

Adopted Levels, Gammas

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

Q(β^-)=-1450 *syst*; S(n)=5587 5; S(p)=5700 50; Q(α)=6293.3 5 [2021Wa16](#)
 $\Delta Q(\beta^-)$ =30 (syst,[2021Wa16](#)).
 S(2n)=12529 14, S(2p)=10388 4 ([2021Wa16](#)).

²⁴⁹Cf Levels

Cross Reference (XREF) Flags

A	²⁴⁹ Bk β^- decay	D	²⁴⁹ Cf(d,d')
B	²⁴⁹ Es ϵ decay	E	²⁴⁹ Cf(²⁰⁸ Pb, ²⁰⁸ Pb' γ)
C	²⁵³ Fm α decay		

E(level) [†]	J ^{π}	T _{1/2}	XREF	Comments
0.0 [‡]	9/2 ⁻	351 y 2	ABCDE	% α =100; %SF=5.0×10 ⁻⁷ 5 μ =-0.395 17; Q=6.27 33 μ ,Q: Deduced from the weighted mean values for the ground state HFS parameters (2023We04). J ^{π} : From favored α to 9/2 ⁻ , 9/2[734] level in ²⁴⁵ Cm. T _{1/2} : From weighted average of 350.6 y 21 (1973St15), 352 y 6 (1969Me01), 345 y 15 (1969Mi08) and 360 y 40 (1957Ea01). %SF: fom T _{1/2} (SF)=7.2×10 ¹⁰ 7; unweighted average of 8.5×10 ¹⁰ y 5 (1987Ta26), 6.87×10 ¹⁰ y 33 (1969Mi08), 6.14×10 ¹⁰ y 37 (1966Rg04).
62.48 [#] 5	11/2 ⁻		BCDE	J ^{π} : M1+E2 62.47 γ to 9/2 ⁻ g.s.; band member.
136.2 [‡] 3	13/2 ⁻		B DE	J ^{π} : From (d,d'); band member.
144.98 [@] 5	5/2 ⁺	45 μ s 5	BC E	J ^{π} : M2+E3 234.6 γ to 9/2 ⁻ g.s., E2 271.8 γ from 1/2 ⁺ 416.8-keV level. T _{1/2} : From $\alpha\gamma$ (t) in ²⁵³ Fm α decay (1967Ah02).
187.97 ^{&} 6	7/2 ⁺		BCDE	J ^{π} : M1+E2 43.00 γ to 5/2 ⁺ 144.98-keV level; band member.
221.7 [#] 10	15/2 ⁻		CDE	J ^{π} : From (d,d'); 159.3 γ to 11/2 ⁻ 62.47-keV level; band member.
243.13 [@] 7	9/2 ⁺		BCDE	J ^{π} : M1+E2 55.14 γ to 7/2 ⁺ level; band member.
310.1 ^{&} 10	11/2 ⁺		E	J ^{π} : 122.0 γ to 7/2 ⁺ 187.97-keV level; band member.
318.4 [‡] 6	17/2 ⁻		DE	J ^{π} : From (d,d'); 182.2 γ to 13/2 ⁻ 136-keV level; band member.
379.54 ^b 5	7/2 ⁺		B	J ^{π} : E1 379.5 γ to 9/2 ⁻ g.s., E2+M1 γ to 5/2 ⁺ 144.98-keV level.
390.0 [@] 10	13/2 ⁺		DE	J ^{π} : From (d,d'); 416.8 γ to 9/2 ⁺ 243.13-keV level; band member.
416.8 ^a 4	1/2 ⁺		C	J ^{π} : From favored α -decay with HF=3.0 from 1/2 ⁺ ²⁵³ Fm parent.
426.9 [#] 12	19/2 ⁻		DE	J ^{π} : From (d,d'); 205.2 γ to 15/2 ⁻ 221.7-keV level; band member.
437.56 ^b 6	9/2 ⁺		B	J ^{π} : E1 375.1 γ to 11/2 ⁻ 62.48-keV level; E1 437.6 γ to 9/2 ⁻ g.s.; M1+E2 58.01 γ to 7/2 ⁺ 379.54-keV level.
440 ^a	(3/2 ⁺)		C	J ^{π} : band member.
442.99 ^c 6	7/2 ⁺		B	J ^{π} : M1 255.0 γ to 7/2 ⁺ 187.97-keV level ; M1 298.0 γ to 5/2 ⁺ 144.98-keV level; 443.1 γ to 9/2 ⁻ g.s.
460 ^a	(5/2 ⁺)		C	J ^{π} : band member.
480.2 ^{&} 12	15/2 ⁺		E	J ^{π} : 170 γ to 11/2 ⁺ 310.1-keV level; band member.
500.6 ^{?c} 3	(9/2 ⁺)		B	J ^{π} : 63 γ to 9/2 ⁺ 437.56-keV level; band member.
546.3 [‡] 11	21/2 ⁻		E	J ^{π} : 227.8 γ to 17/2 ⁻ 318.4-keV level; band member.
550.6 10	(1/2 ⁺ ,3/2,5/2 ⁺)		C	J ^{π} : 405 γ to 5/2 ⁺ 144.98-keV level; 134 γ to 1/2 ⁺ 416.8-keV level.
583.6 [@] 12	17/2 ⁺		E	J ^{π} : 193.7 γ to 13/2 ⁺ 390.0-keV level; band member.
≈606			C	

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Adopted Levels, Gammas (continued) ^{249}Cf Levels (continued)

