

**Adopted Levels, Gammas**

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

Q( $\beta^-$ )=-377 6; S(n)=5107 4; S(p)=6106 5; Q( $\alpha$ )=6177.0 9 [2021Wa16](#)  
 S(2n)=11730 4, S(2p)=11194 4 ([2021WA16](#)).  
 Measured A( $\theta$ ): [2011Gu11](#), [2005Se08](#).

<sup>251</sup>Cf Levels

The level scheme and band assignments are from <sup>255</sup>Fm  $\alpha$ -decay ([2005Ah09](#),[1971Ah01](#),[1975Ah01](#)) and from <sup>250</sup>Cf(d,p) ([1990Ah02](#)). For a discussion of single-particle Nilsson states above N=152, see [1990Ah02](#).

Cross Reference (XREF) Flags

- A <sup>251</sup>Bk  $\beta^-$  decay
- B <sup>251</sup>Es  $\epsilon$  decay
- C <sup>255</sup>Fm  $\alpha$  decay
- D <sup>250</sup>Cf(d,p)

E(level) <sup>†</sup>	J $^\pi$	T <sub>1/2</sub> <sup>‡</sup>	XREF	Comments
0 <sup>#</sup>	1/2 <sup>+</sup>	898 y 44	ABCD	%SF=?; % $\alpha$ ≈100 configuration= $\nu$ 1/2 <sup>+</sup> [620] ( <a href="#">2005Ah09</a> ) J $^\pi$ : favored $\alpha$ decay to 1/2 <sup>+</sup> in <sup>247</sup> Cm. T <sub>1/2</sub> : weighted average of 892 y 88 ( <a href="#">1968Ch03</a> ), 900 y 50 ( <a href="#">1969Me01</a> ). %SF: SF has not been observed, however, calculated T <sub>1/2</sub> (SF)≈1000 y ( <a href="#">1985Lo17</a> ).
24.826 <sup>#</sup> 12	3/2 <sup>+</sup>		ABCD	J $^\pi$ : M1+E2 to 1/2 <sup>+</sup> g.s.
47.832 <sup>#</sup> 14	5/2 <sup>+</sup>		ABCD	J $^\pi$ : E2 $\gamma$ to 1/2 <sup>+</sup> g.s.
105.738 <sup>#</sup> 20	7/2 <sup>+</sup>		Cd	J $^\pi$ : E2 $\gamma$ to 3/2 <sup>+</sup> level, (M1+E2) $\gamma$ to 5/2 <sup>+</sup> level; band structure (E=105.75 3 from band parameters).
106.309 <sup>@</sup> 18	7/2 <sup>+</sup>	38 ns 2	BCd	T <sub>1/2</sub> : from $\alpha\gamma$ (t) ( <a href="#">1971Ah01</a> ); other 37 ns 2 $\alpha\gamma$ (t) ( <a href="#">1964As01</a> ). J $^\pi$ : E2 $\gamma$ to 3/2 <sup>+</sup> level, (M1+E2) $\gamma$ to 5/2 <sup>+</sup> level; band structure and configuration=7/2 <sup>+</sup> [613] ( <a href="#">2005Ah09</a> ).
146.729 <sup>#</sup> 21	9/2 <sup>+</sup> <sup>f</sup>		CD	J $^\pi$ : $\gamma$ to 5/2 <sup>+</sup> , 7/2 <sup>+</sup> levels; band structure (E=147.16 4 from band parameters).
166.303 <sup>@</sup> 23	9/2 <sup>+</sup>		CD	J $^\pi$ : M1(+E2) $\gamma$ to 7/2 <sup>+</sup> level; favored $\alpha$ decay from <sup>255</sup> Fm suggests band structure with 7/2 <sup>+</sup> 106.309 level.
177.602 <sup>&amp;</sup> 19	3/2 <sup>+</sup> <sup>f</sup>		ABCD	configuration= $\nu$ 3/2 <sup>+</sup> [622] ( <a href="#">2005Ah09</a> ) J $^\pi$ : M1 $\gamma$ 's to 1/2 <sup>+</sup> g.s. and 3/2 <sup>+</sup> levels.
211.530 <sup>&amp;</sup> 20	5/2 <sup>+</sup>		ABCD	J $^\pi$ : $\gamma$ 's to 3/2 <sup>+</sup> and 5/2 <sup>+</sup> levels; log ft=7.2 from <sup>251</sup> Bk $\beta^-$ decay, log ft=6.9 from <sup>251</sup> Es $\epsilon$ decay; band structure.
237.71 <sup>#</sup> 4	(11/2 <sup>+</sup> ) <sup>f</sup>		CD	J $^\pi$ : (E2) $\gamma$ to 7/2 <sup>+</sup> level; band structure (E=238.18 7 from band parameters).
239.33 <sup>@</sup> 3	11/2 <sup>+</sup> <sup>f</sup>		C	J $^\pi$ : M1(+E2) $\gamma$ to 9/2 <sup>+</sup> level, (E2) $\gamma$ to 7/2 <sup>+</sup> level; band structure; HF in <sup>255</sup> Fm $\alpha$ decay suggests membership in the 7/2[613] band.
258.514 <sup>&amp;</sup> 18	7/2 <sup>+</sup> <sup>f</sup>		CD	J $^\pi$ : $\gamma$ 's to 3/2 <sup>+</sup> , 5/2 <sup>+</sup> , 7/2 <sup>+</sup> levels; band structure.
295.97 <sup>#</sup> 3	(13/2 <sup>+</sup> )		CD	J $^\pi$ : $\gamma$ to (9/2 <sup>+</sup> ) level; band structure (E=297.99 8 from band parameters).
319.643 <sup>&amp;</sup> 25	9/2 <sup>+</sup> <sup>f</sup>		CD	J $^\pi$ : $\gamma$ 's to 9/2 <sup>+</sup> and 7/2 <sup>+</sup> levels; band structure (E=317 5 from band parameters).
325.29 <sup>@</sup> 3	(13/2 <sup>+</sup> )		C	J $^\pi$ : (M1) $\gamma$ to 11/2 <sup>+</sup> level; member 7/2[613] band.
370.47 3	11/2 <sup>-</sup>	1.3 $\mu$ s 1	C	configuration= $\nu$ 11/2 <sup>-</sup> [725] T <sub>1/2</sub> : from $\alpha\gamma$ (t) ( <a href="#">1971Ah01</a> ). Other: <a href="#">2011He12</a> .

Continued on next page (footnotes at end of table)

**Adopted Levels, Gammas (continued)** $^{251}\text{Cf}$  Levels (continued)

E(level) <sup>†</sup>	J <sup>π</sup>	XREF	Comments
392.33& 5	(11/2 <sup>+</sup> )	C	J <sup>π</sup> : E1 γ's to 11/2 <sup>+</sup> and 9/2 <sup>+</sup> levels, Nilsson model.
420.0?		C	J <sup>π</sup> : rotational structure (E=386 9 from rotational parameters).
423.92@ 4	(15/2 <sup>+</sup> )	C	J <sup>π</sup> : (M1) γ to (13/2 <sup>+</sup> ) level, γ to 11/2 <sup>+</sup> level; rotational structure (E=423.7 16 from rotational parameters).
433.90 4	9/2 <sup>-</sup>	C	configuration= $\nu 9/2^-$ [734] (2005Ah09) J <sup>π</sup> : (M1) γ to (11/2) <sup>-</sup> level, γ's to 9/2 <sup>+</sup> and 7/2 <sup>+</sup> levels.
535.0?		C	
543.99 <sup>a</sup> 3	5/2 <sup>+</sup>	CD	configuration= $\nu 5/2^+$ [622] (2005Ah09) J <sup>π</sup> : (M1) γ to 3/2 <sup>+</sup> level, γ's to 7/2 <sup>+</sup> level; band structure.
569	(15/2 <sup>-</sup> )	D	J <sup>π</sup> : from comparison of (d,p) cross section with 15/2 levels in Cm nuclei.
590.01 <sup>a</sup> 3	(7/2 <sup>+</sup> )	C	J <sup>π</sup> : (M1) γ to (5/2 <sup>+</sup> ) level, γ to 9/2 <sup>+</sup> level; band structure.
601.04 <sup>b</sup> 12	3/2 <sup>-g</sup>	CD	
625.12 <sup>b</sup> 17	7/2 <sup>-g</sup>	CD	
632.02 <sup>b</sup> 14	1/2 <sup>-g</sup>	CD	configuration= $\nu 1/2^-$ [750] (2005Ah09)
648.94 <sup>a</sup> 4	(9/2 <sup>+</sup> )	CD	J <sup>π</sup> : γ's to 11/2 <sup>+</sup> and (7/2 <sup>+</sup> ) levels; band structure.
683	(9/2 <sup>+</sup> ) <sup>g</sup>	D	configuration= $\nu 9/2^+$ [615] (2005Ah09)
691	11/2 <sup>-g</sup>	D	
708.05 <sup>b</sup> 14	5/2 <sup>-g</sup>	CD	
720.50 <sup>a</sup> 12	(11/2 <sup>+</sup> )	C	J <sup>π</sup> : γs to (13/2 <sup>+</sup> ), 9/2 <sup>+</sup> ; band structure.
729		D	
758	(11/2 <sup>+</sup> ) <sup>g</sup>	D	
774?	(3/2 <sup>+</sup> )	CD	configuration= $\nu 1/2^+$ [631] (2005Ah09)
858		D	
942.48 13	(5/2 <sup>-</sup> )	C	configuration= $\{\nu 7/2^+[613]\otimes 1^-\} 5/2^-$ (2005Ah09)
973.98 12	(9/2 <sup>+</sup> )	CD	configuration= $\nu 9/2^+$ [604] (2005Ah09) J <sup>π</sup> : strong peak in (d,p) suggests that this is due to a single-particle state.
981.51 <sup>c</sup> 10	(3/2 <sup>-</sup> )	CD	configuration= $\{\nu 7/2^+[613]\otimes 2^-\} 3/2^-$ (2005Ah09)
1009.13 <sup>c</sup> 8	(5/2 <sup>-</sup> )	C	J <sup>π</sup> : γs to 3/2 <sup>-</sup> , 3/2 <sup>+</sup> , 7/2 <sup>+</sup> ; band structure.
1015		D	
1043.77 <sup>c</sup> 11	(7/2 <sup>-</sup> )	C	J <sup>π</sup> : γs to 5/2 <sup>+</sup> , 9/2 <sup>+</sup> ; band structure.
1050		D	
1061		D	
1077.56 7	(9/2,11/2 <sup>+</sup> )	C	J <sup>π</sup> : γs to 7/2 <sup>+</sup> , 11/2 <sup>+</sup> , 11/2 <sup>-</sup> .
1086.46 14	(9/2 <sup>-</sup> )	CD	configuration= $\{\nu 7/2^+[613]\otimes 1^-\} 9/2^-$ (2005Ah09)
1094.57 <sup>c</sup> 18	(9/2 <sup>-</sup> )	C	
1146		D	
1155.80 <sup>c</sup> 19	(11/2 <sup>-</sup> )	C	
1183 <sup>d</sup>	(7/2 <sup>-</sup> ) <sup>g</sup>	D	
1185.50 18	(5/2,7/2)	C	J <sup>π</sup> : from decay pattern (2005Ah09).
1222		D	
1249.98 13	(7/2 <sup>+</sup> )	C	J <sup>π</sup> : configuration= $(7/2^+[613]\otimes 0^+)$ (2005Ah09).
1250 <sup>e</sup>	(1/2 <sup>-</sup> ) <sup>g</sup>	D	
1262 <sup>e</sup>	(5/2 <sup>-</sup> ) <sup>g</sup>	D	
1304 <sup>d</sup>	(11/2 <sup>-</sup> ) <sup>g</sup>	D	
1326 <sup>e</sup>	(9/2 <sup>-</sup> ) <sup>g</sup>	D	
1335 <sup>e</sup>	(3/2 <sup>-</sup> ) <sup>g</sup>	D	
1374		D	

<sup>†</sup> From a least-squares fit to Eγ or Eα (if no γ's observed), or  $^{250}\text{Cf}(d,p)$  (levels not seen in  $^{255}\text{Fm}$  α-decay).

<sup>‡</sup> From  $^{255}\text{Fm}$  α decay, unless otherwise noted.

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**Adopted Levels, Gammas (continued)**

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 $^{251}\text{Cf}$  Levels (continued)

# Band(A):  $\nu 1/2^+$  [620].

@ Band(B):  $\nu 7/2^+$  [613].

& Band(C):  $\nu 3/2^+$  [622].

<sup>a</sup> Band(D):  $\nu 5/2^+$  [622].

<sup>b</sup> Band(E):  $\nu 1/2^-$  [750].

<sup>c</sup> Band(F):  $\{\nu 7/2^+[613]\otimes 2^-\} 3/2^-$ .

<sup>d</sup> Band(G):  $3/2^-$  [752].

<sup>e</sup> Band(H):  $\nu 1/2^-$  [761].

<sup>f</sup> Assignment and configuration supported by cross-section measurements in (d,p) (1990Ah02).

<sup>g</sup> Assignment is from (d,p) (1990Ah02).

Adopted Levels, Gammas (continued)

$\gamma(^{251}\text{Cf})$

All  $\gamma$  data are from  $^{255}\text{Fm}$   $\alpha$  decay, except where noted.

