^{251}Cm β^- decay 1978Lo13

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. Morse	NDS 189,111 (2023)	23-Sep-2022

Parent: ^{251}Cm: E=0; $J^\pi=(1/2^+)$; $T_{1/2}$=16.8 min *2*; Q(β^-)=1420 *20*; %β^- decay=100

1978Lo13: ^{251}Cm produced through neutron irradiation of ^{250}Cm collected from the debris of the 1969 HUTCH nuclear test.

Observed γ rays produced in β^- decay to states in ^{251}Bk. Measured E_γ, I_γ, $T_{1/2}$, deduced ^{251}Bk level scheme.

α: Additional information 1.

^{251}Bk Levels

E(level)	J^π	$T_{1/2}$	Comments
0[†]	(3/2$^-$)	56 min *1*	%β^-=100 configuration=π3/2$^-$[521] (1978Lo13) $T_{1/2}$: From Adopted Levels.
32.5[†] *6*	(5/2$^-$)		
35.7 *10*	(7/2$^+$)		configuration=π7/2$^+$[633] (1978Lo13) E(level): Stated in 1978Lo13, citing 1970HoZN.
269.3 *14*	(5/2$^+$)		configuration=π5/2$^+$[642] (1978Lo13)
311.7 *10*	(1/2$^+$)		configuration=π1/2$^+$[400] (1978Lo13)
422.3[‡] *8*	(3/2$^-$)		configuration=π1/2$^-$[530] (1978Lo13)
438.2[‡] *10*	(1/2$^-$)		
542.6[#] *8*	(1/2$^-$)		configuration=π1/2$^-$[521] (1978Lo13)
562.5[#] *7*	(3/2$^-$)		
978.4 *6*	(1/2$^-$,3/2$^-$)		J^π: Stated in 1978Lo13. Possibly a vibrational state.

[†] Band(A): π3/2$^-$[521].
[‡] Seq.(B): π1/2$^-$[530].
[#] Seq.(C): π1/2$^-$[521].

β^- radiations

E(decay)	E(level)	Iβ^-[†‡]	Log *ft*	Comments
(442 *20*)	978.4	2.1 *4*	5.96 *11*	av Eβ=126.6 *64*
(858 *20*)	562.5	3.7 *9*	6.67 *12*	av Eβ=266.6 *71*
(877 *20*)	542.6	16 *4*	6.07 *12*	av Eβ=273.7 *72*
(982 *20*)	438.2	2.1 *6*	7.12 *13*	av Eβ=311.0 *73*
(998 *20*)	422.3	3.6 *9*	6.91 *12*	av Eβ=316.8 *73*
(1108 *20*)	311.7	0.7 *17*	7.8 *11*	av Eβ=357.1 *74*
(1151[#] *20*)	269.3	1.7 *8*	7.45 *21*	av Eβ=372.7 *75* β^- feeding to this level seems too large given the spin difference with the parent. A γ-ray photopeak was observed at 152.9 keV in in 1978Lo13 but was assigned to ^{251}Cf. It may be that this peak also contains a component that belongs to ^{251}Bk, and would fit as the decay from the 422.3 keV level to the 269.3 keV level.
(1420 *20*)	0	70 *4*	6.16 *4*	av Eβ=473.8 *77*

[†] From level-scheme intensity balance.
[‡] Absolute intensity per 100 decays.
[#] Existence of this branch is questionable.

^{251}Cm β^- decay 1978Lo13 (continued)

