^{61}Cr β^- decay (234 ms) 2009Cr02

History

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

Parent: ^{61}Cr: E=0; J^π=(5/2$^-$); $T_{1/2}$=234 ms *11*; Q(β^-)=9245.6 *29*; %β^- decay=100.0

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

^{61}Cr-Q(β^-): Deduced from mass excess=−42496.5 keV *18* (measured by 2018Mo14) for ^{61}Cr, and mass excess=−51742.1 keV *23* for ^{61}Mn from 2017Wa10. Other: 9270 keV *100* (2017Wa10).

2009Cr02:^{61}Cr produced through the ^{9}Be(^{76}Ge,X) reaction at a beam energy of 130 MeV/nucleon. The ^{76}Ge beam was produced by the coupled cyclotrons at the National Superconducting Cyclotron Laboratory at Michigan State University. Fragments were separated using the A1900 fragment separator. The β and γ spectra were measured using the Beta Counting System and the Segmented Germanium Array, as well as three Si PIN detectors. Measured Eγ, Iγ, $\gamma\gamma$, β, $\beta\gamma$ coin, (fragment)β coin, half-life of the ^{61}Cr ground state.

Others dealing with production and half-life of ^{61}Cr:

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

1998Am04: ^{61}Cr formed in fragmentation of 500 MeV/nucleon ^{86}Kr beam incident on a Be target, FRS spectrometer at GSI facility. Measured half-life of decay of ^{61}Cr.

In view of the large Q value of 9.4 MeV, this decay scheme may be incomplete since the levels, currently, are reported only up to 2.4 MeV.

From RADLIST code, deduced total decay energy of 9290 *450* keV agrees with 9290 *130* expected from Q value.

^{61}Mn Levels

E(level)[†]	J^π[‡]	$T_{1/2}$	Comments
0	(5/2$^-$)	0.709 s *8*	$T_{1/2}$: from ^{61}Mn Adopted Levels.
157.2 *5*	(7/2$^-$)		E(level),J^π: tentatively assigned from the in beam γ-ray (2008Va08).
1142.3 *4*	(1/2$^-$,3/2)		
1497.2 *4*	(3/2,5/2,7/2)[#]		J^π: 2009Cr02 suggested (3/2$^-$,5/2$^-$) based on apparent log *ft* value, competing (assumed M1) transitions to (5/2$^-$), g.s. and (1/2$^-$,3/2$^-$), 1142 level.
1860.8 *4*	(3/2,5/2,7/2)[#]		
2032?			
2378.2 *4*	(3/2,5/2,7/2)[#]		

[†] From least-squares fit to Eγ data.
[‡] From Adopted Levels.
[#] Negative parity is suggested by the apparent log *ft* values.

β^- radiations

E(decay)	E(level)	Iβ^-[†‡]	Log *ft*[†]	Comments
(6867 *3*)	2378.2	11 *1*	4.9	av Eβ=3170.7 *15*
(7214[#] *3*)	2032?	5 *1*	5.4	av Eβ=3340.0 *15*
(7385 *3*)	1860.8	20 *2*	4.8	av Eβ=3423.8 *15*
(7748 *3*)	1497.2	20 *3*	4.9	av Eβ=3601.7 *15*
(8103[#] *3*)	1142.3	5 *3*	5.6	av Eβ=3775.3 *15* The β feeding to 1142 level treated as uncertain by the evaluators.
(9088 *3*)	157.2	9 *2*	5.6	av Eβ=4257.1 *15*
(9246 *3*)	0	30 *5*	5.1	av Eβ=4333.9 *15* Iβ^-: 100−(summed β feeding to excited states).

Continued on next page (footnotes at end of table)

^{61}Cr β^- decay (234 ms) 2009Cr02 (continued)

β^- radiations (continued)

† Apparent β feedings and log *ft* values deduced by 2009Cr02 from absolute γ-ray intensities. Uncertainties in log *ft* values are given by 2009Cr02 as 0.1 to 0.2, but the evaluators omit these here since the decay scheme is most likely incomplete and the log *ft* values can be treated as (lower) limits only.
‡ Absolute intensity per 100 decays.
# Existence of this branch is questionable.

$\gamma(^{61}Mn)$

Iγ normalization: The γ-ray intensities given by 2009Cr02 are absolute values from $\beta\gamma$-coin data.

E_γ	I_γ†	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α‡
157.2 *5*	9 *2*	157.2	(7/2$^-$)	0	(5/2$^-$)	(M1+E2)	0.044 *35*
354.8 *4*	16 *2*	1497.2	(3/2,5/2,7/2)	1142.3	(1/2$^-$,3/2)		
534.6# *5*	5 *1*	2032?		1497.2	(3/2,5/2,7/2)		
1142.2 *4*	21 *2*	1142.3	(1/2$^-$,3/2)	0	(5/2$^-$)		
1497.3 *5*	9 *2*	1497.2	(3/2,5/2,7/2)	0	(5/2$^-$)		
1860.8 *4*	20 *2*	1860.8	(3/2,5/2,7/2)	0	(5/2$^-$)		
2378.2 *4*	11 *1*	2378.2	(3/2,5/2,7/2)	0	(5/2$^-$)		

† 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.
# Placement of transition in the level scheme is uncertain.

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Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays