

Energy levels [98Ar12].

E^*

[keV]

0

44

≈ 2500

J^π

0^+

$\langle 2^+ \rangle$

$T_{1/2}$ or

Γ_{cm}

35.7(5) h

45(10) ns

$^{246}_{98}\text{Cf}$

Energy levels and branching ratios [92Ak04, 04Ak17].

E^*

[keV]

0.0

55.0(2)

122.1(2)

201.0(5)

383.2(3)

427.2(5)

480.4(1)

532.0(4)

551(1)

595(4)

634(5)

678.0(8)

738(1)

$2J^\pi$

$\langle 7^+ \rangle$

$\langle 9^+ \rangle$

$\langle 11^+ \rangle$

$\langle 13^+ \rangle$

$\langle 5^+ \rangle$

$\langle 7^+ \rangle$

$\langle 9^- \rangle$

$\langle 11^- \rangle$

$\langle 11^+ \rangle$

$\langle 13^- \rangle$

$\langle 13^+ \rangle$

$\langle 7^- \rangle$

$\langle 9^- \rangle$

$T_{1/2}$ or

Γ_{cm}

3.11(3) h

$^{247}_{98}\text{Cf}$

Data for this isotope are considered in vol. LB I/18C.

Energy levels and branching ratios [92Ak04, 04Ak17]. Part 2

E^*

[keV]

55.0(2)

122.1(2)

383.2(3)

427.2(5)

480.4(1)

532.0(4)

551(1)

678.0(8)

738(1)

$2J^\pi$

$\langle 9^+ \rangle$

$\langle 11^+ \rangle$

$\langle 5^+ \rangle$

$\langle 7^+ \rangle$

$\langle 9^- \rangle$

$\langle 11^- \rangle$

$\langle 11^+ \rangle$

$\langle 7^- \rangle$

$\langle 9^- \rangle$

$E_{\text{f}}^*:$

$2J_{\text{f}}^\pi:$

x

50(9)

x

23.6(12)

79(18)

Branching ratios in percentage

0.0

55.0

122.1

201.0

383.2

480.4

$\langle 7^+ \rangle$

$\langle 9^+ \rangle$

$\langle 11^+ \rangle$

$\langle 13^+ \rangle$

$\langle 5^+ \rangle$

$\langle 9^- \rangle$

50(9)

100

57(3)

39(6)

x

21(6)

≈ 44

50(9)

19.0(12)

36(5)

25(5)

≈ 56

x

x

$^{247}_{98}\text{Cf}$

Energy levels [99Ak02].

 $^{248}_{98}\text{Cf}$

E^*	J^π	S_N	$T_{1/2}$ or
[keV]		(d,t)	Γ_{cm}
0.0	0^+	x	333.5(28) d
41.53(6)	2^+		
137.81(9)	4^+		
285(4)	6^+		
592.2(2)	$\langle 2^- \rangle$		
630(1)	$\langle 3^- \rangle$		
677(1)	$\langle 4^- \rangle$		
735(1)	$\langle 5^- \rangle$		
806(1)	$\langle 6^- \rangle$		
885(2)	$\langle 7^- \rangle$		
979(4)	$\langle 8^- \rangle$		
1477(4)	$\langle 2^- \rangle$		
1509(3)	$\langle 3^- \rangle$		
1557(3)	$\langle 4^- \rangle$		
1577(1)	$\langle 7^- \rangle$		
1621(3)	$\langle 5^- \rangle$		
1663(2)	$\langle 8^- \rangle$		
1686(4)	$\langle 6^- \rangle$		
1781(5)	$\langle 9^- \rangle$		

Data for this isotope are considered in vol. LB I/18C.

Energy levels and branching ratios [99Ar21].