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma$	$I_\gamma$	$E_f$	$J_f^\pi$	Mult.	$\delta$	$\alpha^\#$	Comments
24.826	3/2 <sup>+</sup>	24.824 15	100	0	1/2 <sup>+</sup>	M1+E2	0.27 4	8.8×10 <sup>2</sup> 22	$\alpha(\text{L})=4.2\times 10^2$ 12; $\alpha(\text{M})=3.4\times 10^2$ 7; $\alpha(\text{N})=95$ 20; $\alpha(\text{O})=24$ 5; $\alpha(\text{P})=3.9$ 8; $\alpha(\text{Q})=0.0770$ 11
47.832	5/2 <sup>+</sup>	23.001 17		24.826	3/2 <sup>+</sup>	(M1+E2)	<0.04	176 13	$\alpha(\text{L})=9$ 7; $\alpha(\text{M})=122$ 5; $\alpha(\text{N})=33.9$ 13; $\alpha(\text{O})=8.78$ 32; $\alpha(\text{P})=1.69$ 5; $\alpha(\text{Q})=0.0976$ 14
		47.84 2	100	0	1/2 <sup>+</sup>	E2		737 10	$\alpha(\text{L})=531$ 8; $\alpha(\text{M})=151.2$ 21; $\alpha(\text{N})=42.5$ 6; $\alpha(\text{O})=10.50$ 15; $\alpha(\text{P})=1.647$ 23; $\alpha(\text{Q})=0.00386$ 5
105.738	7/2 <sup>+</sup>	57.92 3	70 9	47.832	5/2 <sup>+</sup>	(M1+E2)	<0.23	48 6	$\alpha(\text{L})=36$ 5; $\alpha(\text{M})=9.0$ 13; $\alpha(\text{N})=2.5$ 4; $\alpha(\text{O})=0.65$ 9; $\alpha(\text{P})=0.121$ 14; $\alpha(\text{Q})=0.00624$ 15
		80.92 5	100 9	24.826	3/2 <sup>+</sup>	E2		59.9 9	$\alpha(\text{L})=43.1$ 6; $\alpha(\text{M})=12.30$ 18; $\alpha(\text{N})=3.46$ 5; $\alpha(\text{O})=0.856$ 12; $\alpha(\text{P})=0.1359$ 19; $\alpha(\text{Q})=0.000432$ 6
106.309	7/2 <sup>+</sup>	0.57 <sup>&amp;</sup> 58.48 2	80 6	105.738 47.832	7/2 <sup>+</sup> 5/2 <sup>+</sup>	M1(+E2)	<0.12	42.4 18	$\alpha(\text{L})=31.7$ 13; $\alpha(\text{M})=7.9$ 4; $\alpha(\text{N})=2.18$ 10; $\alpha(\text{O})=0.565$ 26; $\alpha(\text{P})=0.108$ 4; $\alpha(\text{Q})=0.00615$ 9
		81.48 2	100 8	24.826	3/2 <sup>+</sup>	E2		58.0 8	$\alpha(\text{L})=41.7$ 6; $\alpha(\text{M})=11.91$ 17; $\alpha(\text{N})=3.35$ 5; $\alpha(\text{O})=0.828$ 12; $\alpha(\text{P})=0.1316$ 18; $\alpha(\text{Q})=0.000420$ 6 B(E2)(W.u.)=0.47 6
146.729	9/2 <sup>+</sup>	41.0 1 98.88 2	54 15 100 11	105.738 47.832	7/2 <sup>+</sup> 5/2 <sup>+</sup>	[E2]		23.44 33	$\alpha(\text{L})=16.88$ 24; $\alpha(\text{M})=4.81$ 7; $\alpha(\text{N})=1.355$ 19; $\alpha(\text{O})=0.335$ 5; $\alpha(\text{P})=0.0536$ 8 $\alpha(\text{Q})=0.0001967$ 28
166.303	9/2 <sup>+</sup>	60.00 2	100	106.309	7/2 <sup>+</sup>	M1(+E2)	<0.25	44 6	$\alpha(\text{L})=33$ 4; $\alpha(\text{M})=8.3$ 13; $\alpha(\text{N})=2.3$ 4; $\alpha(\text{O})=0.59$ 9; $\alpha(\text{P})=0.110$ 14; $\alpha(\text{Q})=0.00561$ 15
177.602	3/2 <sup>+</sup>	71.5 <sup>‡</sup> 1	≈6.9 <sup>‡</sup>	106.309	7/2 <sup>+</sup>	E2		107.5 17	$\alpha(\text{L})=77.4$ 12; $\alpha(\text{M})=22.08$ 34; $\alpha(\text{N})=6.21$ 10; $\alpha(\text{O})=1.535$ 24; $\alpha(\text{P})=0.243$ 4 $\alpha(\text{Q})=0.000714$ 11
		129.8 <sup>‡</sup> 1	65 <sup>‡</sup> 5	47.832	5/2 <sup>+</sup>	M1		4.01 6	$\alpha(\text{L})=3.01$ 4; $\alpha(\text{M})=0.739$ 10; $\alpha(\text{N})=0.2048$ 29; $\alpha(\text{O})=0.0532$ 8; $\alpha(\text{P})=0.01027$ 15 $\alpha(\text{Q})=0.000605$ 9
		152.78 <sup>@</sup> 2	40 <sup>@</sup> 3	24.826	3/2 <sup>+</sup>	M1		11.36 16	$\alpha(\text{K})=8.85$ 12; $\alpha(\text{L})=1.884$ 26; $\alpha(\text{M})=0.463$ 6; $\alpha(\text{N})=0.1283$ 18; $\alpha(\text{O})=0.0333$ 5 $\alpha(\text{P})=0.00644$ 9; $\alpha(\text{Q})=0.000378$ 5
		177.59 3	100 7	0	1/2 <sup>+</sup>	M1+E2 <sup>†</sup>	0.44 8	6.52 30	$\alpha(\text{K})=4.87$ 29; $\alpha(\text{L})=1.223$ 17; $\alpha(\text{M})=0.308$ 5; $\alpha(\text{N})=0.0856$ 14; $\alpha(\text{O})=0.02203$ 33 $\alpha(\text{P})=0.00414$ 6; $\alpha(\text{Q})=0.000210$ 12
211.530	5/2 <sup>+</sup>	163.69 2	100 8	47.832	5/2 <sup>+</sup>	M1		9.35 13	$\alpha(\text{K})=7.28$ 10; $\alpha(\text{L})=1.547$ 22; $\alpha(\text{M})=0.380$ 5; $\alpha(\text{N})=0.1054$ 15; $\alpha(\text{O})=0.0273$ 4 $\alpha(\text{P})=0.00528$ 7; $\alpha(\text{Q})=0.000311$ 4
		186.66 5	5.5 8	24.826	3/2 <sup>+</sup>	[M1]		6.45 9	$\alpha(\text{K})=5.03$ 7; $\alpha(\text{L})=1.065$ 15; $\alpha(\text{M})=0.262$ 4; $\alpha(\text{N})=0.0725$ 10; $\alpha(\text{O})=0.01881$ 26 $\alpha(\text{P})=0.00363$ 5; $\alpha(\text{Q})=0.0002134$ 30
		211.55 5	6.5 10	0	1/2 <sup>+</sup>				

**Adopted Levels, Gammas (continued)**

$\gamma(^{251}\text{Cf})$  (continued)

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma$	$I_\gamma$	$E_f$	$J_f^\pi$	Mult.	$\delta$	$\alpha^\#$	Comments
237.71	(11/2 <sup>+</sup> )	91.00 5 131.95 5	19 3 100 12	146.729 105.738	9/2 <sup>+</sup> 7/2 <sup>+</sup>	(E2)		6.24 9	$\alpha(\text{L})=4.50$ 6; $\alpha(\text{M})=1.281$ 18; $\alpha(\text{N})=0.360$ 5; $\alpha(\text{O})=0.0893$ 13; $\alpha(\text{P})=0.01440$ 20 $\alpha(\text{Q})=6.85 \times 10^{-5}$ 10
239.33	11/2 <sup>+</sup>	73.05 2 133.04 5	100 11 24 3	166.303 106.309	9/2 <sup>+</sup> 7/2 <sup>+</sup>	M1(+E2) (E2)	<0.2	22.7 15 6.01 8	$\alpha(\text{L})=16.9$ 11; $\alpha(\text{M})=4.22$ 31; $\alpha(\text{N})=1.17$ 9; $\alpha(\text{O})=0.303$ 22; $\alpha(\text{P})=0.0576$ 33; $\alpha(\text{Q})=0.00317$ 7 $\alpha(\text{L})=4.33$ 6; $\alpha(\text{M})=1.234$ 17; $\alpha(\text{N})=0.347$ 5; $\alpha(\text{O})=0.0860$ 12; $\alpha(\text{P})=0.01388$ 20 $\alpha(\text{Q})=6.66 \times 10^{-5}$ 9
258.514	7/2 <sup>+</sup>	111.78 5 152.78 @ 2	100 391 @ 30	146.729 105.738	9/2 <sup>+</sup> 7/2 <sup>+</sup>	[M1]		11.36 16	$\alpha(\text{K})=8.85$ 12; $\alpha(\text{L})=1.884$ 26; $\alpha(\text{M})=0.463$ 6; $\alpha(\text{N})=0.1283$ 18; $\alpha(\text{O})=0.0333$ 5 $\alpha(\text{P})=0.00644$ 9; $\alpha(\text{Q})=0.000378$ 5
		210.70 4	61 9	47.832	5/2 <sup>+</sup>	[M1]		4.59 6	$\alpha(\text{K})=3.58$ 5; $\alpha(\text{L})=0.755$ 11; $\alpha(\text{M})=0.1856$ 26; $\alpha(\text{N})=0.0514$ 7; $\alpha(\text{O})=0.01334$ 19 $\alpha(\text{P})=0.00258$ 4; $\alpha(\text{Q})=0.0001512$ 21
		233.69 2	76 5	24.826	3/2 <sup>+</sup>	[E2]		0.639 9	$\alpha(\text{K})=0.1179$ 17; $\alpha(\text{L})=0.376$ 5; $\alpha(\text{M})=0.1059$ 15; $\alpha(\text{N})=0.0298$ 4; $\alpha(\text{O})=0.00741$ 10 $\alpha(\text{P})=0.001229$ 17; $\alpha(\text{Q})=1.161 \times 10^{-5}$ 16
295.97	(13/2 <sup>+</sup> )	149.24 2	100	146.729	9/2 <sup>+</sup>	[E2]		3.74 5	$\alpha(\text{K})=0.1473$ 21; $\alpha(\text{L})=2.59$ 4; $\alpha(\text{M})=0.736$ 10; $\alpha(\text{N})=0.2071$ 29; $\alpha(\text{O})=0.0514$ 7
319.643	9/2 <sup>+</sup>	172.88 3	100 12	146.729	9/2 <sup>+</sup>	[M1]		8.01 11	$\alpha(\text{P})=0.00833$ 12; $\alpha(\text{Q})=4.51 \times 10^{-5}$ 6 $\alpha(\text{K})=6.24$ 9; $\alpha(\text{L})=1.324$ 19; $\alpha(\text{M})=0.325$ 5; $\alpha(\text{N})=0.0902$ 13; $\alpha(\text{O})=0.02340$ 33 $\alpha(\text{P})=0.00452$ 6; $\alpha(\text{Q})=0.000266$ 4
		213.90 5	47 5	105.738	7/2 <sup>+</sup>	[M1]		4.40 6	$\alpha(\text{K})=3.43$ 5; $\alpha(\text{L})=0.724$ 10; $\alpha(\text{M})=0.1779$ 25; $\alpha(\text{N})=0.0493$ 7; $\alpha(\text{O})=0.01279$ 18 $\alpha(\text{P})=0.002470$ 35; $\alpha(\text{Q})=0.0001449$ 20
325.29	(13/2 <sup>+</sup> )	271.88 5 85.98 2	≈12 100 11	47.832 239.33	5/2 <sup>+</sup> 11/2 <sup>+</sup>	(M1)		13.21 19	$\alpha(\text{L})=9.89$ 14; $\alpha(\text{M})=2.434$ 34; $\alpha(\text{N})=0.674$ 9; $\alpha(\text{O})=0.1751$ 25; $\alpha(\text{P})=0.0338$ 5 $\alpha(\text{Q})=0.001999$ 28
		158.96 2	56 4	166.303	9/2 <sup>+</sup>	[E2]		2.87 4	$\alpha(\text{K})=0.1545$ 22; $\alpha(\text{L})=1.957$ 27; $\alpha(\text{M})=0.556$ 8; $\alpha(\text{N})=0.1564$ 22; $\alpha(\text{O})=0.0388$ 5 $\alpha(\text{P})=0.00631$ 9; $\alpha(\text{Q})=3.67 \times 10^{-5}$ 5
370.47	11/2 <sup>-</sup>	45.2 1	3.3 8	325.29	(13/2 <sup>+</sup> )	[E1]		1.155 17	$\alpha(\text{L})=0.859$ 13; $\alpha(\text{M})=0.2196$ 33; $\alpha(\text{N})=0.0599$ 9; $\alpha(\text{O})=0.01447$ 22; $\alpha(\text{P})=0.002120$ 32 $\alpha(\text{Q})=5.36 \times 10^{-5}$ 8 B(E1)(W.u.)= $1.9 \times 10^{-8}$ 5
		131.13 5	100 12	239.33	11/2 <sup>+</sup>	E1		0.0741 10	$\alpha(\text{L})=0.0555$ 8; $\alpha(\text{M})=0.01375$ 19; $\alpha(\text{N})=0.00377$ 5; $\alpha(\text{O})=0.000946$ 13; $\alpha(\text{P})=0.0001619$ 23