E(level) [†]	J ^π	XREF	Comments
668 ^e 2	(13/2 ⁻)	D	J ^π : From (d,d').
677.2 [#] 13	23/2 ⁻	E	J ^π : 250.4γ to 19/2 ⁻ 426.9-keV level; band member.
697.4 ^{&} 13	19/2 ⁺	E	J ^π : 217.2γ to 15/2 ⁺ 480.2-keV level; band member.
751 ^e 3	(15/2 ⁻)	D	J ^π : From (d,d'); band member.
813.21 ^d 8	(5/2 ⁻)	B D	J ^π : E2 813.2γ to 9/2 ⁻ g.s.; logft=6.3 for ε branch from 7/2 ⁺ ; from (d,d').
819.2 [‡] 12	25/2 ⁻	E	J ^π : 272.9γ to 21/2 ⁻ 546.3-keV level; 142γ to 23/2 ⁻ 677.2-keV level; band member.
823.3 [@] 13	21/2 ⁺	E	J ^π : 126γ to 19/2 ⁺ 697.4-keV level; 239.7γ to 17 ⁺ 583.6 keV level; band member.
852.19 ^d 8	(7/2 ⁻)	B D	J ^π : E2 789.7γ to 11/2 ⁻ 62.48-keV level; logft=6.9 for ε branch from 7/2 ⁺ ; band member.
902.52 ^d 17	(9/2 ⁻)	B D	J ^π : 902.6γ to 9/2 ⁻ g.s., 766.3γ to 13/2 ⁻ 136.2-keV level; logft=7.8 from 7/2 ⁺ ^{249}Es ε decay; band member.
920 ^h 2	(11/2 ⁺)	D	J ^π : From (d,d').
960.2 ^{&} 14	23/2 ⁺	E	J ^π : 137γ to 21/2 ⁺ 823.3-keV level; 262.5γ to 19/2 ⁺ 697.4-keV level; band member.
962 ^d 3	(11/2 ⁻)	D	J ^π : From (d,d'); band member.
972.3 [#] 13	27/2 ⁻	E	J ^π : 153γ to 25/2 ⁻ 819-keV level; 295.2γ to 23/2 ⁻ 677.2-keV level; band member.
992 ^h 2	13/2 ⁺	D	J ^π : From (d,d'); band member.
1007.92 7	(9/2 ⁺)	B D	Configuration=9/2[615] (1976Ah07). J ^π : M1 570.3γ 9/2 ⁺ 437.56-keV level; (E1) 1007.9γ to 9/2 ⁻ g.s.
1031 5		D	
1063 ^f 2	(13/2 ⁺)	D	J ^π : From (d,d').
1078 ⁱ 3	15/2 ⁺	D	J ^π : From (d,d').
1107.4 [@] 15	25/2 ⁺	DE	J ^π : 147γ to 23/2 ⁺ 960.2-keV; 284.4γ to 21/2 ⁺ 823.3-keV; band member.
1136.1 [‡] 14	29/2 ⁻	E	J ^π : 164γ to 27/2 ⁻ 972.3-keV level; 316.8γ to 25/2 ⁻ 819.2-keV level; band member.
1145 ^f 3	(15/2 ⁺)	D	J ^π : From (d,d'); band member.
1164 4		D	
1178 ⁱ 3	(17/2 ⁺)	D	J ^π : From (d,d'); band member.
1199.8 4	(7/2 ⁻ ,9/2)	B D	J ^π : 1137.3γ to 11/2 ⁻ 62.48-keV level; 1199.8γ to 9/2 ⁻ g.s.; logft=7.8 from 7/2 ⁺ ^{249}Es ε decay.
1218.50 10	(7/2 ⁻)	B D	J ^π : M1+E2 1218.5γ to 9/2 ⁻ g.s.; logft=5.9 from 7/2 ⁺ ^{249}Es ε decay. The low logft indicates that this is not the 7/2[743] hole state. 1976Ah07 has suggested that this is a 3-quasiparticle state with configuration=(π 7/2[633])(π 3/2[521])(ν 3/2[622]).
1236 ^f 3	(17/2 ⁺)	D	J ^π : From (d,d'); band member.
1238.06 17	(5/2 ⁻ ,7/2,9/2 ⁺)	B	J ^π : 1093.2γ to 5/2 ⁺ 144.98-keV level; 1238.0γ to 9/2 ⁻ g.s.; band member.
1251 5		D	
1266.1 ^{&} 15	27/2 ⁺	E	J ^π : 159γ to 25/2 ⁺ 1107.4-keV; 305.8γ to 23/2 ⁺ 960.2-keV level; logft=7.2 from 7/2 ⁺ ^{249}Es ε decay; band member.
1267.7 4	(9/2 ⁻)	B	J ^π : 1205.1γ to 11/2 ⁻ 62.48-keV level; 1267.8γ to 9/2 ⁻ g.s.; logft= 7.2 from 7/2 ⁺ ^{249}Es ε decay.
1304.3 3		B D	
1310.8 [#] 15	31/2 ⁻	E	J ^π : 175γ to 29/2 ⁻ 1136.1-keV level; 338.3γ to 27/2 ⁻ 972.3-keV level; band member.
1340 ^f 4	(19/2 ⁺)	D	J ^π : From (d,d'); band member.
1415 ^g 3	(7/2 ⁺)	D	J ^π : From (d,d').
1434.1 [@] 16	29/2 ⁺	E	J ^π : 168γ to 27/2 ⁺ 1266.1-keV level; 326.5γ to 25/2 ⁺ 1107.4-keV level; band member.
1463 ^g 3	(9/2 ⁺)	D	J ^π : From (d,d'); band member.
1482 4		D	
1495.7 [‡] 15	33/2 ⁻	DE	J ^π : 185γ to 31/2 ⁻ 1310.8-keV level; 359.6γ to 29/2 ⁻ 1136.1-keV level; band member.
1530 ^g 3	(11/2 ⁺)	D	J ^π : From (d,d'); band member.
1541 4		D	
1603 ^g 3	(13/2 ⁺)	D	J ^π : From (d,d'); band member.
1613.2 ^{&} 17	31/2 ⁺	E	J ^π : 179γ to 29/2 ⁺ 1434-keV level, 347.4γ to 27/2 ⁺ 1266.1-keV level; band member.

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Adopted Levels, Gammas (continued) ^{249}Cf Levels (continued)

E(level) [†]	J ^π	XREF	Comments
1648 4		D	
1674 4		D	
1690.8 [#] 16	35/2 ⁻	E	J ^π : 195γ to 33/2 ⁻ 1495.7-keV level; 379.9γ to 31/2 ⁻ 1310.9-keV level; band member.
1709 4		D	
1801.0 [@] 17	33/2 ⁺	E	J ^π : 188γ to 31/2 ⁺ 1613.2-keV level; 366.7γ to 29/2 ⁺ 1434-keV level; band member.
1896.1 [‡] 17	37/2 ⁻	E	J ^π : 205γ to 35/2 ⁻ 1690.8-keV level; 400.5γ to 33/2 ⁻ 1495.8-keV level; band member.
1914 3		D	
2000.0 ^{&} 18	35/2 ⁺	E	J ^π : 199γ to 33/2 ⁺ 1801.0-keV level; 386.7γ to 31/2 ⁺ 1613.2-keV level; band member.
2110.3 [#] 17	39/2 ⁻	E	J ^π : 214γ to 37/2 ⁻ 1896.1-keV level; 419.6γ to 35/2 ⁻ 1690.8-keV level; band member.
2205.6 [@] 20	37/2 ⁺	E	J ^π : 404.6γ to 33/2 ⁺ 1801.0-keV level; band member.
2335.2 [‡] 18	41/2 ⁻	E	J ^π : 225γ to 33/2 ⁺ 1801.0-keV level; 439γ to 39/2 ⁻ 2110.3-keV level; band member.
2422.7 ^{&} 21	39/2 ⁺	E	J ^π : 422.7γ to 35/2 ⁺ 2000.0-keV level; band member.
2567.0 [#] 19	43/2 ⁻	E	J ^π : 232γ to 41/2 ⁻ 2335.2-keV level; 456.6γ to 39/2 ⁻ 2110.3-keV level; band member.
2645.1 [@] 23	41/2 ⁺	E	J ^π : 439.5γ to 37/2 ⁺ 2205.6-keV; band member.
2810.3 [‡] 21	45/2 ⁻	E	J ^π : 475.1γ to 41/2 ⁻ 2335.2-keV level; band member.
2879.1 ^{&} 23	43/2 ⁺	E	J ^π : 456.4γ to 39/2 ⁺ 2442.7-keV level; band member.
3057.5 [#] 21	47/2 ⁻	E	J ^π : 490.5γ to 43/2 ⁻ 2567.0-keV; band member.
3116.5 [@] 25	45/2 ⁺	E	J ^π : 4471.4γ to 41/2 ⁺ 2645.1-keV level; band member.
3317.8 [‡] 23	49/2 ⁻	E	J ^π : 507.5γ to 45/2 ⁻ 2810.3-keV level; band member.
3365.2 ^{&} 25	47/2 ⁺	E	J ^π : 486.1γ to 43/2 ⁺ 2879.1-keV level; band member.
3577.7 [#] 24	51/2 ⁻	E	J ^π : 520.2γ to 47/2 ⁻ 3057.5-keV level; band member.
3615 [@] 3	49/2 ⁺	E	J ^π : 498γ to 45/2 ⁺ 3116.5-keV level; band member.
3852.8 [‡] 25	53/2 ⁻	E	J ^π : 535γ to 49/2 ⁻ 3317.8-keV level; band member.
3875 ^{&} 3	51/2 ⁺	E	J ^π : 510γ to 47/2 ⁺ 3385.2-keV level; band member.
4125 [#] 3	55/2 ⁻	E	J ^π : 547γ to 51/2 ⁻ 3577.7-keV level; band member.

[†] From least-squares fit to E_γ by the evaluator. Gammas without uncertainty have been assigned a 1 keV uncertainty during the fit.

[‡] Band(A): ν₉/2[734], α=+1/2.

[#] Band(a): ν₉/2[734], α=-1/2.

[@] Band(B): ν₅/2[622], α=+1/2.

[&] Band(b): ν₅/2[622], α=-1/2.

^a Band(C): 1/2⁺[620].

^b Band(D): 7/2⁺[624].

^c Band(E): 7/2[613].

^d Band(F): 9/2[734]-2⁺.

^e Band(G): 9/2[734]+2⁺.

^f Band(H): 9/2[734]+2⁻.

^g Band(I): 9/2[734]-1⁻.

^h Band(J): 9/3[734]+1⁻.

ⁱ Band(K): 9/2[734]+3⁻.