 $^{249}_{98}\text{Cf}$

E^*	$2J^\pi$	$T_{1/2}$ or
[keV]		Γ_{cm}
0	9^-	351(2) yr
62.48(5)	11^-	
136.2(2)	$\langle 13^- \rangle$	
144.98(5)	5^+	45(5) μs
187.97(6)	7^+	
220(2)	$\langle 15^- \rangle$	
243.13(7)	9^+	
315(3)	$\langle 17^- \rangle$	
315(3)	$\langle 11^+ \rangle$	
379.54(5)	7^+	
384(4)	$\langle 13^+ \rangle$	
416.8(4)	$\langle 1^+ \rangle$	
425(4)	$\langle 19^- \rangle$	
437.56(5)	9^+	
440(4)	$\langle 3^+ \rangle$	
442.99(6)	$\langle 7^+ \rangle$	

(continued)

 $^{249}_{98}\text{Cf}$

E^*	$2J^\pi$	$T_{1/2}$ or Γ_{cm}
[keV]		
460(4)	$\langle 5^+ \rangle$	
500.6(3)	$\langle 9^+ \rangle$	
550(2)	$\langle 1^+, 3, 5^+ \rangle$	
≈ 606		
668(2)	$\langle 13^- \rangle$	
751(3)	$\langle 15^- \rangle$	
813.21(8)	$\langle 5^- \rangle$	
852.19(8)	$\langle 7^- \rangle$	
902.5(2)	$\langle 9^- \rangle$	
920(2)	$\langle 11^+ \rangle$	
962(3)	$\langle 11^- \rangle$	
992(2)	$\langle 13^+ \rangle$	
1007.92(7)	9^+	
1031(5)		
1063(2)	$\langle 13^+ \rangle$	
1078(3)	$\langle 15^+ \rangle$	
1115(4)		
1145(3)	$\langle 15^+ \rangle$	
1164(4)		
1178(3)	$\langle 17^+ \rangle$	
1192(4)		
1199.8(4)	$\langle 7^-, 9 \rangle$	
1218.50(10)	$\langle 7^- \rangle$	
1236(3)	$\langle 17^+ \rangle$	
1238.1(2)	$\langle 5^-, 7, 9^+ \rangle$	
1251(5)		
1267.7(4)	$\langle 9^- \rangle$	
1304.3(3)		
1340(4)	$\langle 19^+ \rangle$	
1415(3)	$\langle 7^+ \rangle$	
1463(3)	$\langle 9^+ \rangle$	
1482(4)		
1498(4)		
1530(3)	$\langle 11^+ \rangle$	
1541(4)		
1603(3)	$\langle 13^+ \rangle$	
1648(4)		
1674(4)		
1709(4)		
1914(3)		

Data for this isotope are considered in vol. LB I/18C.

Energy levels and branching ratios [99Ar21]. Part 2

²⁴⁹Cf₉₈

E^* [keV]	$2J^\pi$	Branching ratios in percentage										
		E_f^* : 0 $2J_f^\pi$: 9^-	62.48 11^-	136.2 $\langle 13^- \rangle$	144.98 5^+	187.97 7^+	243.13 9^+	379.54 7^+	416.8 $\langle 1 \rangle^+$	437.56 9^+	442.99 $\langle 7 \rangle^+$	500.6 $\langle 9^+ \rangle$
62.48(5)	11^-	x										
136.2(2)	$\langle 13^- \rangle$	x	x									
144.98(5)	5^+	100										
187.97(6)	7^+				x							
243.13(7)	9^+					x						
379.54(5)	7^+	98(6)			0.63(8)	0.98(8)	0.16(4)					
416.8(4)	$\langle 1 \rangle^+$				100							
437.56(5)	9^+	18.3(12)	81(7)					1.07(17)				
442.99(6)	$\langle 7 \rangle^+$	4.0(12)			74(5)	15(4)		7.7(10)				
550(2)	$\langle 1^+, 3, 5^+ \rangle$				x				x			
813.21(8)	$\langle 5 \rangle^-$	94(7)			2.4(2)	1.33(13)		0.63(10)			1.4(5)	
852.19(8)	$\langle 7 \rangle^-$	42(3)	54(4)		≈ 2	≈ 1	≈ 2					
902.5(2)	$\langle 9^- \rangle$	9(3)	45(4)	46(5)								
1007.92(7)	9^+	45(4)	15(1)		1.1(4)	≈ 0.6	6(1)	13.0(10)		3.3(9)	13.0(10)	2.5(6)
1199.8(4)	$\langle 7^-, 9 \rangle$	61(23)	≈ 39									
1218.50(10)	$\langle 7 \rangle^-$	x										
1238.1(2)	$\langle 5^-, 7, 9^+ \rangle$	43(6)			57(11)							
1267.7(4)	$\langle 9^- \rangle$	17(6)	83(17)									
1304.3(3)		x										

Energy levels and branching ratios [01Ak11].

