^{127}Ba β^+ decay 1976Be11,1999Co22

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	A. Hashizume	NDS 112, 1647 (2011)	1-Oct-2009

Parent: ^{127}Ba: E=0.0; J$^\pi$=1/2$^+$; $T_{1/2}$=12.7 min *4*; Q(β^+)=3424 *13*; %β^+ decay=100.0
The decay scheme is that proposed by 1976Be11 on the basis of $\gamma\gamma$ coin and Eγ sums.
1999Co22: Ta(p,spall) E=1 GeV, ISOLDE; γ-ce PAC; BaF_2 scintillator.
for γ, plastic scintillator-magnetic lens for ce.
1976Be11: Ce(p,spall) E=600 MeV, ^{127}La β^+ decay, chem, mass; semi γ, ce, $\gamma\gamma$ coin, (β^+)(γ) coin, semi-scin (β^+)(γ)(t).
1977Pa10: ^{133}Cs(p,7n) chem, semi γ, $\gamma\gamma$(t).
1975Pa03: ^{115}In(^{16}O,4n), ^{127}La ε+β^+ decay; semi γ, $\gamma\gamma$ coin.
1987Fr10: Ce(^{3}He,X) E=270 MeV, on-line mass; ce, ceγ(t).
Other: 1968Da09: $T_{1/2}$.
I(K x ray)=470 *50*, I($\gamma^\pm$)=877 *70*; values are relative to I(180.8γ)=100.0 (1976Be11).

^{127}Cs Levels

E(level)†	J$^\pi$‡	$T_{1/2}$	Comments
0.0	1/2$^+$	6.25 h *10*	μ=+1.459 *7* μ: ABLS (1987Co19), μ value relative to μ=+2.582 *1* for ^{133}Cs (7/2$^+$ g.s.).
66.24 *17*	(5/2)$^+$	24.88 ns *30*	μ=2.7 *5* Q=0.58 *12* $T_{1/2}$: From (114.8γ)(66.3 ce)(t) (1999Co22). Other: 25.5 ns *15* (1977Pa10), 24.5 ns *30* (1976Be11). μ: TDPAC (1999Co22). Q: From PAC (1999Co22). From Q=0.51 *5* of 561 keV state in ^{80}Rb (1999Co22) which is isovalent to Cs.
138.90 *20*	(3/2)$^+$	120 ps *20*	$T_{1/2}$: from ceγ(t)-delayed coin (1987Fr10).
180.97 *17*	3/2$^+$	≤60 ps	$T_{1/2}$: from ceγ(t)-delayed coin (1987Fr10).
567.61 *22*	1/2,3/2		
578.0? *3*			
590.0? *6*			
621.7? *7*			
713.1 *4*	1/2,3/2		
872.5 *4*	1/2,3/2		
1151.1? *4*			
1200.97 *25*	1/2,3/2		
1289.3 *3*	1/2,3/2		
1566.31 *22*	1/2,3/2		
1618.0? *3*			
1981.57 *24*	1/2,3/2		
2089.7 *3*	1/2,3/2		
2143.8 *7*	1/2,3/2,5/2$^-$		
2238.5 *4*	1/2,3/2		
2255.7 *5*	1/2,3/2		
2321.17 *23*	1/2,3/2		

† From a least-squares fit to E$_\gamma$'s.
‡ From Adopted Levels.

^{127}Ba β^+ decay 1976Be11,1999Co22 (continued)

