^{252}Es ε decay 1973Fi06

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	A. M. Mattera, S. Zhu, A. B. Hayes, E. A. Mccutchan	NDS 172, 543 (2021)	1-Jan-2021

Parent: ^{252}Es: E=0.0; J$^{\pi}$=(5$^-$); $T_{1/2}$=471.7 d *19*; Q(ε)=1.26×10^3 *5*; %ε+%β^+ decay=22 *2*

1973Fi06: ^{252}Es was produced in reactions of ^{252}Cf(d,2n) or ^{249}Bk(α,n) at the Argonne 152-cm cyclotron, and was chemically separated from the targets and other reaction products. Detectors: Ge(Li) with Be window, Si(Li) and NaI(Tl); Measured $T_{1/2}$, E_α, I_α, E_γ, I_γ, I_{ce}, γγ, γce, α/EC ratio.

x-ray energies (1973Fi06): E(Kα_2)=109.82 keV *5*; E(Kα_1)=115.02 keV *5*; E(Kβ_3)=128.58 keV *10*; E(Kβ_1)=129.82 keV *10*; E(Kβ_2+Kβ_4)=133.60 keV *10*; E(KO$_2$+KO$_3$)=134.76 keV *10*.

x-ray intensities per 100 ε decays (1973Fi06): I(Kα_2)=13.4 *10*; I(Kα_1)=20.5 *14*; I(K$\beta_{1,3}$)=8.4 *7*; I(K$\beta_{2,4}$+KO$_{2,3}$)=2.9 *3*.

α: Additional information 1.

^{252}Cf Levels

E(level)†	J$^{\pi}$‡	$T_{1/2}$‡
0.0	0$^+$	
45.72 *5*	2$^+$	92 ps *6*
151.73 *6*	4$^+$	
804.82 *7*	(2$^+$)	
830.81 *7*	(2$^-$)	
845.72 *9*	(3$^+$)	
867.51 *7*	(3$^-$)	
900.29 *25*	(4$^+$)	
917.03 *12*	(4$^-$)	
969.83 *6*	(3$^+$)	

† From a least-squares fit to Eγ, by evaluators.
‡ From the Adopted Levels.

ε,β^+ radiations

1973Fi06 assign 100% ε feeding to the 969.8 level. An intensity balance indicates small feeding to the (3$^+$), 845.7-keV level, (4$^+$), 900.3-keV level and (4$^-$), 917.0-keV level, and is adopted here.

E(decay)	E(level)	Iε†	Log *ft*	I(ε+β^+)†	Comments
(2.9×10^2 *5*)	969.83	20 *3*	8.3^{1u} *4*	20 *3*	εK=0.22 *12*; εL=0.53 *7*; εM+=0.25 *5* E(decay): in 1973Fi06, the ε decay energy to the 969.8-keV level was deduced to be 320 keV *30* based on ε(K)/ε=0.45 *10*. From the recommended value of Q(ε)=1260 keV *50* by 2017Wa10, the ε decay energy to this level is 290 keV *50*.
(3.4×10^2 *5*)	917.03	0.16 *2*	11.25 *21*	0.16 *2*	εK=0.59 *6*; εL=0.30 *4*; εM+=0.118 *18*
(3.6×10^2 *5*)	900.29	0.095 *17*	11.54 *21*	0.095 *17*	εK=0.60 *5*; εL=0.29 *3*; εM+=0.114 *15*
(4.1×10^2 *5*)	845.72	1.64 *21*	10.1^{1u} *3*	1.64 *21*	εK=0.43 *7*; εL=0.40 *5*; εM+=0.174 *25*

† Absolute intensity per 100 decays.

^{252}Es ε decay 1973Fi06 (continued)