Adopted Levels, Gammas (continued)

E _i (level)	J ^π _i	E _γ	I _γ	E _f	J ^π _f	Mult.#	γ(²⁴⁹ Cf)		Comments
							δ [#]	α [@]	
62.48	11/2 ⁻	62.47 5	100	0.0	9/2 ⁻	M1+E2	0.29 3	46.8 27	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 E _γ : from ²⁴⁹ Es ε decay.
136.2	13/2 ⁻	(73.7)		62.48	11/2 ⁻	[M1,E2]		6.×10 ¹ 4	α(L)=41 26; α(M)=11 8 α(N)=3.2 22; α(O)=0.8 5; α(P)=0.13 8; α(Q)=0.0019 13 E _γ : From level energy difference.
		(136.2)		0.0	9/2 ⁻	[E2]		5.53 8	α(K)=0.1179 17; α(L)=3.90 5; α(M)=1.110 16 α(N)=0.312 4; α(O)=0.0774 11; α(P)=0.01250 17; α(Q)=6.14×10 ⁻⁵ 9 E _γ : From level energy difference.
144.98	5/2 ⁺	144.99 6	100	0.0	9/2 ⁻	M2+E3	0.42 +11-12	64.9 11	α(K)=30.7 25; α(L)=24.5 21; α(M)=7.1 7 α(N)=2.01 21; α(O)=0.51 5; α(P)=0.091 7; α(Q)=0.00350 22 B(M2)(W.u.)=0.0035 +5-4; B(E3)(W.u.)=12 6 Mult.: From analysis of anomalous M2 conversion coefficients (1993Li52). E _γ : Other: 144.8 4 from ²⁵³ Fm α decay.
187.97	7/2 ⁺	43.00 [†] 5	100 [†]	144.98	5/2 ⁺	M1+E2	0.27	177.5 26	α(L)=130.5 19; α(M)=34.5 5 α(N)=9.63 14; α(O)=2.44 4; α(P)=0.427 6; α(Q)=0.01466 21
221.7	15/2 ⁻	159.3 [‡]		62.48	11/2 ⁻				
243.13	9/2 ⁺	55.14 [†] 5	100 [†]	187.97	7/2 ⁺	M1+E2	0.14	54.6 8	α(L)=40.6 6; α(M)=10.21 15 α(N)=2.84 4; α(O)=0.731 10; α(P)=0.1377 20; α(Q)=0.00724 10 E _γ : From level energy difference.
310.1	11/2 ⁺	(98.2) (122.0)		144.98	5/2 ⁺				E _γ : From level energy difference.
318.4	17/2 ⁻	182.2 [‡] 5		187.97	7/2 ⁺				E _γ : From level energy difference.
379.54	7/2 ⁺	136.37 [†] 8	0.16 [†] 4	243.13	9/2 ⁺	[M1]		15.50 22	α(K)=12.01 17; α(L)=2.61 4; α(M)=0.641 9 α(N)=0.1777 25; α(O)=0.0461 7; α(P)=0.00891 13; α(Q)=0.000525 7
		191.6 [†] 1	0.99 [†] 7	187.97	7/2 ⁺	M1+E2	0.53 +18-19	5.0 5	α(K)=3.7 5; α(L)=0.962 19; α(M)=0.2436 34 α(N)=0.0677 10; α(O)=0.01740 25; α(P)=0.00325 8; α(Q)=0.000159 21
		234.6 [†] 1	0.64 [†] 7	144.98	5/2 ⁺	M1+E2	4.7 15	0.75 13	α(K)=0.23 12; α(L)=0.378 10; α(M)=0.1057 21 α(N)=0.0297 6; α(O)=0.00740 16; α(P)=0.00124 4; α(Q)=1.6×10 ⁻⁵ 5
		379.5 [†] 1	100 [†] 6	0.0	9/2 ⁻	E1		0.0281 4	α(K)=0.02213 31; α(L)=0.00451 6; α(M)=0.001100 15 α(N)=0.000303 4; α(O)=7.73×10 ⁻⁵ 11; α(P)=1.422×10 ⁻⁵ 20; α(Q)=6.86×10 ⁻⁷ 10

Adopted Levels, Gammas (continued)

$\gamma(^{249}\text{Cf})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.#	$\delta^\#$	$\alpha^@$	Comments
390.0	13/2 ⁺	147 ^{&‡}		243.13	9/2 ⁺				
416.8	1/2 ⁺	271.8 [†] 4	100 [†]	144.98	5/2 ⁺	E2		0.377 6	$\alpha(\text{K})=0.0954$ 14; $\alpha(\text{L})=0.2039$ 31; $\alpha(\text{M})=0.0571$ 9 $\alpha(\text{N})=0.01603$ 24; $\alpha(\text{O})=0.00400$ 6; $\alpha(\text{P})=0.000669$ 10; $\alpha(\text{Q})=7.75 \times 10^{-6}$ 11 Mult.: From conversion electron data in ²⁵³ Fm α decay.
426.9	19/2 ⁻	205.2 [‡]		221.7	15/2 ⁻				
437.56	9/2 ⁺	58.01 [†] 5	1.33 [†] 21	379.54	7/2 ⁺	M1+E2	0.52 9	95 15	$\alpha(\text{L})=69$ 10; $\alpha(\text{M})=18.8$ 31 $\alpha(\text{N})=5.3$ 9; $\alpha(\text{O})=1.32$ 21; $\alpha(\text{P})=0.224$ 32; $\alpha(\text{Q})=0.00534$ 28
		375.1 [†] 1	100 [†] 9	62.48	11/2 ⁻	E1		0.0288 4	$\alpha(\text{K})=0.02265$ 32; $\alpha(\text{L})=0.00462$ 6; $\alpha(\text{M})=0.001128$ 16 $\alpha(\text{N})=0.000310$ 4; $\alpha(\text{O})=7.93 \times 10^{-5}$ 11; $\alpha(\text{P})=1.457 \times 10^{-5}$ 20; $\alpha(\text{Q})=7.01 \times 10^{-7}$ 10
		437.6 [†] 1	22.7 [†] 15	0.0	9/2 ⁻	E1		0.02119 30	$\alpha(\text{K})=0.01675$ 23; $\alpha(\text{L})=0.00333$ 5; $\alpha(\text{M})=0.000812$ 11 $\alpha(\text{N})=0.0002235$ 31; $\alpha(\text{O})=5.72 \times 10^{-5}$ 8; $\alpha(\text{P})=1.059 \times 10^{-5}$ 15; $\alpha(\text{Q})=5.25 \times 10^{-7}$ 7
442.99	7/2 ⁺	63.45 [†] 5	10.4 [†] 13	379.54	7/2 ⁺	M1		32.0 5	$\alpha(\text{L})=23.99$ 34; $\alpha(\text{M})=5.91$ 8 $\alpha(\text{N})=1.637$ 23; $\alpha(\text{O})=0.425$ 6; $\alpha(\text{P})=0.0822$ 12; $\alpha(\text{Q})=0.00486$ 7
		255.0 [†] 2	20 [†] 5	187.97	7/2 ⁺	M1		2.69 4	$\alpha(\text{K})=2.097$ 30; $\alpha(\text{L})=0.441$ 6; $\alpha(\text{M})=0.1084$ 15 $\alpha(\text{N})=0.0300$ 4; $\alpha(\text{O})=0.00779$ 11; $\alpha(\text{P})=0.001505$ 21; $\alpha(\text{Q})=8.82 \times 10^{-5}$ 12
		298.0 [†] 1	100 [†] 7	144.98	5/2 ⁺	M1		1.741 24	$\alpha(\text{K})=1.360$ 19; $\alpha(\text{L})=0.286$ 4; $\alpha(\text{M})=0.0701$ 10 $\alpha(\text{N})=0.01941$ 27; $\alpha(\text{O})=0.00504$ 7; $\alpha(\text{P})=0.000973$ 14; $\alpha(\text{Q})=5.69 \times 10^{-5}$ 8
		443.1 [†] 3	5.5 [†] 16	0.0	9/2 ⁻	[E1]		0.02068 29	$\alpha(\text{K})=0.01635$ 23; $\alpha(\text{L})=0.00325$ 5; $\alpha(\text{M})=0.000791$ 11 $\alpha(\text{N})=0.0002177$ 31; $\alpha(\text{O})=5.57 \times 10^{-5}$ 8; $\alpha(\text{P})=1.032 \times 10^{-5}$ 15; $\alpha(\text{Q})=5.13 \times 10^{-7}$ 7
480.2	15/2 ⁺	170 [‡]		310.1	11/2 ⁺				
500.6?	(9/2 ⁺)	(63.0)		437.56	9/2 ⁺	[M1,E2]		1.1×10 ² 8	$\alpha(\text{L})=8\text{E}1$ 6; $\alpha(\text{M})=23$ 17 $\alpha(\text{N})=7$ 5; $\alpha(\text{O})=1.6$ 12; $\alpha(\text{P})=0.26$ 18; $\alpha(\text{Q})=0.0031$ 19 E_γ : From level energy difference.
546.3	21/2 ⁻	227.8 [‡]		318.4	17/2 ⁻				
550.6	(1/2 ⁺ , 3/2, 5/2 ⁺)	134 [†]		416.8	1/2 ⁺				

