^{137}Ce ε decay (9.0 h) 1975He20

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 108,2173 (2007)	1-Oct-2006

Parent: ^{137}Ce: E=0.0; J$^{\pi}$=3/2^{+}; $T_{1/2}$=9.0 h *3*; Q(ε)=1222.1 *16*; %ε+%β^{+} decay=100.0

Additional information 1.

Measured: γ, ce (1975He20,1975ArYT), γγ, γ(θ,T), γγ(θ) (1964FrZZ), γγ(t) (1963Ru03), β^{+} (1979BuZZ), ceγ (1980ZhZY), γ, γγ (1982Ko05).

ε feedings and decay-scheme normalization was determined based on the assumption of no ground-state ε branch.

α(K)exp normalized so that α(K)exp(447γ)=0.0136 *14* (if α(K)(254.5γ)=5.54 (M4)).

1979BuZZ observed β^{+} with Eβ+=188.8 *15*.

^{137}La Levels

E(level)	J$^{\pi}$	$T_{1/2}$	Comments
0.0	7/2^{+}		
10.59 *4*	5/2^{+}	89 ns *4*	$T_{1/2}$: from 1963Ru03.
447.17 *6*	5/2^{+}		
493.09 *6*	(3/2)$^{+}$		
641.95 *7*	1/2^{+}		
709.30 *6*	(3/2)$^{+}$		
781.57 *9*	(7/2)$^{+}$		
926.33 *6*	5/2^{+}		
1171.40 *11*	(1/2^{+},3/2^{-})		

ε,β^{+} radiations

E(decay)	E(level)	Iβ^{+} †	Iε†	Log *ft*	I(ε+β^{+})†	Comments
(50.7 *16*)	1171.40		0.0029 *5*	6.4 *1*	0.0029 *5*	εK=0.28 *5*; εL=0.54 *3*; εM+=0.185 *12*
(295.8 *16*)	926.33		0.145 *6*	6.90 *2*	0.145 *6*	εK=0.8195; εL=0.14000 *17*; εM+=0.04052 *6*
(440.5 *16*)	781.57		0.0086 *6*	8.50 *4*	0.0086 *6*	εK=0.8318; εL=0.1308; εM+=0.03744 log *ft*=8.48 is inconsistent with ΔJ=2 Δπ=no transition. log *ft*≥12.8 is expected.
(512.8 *16*)	709.30		0.027 *2*	8.15 *4*	0.027 *2*	εK=0.8351; εL=0.1283; εM+=0.03661
(580.1 *16*)	641.95		0.0134 *9*	8.57 *4*	0.0134 *9*	εK=0.8374; εL=0.1266; εM+=0.03604
(729.0 *16*)	493.09		≈0.0018	≈9.6	≈0.0018	εK=0.8408; εL=0.1240; εM+=0.03518
(774.9 *16*)	447.17		1.95 *7*	6.67 *2*	1.95 *7*	εK=0.8416; εL=0.1234; εM+=0.03499
1210.8 *15*	10.59	0.0085 *4*	97.83 *8*	5.37 *2*	97.84 *8*	av Eβ=95.8 *8*; εK=0.8458; εL=0.1202; εM+=0.03391

† Absolute intensity per 100 decays.

γ(^{137}La)

Iγ normalization: from I(254γ)/I(447γ)=4.91 *15* in a transient equilibrium γ-spectrum of 9.0 h and 34.4 h ^{137}Ce. The correction factor for the γ-ray intensities from ^{137}Ce(9.0 h) is 34.4 *3*/[34.4 *3* − 9.0 *3*] = 1.354 *16*, where 34.4 h *3* is the half-life of ^{137m}Ce, and 9.0 h *3* the half-life of ^{137}Ce ground state. Thus the normalization factor becomes Iγ(447)/[Iγ(254)x(1+α)]x 1/1.354 *16* = (1/4.91 *15*)x(1/(1+7.93 *12*))x(1/1.354 *16*) = 0.0168 *6*, where α=7.93 *12* is the M4 conversion coefficient of 254γ. However, since in our scale of relative intensities we use Iγ(447)=1000, then Iγ normalization=0.00168 *6*.