²⁵⁰Cf₉₈

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}
0.0	0^+	13.08(9) yr
42.721(5)	2^+	96(10) ps
141.875(10)	4^+	
296.22(6)	6^+	
≈ 500	8^+	
871.57(3)	2^-	
905.89(2)	3^-	
951.98(2)	4^-	
1008.51(2)	5^-	
1031.852(21)	2^+	0.94(10) ps
≈ 1070	$\langle 6^- \rangle$	
1071.37(2)	3^+	
1123(1)	$\langle 4^+ \rangle$	
1154.24(10)	0^+	
1175.52(3)	1^-	
1189.39(3)	2^+	
1209.97(4)	$\langle 2 \rangle^-$	

(continued)

²⁵⁰₉₈Cf

<i>E</i> [*]	<i>J</i> ^π	<i>T</i> _{1/2} or
[keV]		<i>Γ</i> _{cm}
1211(1)	⟨3 [−] ⟩	
≈1218.2		
1244.50(8)	2 ⁺	
1247(2)	⟨3 [−] ⟩	
1255.39(4)	4 [−]	
1266.6(2)	0 ⁺	
1272(2)		
1296.60(4)	2 ⁺	
1311.00(4)	5 [−]	
1313(2)	⟨5 [−] ⟩	
1335(2)	⟨3 [−] ⟩	
1377.76(4)	6 [−]	
1385.50(10)	1,2 ⁺	
1396.09(7)	⟨5 [−] ⟩	
1411.33(6)	⟨1,2 ⁺ ⟩	
1426.86(12)	⟨3 [−] ⟩	
1457.76(4)	⟨6 [−] ⟩	
1478.37(4)	⟨5 [−] ⟩	
1499.53(4)	⟨6 [−] ⟩	
≈1530	⟨7 [−] ⟩	
1541(2)	⟨5 [−] ⟩	
≈1550	⟨6 [−] ⟩	
1570(2)		
≈1575	⟨7 [−] ⟩	
≈1600	⟨6 [−] ⟩	
1626(3)		
1658.00(4)	2 ⁺	
1695.15(10)	⟨3 ⁺ ⟩	
1735(2)		
1915(3)		
2015(3)		

Data for this isotope are considered in vol. LB I/18C.

Energy levels and branching ratios [01Ak11]. Part 2

²⁵⁰₉₈Cf

<i>E</i> [*]	<i>J</i> ^π	Branching ratios in percentage							
		<i>E</i> _f [*] :	0.0	42.721	141.875	296.22	871.57	905.89	951.98
[keV]		<i>J</i> _f ^π :	0 ⁺	2 ⁺	4 ⁺	6 ⁺	2 [−]	3 [−]	4 [−]
42.721(5)	2 ⁺		x						
141.875(10)	4 ⁺			x					
296.22(6)	6 ⁺				x				
871.57(3)	2 [−]			x					

(continued)

 $^{250}_{98}\text{Cf}$

E^* [keV]	J^π	Branching ratios in percentage							
		$E_f^*:$ $J_f^\pi:$	0.0 0 ⁺	42.721 2 ⁺	141.875 4 ⁺	296.22 6 ⁺	871.57 2 ⁻	905.89 3 ⁻	951.98 4 ⁻
905.89(2)	3 ⁻			56(3)	44(2)		0.7(1)		
951.98(2)	4 ⁻				95(6)		3.0(4)	2.0(3)	
1008.51(2)	5 ⁻				44(4)	46(3)		7.2(10)	3.1(4)
1031.852(21)	2 ⁺		43.3(7)	55	1.86(3)		0.035(2)	0.0077(7)	
1071.37(2)	3 ⁺			80(2)	20.1(3)		0.018(2)	0.022(3)	0.011(4)
1154.24(10)	0 ⁺		x	100					
1175.52(3)	1 ⁻		64(6)	32(2)			3.8(4)		
1189.39(3)	2 ⁺			85(4)	15.3(11)				
1209.97(4)	$\langle 2 \rangle^-$			x					
1211(1)	$\langle 3^- \rangle$			x	x				
≈ 1218.2				x					
1244.50(8)	2 ⁺		19(2)	76(5)	5.4(18)				
1255.39(4)	4 ⁻						23(1)	33(2)	37(2)
1266.6(2)	0 ⁺		x	x					
1296.60(4)	2 ⁺		7.1(10)	17.6(14)	75(4)				
1385.50(10)	1,2 ⁺		52(4)	48(4)					
1411.33(6)	$\langle 1,2^+ \rangle$		16(4)	84(7)					
1426.86(12)	$\langle 3^- \rangle$						x		
1658.00(4)	2 ⁺		25(1)	42(2)	1.1(1)		5(1)		
1695.15(10)	$\langle 3^+ \rangle$			65(6)	35(9)				