**Adopted Levels, Gammas (continued)**

$\gamma(^{251}\text{Cf})$  (continued)

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma$	$I_\gamma$	$E_f$	$J_f^\pi$	Mult.	$\alpha^\#$	Comments
370.47	11/2 <sup>-</sup>	204.17 2	89 7	166.303	9/2 <sup>+</sup>	E1	0.1059 15	$\alpha(\text{Q})=5.94 \times 10^{-6}$ 8 B(E1)(W.u.)= $2.3 \times 10^{-8}$ 4 $\alpha(\text{K})=0.0811$ 11; $\alpha(\text{L})=0.01857$ 26; $\alpha(\text{M})=0.00458$ 6; $\alpha(\text{N})=0.001258$ 18; $\alpha(\text{O})=0.000318$ 4 $\alpha(\text{P})=5.65 \times 10^{-5}$ 8; $\alpha(\text{Q})=2.350 \times 10^{-6}$ 33
		264.15 3	3.9 3	106.309	7/2 <sup>+</sup>	[M2]	7.97 11	B(E1)(W.u.)= $5.5 \times 10^{-9}$ 7 $\alpha(\text{K})=5.28$ 7; $\alpha(\text{L})=1.973$ 28; $\alpha(\text{M})=0.526$ 7; $\alpha(\text{N})=0.1483$ 21; $\alpha(\text{O})=0.0384$ 5 $\alpha(\text{P})=0.00724$ 10; $\alpha(\text{Q})=0.000393$ 6 B(M2)(W.u.)= $0.0073$ 10
392.33	(11/2 <sup>+</sup> )	245.7 4 286.65 5	13 4 100 10	146.729	9/2 <sup>+</sup> 7/2 <sup>+</sup>			
420.0?		182.3 & 3	100	237.71	(11/2 <sup>+</sup> )			
423.92	(15/2 <sup>+</sup> )	184.59 3	100	239.33	11/2 <sup>+</sup>	[E2]	1.563 22	$\alpha(\text{K})=0.1501$ 21; $\alpha(\text{L})=1.019$ 14; $\alpha(\text{M})=0.289$ 4; $\alpha(\text{N})=0.0812$ 11; $\alpha(\text{O})=0.02017$ 28 $\alpha(\text{P})=0.00330$ 5; $\alpha(\text{Q})=2.296 \times 10^{-5}$ 32
433.90	9/2 <sup>-</sup>	63.4 1	$1.0 \times 10^2$ 3	370.47	11/2 <sup>-</sup>	(M1)	32.1 5	$\alpha(\text{L})=24.05$ 35; $\alpha(\text{M})=5.92$ 9; $\alpha(\text{N})=1.641$ 24; $\alpha(\text{O})=0.426$ 6; $\alpha(\text{P})=0.0824$ 12; $\alpha(\text{Q})=0.00487$ 7
		194.6 4 267.61 4	3.4 5 15.2 15	239.33	11/2 <sup>+</sup> 9/2 <sup>+</sup>	[E1]	0.0584 8	$\alpha(\text{K})=0.0453$ 6; $\alpha(\text{L})=0.00981$ 14; $\alpha(\text{M})=0.002408$ 34; $\alpha(\text{N})=0.000662$ 9 $\alpha(\text{O})=0.0001684$ 24; $\alpha(\text{P})=3.04 \times 10^{-5}$ 4; $\alpha(\text{Q})=1.354 \times 10^{-6}$ 19
		327.58 4	21.0 20	106.309	7/2 <sup>+</sup>	[E1]	0.0380 5	$\alpha(\text{K})=0.0297$ 4; $\alpha(\text{L})=0.00621$ 9; $\alpha(\text{M})=0.001520$ 21; $\alpha(\text{N})=0.000418$ 6; $\alpha(\text{O})=0.0001066$ 15 $\alpha(\text{P})=1.946 \times 10^{-5}$ 27; $\alpha(\text{Q})=9.09 \times 10^{-7}$ 13
535.0?		209.7 & 2	100	325.29	(13/2 <sup>+</sup> )			
543.99	5/2 <sup>+</sup>	285.49 3	6.5 7	258.514	7/2 <sup>+</sup>	[M1]	1.961 27	$\alpha(\text{K})=1.531$ 21; $\alpha(\text{L})=0.322$ 5; $\alpha(\text{M})=0.0790$ 11; $\alpha(\text{N})=0.02188$ 31; $\alpha(\text{O})=0.00568$ 8 $\alpha(\text{P})=0.001096$ 15; $\alpha(\text{Q})=6.42 \times 10^{-5}$ 9
		332.43 4	44 4	211.530	5/2 <sup>+</sup>	(M1)	1.286 18	$\alpha(\text{K})=1.005$ 14; $\alpha(\text{L})=0.2106$ 29; $\alpha(\text{M})=0.0517$ 7; $\alpha(\text{N})=0.01431$ 20; $\alpha(\text{O})=0.00371$ 5 $\alpha(\text{P})=0.000717$ 10; $\alpha(\text{Q})=4.20 \times 10^{-5}$ 6
		366.4 1	100 7	177.602	3/2 <sup>+</sup>	(M1)	0.984 14	$\alpha(\text{K})=0.769$ 11; $\alpha(\text{L})=0.1608$ 23; $\alpha(\text{M})=0.0395$ 6; $\alpha(\text{N})=0.01093$ 15; $\alpha(\text{O})=0.00284$ 4 $\alpha(\text{P})=0.000548$ 8; $\alpha(\text{Q})=3.20 \times 10^{-5}$ 4
		397.5 2 437.7 1	0.044 9 28.9 21	146.729	9/2 <sup>+</sup> 7/2 <sup>+</sup>	[M1]	0.604 8	$\alpha(\text{K})=0.473$ 7; $\alpha(\text{L})=0.0985$ 14; $\alpha(\text{M})=0.02416$ 34; $\alpha(\text{N})=0.00669$ 9; $\alpha(\text{O})=0.001735$ 24 $\alpha(\text{P})=0.000335$ 5; $\alpha(\text{Q})=1.959 \times 10^{-5}$ 27
		496.2 2	3.5 3	47.832	5/2 <sup>+</sup>	[M1]	0.429 6	$\alpha(\text{K})=0.336$ 5; $\alpha(\text{L})=0.0698$ 10; $\alpha(\text{M})=0.01712$ 24; $\alpha(\text{N})=0.00474$ 7;