ε,β^+ radiations

E(decay)	E(level)	Iβ^+†	Iε†	Log *ft*	I($\varepsilon+\beta^+$)†	Comments
(1103 *13*)	2321.17		0.71 *11*	5.73 *7*	0.71 *11*	εK=0.84844 *9*; εL=0.11865 *7*; εM+=0.03291 *3*
(1168 *13*)	2255.7		0.15 *4*	6.46 *12*	0.15 *4*	εK=0.8488; εL=0.11833 *7*; εM+=0.03280 *2*
(1186 *13*)	2238.5		0.45 *7*	5.99 *7*	0.45 *7*	εK=0.8489; εL=0.11825 *6*; εM+=0.03278 *2*
(1280 *13*)	2143.8		0.125 *24*	6.62 *9*	0.125 *24*	εK=0.8491; εL=0.11781 *7*; εM+=0.03264 *2*
(1334 *13*)	2089.7		0.50 *8*	6.05 *8*	0.50 *8*	εK=0.8489 *1*; εL=0.11755 *7*; εM+=0.03256 *2*
(1442 *13*)	1981.57	0.0018 *4*	0.53 *9*	6.10 *8*	0.53 *9*	av Eβ=198.0 *57*; εK=0.8473 *4*; εL=0.11692 *9*; εM+=0.03236 *3*
(1806 *13*)	1618.0?	0.0090 *18*	0.25 *5*	6.62 *9*	0.26 *5*	av Eβ=356.8 *57*; εK=0.8217 *17*; εL=0.1124 *3*; εM+=0.03108 *8*
(1858 *13*)	1566.31	0.037 *6*	0.82 *11*	6.13 *7*	0.86 *12*	av Eβ=379.4 *57*; εK=0.8146 *20*; εL=0.1113 *3*; εM+=0.03077 *9*
(2135 *13*)	1289.3	0.049 *8*	0.40 *6*	6.56 *7*	0.45 *7*	av Eβ=501.2 *58*; εK=0.759 *4*; εL=0.1033 *5*; εM+=0.02854 *13*
(2223 *13*)	1200.97	0.26 *4*	1.6 *3*	5.99 *7*	1.9 *3*	av Eβ=540.2 *58*; εK=0.736 *4*; εL=0.1000 *6*; εM+=0.02763 *15*
(2273 *13*)	1151.1?	0.11 *2*	0.63 *8*	6.42 *6*	0.74 *10*	av Eβ=562.3 *58*; εK=0.722 *4*; εL=0.0980 *6*; εM+=0.02708 *15*
(2552 *13*)	872.5	0.026 *6*	0.074 *19*	7.45 *11*	0.100 *25*	av Eβ=686.6 *59*; εK=0.632 *5*; εL=0.0856 *7*; εM+=0.02363 *18*
(2711 *13*)	713.1	0.065 *13*	0.14 *3*	7.25 *9*	0.20 *4*	av Eβ=758.2 *59*; εK=0.576 *5*; εL=0.0779 *7*; εM+=0.02151 *18*
(2802 *13*)	621.7?	0.03 *1*	0.05 *2*	7.70 *17*	0.08 *3*	av Eβ=799.4 *59*; εK=0.544 *5*; εL=0.0736 *7*; εM+=0.02030 *18*
(2834 *13*)	590.0?	0.20 *5*	0.33 *8*	6.89 *10*	0.53 *12*	av Eβ=813.7 *59*; εK=0.533 *5*; εL=0.0720 *7*; εM+=0.01988 *18*
(2846 *13*)	578.0?	0.20 *3*	0.33 *6*	6.90 *8*	0.53 *9*	av Eβ=819.2 *59*; εK=0.529 *5*; εL=0.0715 *7*; εM+=0.01972 *17*
(2856 *13*)	567.61	0.09 *3*	0.15 *5*	7.25 *15*	0.24 *8*	av Eβ=823.9 *59*; εK=0.525 *5*; εL=0.0710 *7*; εM+=0.01959 *17*
(3243 *13*)	180.97	15 *2*	14 *2*	5.40 *7*	29 *4*	av Eβ=999.7 *60*; εK=0.400 *4*; εL=0.0539 *6*; εM+=0.01488 *15*
(3285 *13*)	138.90	0.65 *16*	0.55 *14*	6.81 *11*	1.2 *3*	av Eβ=1019.0 *60*; εK=0.388 *4*; εL=0.0523 *5*; εM+=0.01442 *14*
(3424 *13*)	0.0	36.1 *14*	25.1 *10*	5.182 *24*	61.2 *24*	av Eβ=1082.7 *60*; εK=0.350 *4*; εL=0.0471 *5*; εM+=0.01299 *13*

† Absolute intensity per 100 decays.

γ(^{127}Cs)

Iγ normalization: $\varepsilon+\beta^+$ feeding to g.s. is estimated from I($\varepsilon+\beta^+$ to g.s.)/I($\varepsilon+\beta^+$ to 180.96 level)=2.14 (1976Be11). Uncertainty is estimated from those for both I($\varepsilon+\beta^+$).

E_γ†	I_γ#&	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	α@	Comments
66.3 *3*	17.1 *17*	66.24	(5/2)$^+$	0.0	1/2$^+$	E2	8.20 *18*	B(E2)(W.u.)=49 *4* α(K)=3.93 *8*; α(L)=3.37 *9*; α(M)=0.735 *19*; α(N+..)=0.165 *5* α(N)=0.148 *4*; α(O)=0.0169 *5*; α(P)=0.0001027 *19* α(K)exp=3.6 *3* if mult(72.8γ)=M1 (1977Pa10). Mult.: α(K)exp gives E2(+M1) with δ>1.0. From transition intensity balance, α(exp) in IT decay gives δ>1.2. From adopted J^π values, ΔJ=2 is required.