Energy levels and branching ratios [01Ak11]. Part 3

 $^{250}_{98}\text{Cf}$

E^*	J^π	Branching ratios in percentage								
[keV]		$E_f^*:$ $J_f^\pi:$	1008.51 5 [−]	1031.85 2 ⁺	1071.37 3 ⁺	1255.39 4 [−]	1311.00 5 [−]	1377.76 6 [−]	1396.09 ⟨5⟩ [−]	1457.76 ⟨6⟩ [−]
1255.39(4)	4 [−]		6.2(3)		0.8(1)					
1311.00(4)	5 [−]					x				
1377.76(4)	6 [−]						x			
1396.09(7)	⟨5⟩ [−]					81(6)	18.6(16)			
1457.76(4)	⟨6⟩ [−]						19(6)	9(3)	72(6)	
1478.37(4)	⟨5⟩ [−]					42(3)			58(5)	
1499.53(4)	⟨6⟩ [−]								71(6)	29(3)
1658.00(4)	2 ⁺			22(2)	6(1)					

Energy levels and branching ratios [99Ar21, 06Tu0A].

²⁵¹Cf₉₈

E^*	$2J^\pi$	$2K[Nn_z\Lambda]$	$T_{1/2}$ or Γ_{cm}	Ref.
[keV]				
0	1^+	$1+[620]$	898(44) yr	
24.826(12)	3^+	$1+[620]$		06Tu0A
47.832(14)	5^+	$1+[620]$		06Tu0A
105.738(20)	7^+	$1+[620]$		06Tu0A
106.309(18)	7^+	$7+[613]$	38(2) ns	06Tu0A
146.729(21)	9^+	$1+[620]$		06Tu0A
166.303(23)	9^+	$7+[613]$		06Tu0A
177.602(19)	3^+	$3+[622]$		06Tu0A
211.530(20)	$\langle 5^+ \rangle$	$3+[622]$		06Tu0A
237.71(4)	$\langle 11^+ \rangle$	$1+[620]$		06Tu0A
239.33(3)	11^+	$7+[613]$		06Tu0A
258.514(18)	$\langle 7^+ \rangle$	$3+[622]$		06Tu0A
295.97(3)	$\langle 13^+ \rangle$	$1+[620]$		06Tu0A
319.643(25)	9^+	$3+[622]$		06Tu0A
325.29(3)	$\langle 13^+ \rangle$	$7+[613]$		06Tu0A
370.47(3)	11^-	$11-[725]$	1.3(1) μs	06Tu0A
392.33(3)	$\langle 11^+ \rangle$	$3+[622]$		06Tu0A
420.0				
423.92(4)	$\langle 15^+ \rangle$	$7+[613]$		06Tu0A
433.90(4)	9^-	$9-[734]$		06Tu0A
442(3)**				
514(3)**	$\langle 11^- \rangle$			
535.0*				06Tu0A
543.99(3)	5^+	$5+[622]$		06Tu0A
569	$\langle 15 \rangle$			06Tu0A
590.01(3)	$\langle 7^+ \rangle$	$5+[622]$		06Tu0A
601.04(12)	3^-	$1-[750]$		06Tu0A
625.12(17)	7^-	$1-[750]$		06Tu0A
632.02(14)	1^-	$1-[750]$		06Tu0A
648.94(4)	$\langle 9^+ \rangle$	$5+[622]$		06Tu0A
683	$\langle 9^+ \rangle$			06Tu0A
691	$\langle 11^- \rangle$			06Tu0A
708.05(14)	5^-	$1-[750]$		06Tu0A
720.50(12)	$\langle 11^+ \rangle$	$5+[622]$		06Tu0A
729				06Tu0A
758	$\langle 11^+ \rangle$			06Tu0A
774*	$\langle 3^+ \rangle$			06Tu0A
858				06Tu0A
942.48(13)	$\langle 5^- \rangle$			06Tu0A
973.98(12)	$\langle 9^+ \rangle$			06Tu0A
981.51(10)	$\langle 3^- \rangle$	$3-[\text{xxx}]$		06Tu0A
1009.13(8)	$\langle 5^- \rangle$	$3-[\text{xxx}]$		06Tu0A
1015				06Tu0A
1043.77(11)	$\langle 7^- \rangle$	$3-[\text{xxx}]$		06Tu0A
1050				06Tu0A