**Adopted Levels, Gammas (continued)**

$\gamma(^{251}\text{Cf})$  (continued)

<u>E<sub>i</sub>(level)</u>	<u>J<sup><math>\pi</math></sup><sub>i</sub></u>	<u>E<sub><math>\gamma</math></sub></u>	<u>I<sub><math>\gamma</math></sub></u>	<u>E<sub>f</sub></u>	<u>J<sup><math>\pi</math></sup><sub>f</sub></u>	<u>Mult.</u>	<u><math>\alpha^{\#}</math></u>	<u>Comments</u>
543.99	5/2 <sup>+</sup>	519.2 2	3.9 3	24.826	3/2 <sup>+</sup>	[M1]	0.379 5	$\alpha(\text{O})=0.001229$ 17 $\alpha(\text{P})=0.0002374$ 33; $\alpha(\text{Q})=1.388\times 10^{-5}$ 19 $\alpha(\text{K})=0.297$ 4; $\alpha(\text{L})=0.0617$ 9; $\alpha(\text{M})=0.01512$ 21; $\alpha(\text{N})=0.00418$ 6; $\alpha(\text{O})=0.001086$ 15
		543.9 2	3.5 4	0	1/2 <sup>+</sup>	[E2]	0.0543 8	$\alpha(\text{P})=0.0002097$ 29; $\alpha(\text{Q})=1.226\times 10^{-5}$ 17 $\alpha(\text{K})=0.0310$ 4; $\alpha(\text{L})=0.01709$ 24; $\alpha(\text{M})=0.00458$ 6; $\alpha(\text{N})=0.001279$ 18; $\alpha(\text{O})=0.000323$ 5 $\alpha(\text{P})=5.71\times 10^{-5}$ 8; $\alpha(\text{Q})=1.546\times 10^{-6}$ 22
590.01	(7/2 <sup>+</sup> )	197.4 4 270.37 3	0.27 8 13.5 12	392.33 319.643	(11/2 <sup>+</sup> ) 9/2 <sup>+</sup>	[M1]	2.282 32	$\alpha(\text{K})=1.781$ 25; $\alpha(\text{L})=0.375$ 5; $\alpha(\text{M})=0.0920$ 13; $\alpha(\text{N})=0.0255$ 4; $\alpha(\text{O})=0.00661$ 9
		331.52 4	69 8	258.514	7/2 <sup>+</sup>	[M1]	1.296 18	$\alpha(\text{P})=0.001277$ 18; $\alpha(\text{Q})=7.48\times 10^{-5}$ 10 $\alpha(\text{K})=1.013$ 14; $\alpha(\text{L})=0.2122$ 30; $\alpha(\text{M})=0.0521$ 7; $\alpha(\text{N})=0.01442$ 20; $\alpha(\text{O})=0.00374$ 5 $\alpha(\text{P})=0.000723$ 10; $\alpha(\text{Q})=4.23\times 10^{-5}$ 6
		350.6 2 378.5 1	0.31 4 100 8	239.33 211.530	11/2 <sup>+</sup> 5/2 <sup>+</sup>	(M1)	0.900 13	$\alpha(\text{K})=0.703$ 10; $\alpha(\text{L})=0.1470$ 21; $\alpha(\text{M})=0.0361$ 5; $\alpha(\text{N})=0.00999$ 14; $\alpha(\text{O})=0.00259$ 4 $\alpha(\text{P})=0.000500$ 7; $\alpha(\text{Q})=2.93\times 10^{-5}$ 4
		412.2 2 423.7 1	1.27 12 27.3 20	177.602 166.303	3/2 <sup>+</sup> 9/2 <sup>+</sup>	[M1]	0.660 9	$\alpha(\text{K})=0.516$ 7; $\alpha(\text{L})=0.1077$ 15; $\alpha(\text{M})=0.0264$ 4; $\alpha(\text{N})=0.00731$ 10; $\alpha(\text{O})=0.001898$ 27
		443.2 1	2.46 20	146.729	9/2 <sup>+</sup>	[M1]	0.584 8	$\alpha(\text{P})=0.000366$ 5; $\alpha(\text{Q})=2.143\times 10^{-5}$ 30 $\alpha(\text{K})=0.457$ 6; $\alpha(\text{L})=0.0952$ 13; $\alpha(\text{M})=0.02334$ 33; $\alpha(\text{N})=0.00646$ 9; $\alpha(\text{O})=0.001676$ 23
		483.7 2	13.8 12	106.309	7/2 <sup>+</sup>	[M1]	0.460 6	$\alpha(\text{P})=0.000324$ 5; $\alpha(\text{Q})=1.893\times 10^{-5}$ 27 $\alpha(\text{K})=0.360$ 5; $\alpha(\text{L})=0.0749$ 11; $\alpha(\text{M})=0.01836$ 26; $\alpha(\text{N})=0.00508$ 7; $\alpha(\text{O})=0.001318$ 19 $\alpha(\text{P})=0.000255$ 4; $\alpha(\text{Q})=1.488\times 10^{-5}$ 21
601.04	3/2 <sup>-</sup>	542.2 2 565.2 2 553.0 2	10.8 12 2.50 20 100 17	47.832 24.826 47.832	5/2 <sup>+</sup> 3/2 <sup>+</sup> 5/2 <sup>+</sup>			
		577.5 @ 3	100 @ 11	24.826	3/2 <sup>+</sup>			
		601.0 4	≈57	0	1/2 <sup>+</sup>			
625.12	7/2 <sup>-</sup>	478.3 2	100	146.729	9/2 <sup>+</sup>			
		577.5 @ 3	438 @ 50	47.832	5/2 <sup>+</sup>			
632.02	1/2 <sup>-</sup>	454.4 3	≈24	177.602	3/2 <sup>+</sup>			
		607.1 4	62 10	24.826	3/2 <sup>+</sup>			
		632.1 2	100 10	0	1/2 <sup>+</sup>			
648.94	(9/2 <sup>+</sup> )	256.67 5	19.1 18	392.33	(11/2 <sup>+</sup> )			

**Adopted Levels, Gammas (continued)**

$\gamma(^{251}\text{Cf})$  (continued)

