

$^{252}\text{Cf}, ^{254}\text{Cf SF decay}$ [1981SeZW](#),[1998Hw08](#)

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Yu. Khazov, A. Rodionov and G. Shulyak		NDS 136, 163 (2016)	14-Jul-2016

Parent: ^{252}Cf : E=0.0; $J^\pi=0^+$; $T_{1/2}=2.645 \text{ y}$ 8; %SF decay=?Parent: ^{254}Cf : E=0.0; $J^\pi=0^+$; $T_{1/2}=60.5 \text{ d}$ 2; %SF decay=?**1998Hw08:** ^{252}Cf SF decay; measured $E\gamma$, $I\gamma$, $\gamma(\text{Nb-fragment})\gamma\gamma$ coin. ^{146}La ; deduced levels, J^π . GAMMASPHERE array consisted of 72 Compton-suppressed Ge detectors.**1981SeZW:** ^{254}Cf SF decay; measured $E\gamma$, $I\gamma$, $\gamma(\text{fragment})(\text{fragment})$ coin, $T_{1/2}$. ^{146}La ; deduced yields, transitions.**1971Ho29, 1972Ho08, 1973Ho22:** ^{252}Cf SF decay; measured $E\gamma$, $I\gamma$, $\gamma\gamma$ coin., $X\gamma$ coin. ^{146}La ; deduced levels. Ge(Li) detectors.**1970Wa05:** ^{252}Cf SF decay; measured E(ce), I(ce), E(X-ray), I(X-ray), I(ce)(t), (fragment)(fragment)(ce)(X) coin, $T_{1/2}$. ^{146}La ; deduced $E\gamma$, K/L.Others: [1970Jo20](#), [1972CIZN](#), [1974CIZX](#).The ^{146}La level scheme from ^{252}Cf SF decay was studied by [1973Ho22](#), [1981SeZW](#) and [1998Hw08](#). However, they suggested tentative schemes which did not agree with each other. The evaluators think that the most complete level scheme was proposed by [1998Hw08](#) on the basis of $\gamma(\text{Nb-fragment})\gamma\gamma$ coincidences in ^{252}Cf SF decay. ^{146}La Levels

E(level) [†]	J^π [‡]	$T_{1/2}$ [#]	Comments
0.0	(2 ⁻)		E(level): from 'Adopted Levels'.
0.0+x	(6 ⁻)		Additional information 1. The high-spin isomeric state was introduced by 1979Ke02 in ^{146}La β^- decay; X=130 130 keV (evaluation in 2012Au07).
130.73+x 11		15 ns 2	
213.15+x 20		12 ns 2	
278.9+x 3			
289.61+x 13		12 ns 2	
577.28+x 22			
619.6+x 3		≈ 20 ns	$T_{1/2}$: from 1998Hw08 , $\gamma\gamma(t)$, GAMMASPHERE.
757.9+x 5			
1027.9+x 6			
1425.0+x 6			
1934.8+x 7			
2540.9+x 8			

[†] From a least-squares fit to $E\gamma$'s, $\Delta E\gamma=0.3$ assumed by the evaluators if not given.[‡] From 'Adopted Levels'.# From coincidence with fission fragment ([1981SeZW](#)) except as noted. $\gamma(^{146}\text{La})$

$E\gamma$ [†]	E_i (level)	E_f	Mult. [‡]	α ^a	Comments
(42.3)	619.6+x	577.28+x			E_γ : entered by 1998Hw08 on basis of observation of (340.8 γ)(148.2 γ), (287.9 γ)(158.9 γ) and (364.0 γ)(82.2 γ) coincidences when double gating on 130.7 γ and 138.3 γ .
^x 46.6 @ 3					$T_{1/2}=11$ ns 2 from coincidence with fission fragment (1981SeZW).
^x 58.3 &					
^x 64.15 15	M1+E2	7 3		$\alpha(K)=3.7$ 4; $\alpha(L)=2.6$ 21; $\alpha(M)=0.6$ 5 $\alpha(N)=0.12$ 10; $\alpha(O)=0.017$ 14; $\alpha(P)=0.00023$ 3 E_γ : from 1971Ho29 and 1970Wa05 . Mult., δ : K/L=2.5 (1970Wa05), calculated by the evaluators with BriccMixing program.	

Continued on next page (footnotes at end of table)

$^{252}\text{Cf},^{254}\text{Cf}$ SF decay 1981SeZW,1998Hw08 (continued) $\gamma(^{146}\text{La})$ (continued)

E_γ^\dagger	$E_i(\text{level})$	E_f	J_f^π	Mult. [‡]	a^a	Comments
82.25 20	213.15+x	130.73+x		D,E2		$T_{1/2}=12 \text{ ns}$ 2 from coincidence with fission fragment (1981SeZW).
^x 103.8 @						$T_{1/2}=2.9 \text{ ns}$ 3 from coincidence with fission fragment (1981SeZW).
130.68 11	130.73+x	0.0+x	(6 ⁻)	E2	0.772	$\alpha(K)=0.533$ 8; $\alpha(L)=0.188$ 3; $\alpha(M)=0.0412$ 6 $\alpha(N)=0.00878$ 13; $\alpha(O)=0.001271$ 19; $\alpha(P)=3.04\times 10^{-5}$ 5 $T_{1/2}=15 \text{ ns}$ 2 from coincidence with fission fragment (1981SeZW). Mult.: K/L=2.5 (1970Wa05).
138.3 #	757.9+x	619.6+x				
148.2 #	278.9+x	130.73+x				
^x 158.7 @						$T_{1/2}=12 \text{ ns}$ 2 from coincidence with fission fragment (1981SeZW).
158.87 9	289.61+x	130.73+x				
^x 167.7 @						E_γ : from 1971Ho29 and 1970Jo20.
^x 205.0 @						$T_{1/2}=20 \text{ ns}$ 4 from coincidence with fission fragment (1981SeZW).
^x 251.1 &						
270.0 #	1027.9+x	757.9+x				
288.0 3	577.28+x	289.61+x				
290.0 #	289.61+x	0.0+x	(6 ⁻)			
340.8 #	619.6+x	278.9+x				
363.95 21	577.28+x	213.15+x				
397.1 #	1425.0+x	1027.9+x				
509.8 #	1934.8+x	1425.0+x				
606.1 #	2540.9+x	1934.8+x				

[†] Unweighted average from 1998Hw08, 1981SeZW, 1970Jo20, 1973Ho22, except as noted.[‡] From K/L ratio (1970Wa05) and RUL.

From 1998Hw08.

@ From 1981SeZW.

& From 1970Jo20.

^a Additional information 2.^x γ ray not placed in level scheme.

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Legend

— — — — ► γ Decay (Uncertain)