(continued)

²⁵¹₉₈Cf

E^*	$2J^\pi$	$2K[Nn_z\Lambda]$	$T_{1/2}$ or Γ_{cm}	Ref.
[keV]				
1061				06Tu0A
1077.56(7)	$\langle 9 \rangle$			06Tu0A
1087.46(14)	$\langle 9^- \rangle$			06Tu0A
1094.57(18)	9^-	$3-[\text{xxx}]$		06Tu0A
1146				06Tu0A
1155.80(19)	11^-	$3-[\text{xxx}]$		06Tu0A
1183				06Tu0A
1185.50(18)	$\langle 5, 7 \rangle$			06Tu0A
1222				06Tu0A
1249.98(13)	$\langle 7^+ \rangle$			06Tu0A
1250	$\langle 1^- \rangle$	$1-[\text{761}]$		06Tu0A
1262	$\langle 5^- \rangle$	$1-[\text{761}]$		06Tu0A
1304				06Tu0A
1326	$\langle 9^- \rangle$	$1-[\text{761}]$		06Tu0A
1335	$\langle 3^- \rangle$	$1-[\text{761}]$		06Tu0A
1374				06Tu0A

Additional data on this isotope can be found in [05Ah09, 00Ah09, 90Ah02].

the possible level [06Tu0A].

* not included in [06Tu0A].

9 bands of levels are suggested in [06Tu0A].

Data for this isotope are considered in vol. LB I/18C.

Energy levels and branching ratios [99Ar21, 06Tu0A]. Part 2

²⁵¹₉₈Cf

E^*	$2J^\pi$	Branching ratios in percentage							
		E_f^* :	0	24.825	47.828	105.732	106.304	146.47	166.31
[keV]		$2J_f^\pi$:	1^+	3^+	5^+	7^+	7^+	$\langle 9^+ \rangle$	9^+
24.826(12)	3^+		x						
47.832(14)	5^+		15(3)	85(17)					
105.738(20)	7^+			62(10)	≈ 38				
106.309(18)	7^+			61(9)	39(9)	x			
146.729(21)	9^+				100				
166.303(23)	9^+						x		
177.602(19)	3^+		60(5)	24(2)	16(6)				
211.530(20)	$\langle 5^+ \rangle$			33(7)	67(7)				
237.71(4)	$\langle 11^+ \rangle$					x			
239.33(3)	11^+						22(2)		78(5)
258.514(18)	$\langle 7^+ \rangle$			34(7)	39(5)	≈ 26			
295.97(3)	$\langle 13^+ \rangle$							x	
319.643(25)	9^+					≈ 25		75(8)	
325.29(3)	$\langle 13^+ \rangle$								35(4)
370.47(3)	11^-						1.9(2)		45(4)

(continued)

 $^{251}_{98}\text{Cf}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage							
		$E_f^*:$ $2J_f^\pi:$	0 1 ⁺	24.825 3 ⁺	47.828 5 ⁺	105.732 7 ⁺	106.304 7 ⁺	146.47 ⟨9 ⁺ ⟩	166.31 9 ⁺
433.90(4)	9 ⁻						19(3)		15(3)
543.99(3)	5 ⁺		2.3(6)	1.4(4)	1.6(4)		13(1)		
590.01(3)	⟨7 ⁺ ⟩						5.6(6)	≈0.7	9(1)
648.94(4)	⟨9 ⁺ ⟩					20(5)		≈3	