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma$	$I_\gamma$	$E_f$	$J_f^\pi$	Mult.	$\alpha^\#$	Comments
648.94	(9/2 <sup>+</sup> )	329.27 4	98 9	319.643	9/2 <sup>+</sup>	[M1]	1.320 18	$\alpha(\text{K})=1.032$ 14; $\alpha(\text{L})=0.2163$ 30; $\alpha(\text{M})=0.0531$ 7; $\alpha(\text{N})=0.01470$ 21; $\alpha(\text{O})=0.00381$ 5
		390.4 1	100 7	258.514	7/2 <sup>+</sup>	[M1]	0.826 12	$\alpha(\text{P})=0.000737$ 10; $\alpha(\text{Q})=4.31 \times 10^{-5}$ 6 $\alpha(\text{K})=0.646$ 9; $\alpha(\text{L})=0.1350$ 19; $\alpha(\text{M})=0.0331$ 5; $\alpha(\text{N})=0.00917$ 13; $\alpha(\text{O})=0.002379$ 33
		409.6 1	28 3	239.33	11/2 <sup>+</sup>	[M1]	0.724 10	$\alpha(\text{P})=0.000459$ 6; $\alpha(\text{Q})=2.69 \times 10^{-5}$ 4 $\alpha(\text{K})=0.567$ 8; $\alpha(\text{L})=0.1182$ 17; $\alpha(\text{M})=0.0290$ 4; $\alpha(\text{N})=0.00803$ 11; $\alpha(\text{O})=0.002083$ 29
		482.5 3	12.7 14	166.303	9/2 <sup>+</sup>			$\alpha(\text{P})=0.000402$ 6; $\alpha(\text{Q})=2.352 \times 10^{-5}$ 33
		502.1 2	16.7 14	146.729	9/2 <sup>+</sup>	[M1]	0.415 6	$\alpha(\text{K})=0.325$ 5; $\alpha(\text{L})=0.0676$ 9; $\alpha(\text{M})=0.01657$ 23; $\alpha(\text{N})=0.00459$ 6; $\alpha(\text{O})=0.001190$ 17
		601.0 2	3.8 4	47.832	5/2 <sup>+</sup>			$\alpha(\text{P})=0.0002298$ 32; $\alpha(\text{Q})=1.343 \times 10^{-5}$ 19
708.05	5/2 <sup>-</sup>	530.4 4	$\approx 10$	177.602	3/2 <sup>+</sup>			
		660.2 2	100 8	47.832	5/2 <sup>+</sup>			
		683.2 3	29 6	24.826	3/2 <sup>+</sup>			
720.50	(11/2 <sup>+</sup> )	395.3 2	24 4	325.29	(13/2 <sup>+</sup> )			
		400.9 2	100 14	319.643	9/2 <sup>+</sup>			
		573.7 2	23.1 21	146.729	9/2 <sup>+</sup>			
		614.5 4	5.5 7	105.738	7/2 <sup>+</sup>			
774?	(3/2 <sup>+</sup> )	774 <sup>&amp;</sup>	100	0	1/2 <sup>+</sup>			
942.48	(5/2 <sup>-</sup> )	731.0 2	10.0 11	211.530	5/2 <sup>+</sup>			
		764.7 3	17.5 18	177.602	3/2 <sup>+</sup>			
		836.2 2	100 8	106.309	7/2 <sup>+</sup>			
973.98	(9/2 <sup>+</sup> )	734.5 2	17.3 19	239.33	11/2 <sup>+</sup>			
		807.7 2	100 8	166.303	9/2 <sup>+</sup>			
		867.8 2	91 8	106.309	7/2 <sup>+</sup>			
981.51	(3/2 <sup>-</sup> )	349.6 3	$\approx 6.7$	632.02	1/2 <sup>-</sup>	(M1)	1.119 16	$\alpha(\text{K})=0.875$ 12; $\alpha(\text{L})=0.1832$ 26; $\alpha(\text{M})=0.0449$ 6; $\alpha(\text{N})=0.01244$ 18; $\alpha(\text{O})=0.00323$ 5
								$\alpha(\text{P})=0.000624$ 9; $\alpha(\text{Q})=3.65 \times 10^{-5}$ 5
		381.0 3	$\approx 13.3$	601.04	3/2 <sup>-</sup>			
		770.0 4	53 7	211.530	5/2 <sup>+</sup>			
		803.8 2	73 6	177.602	3/2 <sup>+</sup>			
		956.6 2	19.3 20	24.826	3/2 <sup>+</sup>			
		981.4 2	100 10	0	1/2 <sup>+</sup>			
1009.13	(5/2 <sup>-</sup> )	301.0 3	$\approx 4.5$	708.05	5/2 <sup>-</sup>			
		408.2 2	$\approx 18.2$	601.04	3/2 <sup>-</sup>			
		750.5 2	39 4	258.514	7/2 <sup>+</sup>			
		797.6 2	85 7	211.530	5/2 <sup>+</sup>			
		831.9 <sup>@</sup> 2	55 <sup>@</sup> 5	177.602	3/2 <sup>+</sup>			



**Adopted Levels, Gammas (continued)**

$\gamma(^{251}\text{Cf})$  (continued)

<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>γ</sub></u>	<u>I<sub>γ</sub></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>	<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>γ</sub></u>	<u>I<sub>γ</sub></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>
1009.13	(5/2 <sup>-</sup> )	903.1 3	12.7 19	105.738	7/2 <sup>+</sup>	1086.46	(9/2 <sup>-</sup> )	920.5 3	58 12	166.303	9/2 <sup>+</sup>
		961.2 2	42 4	47.832	5/2 <sup>+</sup>	1094.57	(9/2 <sup>-</sup> )	702.3 3	42 9	392.33	(11/2 <sup>+</sup> )
		984.2 2	100 11	24.826	3/2 <sup>+</sup>			947.8 3	48 6	146.729	9/2 <sup>+</sup>
1043.77	(7/2 <sup>-</sup> )	724.1 4	45 5	319.643	9/2 <sup>+</sup>			988.8 3	100 16	105.738	7/2 <sup>+</sup>
		785.4 2	8.2 9	258.514	7/2 <sup>+</sup>	1155.80	(11/2 <sup>-</sup> )	763.5 4	≈100	392.33	(11/2 <sup>+</sup> )
		831.9 <sup>@</sup> 2	55 <sup>@</sup> 5	211.530	5/2 <sup>+</sup>			859.8 3	90 15	295.97	(13/2 <sup>+</sup> )
		938.1 3	14.5 19	105.738	7/2 <sup>+</sup>			918.1 3	≈50	237.71	(11/2 <sup>+</sup> )
		996.1 2	100 8	47.832	5/2 <sup>+</sup>	1185.50	(5/2,7/2)	641.6 3	≈26.3	543.99	5/2 <sup>+</sup>
1077.56	(9/2,11/2 <sup>+</sup> )	643.6 3	≈3.4	433.90	9/2 <sup>-</sup>			1019.2 3	26 8	166.303	9/2 <sup>+</sup>
		707.0 3	10.3 21	370.47	11/2 <sup>-</sup>			1079.1 3	100 14	106.309	7/2 <sup>+</sup>
		838.4 3	≈7.0	239.33	11/2 <sup>+</sup>	1249.98	(7/2 <sup>+</sup> )	816.1 3	64 7	433.90	9/2 <sup>-</sup>
		911.3 1	41 4	166.303	9/2 <sup>+</sup>			991.6 3	42 7	258.514	7/2 <sup>+</sup>
		971.2 1	100 8	106.309	7/2 <sup>+</sup>			1038.3 3	42 16	211.530	5/2 <sup>+</sup>
1086.46	(9/2 <sup>-</sup> )	652.5 2	100 9	433.90	9/2 <sup>-</sup>			1072.3 3	91 13	177.602	3/2 <sup>+</sup>
		715.8 4	67 12	370.47	11/2 <sup>-</sup>			1083.9 3	100 13	166.303	9/2 <sup>+</sup>
		847.0 3	61 9	239.33	11/2 <sup>+</sup>			1144.0 4	≈13	105.738	7/2 <sup>+</sup>

† K x ray/(153γ+178γ)=6 2 from αγ experiment, suggesting that both 152.8γ and 177.7γ are mainly M1.

‡ From <sup>251</sup>Es ε decay.

