^{61}V β^- decay (48.3 ms) 2014Su07,2005Ga01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	25-Mar-2019

Parent: ^{61}V: E=0.0; J^π=(3/2$^-$,5/2$^-$); $T_{1/2}$=48.3 ms *10*; Q(β^-)=1199×10[1] *89*; %β^- decay=100.0

^{61}V-J^π,$T_{1/2}$: From Adopted Levels of ^{61}V.

^{61}V-Q(β^-): 11987 *890* from mass excess (^{61}V)=−30510 *890* (2017Wa10) and measured mass excess (^{61}Cr)=−42496.5 *18* (2018Mo14). 2017Wa10 give 11970 *900*.

^{61}V-Q(β^-): From 2017Wa10.

2014Su07: ^{61}V beam produced from fragmentation of 120 MeV/nucleon ^{76}Ge beam on ^{9}Be target, followed by mass separation by A1900 separator at NSCL-MSU accelerator facility. The resulting cocktail ion beam was transported to the Beta Counting System and implanted into a 1-mm-thick double-sided silicon strip detector. Measured Eγ, Iγ, $\gamma\gamma$-coin using SeGA array. Deduced levels J, π, estimate of %β^-n Comparisons made with shell-model calculations.

2005Ga01: ^{61}V produced in fragmentation of $^{76}Ge^{30+}$ beam on ^{58}Ni target. LISE3 achromatic spectrometer used to separate fragments; magnetic rigidity was tuned to optimize transmission of ^{62}V and ^{64}Cr fragments. Transmitted nuclei were identified by three consecutive Si detectors where two served for energy loss and time-of-flight measurements while the last determined their residual energies. Measured Eγ, Iγ, Iβ, $\gamma\gamma$, $\beta\gamma$ coin, γ(t), lifetimes with four Ge detectors placed around a thick Si telescope. Half-lives determined by fitting procedures involving five parameters: half-lives of mother, daughter and grand-daughter nuclei, the β-efficiency and the background rate over the 1 s collecting time. Tentative levels at 97, 310, 450 and 1027 proposed in 2005Ga01, all but the 310 level have been confirmed by 2014Su07.

2003So02: same method of ^{61}V production as in 2005Ga01. measured half-life of ^{61}V decay and probability of delayed-neutron decay from the observation of 2^+ to 0^+ transition in ^{60}Cr.

1999So20 (also 2001So07 and 1999Le67): ^{61}V produced in the fragmentation of 60.4 MeV/nucleon ^{86}Kr beam with ^{58}Ni target; LISE3 spectrometer at GANIL facility. Measured half-lives of decays of ^{61}V and ^{61}Cr.

Theoretical calculations: 1995Ri05 Shell model calculations (predicted spin, binding energy, mass defect).

All data are from 2014Su07.

Energy balance cannot be deduced since the decay scheme is most likely incomplete.

^{61}Cr Levels

No evidence was found for isomeric states in ^{61}Cr based on $\gamma\gamma$-coin data.

A tentative 310-keV level proposed by 2005Ga01 is not confirmed by 2014Su07; it is omitted here.

E(level)[†]	J^π[‡]	$T_{1/2}$[‡]	Comments
0.0	(5/2$^-$)	237 ms *11*	Possible configuration=ν5/2[303] of $f_{5/2}$ orbital or ν1/2[301] of $p_{1/2}$ orbital. From likelihood of β feeding to the ground state, the former configuration is favored by 2005Ga01.
70.8 *3*	(3/2,5/2,7/2)		
97.41 *23*	(3/2,5/2,7/2)		
224.1 *4*			
401.8 *5*			
450.6 *3*			
564.4 *5*			
631.7 *8*			
715.9 *4*			
773.7 *4*			
1026.6 *3*			
1222.0 *5*			
2061.9 *5*			
2261.4 *6*			

[†] From least-squares fit to Eγ data.

[‡] From Adopted Levels.