Adopted Levels, Gammas (continued)

$\gamma(^{249}\text{Cf})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult. #	$\alpha^@$	Comments
550.6	(1/2 ⁺ ,3/2,5/2 ⁺)	405 [†] 2	$\approx 100^\dagger$	144.98	5/2 ⁺			
583.6	17/2 ⁺	193.7 [‡]		390.0	13/2 ⁺			
677.2	23/2 ⁻	250.4 [‡]		426.9	19/2 ⁻			
697.4	19/2 ⁺	217.2 [‡]		480.2	15/2 ⁺			
813.21	(5/2) ⁻	370.1 [†] 2	1.5 [†] 4	442.99	7/2 ⁺	[E1]	0.0296 4	$\alpha(\text{K})=0.02326$ 33; $\alpha(\text{L})=0.00476$ 7; $\alpha(\text{M})=0.001161$ 16 $\alpha(\text{N})=0.000320$ 4; $\alpha(\text{O})=8.16 \times 10^{-5}$ 11; $\alpha(\text{P})=1.499 \times 10^{-5}$ 21; $\alpha(\text{Q})=7.19 \times 10^{-7}$ 10
		433.7 [†] 3	0.67 [†] 11	379.54	7/2 ⁺	[E1]	0.02156 30	$\alpha(\text{K})=0.01704$ 24; $\alpha(\text{L})=0.00340$ 5; $\alpha(\text{M})=0.000827$ 12 $\alpha(\text{N})=0.0002277$ 32; $\alpha(\text{O})=5.83 \times 10^{-5}$ 8; $\alpha(\text{P})=1.078 \times 10^{-5}$ 15; $\alpha(\text{Q})=5.34 \times 10^{-7}$ 8
		625.3 [†] 2	1.41 [†] 14	187.97	7/2 ⁺	[E1]	0.01080 15	$\alpha(\text{K})=0.00862$ 12; $\alpha(\text{L})=0.001634$ 23; $\alpha(\text{M})=0.000396$ 6 $\alpha(\text{N})=0.0001089$ 15; $\alpha(\text{O})=2.80 \times 10^{-5}$ 4; $\alpha(\text{P})=5.25 \times 10^{-6}$ 7; $\alpha(\text{Q})=2.78 \times 10^{-7}$ 4
		668.3 [†] 2	2.61 [†] 21	144.98	5/2 ⁺	E1	0.00957 13	$\alpha(\text{K})=0.00766$ 11; $\alpha(\text{L})=0.001440$ 20; $\alpha(\text{M})=0.000348$ 5 $\alpha(\text{N})=9.59 \times 10^{-5}$ 13; $\alpha(\text{O})=2.466 \times 10^{-5}$ 35; $\alpha(\text{P})=4.64 \times 10^{-6}$ 6; $\alpha(\text{Q})=2.476 \times 10^{-7}$ 35
		813.2 [†] 1	100 [†] 7	0.0	9/2 ⁻	E2	0.02309 32	$\alpha(\text{K})=0.01578$ 22; $\alpha(\text{L})=0.00540$ 8; $\alpha(\text{M})=0.001398$ 20 $\alpha(\text{N})=0.000389$ 5; $\alpha(\text{O})=9.92 \times 10^{-5}$ 14; $\alpha(\text{P})=1.810 \times 10^{-5}$ 25; $\alpha(\text{Q})=6.87 \times 10^{-7}$ 10
819.2	25/2 ⁻	142 [‡] 272.9		677.2	23/2 ⁻ 546.3			
823.3	21/2 ⁺	126 [‡] 239.7 [‡]		697.4	19/2 ⁺ 583.6			
852.19	(7/2) ⁻	609.2 [†] 4	$\approx 2.6^\dagger$	243.13	9/2 ⁺	[E1]	0.01132 16	$\alpha(\text{K})=0.00904$ 13; $\alpha(\text{L})=0.001719$ 24; $\alpha(\text{M})=0.000416$ 6 $\alpha(\text{N})=0.0001146$ 16; $\alpha(\text{O})=2.94 \times 10^{-5}$ 4; $\alpha(\text{P})=5.52 \times 10^{-6}$ 8; $\alpha(\text{Q})=2.91 \times 10^{-7}$ 4
		664.0 [†] 5	$\approx 0.87^\dagger$	187.97	7/2 ⁺	[E1]	0.00968 14	$\alpha(\text{K})=0.00775$ 11; $\alpha(\text{L})=0.001457$ 21; $\alpha(\text{M})=0.000353$ 5 $\alpha(\text{N})=9.70 \times 10^{-5}$ 14; $\alpha(\text{O})=2.496 \times 10^{-5}$ 35; $\alpha(\text{P})=4.69 \times 10^{-6}$ 7; $\alpha(\text{Q})=2.504 \times 10^{-7}$ 35
		707.0 [†] 5	$\approx 2.6^\dagger$	144.98	5/2 ⁺	[E1]	0.00865 12	$\alpha(\text{K})=0.00693$ 10; $\alpha(\text{L})=0.001295$ 18; $\alpha(\text{M})=0.000313$ 4 $\alpha(\text{N})=8.61 \times 10^{-5}$ 12; $\alpha(\text{O})=2.217 \times 10^{-5}$ 31; $\alpha(\text{P})=4.18 \times 10^{-6}$ 6; $\alpha(\text{Q})=2.249 \times 10^{-7}$ 32
		789.7 [†] 1	100 [†] 8	62.48	11/2 ⁻	E2	0.02448 34	$\alpha(\text{K})=0.01658$ 23; $\alpha(\text{L})=0.00583$ 8; $\alpha(\text{M})=0.001515$ 21 $\alpha(\text{N})=0.000422$ 6; $\alpha(\text{O})=0.0001074$ 15; $\alpha(\text{P})=1.956 \times 10^{-5}$ 27; $\alpha(\text{Q})=7.27 \times 10^{-7}$ 10
		852.2 [†] 1	77 [†] 6	0.0	9/2 ⁻	E2	0.02105 29	$\alpha(\text{K})=0.01459$ 20; $\alpha(\text{L})=0.00478$ 7; $\alpha(\text{M})=0.001234$ 17 $\alpha(\text{N})=0.000343$ 5; $\alpha(\text{O})=8.75 \times 10^{-5}$ 12; $\alpha(\text{P})=1.603 \times 10^{-5}$ 22; $\alpha(\text{Q})=6.27 \times 10^{-7}$ 9

Adopted Levels, Gammas (continued)

$\gamma(^{249}\text{Cf})$ (continued)