# [Additional information 1.](#)

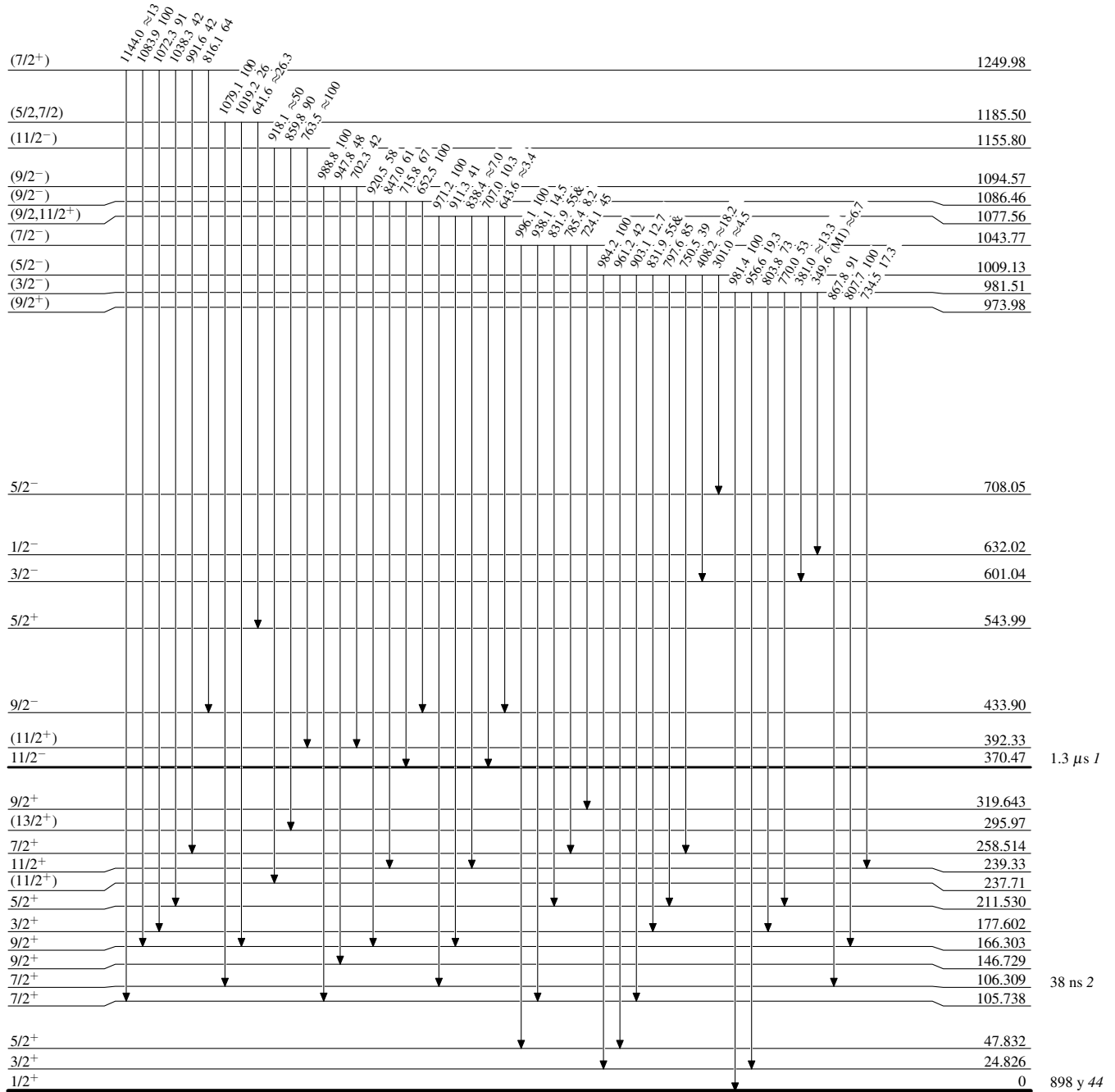
@ Multiply placed with undivided intensity.

& Placement of transition in the level scheme is uncertain.

**Adopted Levels, Gammas**

**Level Scheme**

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



<sup>251</sup><sub>98</sub>Cf<sub>153</sub>

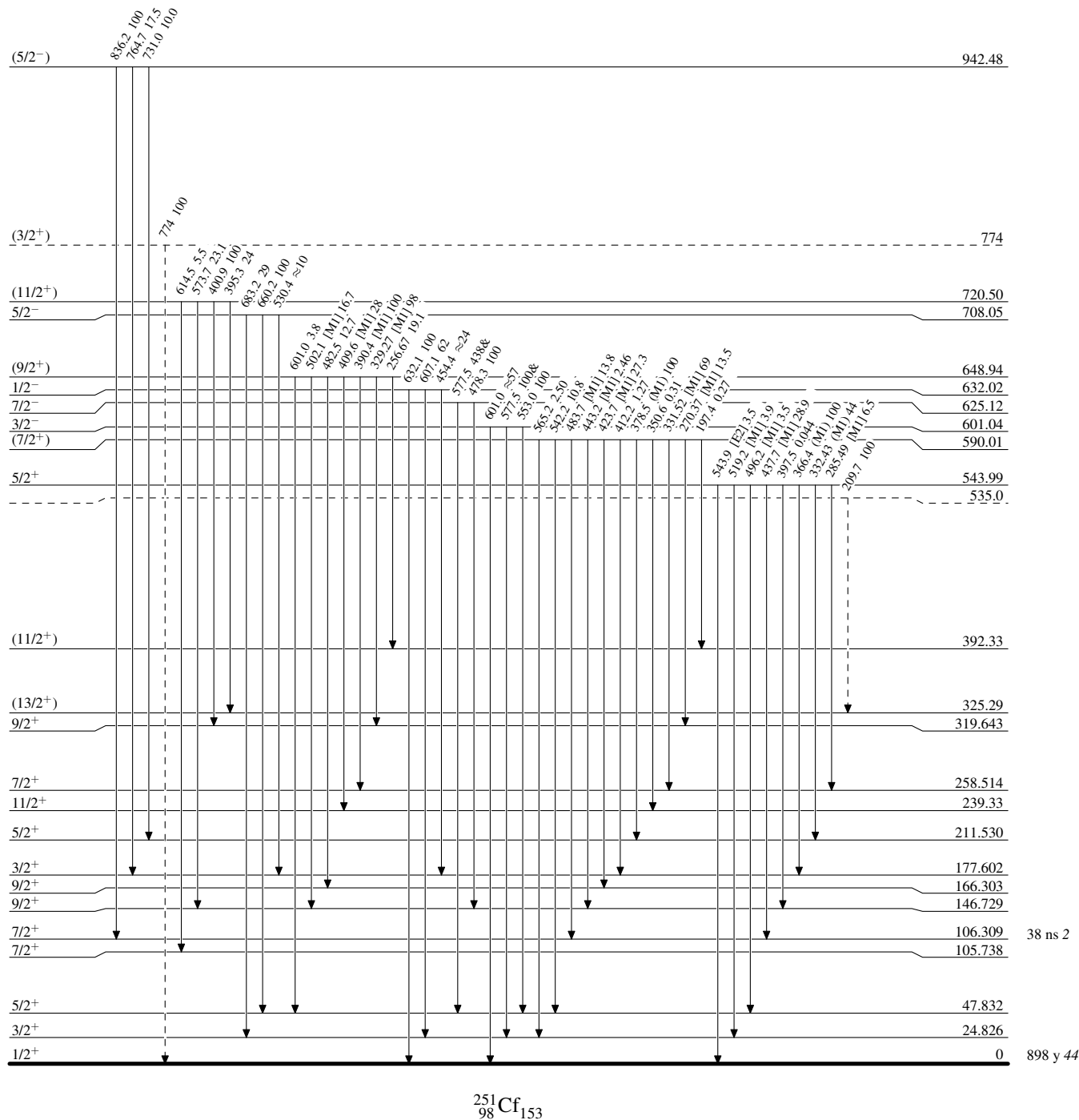
**Adopted Levels, Gammas**

Legend

Level Scheme (continued)

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

-----▶  $\gamma$  Decay (Uncertain)