$\gamma(^{251}Bk)$

E_γ	I_γ[†][‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α	Comments
32.6		32.5	(5/2$^-$)	0	(3/2$^-$)			
233.6	4.1 *4*	269.3	(5/2$^+$)	35.7	(7/2$^+$)	[M1+E2]	1.9 *13*	α(K)=1.3 *12*; α(L)=0.43 *9*; α(M)=0.111 *15*; α(N)=0.031 *4*; α(O)=0.0078 *12*; α(P)=0.0014 *3* α(Q)=6.8×10^{-5} *55*
311.7	4.8 *5*	311.7	(1/2$^+$)	0	(3/2$^-$)	[E1]	0.0411 *7*	α(K)=0.0322 *5*; α(L)=0.00668 *11*; α(M)=0.00163 *3*; α(N)=0.000447 *7*; α(O)=0.0001130 *18* α(P)=2.12×10^{-5} *4*; α(Q)=1.168×10^{-6} *18*
389.7	11.7 *18*	422.3	(3/2$^-$)	32.5	(5/2$^-$)	[M1+E2]	0.44 *32*	α(K)=0.32 *28*; α(L)=0.085 *38*; α(M)=0.0216 *85*; α(N)=0.0060 *24*; α(O)=0.00152 *62* α(P)=2.9×10^{-4} *13*; α(Q)=1.6×10^{-5} *13*
415.9	1.5 *6*	978.4	(1/2$^-$,3/2$^-$)	562.5	(3/2$^-$)	[M1+E2]	0.37 *27*	α(K)=0.27 *23*; α(L)=0.070 *33*; α(M)=0.0177 *74*; α(N)=0.0049 *21*; α(O)=0.00125 *54* α(P)=2.4×10^{-4} *12*; α(Q)=1.4×10^{-5} *11*
422.3	6.6 *8*	422.3	(3/2$^-$)	0	(3/2$^-$)	[M1+E2]	0.35 *26*	α(K)=0.26 *22*; α(L)=0.067 *32*; α(M)=0.0169 *72*; α(N)=0.0047 *20*; α(O)=0.00119 *52* α(P)=2.3×10^{-4} *11*; α(Q)=1.3×10^{-5} *11*
435.8	1.4 *5*	978.4	(1/2$^-$,3/2$^-$)	542.6	(1/2$^-$)	[M1+E2]	0.32 *24*	α(K)=0.24 *20*; α(L)=0.061 *29*; α(M)=0.0154 *67*; α(N)=0.0043 *19*; α(O)=0.00109 *48* α(P)=2.1×10^{-4} *10*; α(Q)=1.22×10^{-5} *94*
438.2	11.4 *7*	438.2	(1/2$^-$)	0	(3/2$^-$)	[M1+E2]	0.32 *24*	α(K)=0.24 *20*; α(L)=0.060 *29*; α(M)=0.0152 *66*; α(N)=0.0042 *18*; α(O)=0.00107 *48* α(P)=2.06×10^{-4} *99*; α(Q)=1.20×10^{-5} *93*
530.0	14.9 *11*	562.5	(3/2$^-$)	32.5	(5/2$^-$)	[M1+E2]	0.19 *14*	α(K)=0.14 *12*; α(L)=0.035 *18*; α(M)=0.0087 *42*; α(N)=0.0024 *12*; α(O)=6.2×10^{-4} *30* α(P)=1.19×10^{-4} *62*; α(Q)=7.2×10^{-6} *54*
542.7	100.0 *26*	542.6	(1/2$^-$)	0	(3/2$^-$)	[M1+E2]	0.18 *13*	α(K)=0.14 *11*; α(L)=0.033 *17*; α(M)=0.0082 *40*; α(N)=0.0023 *11*; α(O)=5.8×10^{-4} *29* α(P)=1.11×10^{-4} *58*; α(Q)=6.8×10^{-6} *51*
562.5	9.4 *30*	562.5	(3/2$^-$)	0	(3/2$^-$)	[M1+E2]	0.16 *12*	α(K)=0.124 *96*; α(L)=0.030 *16*; α(M)=0.0074 *36*; α(N)=0.00204 *99*; α(O)=5.2×10^{-4} *26* α(P)=1.01×10^{-4} *53*; α(Q)=6.2×10^{-6} *46*
945.9	1.4 *7*	978.4	(1/2$^-$,3/2$^-$)	32.5	(5/2$^-$)	[M1,E2]	0.043 *27*	α(K)=0.033 *22*; α(L)=0.0072 *38*; α(M)=0.00177 *91*; α(N)=4.9×10^{-4} *25*; α(O)=1.25×10^{-4} *65* α(P)=2.5×10^{-5} *13*; α(Q)=1.6×10^{-6} *11*
978.2	9.2 *12*	978.4	(1/2$^-$,3/2$^-$)	0	(3/2$^-$)	[M1+E2]	0.039 *24*	α(K)=0.030 *20*; α(L)=0.0066 *35*; α(M)=0.00162 *83*; α(N)=4.5×10^{-4} *23*; α(O)=1.15×10^{-4} *59* α(P)=2.2×10^{-5} *12*; α(Q)=1.47×10^{-6} *93*