<u>E_i(level)</u>	<u>J_i^{π}</u>	<u>E_{γ}</u>	<u>I_{γ}</u>	<u>E_f</u>	<u>J_f^{π}</u>	<u>Mult.#</u>	<u>$\delta^{\#}$</u>	<u>$\alpha^{\textcircled{a}}$</u>	<u>Comments</u>
902.52	(9/2 ⁻)	766.3 ^{a†} 3	<113 ^a	136.2	13/2 ⁻	[E2]		0.0260 4	$\alpha(\text{K})=0.01744$ 24; $\alpha(\text{L})=0.00632$ 9; $\alpha(\text{M})=0.001645$ 23 $\alpha(\text{N})=0.000458$ 6; $\alpha(\text{O})=0.0001166$ 16; $\alpha(\text{P})=2.119\times 10^{-5}$ 30; $\alpha(\text{Q})=7.71\times 10^{-7}$ 11
		840.0 [†] 2	100 [†] 9	62.48	11/2 ⁻	[M1,E2]		0.06 4	$\alpha(\text{K})=0.048$ 33; $\alpha(\text{L})=0.011$ 6; $\alpha(\text{M})=0.0027$ 14 $\alpha(\text{N})=7.E-4$ 4; $\alpha(\text{O})=1.9\times 10^{-4}$ 10; $\alpha(\text{P})=3.7\times 10^{-5}$ 20; $\alpha(\text{Q})=2.0\times 10^{-6}$ 13
		902.6 [†] 3	19 [†] 6	0.0	9/2 ⁻	[M1,E2]		0.052 33	$\alpha(\text{K})=0.040$ 27; $\alpha(\text{L})=0.009$ 5; $\alpha(\text{M})=0.0022$ 11 $\alpha(\text{N})=6.1\times 10^{-4}$ 32; $\alpha(\text{O})=1.6\times 10^{-4}$ 8; $\alpha(\text{P})=3.0\times 10^{-5}$ 16; $\alpha(\text{Q})=1.6\times 10^{-6}$ 11
960.2	23/2 ⁺	137 [‡]		823.3	21/2 ⁺				
		262.5 [‡]		697.4	19/2 ⁺				
972.3	27/2 ⁻	153 [‡]		819.2	25/2 ⁻				
		295.2 [‡]		677.2	23/2 ⁻				
1007.92	(9/2 ⁺)	507.3 [†] 3	5.5 [†] 14	500.6?	(9/2 ⁺)	[M1,E2]		0.23 17	$\alpha(\text{K})=0.18$ 14; $\alpha(\text{L})=0.044$ 22; $\alpha(\text{M})=0.011$ 5 $\alpha(\text{N})=0.0030$ 14; $\alpha(\text{O})=8.E-4$ 4; $\alpha(\text{P})=1.5\times 10^{-4}$ 8; $\alpha(\text{Q})=7.E-6$ 6
		565.0 [†] 2	28.8 [†] 23	442.99	7/2 ⁺	M1		0.302 4	$\alpha(\text{K})=0.2362$ 33; $\alpha(\text{L})=0.0490$ 7; $\alpha(\text{M})=0.01200$ 17 $\alpha(\text{N})=0.00332$ 5; $\alpha(\text{O})=0.000862$ 12; $\alpha(\text{P})=0.0001664$ 23; $\alpha(\text{Q})=9.73\times 10^{-6}$ 14
		570.3 [†] 3	7.4 [†] 19	437.56	9/2 ⁺	M1		0.294 4	$\alpha(\text{K})=0.2303$ 32; $\alpha(\text{L})=0.0477$ 7; $\alpha(\text{M})=0.01170$ 16 $\alpha(\text{N})=0.00324$ 5; $\alpha(\text{O})=0.000840$ 12; $\alpha(\text{P})=0.0001622$ 23; $\alpha(\text{Q})=9.48\times 10^{-6}$ 13
		628.5 [†] 2	28.8 [†] 23	379.54	7/2 ⁺	M1(+E2)	0.71 +31-28	0.163 34	$\alpha(\text{K})=0.126$ 27; $\alpha(\text{L})=0.028$ 5; $\alpha(\text{M})=0.0069$ 11 $\alpha(\text{N})=0.00192$ 30; $\alpha(\text{O})=0.00050$ 8; $\alpha(\text{P})=9.5\times 10^{-5}$ 16; $\alpha(\text{Q})=5.2\times 10^{-6}$ 11
		766.3 ^{a†b} 3	<15.1 ^a	243.13	9/2 ⁺				E _{γ} : Poor fit. Level energy difference=764.79 13.
		820.5 [†] 5	≈1.37 [†]	187.97	7/2 ⁺	[M1,E2]		0.07 4	$\alpha(\text{K})=0.051$ 35; $\alpha(\text{L})=0.012$ 6; $\alpha(\text{M})=0.0029$ 15 $\alpha(\text{N})=8.E-4$ 4; $\alpha(\text{O})=2.0\times 10^{-4}$ 11; $\alpha(\text{P})=3.9\times 10^{-5}$ 21; $\alpha(\text{Q})=2.1\times 10^{-6}$ 14
		862.8 [†] 3	2.5 [†] 8	144.98	5/2 ⁺	[E2]		0.02054 29	$\alpha(\text{K})=0.01428$ 20; $\alpha(\text{L})=0.00463$ 6; $\alpha(\text{M})=0.001194$ 17 $\alpha(\text{N})=0.000332$ 5; $\alpha(\text{O})=8.47\times 10^{-5}$ 12; $\alpha(\text{P})=1.553\times 10^{-5}$ 22; $\alpha(\text{Q})=6.12\times 10^{-7}$ 9
		945.4 [†] 1	32.9 [†] 28	62.48	11/2 ⁻	(E1)		0.00521 7	$\alpha(\text{K})=0.00420$ 6; $\alpha(\text{L})=0.000762$ 11; $\alpha(\text{M})=0.0001835$

Adopted Levels, Gammas (continued)

E _i (level)	J _i ^π	E _γ	I _γ	E _f	J _f ^π	γ(²⁴⁹ Cf) (continued)			Comments
						Mult.#	δ [#]	α [@]	
									26 α(N)=5.05×10 ⁻⁵ 7; α(O)=1.303×10 ⁻⁵ 18; α(P)=2.475×10 ⁻⁶ 35; α(Q)=1.385×10 ⁻⁷ 19
1007.92	(9/2 ⁺)	1007.9 [†] 1	100 [†] 8	0.0	9/2 ⁻	(E1)		0.00467 7	α(K)=0.00377 5; α(L)=0.000681 10; α(M)=0.0001637 23 α(N)=4.51×10 ⁻⁵ 6; α(O)=1.163×10 ⁻⁵ 16; α(P)=2.213×10 ⁻⁶ 31; α(Q)=1.247×10 ⁻⁷ 17
1107.4	25/2 ⁺	147 ^{&‡}		960.2	23/2 ⁺				
		284.4 [‡]		823.3	21/2 ⁺				
1136.1	29/2 ⁻	164 [‡]		972.3	27/2 ⁻				
		316.8 [‡]		819.2	25/2 ⁻				
1199.8	(7/2 ⁻ ,9/2)	1137.3 [†] 5	≈63 [†]	62.48	11/2 ⁻				
		1199.8 [†] 5	100 [†] 38	0.0	9/2 ⁻				
1218.50	(7/2 ⁻)	1218.5 [†] 1	100 [†]	0.0	9/2 ⁻	M1+E2	0.62 +29-28	0.030 5	α(K)=0.024 4; α(L)=0.0050 7; α(M)=0.00122 17 α(N)=0.00034 5; α(O)=8.7×10 ⁻⁵ 12; α(P)=1.68×10 ⁻⁵ 24; α(Q)=9.6×10 ⁻⁷ 16; α(IPF)=1.10×10 ⁻⁵ 17
1238.06	(5/2 ⁻ ,7/2,9/2 ⁺)	1093.2 [†] 3	100 [†] 19	144.98	5/2 ⁺				
		1238.0 [†] 2	74 [†] 10	0.0	9/2 ⁻				
1266.1	27/2 ⁺	159 [‡]		1107.4	25/2 ⁺				
		305.8 [‡]		960.2	23/2 ⁺				
1267.7	(9/2 ⁻)	1205.1 [†] 5	100 [†] 20	62.48	11/2 ⁻	[M1,E2]		0.025 14	α(K)=0.019 11; α(L)=0.0042 21; α(M)=1.0×10 ⁻³ 5 α(N)=2.8×10 ⁻⁴ 14; α(O)=7.E-5 4; α(P)=1.4×10 ⁻⁵ 7; α(Q)=8.E-7 5; α(IPF)=7.E-6 4
		1267.8 [†] 5	20 [†] 7	0.0	9/2 ⁻	[M1,E2]		0.022 12	α(K)=0.017 10; α(L)=0.0037 18; α(M)=9.E-4 4 α(N)=2.5×10 ⁻⁴ 12; α(O)=6.4×10 ⁻⁵ 31; α(P)=1.2×10 ⁻⁵ 6; α(Q)=7.E-7 4; α(IPF)=1.8×10 ⁻⁵ 10
1304.3		1304.3 [†] 3	100 [†]	0.0	9/2 ⁻				
1310.8	31/2 ⁻	175 [‡]		1136.1	29/2 ⁻				
		338.3 [‡]		972.3	27/2 ⁻				
1434.1	29/2 ⁺	168 [‡]		1266.1	27/2 ⁺				
		326.5 [‡]		1107.4	25/2 ⁺				
1495.7	33/2 ⁻	185 [‡]		1310.8	31/2 ⁻				
		359.6 [‡]		1136.1	29/2 ⁻				

