^{133}Ba ε decay (10.551 y)

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Yu. Khazov and A. Rodionov, F. G. Kondev	NDS 112, 855 (2011)	31-Oct-2010

Parent: ^{133}Ba: E=0.0; J^π=1/2$^+$; $T_{1/2}$=10.551 y *11*; Q(ε)=517.5 *10*; %ε decay=100.0

1981He15, 1985Ku26, 1987Mu07, 1991We08, 1983Yo03, 1989Da11, 1990Me15, 1998Hw07, 1996Mi26: ^{133}Ba ε decay (10.539 y); precise measurement Eγ, Iγ using Ge detectors.

See also 2008Si19, 1993Ve06, 1983Yo03, 1980HaYX, 1978He21, 1977Ge12, 1977Sc31.

1983Ch11: ^{133}Ba ε decay (10.539 y); compiled, evaluated, Eγ, Iγ, resulted from an International Intercomparison of Photon Emission-rate measurements. ^{133}Cs; deduced photon emission rates.

^{133}Cs Levels

E(level)†	J^π‡	$T_{1/2}$	Comments
0.0	7/2$^+$	stable	
80.9979 *8*	5/2$^+$	6.283 ns *14*	$T_{1/2}$: from Adopted Levels. Measured values in ^{133}Ba ε decay (10.551 y) are 6.32 ns *4* (1989Ma38), 6.31 ns *5* (1959Bo56), 6.30 ns *15* (1963Fl10), 6.25 ns *5* (1966Bl08), 6.16 ns *7* (1966Ol04), 6.25 ns *5* (1967Ri03), 6.30 ns *7* (1968Ak02), 6.26 ns *17* (1969Sa33), 6.27 ns *4* (1970Va34), 6.28 ns *14* (1971Bo13), 6.36 ns *3* (1972Gu03), 6.23 ns *3* (1983Mo21). Others: 1963Go17, 1964Bl18.
160.6121 *9*	5/2$^+$	172 ps *4*	$T_{1/2}$: weighted average of 180 ps *10* (1991De24), 170 ps *4* (1989Ma38), and 190 ps *15* (1970Va34). Others: 85 ps *16* (1963Fl10), 97 ps *26* (1966Sc36), 103 ps *15* (1968Ak02).
383.8491 *8*	3/2$^+$	44 ps *11*	$T_{1/2}$: weighted average of 46 ps *13* (1967He09) and 40 ps *20* (1970Va34).
437.0113 *9*	1/2$^+$	≤150 ps	$T_{1/2}$: from 1964Va25, 1970Va34.

† From a least-squares fit to Eγ's.
‡ From deduced transition multipolarities.

ε radiations

E(decay)	E(level)	Iε†	Log *ft*	Comments
(80.5 *10*)	437.0113	85.4 *5*	6.627 *18*	εK=0.671 *5*; εL=0.251 *4*; εM+=0.0777 *11* εK(exp)=0.65 *3* (1992Sa28). εL(exp)/εK(exp)=0.371 *7* (1967Sc10).
(133.7 *10*)	383.8491	14.5 *4*	8.020 *15*	εK=0.7727 *9*; εL=0.1755 *7*; εM+=0.05174 *23* εK(exp)=0.74 *4* (1983Si22). εL(exp)/εK(exp)=0.221 *5* (1967Sc10).
(356.9 *10*)	160.6121	<0.1	>11.2	εK=0.8312; εL=0.13165 *6*; εM+=0.03715 *2* εK(exp)=0.79 *3* (1992Sa28).
(436.5 *10*)	80.9979	<0.2	>11.1	εK=0.8361; εL=0.12793 *4*; εM+=0.03593 *2* εK(exp)=0.88 *4* (1992Sa28).

† Absolute intensity per 100 decays.

^{133}Ba ε decay (10.551 y) (continued)

$\gamma(^{133}Cs)$

Iγ normalization: from Iγ(356γ)=0.6205 *19* (1983Ch11). Other: 0.627 *7* from Σ(I(γ+ce))=100 to g.s., assuming that there is no direct ε decay feeding to the 7/2$^+$ g.s. of ^{133}Cs.