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^{127}Ba β^+ decay 1976Be11,1999Co22 (continued)

γ(^{127}Cs) (continued)

E_γ †	I_γ #&	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	δ	α @	Comments
72.8 *5*	6.1 *5*	138.90	(3/2)$^+$	66.24	(5/2)$^+$	M1		2.24 *6*	B(M1)(W.u.)=0.14 *3* α(K)=1.92 *5*; α(L)=0.257 *7*; α(M)=0.0526 *13*; α(N+..)=0.0127 *4* α(N)=0.0111 *3*; α(O)=0.00154 *4*; α(P)=7.55×10^{-5} *19* α(L)exp=0.3 normalized to α(L)(66.3γ E2). Mult.: from α(L)exp.
114.8 *3*	75 *3*	180.97	3/2$^+$	66.24	(5/2)$^+$	M1		0.609 *10*	B(M1)(W.u.)>0.075 α(K)=0.522 *9*; α(L)=0.0693 *11*; α(M)=0.01420 *23*; α(N+..)=0.00344 *6* α(N)=0.00300 *5*; α(O)=0.000417 *7*; α(P)=2.05×10^{-5} *4* Ice(K)/Ice(L+M+N+)=6.8 *7* (1987Fr10). α(K)exp=0.5 *1* and K/L=5.6 *+19−15* normalized to α(L)(66.3γ E2).
139.0 *8*	0.8 *4*	138.90	(3/2)$^+$	0.0	1/2$^+$	[M1]		0.356 *8*	B(M1)(W.u.)=0.0026 *14* α(K)=0.305 *7*; α(L)=0.0404 *9*; α(M)=0.00827 *18*; α(N+..)=0.00200 *5* α(N)=0.00175 *4*; α(O)=0.000243 *6*; α(P)=1.20×10^{-5} *3*
180.8 *3*	100	180.97	3/2$^+$	0.0	1/2$^+$	M1+E2	0.47 *20*	0.184 *9*	B(M1)(W.u.)>0.018; B(E2)(W.u.)>29 α(K)=0.154 *5*; α(L)=0.024 *3*; α(M)=0.0049 *7*; α(N+..)=0.00117 *15* α(N)=0.00102 *14*; α(O)=0.000138 *15*; α(P)=5.77×10^{-6} *9* δ: from K/L (1987Fr10). α(K)exp=0.14 *3* and K/L=3.5 *+14−10* normalized to α(L)(66.3γ E2). Ice(K)/Ice(L+M+N+)=5.2 *5* (1987Fr10).
429.3 *6*	2.2 *4*	567.61	1/2,3/2	138.90	(3/2)$^+$				
441.0 *10*	0.4 *2*	621.7?		180.97	3/2$^+$				
451.5 *10*	0.7 *2*	590.0?		138.90	(3/2)$^+$				
523.5 *7*	3.5 *8*	590.0?		66.24	(5/2)$^+$				
532.1 *7*	0.4 *1*	713.1	1/2,3/2	180.97	3/2$^+$				
567.5 *3*	2.8 *3*	567.61	1/2,3/2	0.0	1/2$^+$				
573.9 *5*	0.7 *2*	713.1	1/2,3/2	138.90	(3/2)$^+$				
578.0 *3*	5.2 *5*	578.0?		0.0	1/2$^+$				
^{x}619.0 *10*	≈0.1								
621.5 *8*	0.2 *1*	621.7?		0.0	1/2$^+$				
^{x}625.5 *7*	0.4 *1*								
647.1 *8*	0.4 *1*	713.1	1/2,3/2	66.24	(5/2)$^+$				
691.9 *7*	0.4 *1*	872.5	1/2,3/2	180.97	3/2$^+$				
713.5 *8*	≈0.1	713.1	1/2,3/2	0.0	1/2$^+$				
872.5 *5*	0.8 *1*	872.5	1/2,3/2	0.0	1/2$^+$				
1012.3 *5*	0.9 *1*	1151.1?		138.90	(3/2)$^+$				
1019.8 *5*	1.3 *1*	1200.97	1/2,3/2	180.97	3/2$^+$				

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^{127}Ba β^+ decay 1976Be11,1999Co22 (continued)

$\gamma(^{127}Cs)$ (continued)

