^{44}Ar β^- decay (11.87 min) 1978Hu10

History

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

Parent: ^{44}Ar: E=0.0; $J^\pi=0^+$; $T_{1/2}$=11.87 min *5*; Q(β^-)=3108.2 *16*; %β^- decay=100

^{44}Ar-J^π: From Adopted Levels of ^{44}Ar.

^{44}Ar-Q(β^-): From 2021Wa16.

1978Hu10 (also 1978Hu15): ^{44}Ar isotope produced in the spallation reaction ^{51}V(p,6pxn) with the protons from the 600 MeV external beam of the CERN synchrocyclotron. Argon nuclides isotopically separated in the ISOLDE on-line mass separator. Ge(Li) detectors for detecting γ-rays. Measured Eγ, Iγ, $\gamma\gamma$-coin.

Others: 1970Hu11, 1969La16.

^{44}K Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[‡]	Comments
0.0	2^-	22.13 min *19*	
182.64 *6*	(1^-)	<0.9 ns	$T_{1/2}$: adopted value from $\gamma\gamma$(t) (1978Hu10).
382.90 *9*	(3^-)	<0.7 ns	
519.98 *19*	(4^-)	<0.7 ns	
1051.30 *8*	(3^-)		
1076.80 *7*	(2^-)		
1459.39 *7*	(1^-)		
1886.05 *6*	1^+		
2325.92 *18*	1^+		
2574.11 *12*	1^+		

[†] From a least-squares fit to γ-ray energies. In the fitting procedure, $\Delta E\gamma$ for 1460.0γ has been doubled to decrease the reduced χ^2 to 2.0 from 4.0.

[‡] From the Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-[†‡]	Log *ft*	Comments
(534.1 *16*)	2574.11	2.2 *1*	4.42 *2*	av Eβ=179.5 *6*
(782.3 *16*)	2325.92	3.2 *2*	4.87 *3*	av Eβ=279.6 *7*
(1222.2 *16*)	1886.05	93.0 *6*	4.151 *4*	av Eβ=468.7 *7*
(1648.8 *16*)	1459.39	1.5 *4*	6.47 *12*	av Eβ=661.0 *7*
(2031.4[#] *16*)	1076.80	<0.1	>9.1[1u]	av Eβ=859.3 *7*
(2056.9[#] *16*)	1051.30	<0.3	>9.9	av Eβ=894.5 *7* log *ft* is calculated as for 2nd-forbidden unique decay.
(2725.3[#] *16*)	382.90	0.14 *10*	11.2 *+5−3*	av Eβ=1203.2 *7*
(2925.6[#] *16*)	182.64	<10	>6.7	av Eβ=1260.7 *8*
(3108.2[#] *16*)	0.0	<15	>8.1[1u]	av Eβ=1363.5 *8*

[†] From 1978Hu10.

[‡] Absolute intensity per 100 decays.

[#] Existence of this branch is questionable.

^{44}Ar β^- decay (11.87 min) 1978Hu10 (continued)

$\gamma(^{44}K)$

Iγ normalization: From intensity balance at 1886 level and %Iβ^-(1886)=93.0 *6* measured by 1978Hu10.

E_γ [†]	I_γ [†‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α [#]	Comments
137.3 *3*	0.20	519.98	(4$^-$)	382.90	(3$^-$)	[M1]	0.00493 *8*	
182.6 *1*	100.0	182.64	(1$^-$)	0.0	2$^-$	[M1+E2]	0.013 *10*	
382.9 *1*	0.78	382.90	(3$^-$)	0.0	2$^-$			
408.1 *1*	6.2	1459.39	(1$^-$)	1051.30	(3$^-$)			
426.7 *1*	4.0	1886.05	1$^+$	1459.39	(1$^-$)			Iγ(427)/Iγ(809)/Iγ(1703)/Iγ(1886)=2.8 *1*/2.1 *2*/61.1 *23*/34.0 *11*.
519.4 *4*	0.07	519.98	(4$^-$)	0.0	2$^-$			Iγ(519)/Iγ(137)=30.2 *5*/69.8 *5*.
531.2 *3*	0.19	1051.30	(3$^-$)	519.98	(4$^-$)			Iγ(531)/Iγ(1051)=3.1 *6*/96.9 *6*.
693.8 *2*	0.35	1076.80	(2$^-$)	382.90	(3$^-$)			Iγ(694)/Iγ(894)/Iγ(1077)=12.8 *20*/35.6 *25*/52.0 *28*.
809.1 *1*	3.0	1886.05	1$^+$	1076.80	(2$^-$)			
866.1 *10*	2.47	2325.92	1$^+$	1459.39	(1$^-$)			
[x]884.9 *7*	0.05							
894.2 *1*	1.01	1076.80	(2$^-$)	182.64	(1$^-$)			
[x]911.1 *2*	0.23							
[x]975.0 *4*	0.33							
1051.3 *1*	6.0	1051.30	(3$^-$)	0.0	2$^-$			
1076.6 *1*	1.47	1076.80	(2$^-$)	0.0	2$^-$			
1114.7 *1*	3.30	2574.11	1$^+$	1459.39	(1$^-$)			
1276.6 *1*	2.33	1459.39	(1$^-$)	182.64	(1$^-$)			Iγ(1277)/Iγ(1460)/Iγ(408)=19.6 *14*/27.8 *18*/52.6 *20*.
1460.0 *1*	3.30	1459.39	(1$^-$)	0.0	2$^-$			E_γ: poor fit. Level-energy difference=1459.36 *7*.
[x]1585.7 *2*	0.78							
[x]1639.7 *2*	1.02							
1703.4 *1*	85.6	1886.05	1$^+$	182.64	(1$^-$)			
[x]1765.4 *8*	0.17							
1886.1 *1*	47.7	1886.05	1$^+$	0.0	2$^-$			
2143.5 *4*	1.18	2325.92	1$^+$	182.64	(1$^-$)			
[x]2279.9 *3*	0.26							
2325.8 *2*	1.23	2325.92	1$^+$	0.0	2$^-$			Iγ(2326)/Iγ(2143)/Iγ(866)=25.5 *15*/24.3 *15*/50.2 *28*.

[†] From 1978Hu10. Quoted intensities are relative values with no uncertainties given in 1978Hu10. The authors also list branching ratios with uncertainties, which are given under comments and are used when considered in the Adopted Gammas.

[‡] For absolute intensity per 100 decays, multiply by 0.66.

[#] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

[x] γ ray not placed in level scheme.

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Decay Scheme

Intensities: I_γ per 100 parent decays