$\gamma(^{252}Cf)$

E_γ[#]	I_γ[†#@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α	Comments
45.72 *5*	0.10 *1*	45.72	2+	0.0	0+	E2	9.2×10^2 *5*	α(L)=661 *34*; α(M)=188 *10*; α(N)=52.9 *27*; α(O)=13.1 *7*; α(P)=2.05 *10*; α(Q)=0.00469 *21* Mult.: from α(M)exp=240, α(N+O+...)=70 with uncertainties better than 15% (1973Fi06).
102.33 *5*	7.2 *5*	969.83	(3+)	867.51	(3−)	[E1]	0.1394 *20*	α(L)=0.1042 *15*; α(M)=0.0260 *4*; α(N)=0.00711 *10*; α(O)=0.001772 *25*; α(P)=0.000296 *4* α(Q)=1.003×10^{-5} *14*
106.02 *5*	0.53 *5*	151.73	4+	45.72	2+	E2	16.97 *25*	α(L)=12.22 *18*; α(M)=3.49 *5*; α(N)=0.981 *14*; α(O)=0.243 *4*; α(P)=0.0389 *6* α(Q)=0.0001510 *22* Mult.: from α(L2)exp=7.2, α(L3)exp=3.8 with uncertainties better than 15% (1973Fi06).
139.03 *5*	53 *4*	969.83	(3+)	830.81	(2−)	E1	0.2502 *35*	α(K)=0.1862 *26*; α(L)=0.0479 *7*; α(M)=0.01186 *17*; α(N)=0.00326 *5*; α(O)=0.000817 *12* α(P)=0.0001406 *20*; α(Q)=5.25×10^{-6} *7* Mult.: from α(L1+L2)exp=0.03 with uncertainty better than 15% (1973Fi06).
165.0 *1*	0.55 *6*	969.83	(3+)	804.82	(2+)	M1	9.89	α(K)=7.70; α(L)=1.634; α(M)=0.404; α(N+..)=0.156 Mult.,δ: M1 with δ=0.0 *23* from α(L1+L2)exp=2.2 with uncertainty better than 15% (1973Fi06).
694.0 *1*	1.76 *12*	845.72	(3+)	151.73	4+			
715.8 *1*	3.30 *23*	867.51	(3−)	151.73	4+	[E1]	0.00847 *19*	α(K)=0.00678 *15*; α(L)=0.001265 *30*; α(M)=0.000306 *7*; α(N)=8.42×10^{-5} *20*; α(O)=2.17×10^{-5} *5* α(P)=4.08×10^{-6} *9*; α(Q)=2.20×10^{-7} *5*
748.6 *3*	0.29 *5*	900.29	(4+)	151.73	4+	[E2]	0.0273 *7*	α(K)=0.0181 *4*; α(L)=0.00673 *21*; α(M)=0.00176 *6*; α(N)=0.000489 *15*; α(O)=0.000124 *4* α(P)=2.26×10^{-5} *7*; α(Q)=8.07×10^{-7} *20*
759.1 *1*	1.96 *14*	804.82	(2+)	45.72	2+	[E2]	0.0265 *7*	α(K)=0.0177 *4*; α(L)=0.00648 *20*; α(M)=0.00169 *5*; α(N)=0.000470 *15*; α(O)=0.000120 *4* α(P)=2.17×10^{-5} *7*; α(Q)=7.86×10^{-7} *19*
765.3 *1*	0.70 *6*	917.03	(4−)	151.73	4+	[E1]	0.00752 *17*	α(K)=0.00604 *14*; α(L)=0.001118 *26*; α(M)=0.000270 *6*; α(N)=7.43×10^{-5} *17*; α(O)=1.91×10^{-5} *4* α(P)=3.61×10^{-6} *8*; α(Q)=1.97×10^{-7} *4*
785.1 *1*	70 *4*	830.81	(2−)	45.72	2+	[E1]	0.00719 *16*	α(K)=0.00577 *13*; α(L)=0.001066 *25*; α(M)=0.000257 *6*; α(N)=7.08×10^{-5} *17*; α(O)=1.82×10^{-5} *4* α(P)=3.45×10^{-6} *8*; α(Q)=1.88×10^{-7} *4*
800.0 *1*	5.7 *4*	845.72	(3+)	45.72	2+			
804.8 *1*	1.5 *1*	804.82	(2+)	0.0	0+	[E2]	0.0236 *6*	α(K)=0.01606 *35*; α(L)=0.00555 *17*; α(M)=0.00144 *4*; α(N)=0.000400 *12* α(O)=0.0001020 *31*; α(P)=1.86×10^{-5} *6*; α(Q)=7.01×10^{-7} *17*
818.1 *1*	2.85 *22*	969.83	(3+)	151.73	4+			

Continued on next page (footnotes at end of table)

^{252}Es ε decay 1973Fi06 (continued)

γ(^{252}Cf) (continued)

E_γ[#]	I_γ[†#@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	α	Comments
821.8 *1*	1.33 *10*	867.51	(3⁻)	45.72	2⁺	[E1]	0.00664 *15*	α(K)=0.00534 *12*; α(L)=0.000981 *23*; α(M)=0.000237 *6*; α(N)=6.51×10⁻⁵ *15*; α(O)=1.68×10⁻⁵ *4* α(P)=3.18×10⁻⁶ *7*; α(Q)=1.75×10⁻⁷ *4*
854.5 *4*	0.13 *3*	900.29	(4⁺)	45.72	2⁺	[E2]	0.0209 *5*	α(K)=0.01452 *32*; α(L)=0.00475 *14*; α(M)=0.00122 *4*; α(N)=0.000341 *10*; α(O)=8.69×10⁻⁵ *26* α(P)=1.59×10⁻⁵ *5*; α(Q)=6.24×10⁻⁷ *15*
924.1 *1*	9.2 *6*	969.83	(3⁺)	45.72	2⁺			

† Photon intensities per 100 ε decays, obtained in 1973Fi06 by normalizing the total γ-ray and conversion electron intensities of the high energy transitions populating the ground-state band to 100% with the ce cofficients from 1968Ha53 assuming no direct ε branch to the g.s. band is expected.
‡ From the Adopted Gammas unless otherwise noted.
# From 1973Fi06.
@ For absolute intensity per 100 decays, multiply by 0.22 *2*.

^{252}Es ε decay 1973Fi06

Decay Scheme

Intensities: I_{γ} per 100 parent decays