E_γ [†]	I_γ [#&]	E_i(level)	J_i^π	E_f	J_f^π
1062.0 *10*	0.4 *1*	1200.97	1/2,3/2	138.90	$(3/2)^+$
1084.9 *5*	3.5 *3*	1151.1?		66.24	$(5/2)^+$
1108.3 *5*	0.9 *2*	1289.3	1/2,3/2	180.97	$3/2^+$
1135.2 *10*	≈0.1	1200.97	1/2,3/2	66.24	$(5/2)^+$
1150.7[a] *7*	1.5[a] *2*	1151.1?		0.0	$1/2^+$
1150.7[a] *7*	1.5[a] *2*	1289.3	1/2,3/2	138.90	$(3/2)^+$
1201.0 *3*	13.0 *15*	1200.97	1/2,3/2	0.0	$1/2^+$
1222.9 *8*	0.2 *1*	1289.3	1/2,3/2	66.24	$(5/2)^+$
1289.3 *4*	1.0 *1*	1289.3	1/2,3/2	0.0	$1/2^+$
1385.2 *5*	0.8 *2*	1566.31	1/2,3/2	180.97	$3/2^+$
1437.5 *10*	≈0.1	1618.0?		180.97	$3/2^+$
1448.8 *5*	0.4 *1*	2321.17	1/2,3/2	872.5	1/2,3/2
1500.1 *3*	3.0 *3*	1566.31	1/2,3/2	66.24	$(5/2)^+$
1511.2 *10*	1.0 *1*	2089.7	1/2,3/2	578.0?	
1522.0 *7*	0.6 *1*	2089.7	1/2,3/2	567.61	1/2,3/2
1566.3 *3*	3.1 *3*	1566.31	1/2,3/2	0.0	$1/2^+$
1576.3 *10*	0.5 *1*	2143.8	$1/2,3/2,5/2^-$	567.61	1/2,3/2
1618.0 *3*	2.0 *3*	1618.0?		0.0	$1/2^+$
[x]1697.0 *8*	0.4 *2*				
1753.6 *3*	2.0 *3*	2321.17	1/2,3/2	567.61	1/2,3/2
1800.1 *6*	0.6 *2*	1981.57	1/2,3/2	180.97	$3/2^+$
1842.2 *6*	0.9 *2*	1981.57	1/2,3/2	138.90	$(3/2)^+$
1915.3 *6*	0.9 *3*	1981.57	1/2,3/2	66.24	$(5/2)^+$
[x]1920.6 *8*	0.3 *1*				
1950.8 *6*	1.1 *2*	2089.7	1/2,3/2	138.90	$(3/2)^+$
1962.8 *8*	0.5 *1*	2143.8	$1/2,3/2,5/2^-$	180.97	$3/2^+$
1981.8 *3*	1.8 *2*	1981.57	1/2,3/2	0.0	$1/2^+$
[x]1991.9 *6*	1.0 *1*				
[x]2028.2 *7*	0.5 *1*				
2057.0 *6*	1.0 *2*	2238.5	1/2,3/2	180.97	$3/2^+$
2075.0 *6*	0.9 *2*	2255.7	1/2,3/2	180.97	$3/2^+$
2089.8 *4*	1.3 *2*	2089.7	1/2,3/2	0.0	$1/2^+$
2100.3 *5*	1.1 *2*	2238.5	1/2,3/2	138.90	$(3/2)^+$
2141.0 *8*	0.3 *1*	2321.17	1/2,3/2	180.97	$3/2^+$
2172.0 *6*	1.1 *2*	2238.5	1/2,3/2	66.24	$(5/2)^+$
2182.0 *3*	1.8 *2*	2321.17	1/2,3/2	138.90	$(3/2)^+$
2189.0 *7*	0.3 *1*	2255.7	1/2,3/2	66.24	$(5/2)^+$
[x]2222.4 *7*	0.5 *1*				
2238.1 *10*	0.4 *1*	2238.5	1/2,3/2	0.0	$1/2^+$
2321.2 *5*	1.2 *2*	2321.17	1/2,3/2	0.0	$1/2^+$
[x]2467.8 *7*	1.2 *2*				

† From 1976Be11. The 682.06γ reported by 1975Pa03 was reassigned to the ^{126}Ba β^+ decay by 1976Be11 in authors′ fig. 3.

‡ From α(exp) (1976Be11,1977Pa10) and γ(θ) (1971Co05).

\# Relative to I(180.8γ)=100.

@ Theoretical conversion coefficients are calculated using BrIcc code for the multipolarity and mixing ratio indicated.

& For absolute intensity per 100 decays, multiply by 0.125 *15*.

a Multiply placed with undivided intensity.

x γ ray not placed in level scheme.

^{127}Ba β^+ decay 1976Be11,1999Co22

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
& Multiply placed: undivided intensity given