^{253}Fm α decay 1967Ah02

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. D. Nesaraja	NDS 195,718 (2024)	12-Oct-2023

Parent: ^{253}Fm: E=0.0; $J^\pi=1/2^+$; $T_{1/2}$=3.00 d *12*; Q(α)=7197.9 *10*; %α decay=12 *1*

^{253}Fm-Q(α): From 2021Wa16.

^{253}Fm-J^π,$T_{1/2}$: From Adopted Levels in ^{253}Fm in the ENSDF database (2013Br09).

^{253}Fm-%α decay: %α=12 *1* (1967Ah02).

1967Ah02: ^{253}Fm was produced from the ^{252}Cf(α,3n) nuclear reaction at Argonne cyclotron and was chemically separated from the fission products. It was noted that the high-energy α groups from the decay of ^{253}Fm are masked by the ^{255}Fm and ^{252}Fm α peaks, whereas the α groups below 6.682 MeV are obscured by the ^{253}Es α peaks which grows from the electron-capture decay of ^{253}Fm during the measurement. Hence the sample was allowed to decay for approximately 10 days so that ^{252}Fm ($t_{1/2}$= 25.39 h) and ^{255}Fm ($t_{1/2}$= 20.07 h) would decay to a very low level, allowing the α decay from ^{253}Fm to be measured without impurities. α-particles were measured with a Au-Si surface-barrier detector, the γ rays were measured with a NaI(Tl) detector and the conversion electrons were detected with a Si(Li) detector. Measured α, γ, αγ-coin, conversion electrons and $t_{1/2}$.

Others: 1959Si88, 1990Po14 (measured relative L and M x-ray intensities from the decay using the x-ray spectrometer).

^{249}Cf Levels

E(level)†	J^π‡	$T_{1/2}$	Comments
0#	$9/2^-$	351 y *2*	$T_{1/2}$: From Adopted Levels.
62.48# *5*	$11/2^-$		
144.98@ *5*	$5/2^+$	45 μs *5*	$T_{1/2}$: From αγ(t) (1967Ah02).
187.97@ *6*	$7/2^+$		
221.7 *10*	$15/2^-$		
243.13@ *7*	$9/2^+$		
416.8& *4*	$1/2^+$		
440&	$(3/2^+)$		
460&	$(5/2^+)$		
550.6 *10*	$(1/2^+,3/2,5/2^+)$		
≈606			

† From Adopted Levels.
‡ From Adopted Levels. Band assignments are from 1967Ah02.
# Band(A): $9/2^-[734]$ Band.
@ Band(B): $5/2^+[622]$ Band.
& Band(C): $1/2^+[620]$ Band.

α radiations

Eα†	E(level)	Iα‡@	HF#	Eα†	E(level)	Iα‡@	HF#
≈6487	≈606	≈0.3	≈32	≈6867	221.7	≈0.9	≈550
6541 *5*	550.6	1.5 *4*	11 *4*	6901 *4*	187.97	9.8 *5*	70 *8*
6630 *4*	460	2.6 *5*	17 *4*	6943 *3*	144.98	42.7 *11*	24.5 *24*
6650 *4*	440	2.4 *4*	23 *5*	7023 *4*	62.48	6.7 *4*	345 *38*
6673 *3*	416.8	23.2 *9*	3.0 *3*	7083 *4*	0	1.3 *2*	3.21×10^3 *58*
6846 *3*	243.13	8.4 *5*	48 *6*				

† Adjusted by evaluator with correction recommended by 1991Ry01 (−8.8 keV) from measurements of 1967Ah02.
‡ From 1967Ah02.

Continued on next page (footnotes at end of table)

^{253}Fm α decay 1967Ah02 (continued)

α radiations (continued)

[#] The nuclear radius parameter $r_0(^{249}Cf)$=1.47787 *78* is deduced from interpolation (or unweighted average) of radius parameters of the adjacent even-even nuclides.