Energy levels and branching ratios [99Ar21, 06Tu0A]. Part 3

 $^{251}_{98}\text{Cf}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage							
		$E_f^*:$ $2J_f^\pi:$	177.69 ⟨3 ⁺ ⟩	211.72 ⟨5 ⁺ ⟩	239.34 11 ⁺	258.44 ⟨7 ⁺ ⟩	319.29 ⟨9 ⁺ ⟩	325.34 ⟨13 ⁺ ⟩	370.39 ⟨11 ⁻ ⟩
325.29(3)	⟨13 ⁺ ⟩				65(6)				
370.47(3)	11 ⁻				53(6)				
423.92(4)	⟨15 ⁺ ⟩				44(4)			≈56	
433.90(4)	9 ⁻								66(25)
543.99(3)	5 ⁺		47(5)	31(4)		3.7(4)			
590.01(3)	⟨7 ⁺ ⟩			33(4)		47(6)	4.6(6)		
648.94(4)	⟨9 ⁺ ⟩				10(3)	32(6)	35(6)		

Energy levels and branching ratios [99Ak02, 05Ni22].

 $^{252}_{98}\text{Cf}$

E^* [keV]	J^π	$T_{1/2}$ or Γ_{cm}
0.0	0 ⁺	2.645(8) yr
45.72(5)	2 ⁺	92(6) ps
151.74(7)	4 ⁺	
804.8(1)	⟨2 ⁺ ⟩	
830.8(1)	⟨2 ⁻ ⟩	
845.7(1)	⟨3 ⁺ ⟩	
867.5(1)	⟨3 ⁻ ⟩	
900.3(3)	⟨4 ⁺ ⟩	
917.0(1)	⟨4 ⁻ ⟩	
969.8(1)	⟨3 ⁺ ⟩	

Data for this isotope are considered in vol. LB I/18C.

Energy levels and branching ratios [99Ak02, 05Ni22]. Part 2

 $^{252}_{98}\text{Cf}$

E^* [keV]	J^π	Branching ratios in percentage						
		$E^*_f:$ $J^\pi_f:$	0.0 0^+	45.72 2^+	151.74 4^+	804.8 $\langle 2^+ \rangle$	830.8 $\langle 2^- \rangle$	867.5 $\langle 3^- \rangle$
45.72(5)	2^+		x					
151.74(7)	4^+			x				
804.8(1)	$\langle 2^+ \rangle$		44(3)	56(5)				
830.8(1)	$\langle 2^- \rangle$			x				
845.7(1)	$\langle 3^+ \rangle$			76(5)	23.6(17)			
867.5(1)	$\langle 3^- \rangle$			28.7(22)	71(4)			
900.3(3)	$\langle 4^+ \rangle$			31(8)	69(12)			
917.0(1)	$\langle 4^- \rangle$				x			
969.8(1)	$\langle 3^+ \rangle$			12.7(9)	3.9(4)	0.76(9)	73(6)	9.9(7)

Energy levels and branching ratios [99Ar21, 06Ja10].

 $^{253}_{98}\text{Cf}$

E^* [keV]	$2J^\pi$	$T_{1/2}$ or Γ_{cm}
0.0	$\langle 7^+ \rangle$	17.81(8) d
61.61(8)	$\langle 9^+ \rangle$	
136.62(9)	$\langle 11^+ \rangle$	
241.01(8)	$\langle 9^+ \rangle$	
321.21(22)	$\langle 11^+ \rangle$	
417(5)	$\langle 13^+ \rangle$	

Two bands of levels are suggested in [06Ja10].

Data for this isotope are considered in vol. LB I/18C.

Energy levels and branching ratios [99Ar21, 06Ja10]. Part 2

 $^{253}_{98}\text{Cf}$

E^* [keV]	$2J^\pi$	Branching ratios in percentage				
		$E^*_f:$ $2J^\pi_f:$	0.0 $\langle 7^+ \rangle$	61.61 $\langle 9^+ \rangle$	136.62 $\langle 11^+ \rangle$	241.01 $\langle 9^+ \rangle$
61.61(8)	$\langle 9^+ \rangle$		100			
136.62(9)	$\langle 11^+ \rangle$		23(8)	77(7)		
241.01(8)	$\langle 9^+ \rangle$		54(3)	43(3)	3.0(3)	
321.21(22)	$\langle 11^+ \rangle$					x