PRIV.COMM. (L.G. Multhauf and S. Raman) to 1980Hu10.

γ(^{45}Ca) (continued)

[&] The coincidence gate included a 511γ component which was also observed As a coincidence G. The coincident 1706γ was observed along with the single- and double-escape peaks. Only the single- and double-escape peaks of the coincident 2354γ were observed and only the double-escape peak of the 2597γ was observed In this gate. The gate on the 512γ showed an unexpected enhancement of the 1706γ. Therefore, 1980Hu10 postulate that the 512γ was a transition between the 2392- and 1880-keV states.

[a] Placed only on basis of energy balance.

[b] May correspond to the 1751.1γ and the 1938.1γ or 1942γ In (n,γ), respectively.

[c] 147 *8* from 1975TiZY and PRIV.COMM. (L.G. Multhauf and S. Raman) to 1980Hu10. 1980Hu10 suggest that their value is correct from the nonobservation of the 1880γ In (n,γ); however, from the large discrepancy In Eγ for the$\approx$1.7−MeV γ between β^- decay and (d,pγ) (1706) and (n,γ) (1710.1 *4*, the evaluator believes that different states are populated In β^- decay and (d,pγ).

[d] See comment on associated level.

[e] See comment on adopted G.

[f] For absolute intensity per 100 decays, multiply by 0.0527 *32*.

[g] Placement of transition in the level scheme is uncertain.

[x] γ ray not placed in level scheme.

$^{45}_{20}$Ca$_{25}$-6

^{45}K β^- decay 1980Hu10