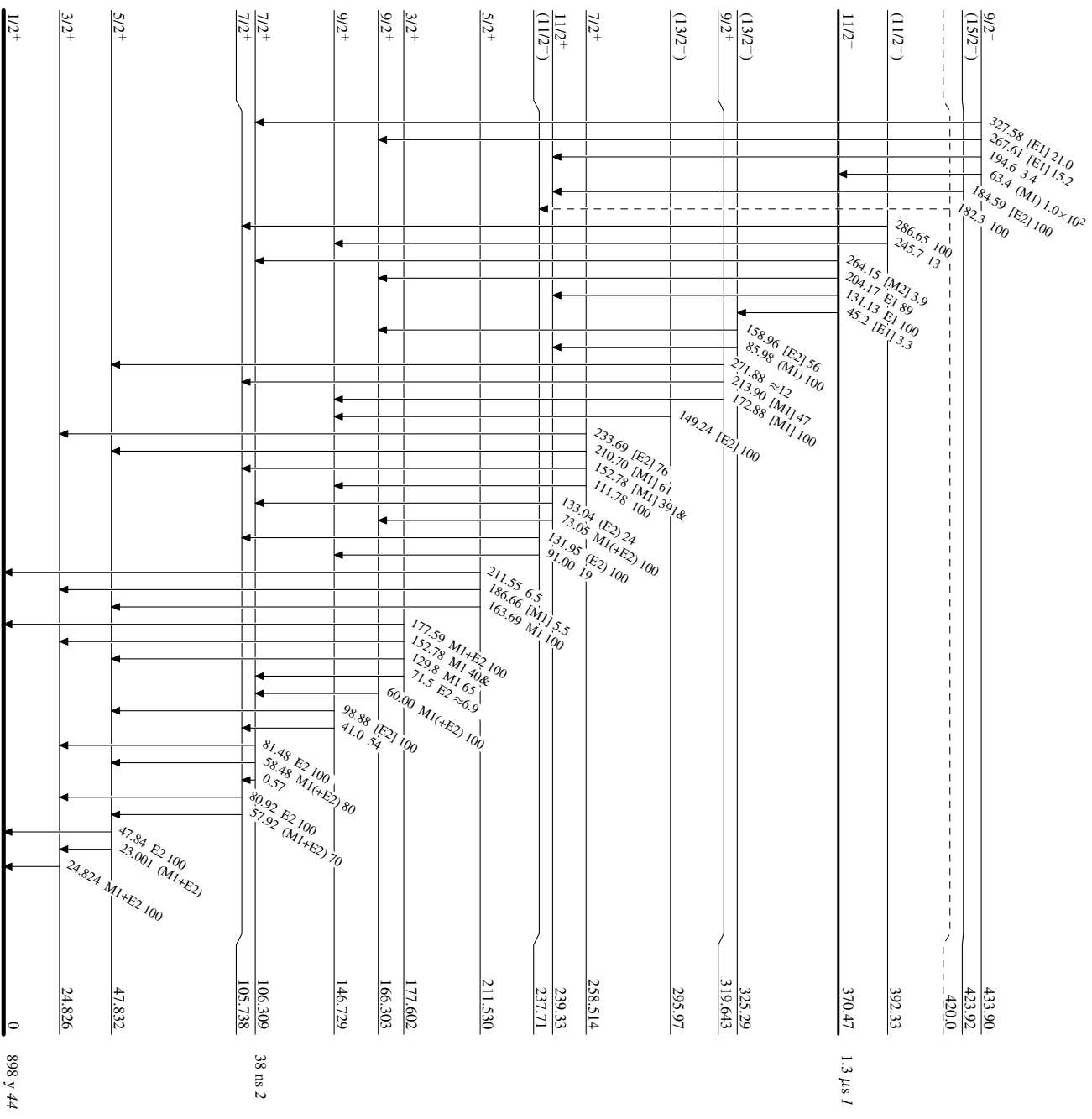
**Adopted Levels, Gammas**

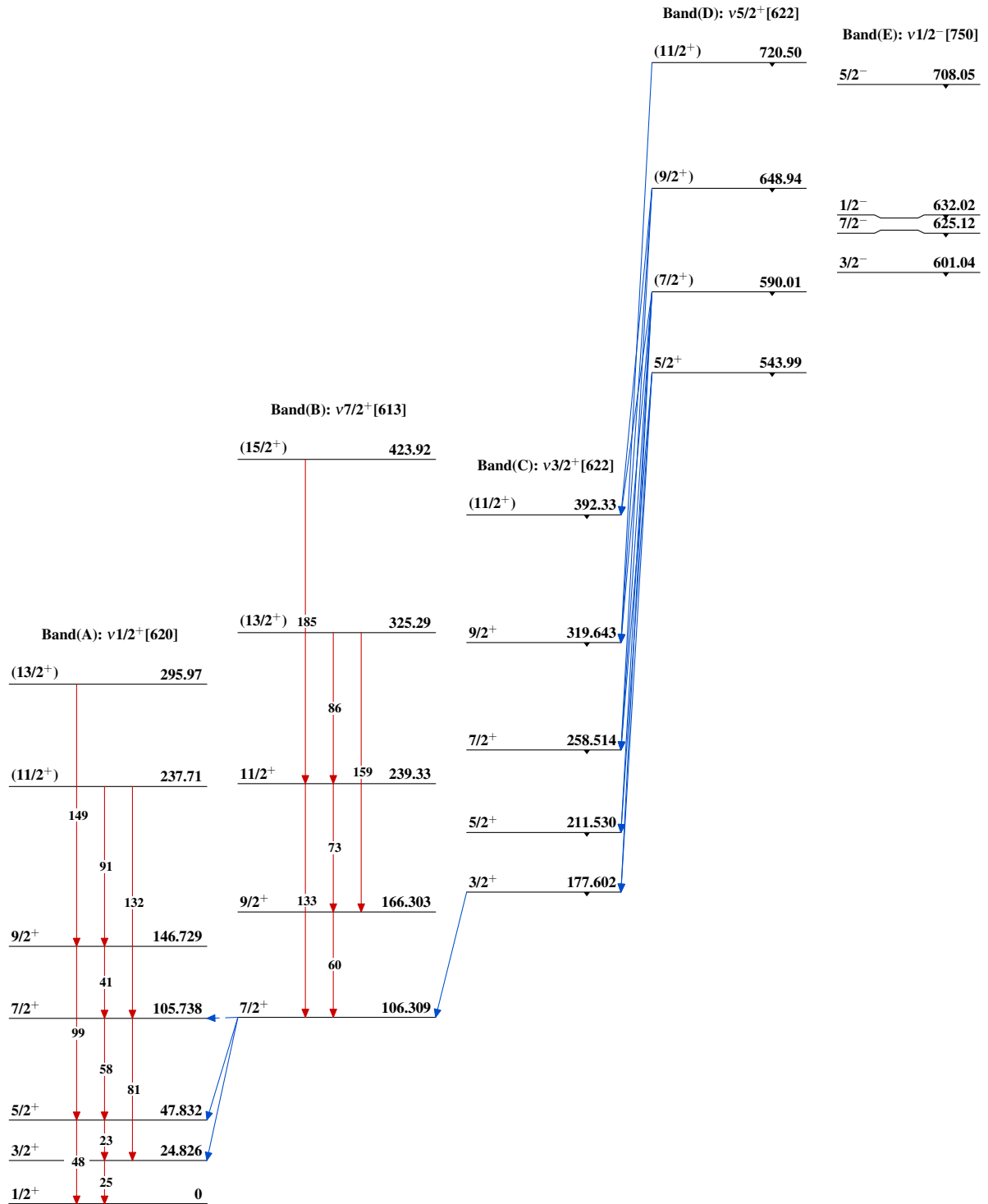
**Level Scheme (continued)**

Legend

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

-----▶  $\gamma$  Decay (Uncertain)



Adopted Levels, Gammas $^{251}_{98}\text{Cf}_{153}$

Adopted Levels, Gammas (continued)

		<b>Band(H): <math>v1/2^-</math> [761]</b>
		<u>(3/2<sup>-</sup>)      1335</u>
		<u>(9/2<sup>-</sup>)      1326</u>
		<b>Band(G): <math>3/2^-</math> [752]</b>
		<u>(11/2<sup>-</sup>)      1304</u>
		<u>(5/2<sup>-</sup>)      1262</u>
		<u>(1/2<sup>-</sup>)      1250</u>
		<u>(7/2<sup>-</sup>)      1183</u>
<b>Band(F): <math>\{v7/2^+[613] \otimes 2^-\} 3</math></b>		
		<u>(11/2<sup>-</sup>)      1155.80</u>
		↓
		<u>(9/2<sup>-</sup>)      1094.57</u>
		↓
		<u>(7/2<sup>-</sup>)      1043.77</u>
		↓
		<u>(5/2<sup>-</sup>)      1009.13</u>
		↓
		<u>(3/2<sup>-</sup>)      981.51</u>

 $^{251}_{98}\text{Cf}_{153}$