Adopted Levels, Gammas (continued)

$\gamma(^{249}\text{Cf})$ (continued)

<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ</u>	<u>E_f</u>	<u>J_f^π</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ</u>	<u>E_f</u>	<u>J_f^π</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ</u>	<u>E_f</u>	<u>J_f^π</u>
1613.2	31/2 ⁺	179 [‡]	1434.1	29/2 ⁺	2110.3	39/2 ⁻	214 [‡]	1896.1	37/2 ⁻	2879.1	43/2 ⁺	456.4 [‡]	2422.7	39/2 ⁺
		347.4 [‡]	1266.1	27/2 ⁺			419.6 [‡]	1690.8	35/2 ⁻	3057.5	47/2 ⁻	490.5 [‡]	2567.0	43/2 ⁻
1690.8	35/2 ⁻	195 [‡]	1495.7	33/2 ⁻	2205.6	37/2 ⁺	404.6 [‡]	1801.0	33/2 ⁺	3116.5	45/2 ⁺	471.4 [‡]	2645.1	41/2 ⁺
		379.9 [‡]	1310.8	31/2 ⁻	2335.2	41/2 ⁻	225 [‡]	2110.3	39/2 ⁻	3317.8	49/2 ⁻	507.5 [‡]	2810.3	45/2 ⁻
1801.0	33/2 ⁺	188 [‡]	1613.2	31/2 ⁺			439.2 [‡]	1896.1	37/2 ⁻	3365.2	47/2 ⁺	486.1 [‡]	2879.1	43/2 ⁺
		366.7 [‡]	1434.1	29/2 ⁺	2422.7	39/2 ⁺	422.7 [‡]	2000.0	35/2 ⁺	3577.7	51/2 ⁻	520.2 [‡]	3057.5	47/2 ⁻
1896.1	37/2 ⁻	205 [‡]	1690.8	35/2 ⁻	2567.0	43/2 ⁻	232 [‡]	2335.2	41/2 ⁻	3615	49/2 ⁺	498 [‡]	3116.5	45/2 ⁺
		400.5 [‡]	1495.7	33/2 ⁻			456.6 [‡]	2110.3	39/2 ⁻	3852.8	53/2 ⁻	535 [‡]	3317.8	49/2 ⁻
2000.0	35/2 ⁺	199 [‡]	1801.0	33/2 ⁺	2645.1	41/2 ⁺	439.5 [‡]	2205.6	37/2 ⁺	3875	51/2 ⁺	510 ^{‡b}	3365.2	47/2 ⁺
		386.7 [‡]	1613.2	31/2 ⁺	2810.3	45/2 ⁻	475.1 [‡]	2335.2	41/2 ⁻	4125	55/2 ⁻	547 ^{‡b}	3577.7	51/2 ⁻

[†] From ²⁴⁹Es ε decay.

[‡] From (²⁰⁸Pb, ²⁰⁸Pb'γ).

[#] From conversion coefficient data in ²⁴⁹Es ε decay (1976Ah07), except as noted.

@ [Additional information 1.](#)

& Multiply placed.

^a Multiply placed with undivided intensity.

^b Placement of transition in the level scheme is uncertain.

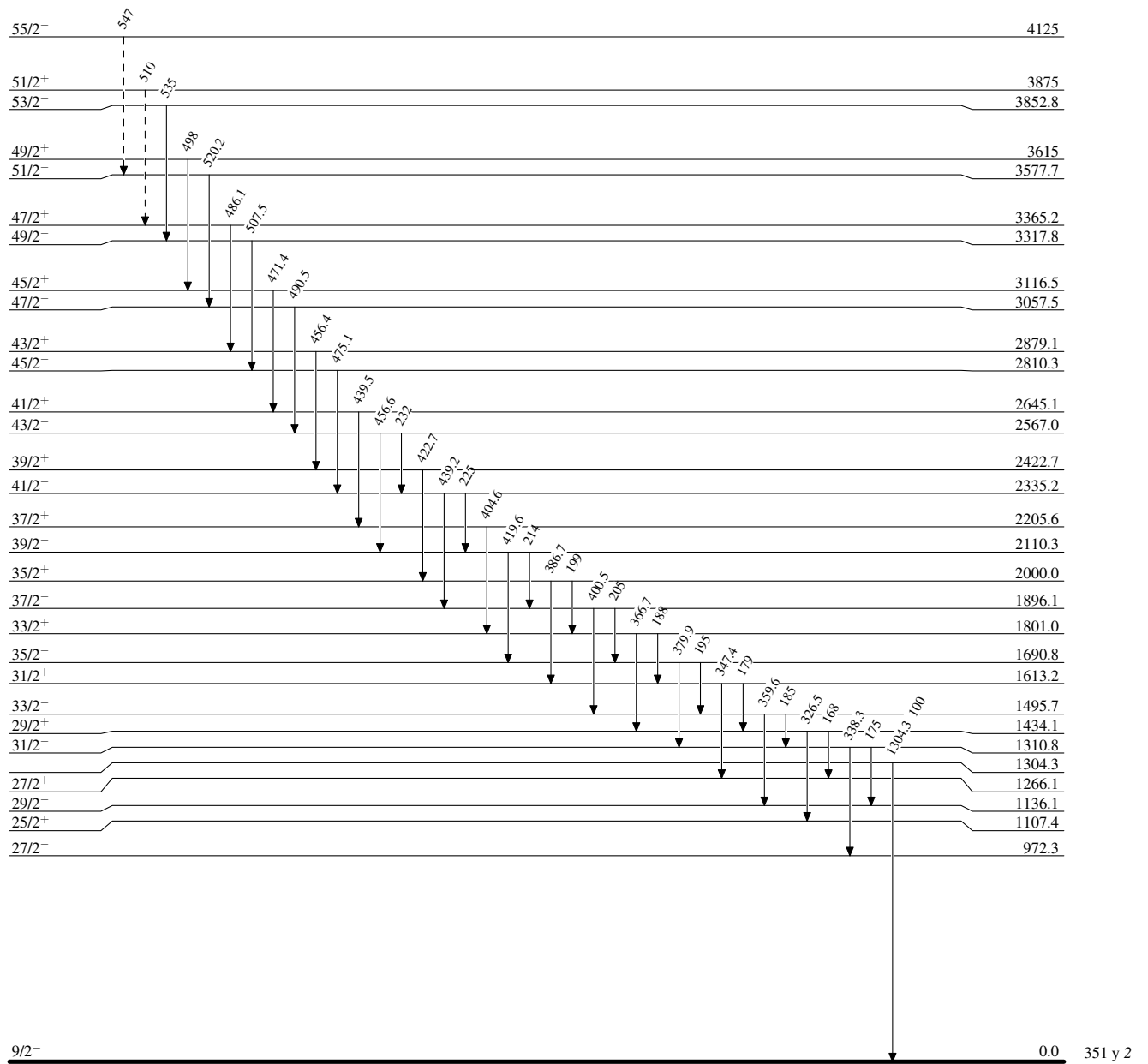
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

-----▶ γ Decay (Uncertain)