[@] For absolute intensity per 100 decays, multiply by 0.12 *1*.

^{253}Fm α decay 1967Ah02 (continued)

γ(^{249}Cf)

Iγ normalization: From I(271.8γ)=22 *3* per 100 α (1967Ah02).

E_γ	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	δ[†]	α[‡]	Comments
43.00		187.97	7/2$^+$	144.98	5/2$^+$	M1+E2	0.27	177.5 *25*	α(L)=130.5 *18*; α(M)=34.5 *5* α(N)=9.63 *13*; α(O)=2.437 *34*; α(P)=0.427 *6*; α(Q)=0.01466 *21*
(55.14)		243.13	9/2$^+$	187.97	7/2$^+$	M1+E2	0.14	54.6 *8*	E$_\gamma$: From Adopted Gammas. α(L)=40.6 *6*; α(M)=10.21 *14* α(N)=2.84 *4*; α(O)=0.731 *10*; α(P)=0.1377 *19*; α(Q)=0.00724 *10*
(62.47)		62.48	11/2$^-$	0	9/2$^-$	M1+E2	0.29 *3*	46.8 *27*	E$_\gamma$: From Adopted Gammas. α(L)=34.6 *19*; α(M)=9.0 *6* α(N)=2.50 *16*; α(O)=0.64 *4*; α(P)=0.115 *6*; α(Q)=0.00479 *9*
134		550.6	(1/2$^+$,3/2,5/2$^+$)	416.8	1/2$^+$				E$_\gamma$: From Adopted Gammas. E$_\gamma$: Existence of γ deduced from (α,γ) coin (1967Ah02).
144.8 *4*	1.6 *2*	144.98	5/2$^+$	0	9/2$^-$	M2+E3	0.42 *+11−12*	65.2 *13*	α(K)=30.8 *26*; α(L)=24.7 *22*; α(M)=7.1 *7* α(N)=2.03 *21*; α(O)=0.52 *5*; α(P)=0.092 *8*; α(Q)=0.00352 *22* Mult.: Other: E2 from L12/M+=2.7 *6* (1967Ah02).
271.8 *4*	22 *3*	416.8	1/2$^+$	144.98	5/2$^+$	E2		0.377 *6*	α(K)=0.0954 *14*; α(L)=0.2039 *31*; α(M)=0.0571 *9* α(N)=0.01603 *24*; α(O)=0.00400 *6*; α(P)=0.000669 *10*; α(Q)=7.75×10^{-6} *11* I$_\gamma$: Absolute intensity per 100 α decays= 22 *3* (1967Ah02). Mult.: From K:L12:M=0.9 *2*: 2.0 *2*: 0.8 *1* (1967Ah02).
405 *2*	≈0.7	550.6	(1/2$^+$,3/2,5/2$^+$)	144.98	5/2$^+$				

[†] From Adopted Gammas, except as noted. Conversion coefficient data measured by 1967Ah02 in this dataset are provided in comments.
[‡] Additional information 1.
[#] For absolute intensity per 100 decays, multiply by 0.120 *21*.

$^{249}_{98}Cf_{151}$-3

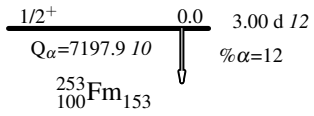
^{253}Fm α decay 1967Ah02

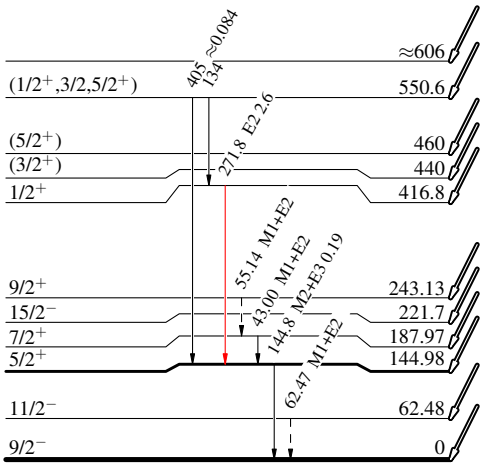
Decay Scheme

Intensities: Iα per 100 α decays of the parent

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)