[†] The normalization has been deduced by the evaluator based on the intensity balance of the γ rays populating the 542-keV level, corrected for internal conversion, and the β-feeding intensity to the 542-keV level quoted in 1978Lo13. Explicitly, $N=I_\beta^{542}/(I_\gamma^{542}\alpha^{542}-I_\gamma^{435}\alpha^{435})$.

[‡] For absolute intensity per 100 decays, multiply by 0.14 *3*.

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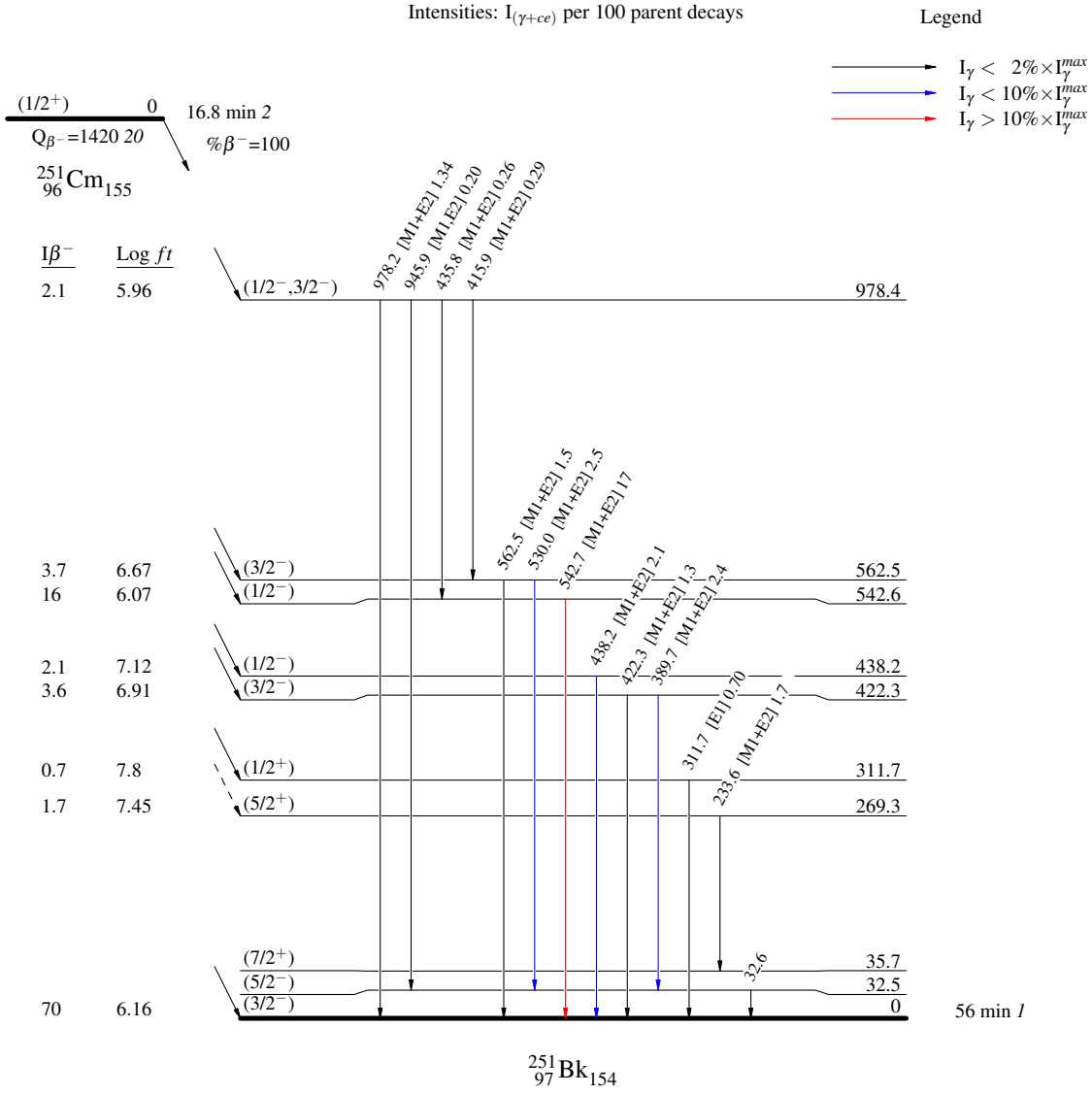
Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