I(Kα_2 x ray/Kα_1 x ray)=0.5376 *13*, I(Kβ_1 x ray/Kα_1 x ray)=0.1756 *23*, I(Kβ x ray/Kα x ray)=0.2165 *7* (2007Ya02).

E_γ[‡]	I_γ[#a]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[@]	δ[&]	α[†]	Comments
53.1622 *6*	3.45 *5*	437.0113	1/2$^+$	383.8491	3/2$^+$	M1+E2	0.08 *+2−3*	5.66 *10*	α(K)exp=5.0 *10*; α(L1)exp=0.51 *7*; α(L2)exp=0.069 *15* K:L1:L2=100 *19*:10.1 *3*:1.4 *5*; ce(K)=840 *160*; L/M+N=3.1 *3* α(N)=0.0303 *16*; α(O)=0.00413 *18*; α(P)=0.000188 *3* α(L1)=0.585 *8*; α(L2)=0.071 *15* δ: −0.15 *+6−5* from $\gamma\gamma(\theta)$; penetration parameter λ(M1)=7 *7*.
79.6142 *12*	4.27 *8*	160.6121	5/2$^+$	80.9979	5/2$^+$	M1+E2(+E0)	0.124 *15*	1.77 *3*	α(K)exp=1.41 *11*; α(L1)exp=0.178 *16*; α(L2)exp=0.022 *4*; α(L3)exp=0.014 *3* K:L1:L2:L3=100 *7*:12.6 *4*:1.5 *3*:0.98 *23*; ce(K)=285 *20* α(K)=1.495 *22*; α(L)=0.217 *6*; α(M)=0.0447 *13*; α(N+..)=0.0107 *3* α(N)=0.00940 *25*; α(O)=0.00128 *3*; α(P)=5.84×10^{-5} *9* α(L1)=0.1816 *25*; α(L2)=0.0220 *21*; α(L3)=0.013 *3* ce(K)(E0)/ce(K)(E2)≤0.3 (1982Si17). δ: Others: 0.171 (1985Po04); −0.03 *3* from $\gamma\gamma(\theta)$; penetration parameter λ(M1)=4 *4*.
80.9979 *11*	53.1 *5*	80.9979	5/2$^+$	0.0	7/2$^+$	M1+E2	0.158 *5*	1.703	α(K)exp=1.29 *6*; α(L1)exp=0.166 *9*; α(L2)exp=0.0253 *13*; α(L3)exp=0.0186 *10* ce(K)=3360 *140*; K:L1:L2:L3=100 *4*:12.8 *8*:1.93 *14*:1.43 *11* α(K)=1.431 *20*; α(L)=0.216 *4*; α(M)=0.0447 *8*; α(N+..)=0.01071 *18* α(N)=0.00939 *16*; α(O)=0.001271 *20*; α(P)=5.56×10^{-5} *8* α(L1)=0.1730 *24*; α(L2)=0.0253 *9*; α(L3)=0.0181 *10* δ: Others: 0.169 (1986Po04); −0.151 *2* from $\gamma\gamma(\theta)$; penetration parameter λ(M1)=6.5 *23*.
160.6120 *16*	1.028 *8*	160.6121	5/2$^+$	0.0	7/2$^+$	M1+E2	0.96 *5*	0.294 *6*	α(K)exp=0.233 *10*; α(L1)exp=0.0227 *19*; α(L2)exp=0.0113 *10*; α(L3)exp=0.0107 *9* K:L1:L2:L3=100 *3*:9.6 *9*:4.9 *5*:4.6 *4*; ce(K)=11.1 *3* α(K)=0.234 *4*; α(L)=0.0471 *13*; α(M)=0.0099 *3*; α(N+..)=0.00232 *7* α(N)=0.00205 *6*; α(O)=0.000261 *7*; α(P)=8.08×10^{-6} *12* α(L1)=0.0255 *4*; α(L2)=0.0111 *6*; α(L3)=0.0104 *6* δ: Others: +1.28 *13* from $\gamma\gamma(\theta)$; penetration parameter λ(M1)=4 4.
223.2368 *13*	0.730 *5*	383.8491	3/2$^+$	160.6121	5/2$^+$	M1+E2	−0.114 *14*	0.0975	α(K)exp=0.081 *6*; α(L)exp=0.0104 *13* ce(K)=2.79 *13*; K/L=7.8 *12* α(K)=0.0836 *12*; α(L)=0.01103 *16*; α(M)=0.00226 *4*; α(N+..)=0.000547 *8*