$^{249}_{98}\text{Cf}_{151}$

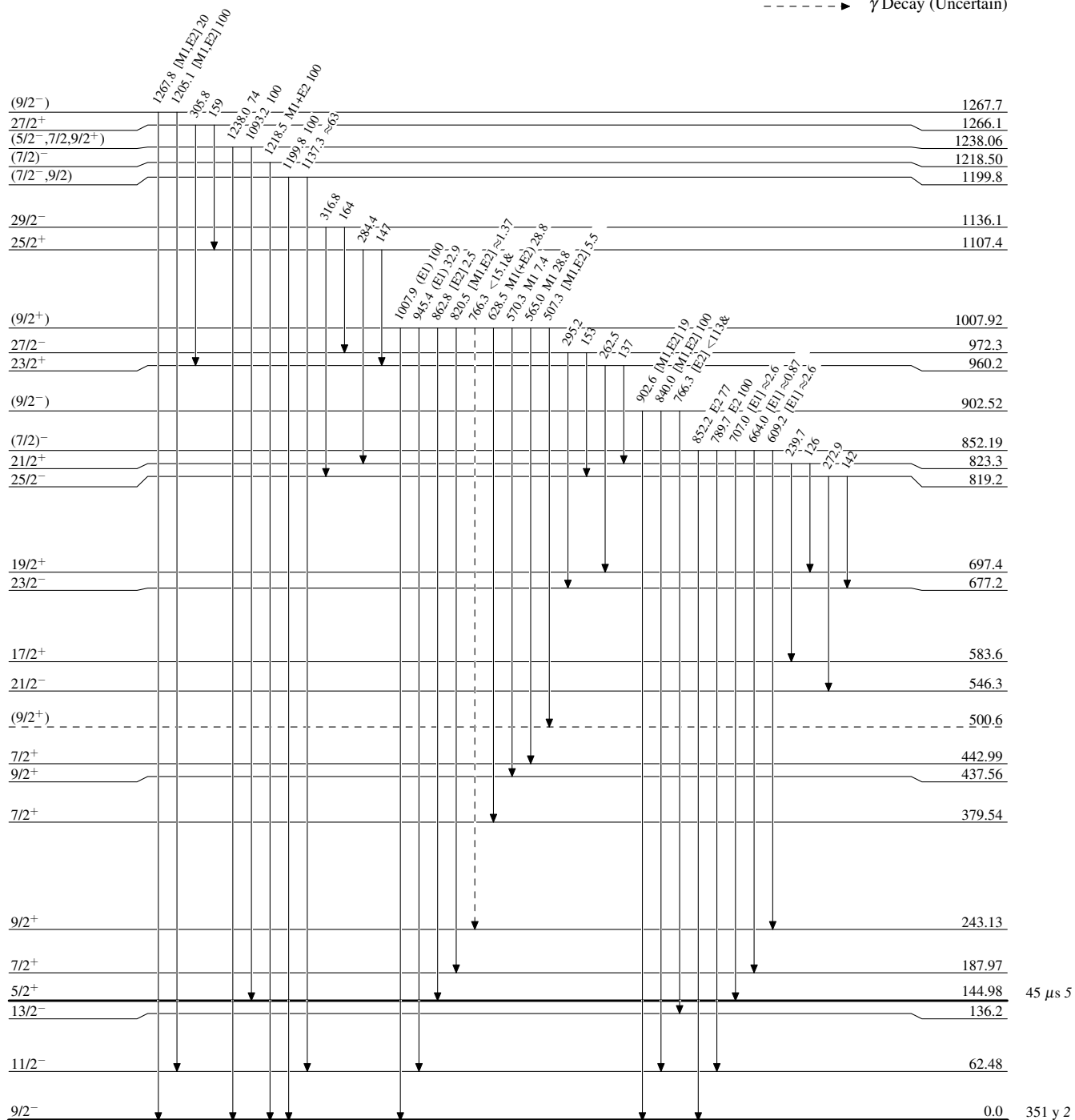
Adopted Levels, Gammas

Level Scheme (continued)

Legend

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

-----▶ γ Decay (Uncertain)



$^{249}_{98}\text{Cf}_{151}$

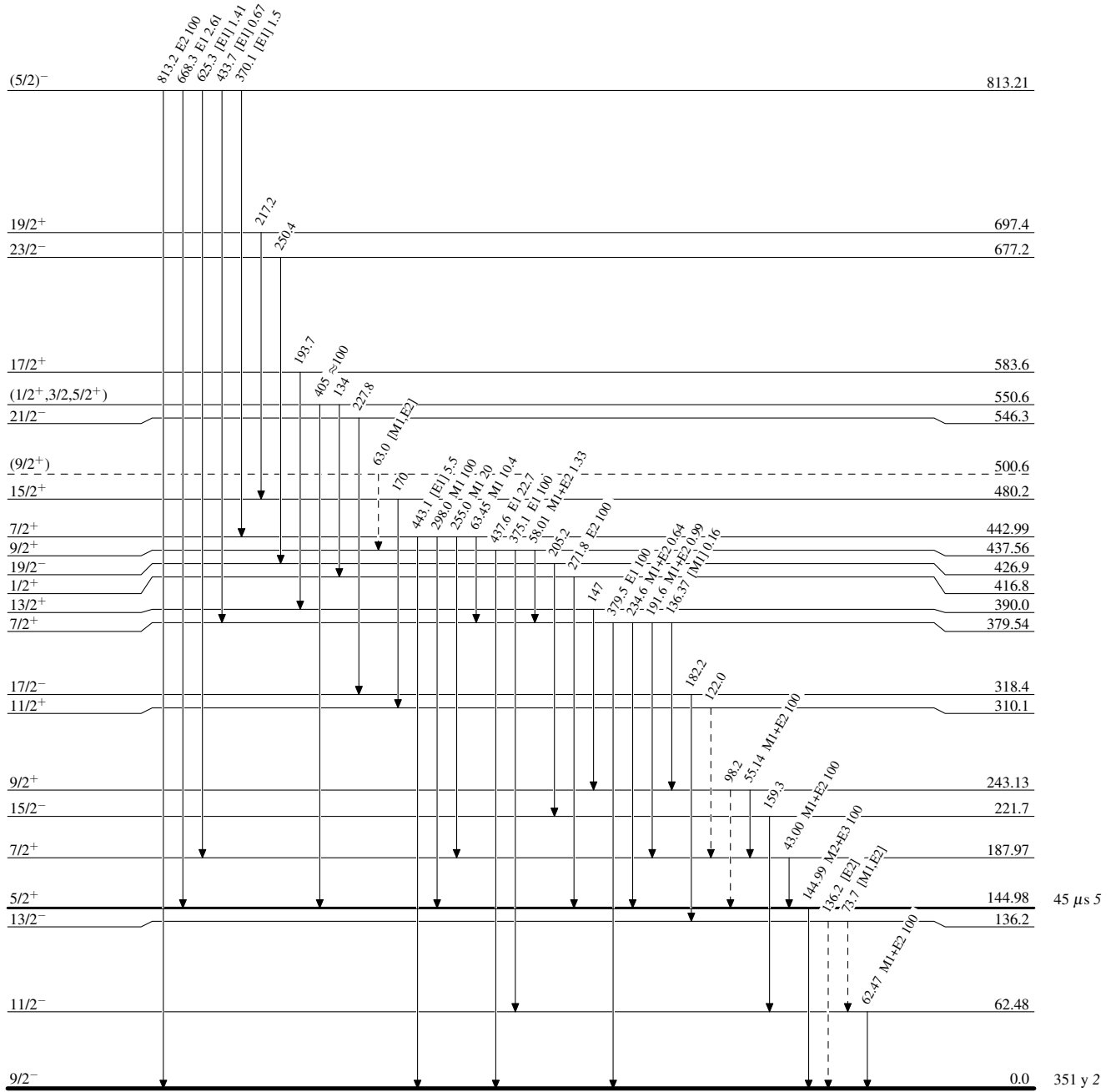
Adopted Levels, Gammas

Legend

Level Scheme (continued)