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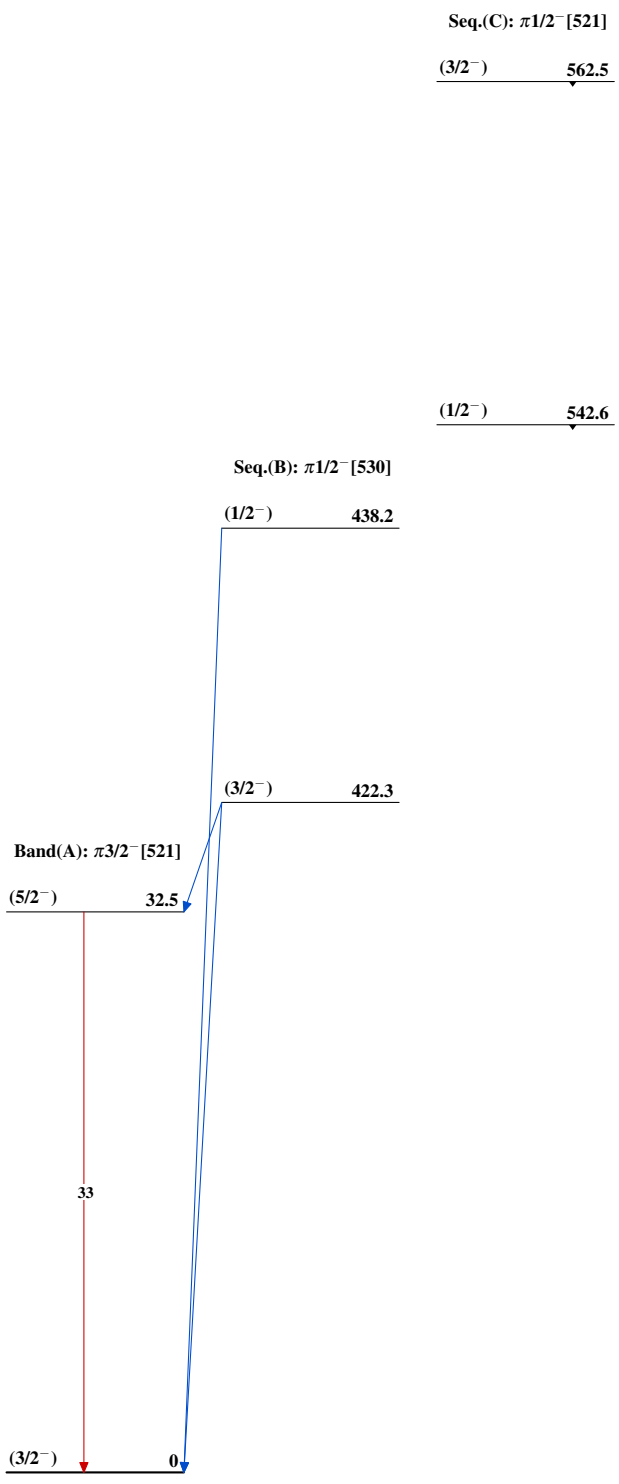

$^{251}_{97}Bk_{154}$