Adopted Levels, Gammas

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

Q(β^-)=−1.26×10^3 *5*; S(n)=6172 *4*; S(p)=6482 *11*; Q(α)=6216.95 *4* 2017Wa10
S(2n)=11278.4 *27*; S(2p)=11533 *10* (2017Wa10).
α: Additional information 1.

^{252}Cf Levels

Cross Reference (XREF) Flags

- A ^{256}Fm α decay
- B ^{252}Es ε decay
- C Coulomb excitation
- D Cf(^{18}O,Xγ)

E(level)†	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0‡	0$^+$	2.647 y *3*	ABCD	%α=96.898 *3*; %SF=3.102 *3* T$_{1/2}$: 2.647 y *3* adopted from 1994KhZW on the analysis of the following measured half-lives: 2.646 y *4* (1965Me02), 2.621 y *6* (1969De23), 2.659 y *10* (1973Mi05), 2.638 y *7* (1974Sp02), 2.637 y *5* (1976Mo30), 2.640 y *7* (1982La25), 2.651 y *4* (1984SmZV), 2.648 y *2* (W.G. Alberts and M. Matzke, PTB Mitteilungen 93, 315 (1983)), and 2.6503 y *31* (1985Ax02). This analysis took into account the duration and the number of measurements in each experiment by comparing them with a formulated ideal experiment. Other measured half-lives: 2.55 y *15* (1957Ea01); 2.628 y *10* (1974Sh15); 2.653 y *1* (quoted in 1992Ra08 as private communication J.R. Smith). Other evaluated half-lives: 2.645 y *8* (1986LoZT: an average of 2.638 y and 2.651 y with a quoted error sufficiently large to cover the range of uncertainty); 2.648 y *2* (1992Ra08: Rajeval method); 2.650 y *2* (1994Ka08: Modified Bayesian Method). %α and %SF from weighted average of deduced %SF values from α/SF=31.56 *35* (1993Pa29), 31.5 *3* (1970Al23), 31.3 *5* (1970Al23), 31.3 *2* (1965Me02), 31 *1* (1954Ma98) and measured %SF value of 3.1028 *27* (2018Be29). Other α/SF measurements: T$_{1/2}$(SF)=66 y *10* (1957Ea01), α/SF=36.4 (1961Se18).
45.72‡ *5*	2$^+$	92 ps *6*	ABCD	B(E2)↑=16.7 *11* (1971Fo17) T$_{1/2}$: calculated from B(E2)↑=16.7 e^{2}b^2 *11* in Coulomb excitation with α(45.72γ)=917. J$^\pi$: E2 γ to 0$^+$; populated from 0$^+$ by Coulomb excitation.
151.73‡ *6*	4$^+$		B D	J$^\pi$: E2 γ to 2$^+$.
316.23‡ *12*	6$^+$		D	J$^\pi$: E2 γ to 4$^+$.
536.6‡ *3*	8$^+$		D	J$^\pi$: E2 γ to 6$^+$.
804.82# *7*	(2$^+$)		B	J$^\pi$: γs to 0$^+$ and 2$^+$, no γ to 4$^+$; analogous to the K=2, 2$^+$ band head of K$^\pi$=2$^+$ band observed in ^{250}Cf and ^{254}Fm.
809.2‡ *6*	10$^+$		D	J$^\pi$: E2 γ to 8$^+$.
830.81@ *7*	(2$^-$)		B	J$^\pi$: no γs to 0$^+$ or 4$^+$; 785.1γ to 2$^+$, analogous to the K=2,2$^-$ band head of K$^\pi$=2$^-$ band observed in ^{250}Cf, and consistent with its properties.
845.72# *9*	(3$^+$)		B	J$^\pi$: γs to 2$^+$ and 4$^+$, no γ to 0$^+$; member of K$^\pi$=2$^+$ band.
867.52@ *7*	(3$^-$)		B	J$^\pi$: γs to 4$^+$ and 2$^+$, no γ to 0$^+$; member of K$^\pi$=2$^-$ band.
900.33# *25*	(4$^+$)		B	J$^\pi$: γs to 4$^+$ and 2$^+$, no γ to 0$^+$; member of K$^\pi$=2$^+$ band.
917.03@ *12*	(4$^-$)		B	J$^\pi$: γ to 4$^+$, no γs to 2$^+$, 0$^+$; member of K$^\pi$=2$^-$ band.
969.83 *6*	(3$^+$)		B	J$^\pi$: E1 γ to (2$^-$); M1 γ to (2$^+$); γs to 2$^+$ and 4$^+$; and no γ to 0$^+$. the two-quasiparticle configuration of ν 1/2[620] + ν 7/2[613] was proposed by 1973Fi06. This assignment is consistent with its population in ^{252}Es ε decay.

