^{138}Cs β^- decay (2.91 min) 1971Ca21

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 146, 1 (2017)	30-Sep-2017

Parent: ^{138}Cs: E=79.9 *3*; $J^\pi=6^-$; $T_{1/2}$=2.91 min *10*; Q(β^-)=5375 *9*; %β^- decay=19 *3*

^{138}Cs-J^π,$T_{1/2}$: From Adopted Levels of ^{138}Cs.

^{138}Cs-Q(β^-): From 2017Wa10.

^{138}Cs-%β^- decay: From %IT=81 *3*, weighted average of 81.5 *+25−30* (at 68.3% confidence level) from 1978Au08 and 75 *8* from 1971Ca21, deduced from growth curves of 463γ, 1436γ, and 1010γ. Other: %IT=81.5 *+50−140* from 1978Au08 at 99.7% confidence level. The 1010γ is not fed in β^- decay of 2.9-min ^{138}Cs, but follows the β^- decay of the ^{138}Cs ground state (1978Au08,1971Ca21).

1971Ca21: Source of ^{138}Cs was produced via the thermal-neutron induced fissions of ^{235}U and also the ^{138}Ba(n,p) reaction, at CEN, Grenoble. γ and X rays were detected with Ge(Li) detectors (FWHM=1.2 keV at 122 keV, 3-4 keV at 1333 keV) and NaI(Tl) detectors; β particles and conversion electrons were detected by a β detector. Measured Eγ, Iγ, Eβ, $\beta\gamma$-coin, $\gamma\gamma$-coin, $\beta\gamma$(t). Deduced levels, J, π, half-life, decay branching, conversion coefficient, γ-ray multipolarity. Systematics of neighboring isotones.

1978Au08: Measured Eγ, Iγ. Deduced levels.

Additional information 1.

Others: 1997Gr09, 1994He33, 1992Gr21.

See also ^{138}Cs IT decay (2.91 min).

All data are from 1971Ca21, unless otherwise noted.

^{138}Ba Levels

E(level)†	J^π‡	$T_{1/2}$	Comments
0.0	0^+	stable	
1436.0 *2*	2^+		
1899.0 *2*	4^+		
2090.7 *2*	6^+	0.8 μs *1*	$T_{1/2}$: from $\beta\gamma$(t) in 1971Ca21.
2203.2 *3*	6^+		
2307.8 *3*	4^+		
2415.2 *3*	5^+		

† From a least-squares fit to γ-ray energies.

‡ From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-†‡	Log *ft*	Comments
(3040 *9*)	2415.2	2.8 *6*	7.3 *1*	av Eβ=1250.7 *42*
(3252 *9*)	2203.2	2.0 *5*	7.5 *1*	av Eβ=1349.1 *42*
(3364 *9*)	2090.7	14.4 *25*	6.73 *8*	av Eβ=1401.4 *42*

† From I(γ+ce) intensity balance at each level, with conversion coefficients calculated using the BrIcc program.

‡ Absolute intensity per 100 decays.

^{138}Cs β^- decay (2.91 min) 1971Ca21 (continued)

$\gamma(^{138}Ba)$

E_γ	I_γ[‡][@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	α[†]	Comments
107.5 *3*	1.0 *5*	2415.2	5^+	2307.8	4^+	[M1]		0.803 *13*	α(K)=0.687 *11*; α(L)=0.0922 *15*; α(M)=0.0190 *3* α(N)=0.00411 *7*; α(O)=0.000628 *11*; α(P)=4.53×10^{-5} *8*
112.5 *3*	8 *1*	2203.2	6^+	2090.7	6^+	M1+E2	−0.25 *2*	0.739 *13*	α(K)=0.618 *11*; α(L)=0.096 *3*; α(M)=0.0200 *6* α(N)=0.00428 *13*; α(O)=0.000638 *17*; α(P)=3.98×10^{-5} *7*
191.7 *2*	80 *4*	2090.7	6^+	1899.0	4^+	E2		0.199	α(K)=0.1531 *22*; α(L)=0.0361 *6*; α(M)=0.00773 *12* α(N)=0.001623 *24*; α(O)=0.000226 *4*; α(P)=8.05×10^{-6} *12*
212.0 *3*	2.8 *5*	2415.2	5^+	2203.2	6^+	(M1)		0.1221	α(K)=0.1047 *16*; α(L)=0.01384 *21*; α(M)=0.00285 *5* α(N)=0.000616 *9*; α(O)=9.43×10^{-5} *14*; α(P)=6.87×10^{-6} *10*
324.5 *3*	6.2 *10*	2415.2	5^+	2090.7	6^+	M1+E2	−7.8 *+17−26*	0.0353	α(K)=0.0290 *5*; α(L)=0.00505 *8*; α(M)=0.001063 *16* α(N)=0.000226 *4*; α(O)=3.26×10^{-5} *5*; α(P)=1.666×10^{-6} *25*
408.8 *2*		2307.8	4^+	1899.0	4^+	M1+E2	−0.23 *+7−10*	0.0216 *4*	α(K)=0.0186 *4*; α(L)=0.00243 *4*; α(M)=0.000500 *7* α(N)=0.0001078 *16*; α(O)=1.650×10^{-5} *24*; α(P)=1.202×10^{-6} *25*
463.0 *2*	99 *5*	1899.0	4^+	1436.0	2^+	E2		0.01221	α(K)=0.01023 *15*; α(L)=0.001576 *23*; α(M)=0.000329 *5* α(N)=7.01×10^{-5} *10*; α(O)=1.035×10^{-5} *15*; α(P)=6.11×10^{-7} *9*
516.2 *5*	3.2 *10*	2415.2	5^+	1899.0	4^+	M1+E2	−0.11 *4*	0.01212 *18*	α(K)=0.01043 *15*; α(L)=0.001343 *20*; α(M)=0.000276 *4* α(N)=5.96×10^{-5} *9*; α(O)=9.14×10^{-6} *14*; α(P)=6.75×10^{-7} *10*
871.8 *3*		2307.8	4^+	1436.0	2^+	E2		0.00245	α(K)=0.00210 *3*; α(L)=0.000281 *4*; α(M)=5.79×10^{-5} *9* α(N)=1.243×10^{-5} *18*; α(O)=1.88×10^{-6} *3*; α(P)=1.298×10^{-7} *19*
1436.0 *2*	100	1436.0	2^+	0.0	0^+	E2		9.17×10^{-4}	α(K)=0.000742 *11*;

Continued on next page (footnotes at end of table)

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$\gamma(^{138}Ba)$ (continued)

E_γ	E_i(level)	Comments
		α(L)=9.37×10^{-5} *14*; α(M)=1.92×10^{-5} *3* α(N)=4.14×10^{-6} *6*; α(O)=6.34×10^{-7} *9*; α(P)=4.62×10^{-8} *7*; α(IPF)=5.73×10^{-5} *8*

† Additional information 2.
‡ Absolute intensity per 100 decays through this branch.
# From Adopted Gammas.
@ For absolute intensity per 100 decays, multiply by 0.19 *3*.

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Decay Scheme

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