^{133}Ba ε decay (10.551 y) (continued)

γ(^{133}Cs) (continued)

E$_γ$[‡]	I$_γ$[#a]	E$_i$(level)	$J^π_i$	E$_f$	$J^π_f$	Mult.[@]	δ[&]	α[†]	Comments
									α(N)=0.000477 *7*; α(O)=6.64×10^{-5} *10*; α(P)=3.26×10^{-6} *5* δ: from γγ(θ) (1977Kr13, 1980Kr22); penetration parameter λ(M1)=4 *4*.
276.3989 *12*	11.54 *7*	437.0113	1/2$^+$	160.6121	5/2$^+$	E2		0.0566	α(K)exp=0.047 *3*; α(L)exp=0.0087 *7* ce(K)=26.0 *13*; K/L=5.4 *3*; L/M+N=3.8 *4* α(K)=0.0460 *7*; α(L)=0.00842 *12*; α(M)=0.001763 *25*; α(N+..)=0.000414 *6* α(N)=0.000365 *6*; α(O)=4.70×10^{-5} *7*; α(P)=1.545×10^{-6} *22*
302.8508 *5*	29.55 *18*	383.8491	3/2$^+$	80.9979	5/2$^+$	M1+E2	+0.022 *20*	0.0434	α(K)exp=0.037 *2*; α(L)exp=0.0054 *4* ce(K)=52 *3*; K/L=6.9 *3*; L/M+N=4.0 *4* α(K)=0.0373 *6*; α(L)=0.00484 *7*; α(M)=0.000988 *14*; α(N+..)=0.000240 *4* α(N)=0.000209 *3*; α(O)=2.92×10^{-5} *4*; α(P)=1.453×10^{-6} *21* δ: from γγ(θ) (1977Kr13, 1980Kr22); Other: 0.022 (1985Po04).
356.0129 *7*	100	437.0113	1/2$^+$	80.9979	5/2$^+$	E2		0.0254	α(K)exp=0.0211; α(L)exp=0.0035 *2*; K/L=6.1 *3*; L/M+N=3.9 *4*; ce(K)=100 α(K)=0.0211 *3*; α(L)=0.00346 *5*; α(M)=0.000721 *10*; α(N+..)=0.0001704 *24* α(N)=0.0001499 *21*; α(O)=1.97×10^{-5} *3*; α(P)=7.32×10^{-7} *11*
383.8485 *12*	14.41 *9*	383.8491	3/2$^+$	0.0	7/2$^+$	E2		0.0202	α(K)exp=0.0169 *9*; α(L)exp=0.0027 *2* ce(K)=11.8 *13*; K/L=6.1 *4*; L/M+N=4.3 *4* (1967He09) α(K)=0.01684 *24*; α(L)=0.00270 *4*; α(M)=0.000560 *8*; α(N+..)=0.0001326 *19* α(N)=0.0001166 *17*; α(O)=1.541×10^{-5} *22*; α(P)=5.90×10^{-7} *9*

[†] Additional information 1.
[‡] From adopted gammas.
[#] Evaluated values from 2004BeZR.
[@] From α(exp) in 1984SeZV (compiled and evaluated α(exp) and penetration parameters values) with α(K)exp=Ice(K)/Iγ normalized to α(K)=0.0211 *3* for 356.0129 pure E2 transition (by evaluators), compilation of α(exp) and subshell ratios in 1981HaZY, and γγ(θ) in 1977Kr13 and 1980Kr22 (others: 1970NaZL and 1974Aw02).
[&] From α(exp), except as noted. Values from γγ(θ) are from 1977Kr13 and 1980Kr22.
[a] For absolute intensity per 100 decays, multiply by 0.6205 *19*.

$^{133}_{55}Cs_{78}$-3

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Decay Scheme

Intensities: Relative I_γ