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Adopted Levels, Gammas (continued)

^{252}Cf Levels (continued)

† From a least-squares fit to Eγ, by evaluators.
‡ Band(A): $K^\pi=0^+$ g.s. band.
# Band(B): $K^\pi=2^+$ γ-vibrational band. Mixed with the K=3 state at 969.83 keV.
@ Band(C): $K^\pi=2^-$ band.

γ(^{252}Cf)

E_i(level)	J_i^π	E_γ†	I_γ†	E_f	J_f^π	Mult.	α	Comments
45.72	2+	45.72 *5*	100	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* B(E2)(W.u.)=349 *24* Eγ: other: 44.0 keV *5* in Coulomb Excitation. Mult.: from α(M)exp=240, α(N+O+...)=70 with uncertainties better than 15% in ^{252}Es ε decay.
151.73	4+	106.02 *5*	100	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% in ^{252}Es ε decay.
316.23	6+	164.5 *1*	100	151.73	4+	E2	2.49 *11*	α(K)=0.1557 *22*; α(L)=1.68 *8*; α(M)=0.478 *22*; α(N)=0.134 *6*; α(O)=0.0334 *15* α(P)=0.00543 *25*; α(Q)=3.29×10^{-5} *11* Eγ: from Cf(^{18}O,Xγ) (2010Ta10). Mult.: Q from Iγ(in-plane)/Iγ(out-of-plane)=1.33 *22* in Cf(^{18}O,Xγ); E2 from assignment to rotational band.
536.6	8+	220.4 *3*	100	316.23	6+	E2	0.791 *32*	α(K)=0.1268 *23*; α(L)=0.480 *22*; α(M)=0.135 *6*; α(N)=0.0380 *17*; α(O)=0.0095 *4* α(P)=0.00156 *7*; α(Q)=1.37×10^{-5} *4* Eγ: from Cf(^{18}O,Xγ) (2010Ta10). Mult.: Q from Iγ(in-plane)/Iγ(out-of-plane)=1.1 *3* in Cf(^{18}O,Xγ); E2 from assignment to rotational band.
804.82	(2+)	759.1 *1*	100 *8*	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*
		804.8 *1*	77 *5*	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*
809.2	10+	272.6 *5*	100	536.6	8+	E2	0.373 *14*	α(K)=0.0950 *19*; α(L)=0.202 *9*; α(M)=0.0564 *24*; α(N)=0.0158 *7*; α(O)=0.00395 *17* α(P)=0.000661 *28*; α(Q)=7.69×10^{-6} *23* Eγ: from Cf(^{18}O,Xγ) (2010Ta10). Mult.: Q from Iγ(in-plane)/Iγ(out-of-plane)=1.4 *4* in Cf(^{18}O,Xγ); E2 from assignment to rotational band.
830.81	(2−)	785.1 *1*	100	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*

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Adopted Levels, Gammas (continued)

γ(^{252}Cf) (continued)