^{61}V β^- decay (48.3 ms) 2014Su07,2005Ga01 (continued)

β^- radiations

E(decay)	E(level)	Iβ^-[†][‡]	Comments
(9.7×10^3 *9*)	2261.4	2.5 *8*	
(9.9×10^3 *9*)	2061.9	2.2 *7*	
(1.08×10^4 *9*)	1222.0	1.4 *3*	
(1.10×10^4 *9*)	1026.6	8.4 *8*	Iβ^-: other: <14 (2005Ga01).
(1.12×10^4 *9*)	773.7	3.2 *7*	
(1.13×10^4 *9*)	715.9	6.1 *8*	
(1.14×10^4 *9*)	631.7	1.7 *7*	
(1.14×10^4 *9*)	564.4	1.5 *4*	
(1.15×10^4 *9*)	450.6	5.7 *7*	Iβ^-: other: <17 (2005Ga01).
(1.16×10^4 *9*)	401.8	1.7 *5*	
(1.18×10^4 *9*)	224.1	7.1 *11*	
(1.19×10^4 *9*)	97.41	10 *6*	
(1.19×10^4 *9*)	70.8	6.0 *12*	
(1.20×10^4 *9*)	0.0	<40	Iβ^-: estimated by 2014Su07.

[†] Apparent β feedings deduced from intensity balances. Since the decay scheme is considered as incomplete, true β feedings cannot be determined, thus no log *ft* values are deduced.
[‡] Absolute intensity per 100 decays.

$\gamma(^{61}Cr)$

Iγ normalization: Absolute intensities/100 decays of ^{61}V are given in 2014Su07. Based on observation and absolute intensity of the 644-keV transition in ^{60}Cr, %β^-n>10 is estimated by 2014Su07.

E$_\gamma$	I$_\gamma$[‡]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.	α[#]	Comments
70.8 *3*	9.3 *8*	70.8	(3/2,5/2,7/2)	0.0	(5/2$^-$)	D	0.083 *18*	Mult.: from Weisskopf estimates and non-observation of a long lifetime for 71-keV level. Additional information 1.
97.7 *3*	24.9 *8*	97.41	(3/2,5/2,7/2)	0.0	(5/2$^-$)	D,M1+E2	0.24 *21*	α(exp)=0.17 *13* (2014Su07) Additional information 2. Mult.: from Weisskopf estimates, and observation of no time delay between the 127- and 98-keV γ rays within the experimental detection limit of ≈150 ns.
126.7 *3*	8.1 *5*	224.1		97.41	(3/2,5/2,7/2)	[D,E2]	0.09 *8*	Additional information 3.
331.0 *4*	1.7 *5*	401.8		70.8	(3/2,5/2,7/2)			Additional information 4.
353.6[†] *5*	1.2 *4*	450.6		97.41	(3/2,5/2,7/2)			Additional information 5.
407.6 *7*	1.7 *7*	631.7		224.1				
450.5 *3*	4.5 *5*	450.6		0.0	(5/2$^-$)			Additional information 6.
467.0 *4*	1.5 *4*	564.4		97.41	(3/2,5/2,7/2)			
[x]576.7 *4*	0.7 *3*							
645.0[†] *8*	1.0 *4*	715.9		70.8	(3/2,5/2,7/2)			
676.4 *6*	0.9 *4*	773.7		97.41	(3/2,5/2,7/2)			

Continued on next page (footnotes at end of table)

^{61}V β^- decay (48.3 ms) 2014Su07,2005Ga01 (continued)

$\gamma(^{61}Cr)$ (continued)

E_γ	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Comments
715.9 *4*	5.1 *6*	715.9		0.0	$(5/2^-)$	Additional information 7.
773.7 *4*	2.3 *5*	773.7		0.0	$(5/2^-)$	
929.4 *4*	3.7 *5*	1026.6		97.41	(3/2,5/2,7/2)	Additional information 8.
1026.3 *4*	4.7 *6*	1026.6		0.0	$(5/2^-)$	Additional information 9.
1151.2 *4*	1.4 *3*	1222.0		70.8	(3/2,5/2,7/2)	Additional information 10.
1964.5 *4*	2.2 *7*	2061.9		97.41	(3/2,5/2,7/2)	
2164.0 *5*	2.5 *8*	2261.4		97.41	(3/2,5/2,7/2)	

[†] Observed only in $\gamma\gamma$-coin.
[‡] Absolute intensity per 100 decays.
[#] 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.

^{61}V β^- decay (48.3 ms) 2014Su07,2005Ga01

Decay Scheme

Intensities: I_γ per 100 parent decays