E_γ†	I_γ†‡	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α#	$I_{(\gamma+ce)}$‡	Comments
10.61 *5*	491 *11*	10.59	5/2+	0.0	7/2+	M1	117.6 *24*	58232	ce(L)/(γ+ce)=0.786 *10*; ce(M)/(γ+ce)=0.164 *5*; ce(N+)/(γ+ce)=0.0422 *12* ce(N)/(γ+ce)=0.0359 *10*; ce(O)/(γ+ce)=0.00582 *17*; ce(P)/(γ+ce)=0.000445 *13* I_γ: calculated from I(γ+ce)=97.83% 8 and α=117.6 *24*. $I_{(\gamma+ce)}$: From γ-ray intensity balance and assumption of no ε branch to ground state. Mult.: M1:M2:M3=23.4 *16*:2.87 *24*:1 (1975Mo12), M1:M2:M3:M4+= 100:10 *1*:2.6 *7*:0.50 *15*, δ<0.008 (1975ArYT).
148.83 *8*	0.5 *2*	641.95	1/2+	493.09	(3/2)+				
217.03 *5*	2.2 *3*	926.33	5/2+	709.30	(3/2)+				
433.22 *9*	29.1 *5*	926.33	5/2+	493.09	(3/2)+	E2	0.01542		α(K)=0.01282 *18*; α(L)=0.00206 *3*; α(M)=0.000435 *6*; α(N+..)=0.0001101 *16* α(N)=9.44×10^{-5} *14*; α(O)=1.479×10^{-5} *21*; α(P)=8.97×10^{-7} *13* Mult.: α(K)exp=0.013 *5*.
436.59 *9*	149 *5*	447.17	5/2+	10.59	5/2+	E2	0.01509		α(K)=0.01254 *18*; α(L)=0.00201 *3*; α(M)=0.000424 *6*; α(N+..)=0.0001075 *15* α(N)=9.21×10^{-5} *13*; α(O)=1.444×10^{-5} *21*; α(P)=8.78×10^{-7} *13* Mult.: α(K)exp=0.012 *2*.
447.15 *8*	1000	447.17	5/2+	0.0	7/2+	M1+E2	0.0165 *25*		α(K)=0.0140 *23*; α(L)=0.00199 *13*; α(M)=0.000416 *24*; α(N+..)=0.000107 *7* α(N)=9.1×10^{-5} *6*; α(O)=1.46×10^{-5} *12*; α(P)=1.04×10^{-6} *22* Mult.: α(K)exp=0.0136 *14* (if α(K)(254.5γ)=5.54), K:L:M=100 *5*:12.8 *16*:2.9 *9*.
479.12 *10*	6.7 *3*	926.33	5/2+	447.17	5/2+				
482.47 *10*	25.7 *9*	493.09	(3/2)+	10.59	5/2+				
493.03 *10*	5.9 *3*	493.09	(3/2)+	0.0	7/2+				
529.3@ *2*	0.2 *1*	1171.40	(1/2+,3/2−)	641.95	1/2+				
631.38 *6*	7.5 *4*	641.95	1/2+	10.59	5/2+				
678.26 *12*	0.5 *2*	1171.40	(1/2+,3/2−)	493.09	(3/2)+				
698.72 *11*	17.5 *9*	709.30	(3/2)+	10.59	5/2+	M1+(E2)	0.0053 *10*		α(K)=0.0046 *9*; α(L)=0.00061 *9*; α(M)=0.000126 *18*;

From ENSDF

^{137}Ce ε decay (9.0 h) 1975He20 (continued)

$\gamma(^{137}La)$ (continued)

E_γ †	I_γ †‡	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α #	Comments
								α(N+..)=3.2×10^{-5} *5* α(N)=2.8×10^{-5} *4*; α(O)=4.5×10^{-6} *7*; α(P)=3.4×10^{-7} *8* Mult.: α(K)exp=0.0050 *10*.
709.30 *11*	0.6 *1*	709.30	(3/2)$^+$	0.0	7/2$^+$			
724.4 *3*	0.4 *2*	1171.40	(1/2$^+$,3/2$^-$)	447.17	5/2$^+$			
770.97 *10*	3.4 *2*	781.57	(7/2)$^+$	10.59	5/2$^+$			
781.57 *13*	1.7 *2*	781.57	(7/2)$^+$	0.0	7/2$^+$			
915.80 *13*	28.9 *10*	926.33	5/2$^+$	10.59	5/2$^+$	(M1+E2)	0.0028 *5*	α(K)=0.0024 *5*; α(L)=0.00031 *5*; α(M)=6.5×10^{-5} *10*; α(N+..)=1.7×10^{-5} *3* α(N)=1.43×10^{-5} *22*; α(O)=2.3×10^{-6} *4*; α(P)=1.8×10^{-7} *4* Mult.: α(K)exp=0.0025 *5*.
926.35 *13*	19.0 *7*	926.33	5/2$^+$	0.0	7/2$^+$	(M1+E2)	0.0027 *5*	α(K)=0.0024 *5*; α(L)=0.00031 *5*; α(M)=6.3×10^{-5} *10*; α(N+..)=1.6×10^{-5} *3* α(N)=1.39×10^{-5} *22*; α(O)=2.3×10^{-6} *4*; α(P)=1.8×10^{-7} *4* Mult.: α(K)exp=0.0023 *4*.
1160.85 *22*	0.84 *8*	1171.40	(1/2$^+$,3/2$^-$)	10.59	5/2$^+$			

† From 1975He20.

‡ For absolute intensity per 100 decays, multiply by 0.00168 *6*.

\# 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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