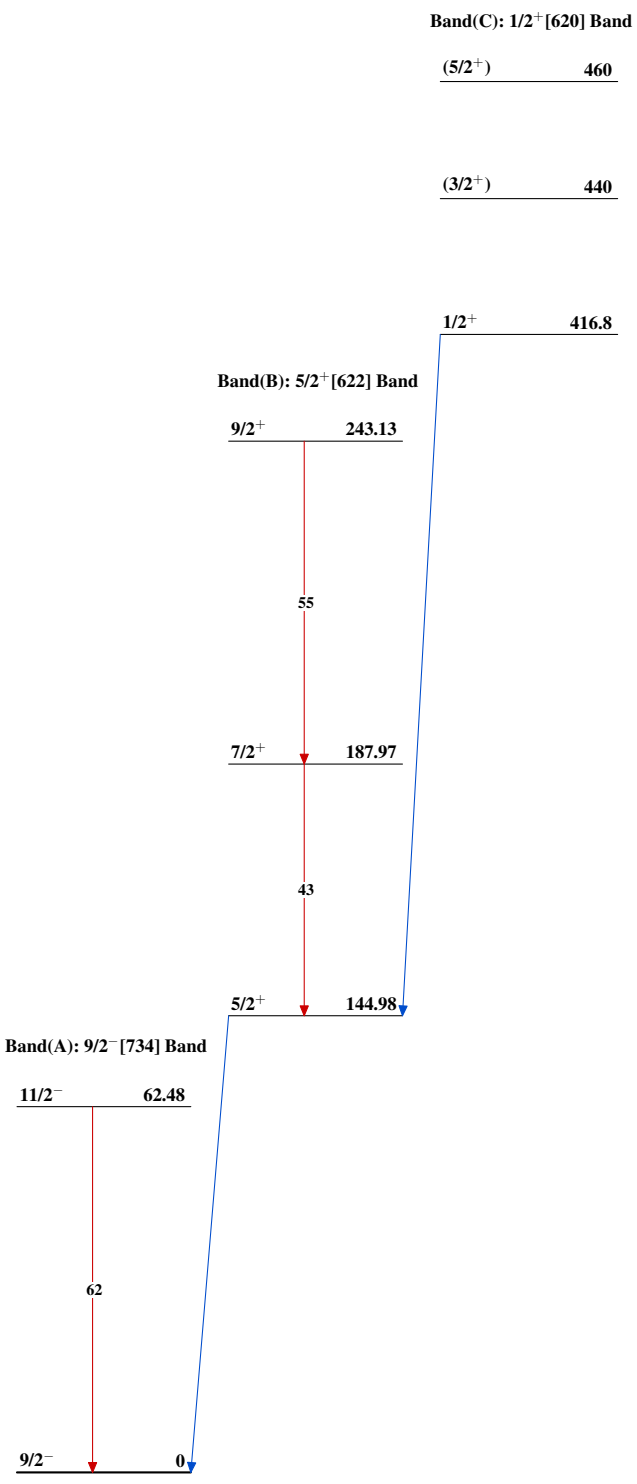




		Eα	Iα	HF
≈606		≈6487	≈0.036	≈32
550.6		6541	0.18	11
460		6630	0.31	17
440		6650	0.29	23
416.8		6673	2.78	3.0
243.13		6846	1.01	48
221.7		≈6867	≈0.11	≈550
187.97		6901	1.18	70
144.98	45 μs 5	6943	5.1	24.5
62.48		7023	0.80	345
0	351 y 2	7083	0.156	3210

$^{249}_{98}Cf_{151}$

^{253}Fm α decay 1967Ah02



$^{249}_{98}Cf_{151}$