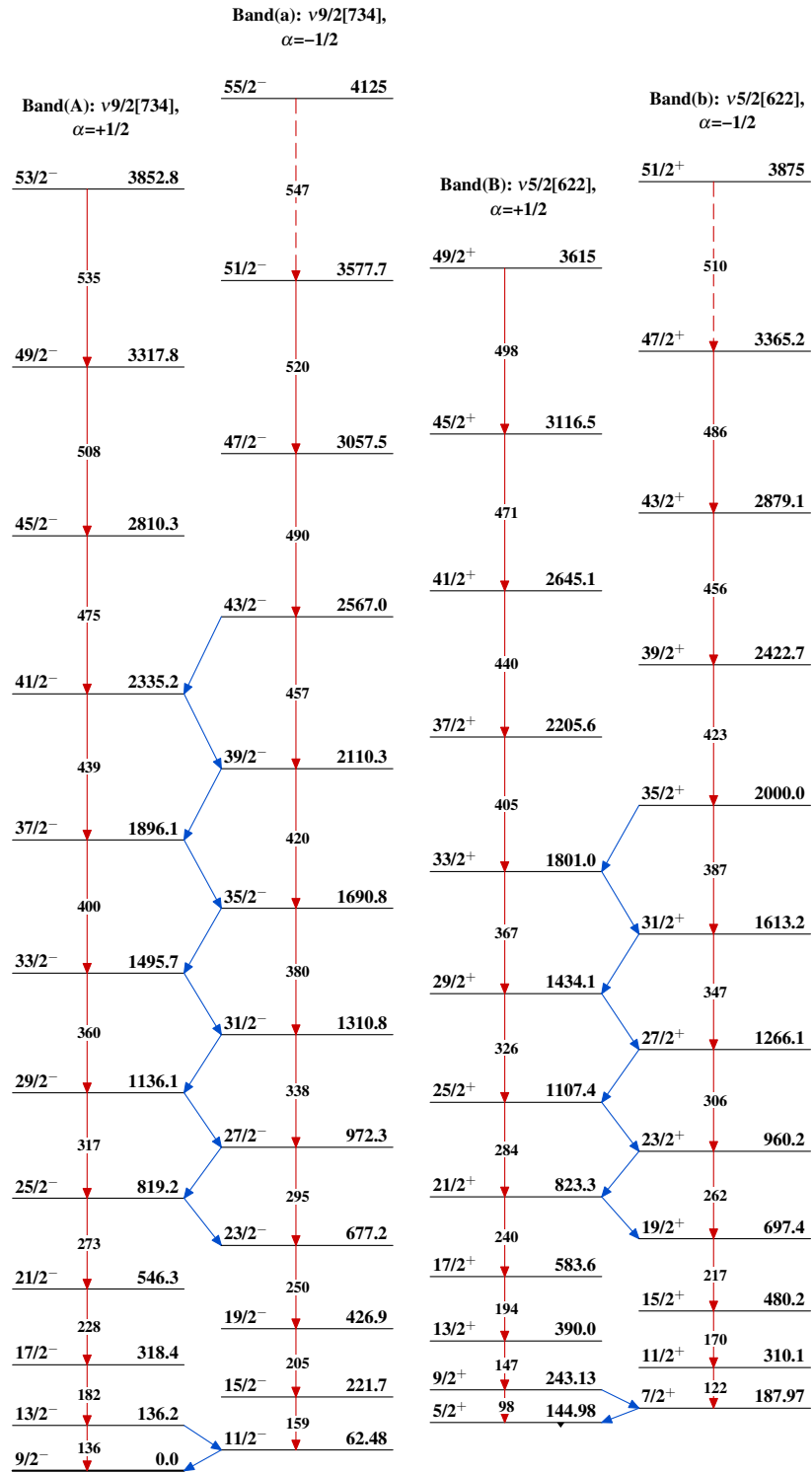
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

-----> γ Decay (Uncertain)



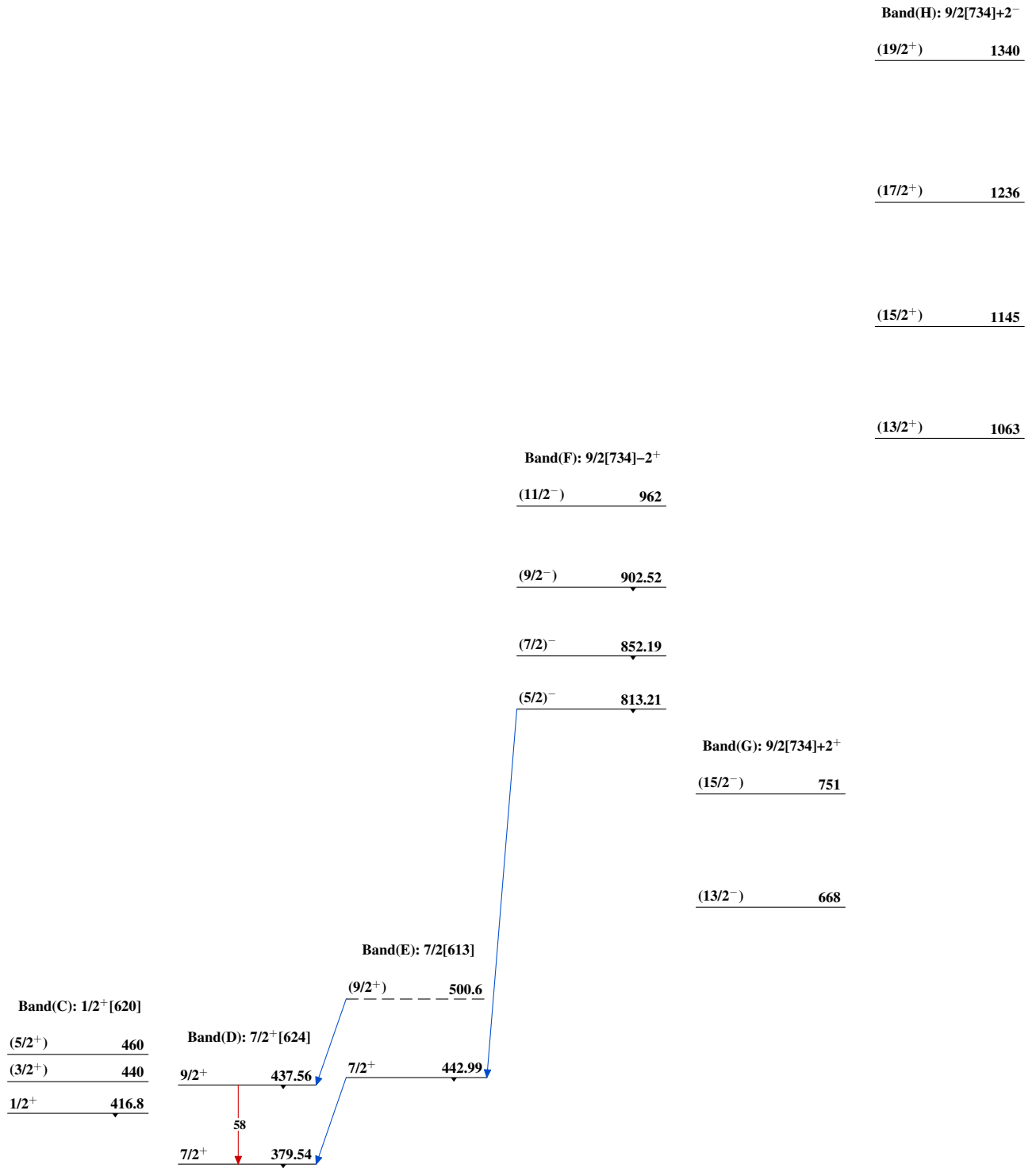
$^{249}_{98}\text{Cf}_{151}$

Adopted Levels, Gammas



$^{249}_{98}\text{Cf}_{151}$

Adopted Levels, Gammas (continued)



$^{249}_{98}\text{Cf}_{151}$

Adopted Levels, Gammas (continued)**Band(I): 9/2[734]-1⁻**(13/2⁺) 1603(11/2⁺) 1530(9/2⁺) 1463(7/2⁺) 1415**Band(K): 9/2[734]+3⁻**(17/2⁺) 117815/2⁺ 1078**Band(J): 9/3[734]+1⁻**13/2⁺ 992(11/2⁺) 920 $^{249}_{98}\text{Cf}_{151}$