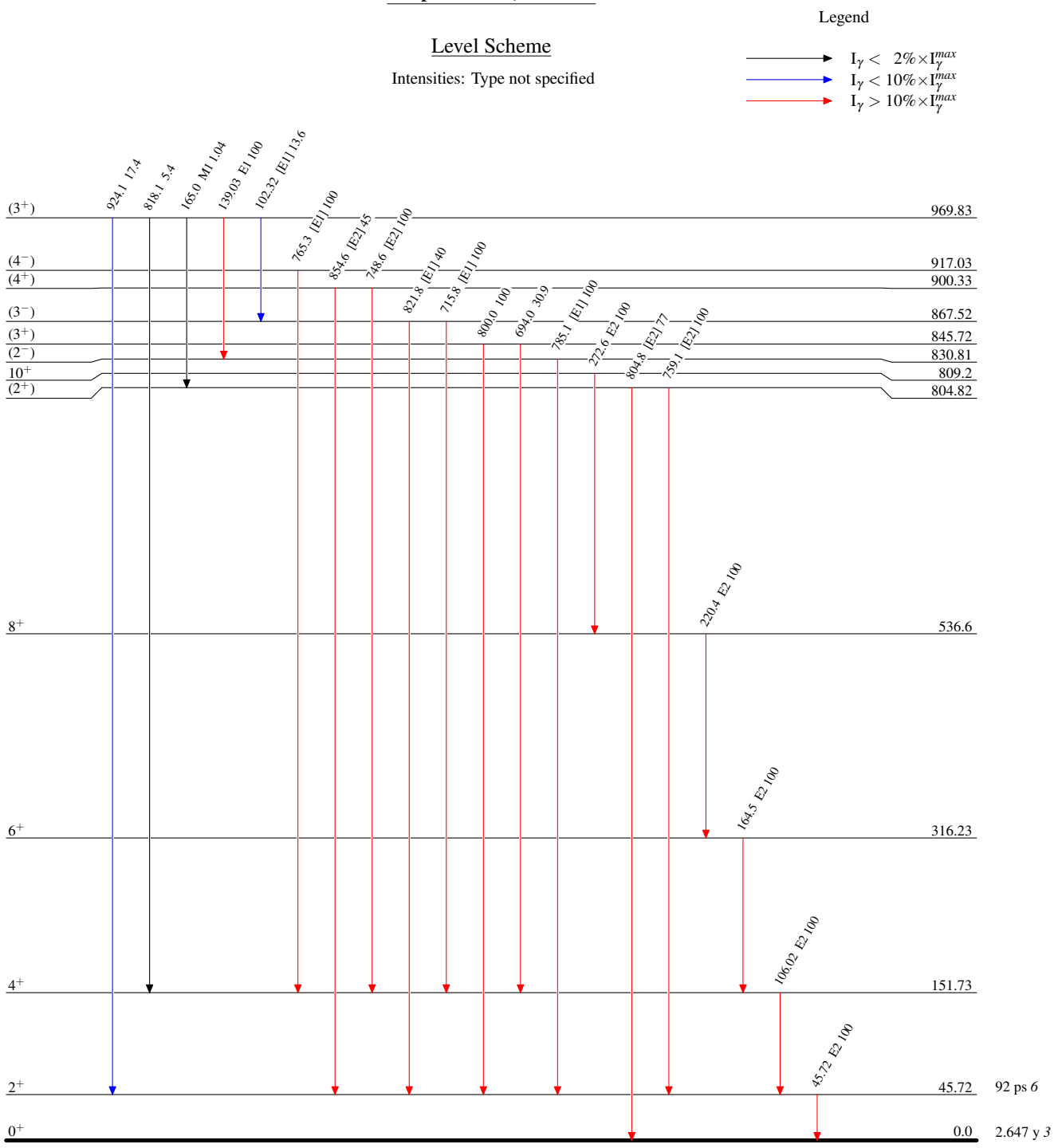
E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.	α	Comments
845.72	(3$^+$)	694.0 *1*	30.9 *21*	151.73	4$^+$			
		800.0 *1*	100 *7*	45.72	2$^+$			
867.52	(3$^-$)	715.8 *1*	100 *6*	151.73	4$^+$	[E1]	0.00847 *19*	α(K)=0.00678 *15*; α(L)=0.001265 *30*; α(M)=0.000306 *7*; α(N)=8.42×10^{-5} *20*; α(O)=2.17×10^{-5} *5* α(P)=4.08×10^{-6} *9*; α(Q)=2.20×10^{-7} *5*
		821.8 *1*	40 *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*
900.33	(4$^+$)	748.6 *3*	100 *17*	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*
		854.6 *4*	45 *10*	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*
917.03	(4$^-$)	765.3 *1*	100	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*
969.83	(3$^+$)	102.32 *5*	13.6 *9*	867.52	(3$^-$)	[E1]	0.1394 *20*	α(L)=0.1043 *15*; α(M)=0.0260 *4*; α(N)=0.00711 *10*; α(O)=0.001772 *25*; α(P)=0.000296 *4* α(Q)=1.004×10^{-5} *14*
		139.03 *5*	100 *8*	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% in ^{252}Es ε decay.
		165.0 *1*	1.04 *11*	804.82	(2$^+$)	M1	9.89	Mult.,δ: M1 with δ=0.0 *23* from α(L1+L2)exp=2.2 with uncertainty better than 15% in ^{252}Es ε decay.
		818.1 *1*	5.4 *4*	151.73	4$^+$			
		924.1 *1*	17.4 *11*	45.72	2$^+$			

[†] From ^{252}Es ε decay, except where noted.

Adopted Levels, Gammas

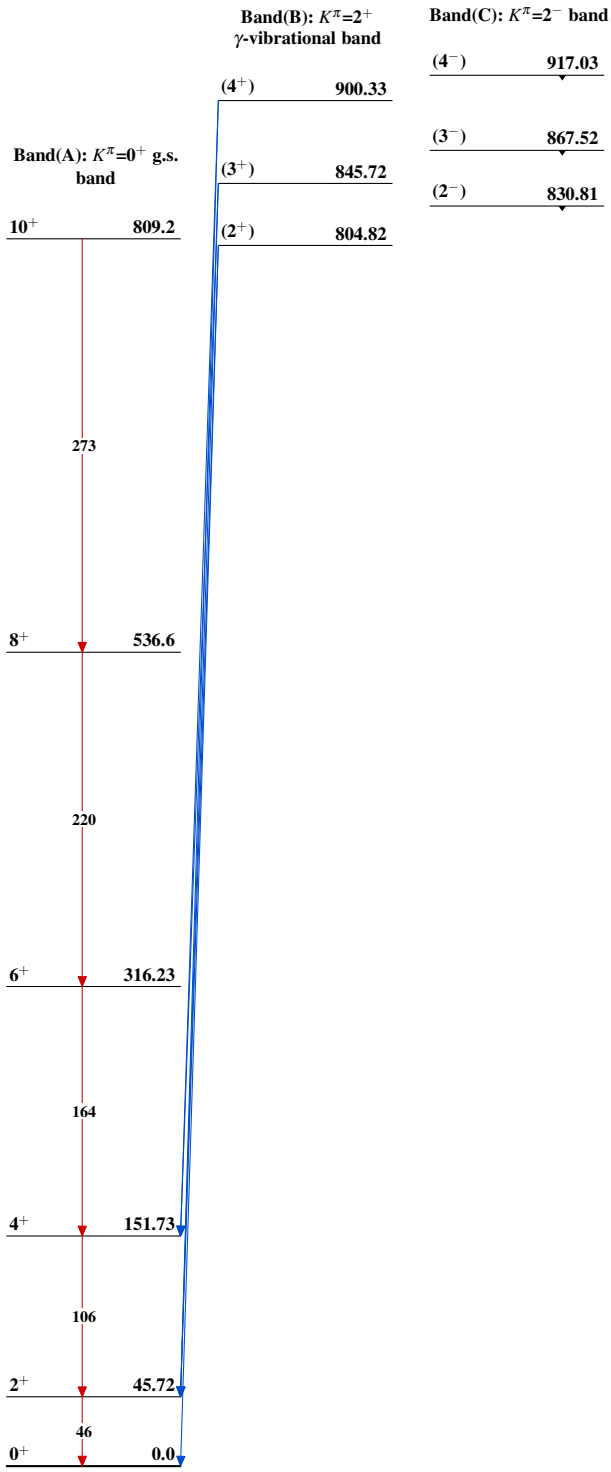
Level Scheme

Intensities: Type not specified



$^{252}_{98}Cf_{154}$

Adopted Levels, Gammas



$^{252}_{98}Cf_{154}$