

Adopted Levels, Gammas

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

$Q(\beta^-)=904.4\ 26$; $S(n)=4713.37\ 25$; $S(p)=7100\ \text{syst}$; $Q(\alpha)=5148\ 13$ [2021Wa16](#)

$\Delta S(p)=200\ (\text{syst}, \text{2021Wa16})$.

$S(2n)=10925\ 4$, $S(2p)=13040\ 200\ (\text{syst})$ ([2021Wa16](#)).

 ^{249}Cm Levels**Cross Reference (XREF) Flags**

A	$^{253}\text{Cf}\ \alpha\ \text{decay}$	E	$^{248}\text{Cm}(\alpha, ^3\text{He})$	I	$^{248}\text{Cm}(^{18}\text{O}, ^{16}\text{O}n\gamma)$
B	$^{248}\text{Cm}(n,\gamma)E=\text{th}; \text{primary}\ \gamma's$	F	$^{248}\text{Cm}(^{13}\text{C}, ^{12}\text{C}\gamma)$	J	$^{248}\text{Cm}(^{209}\text{Bi}, ^{208}\text{Bi}\gamma)$
C	$^{248}\text{Cm}(n,\gamma)E=\text{th}; \text{secondary}\ \gamma's$	G	$^{248}\text{Cm}(^{16}\text{O}, ^{15}\text{O}\gamma)$		
D	$^{248}\text{Cm}(d,p)$	H	$^{248}\text{Cm}(^{18}\text{O}, ^{17}\text{O}\gamma)$		

E(level)	J^π	$T_{1/2}$	XREF	Comments
0.0 [#]	$1/2^+$	64.15 min 3	ABCD FGHIJ	$\% \beta^- = 100$ J^π : from (d,p) measurements by 1971Br27 based on DWBA analysis of cross sections, Nilsson level systematics for $N=153$ isotones (^{251}Cf , ^{253}Fm , ^{255}No) and calculated bandhead energies using the cranked shell model with the pairing correlations (2012Zh01). $\% \beta^-$: No α decay observed. Calculated $T_{1/2}(\alpha) \approx 1 \times 10^8\ \text{d}$ (2019Mo01). $T_{1/2}$: from 1973DrZM . No details have been provided by 1973DrZM . Prior evaluations in Nuclear Data Sheets (2011Ab07 , 1999Ar21 , 1990Sc03 , 1981Sc22 , 1976Sc09) have cited an incorrect reference. Other: 64 min 3 (1958Ea06), 64.3 min 6 (1975HoZA). It is noted that the evaluator is unable to verify this value.
26.2 [‡] 10	$3/2^+$		CD FGHIJ	J^π : from (d,p) measurements by 1971Br27 based on DWBA analysis of cross sections, and band member.
48.2 [#] 10	$5/2^+$		CD FGHIJ	J^π : from (d,p) measurements by 1971Br27 based on DWBA analysis of cross sections, and band member.
48.8 [@] 10	$(7/2^+)$	23 μs	A C FGHI	J^π : from favored α decay from $(7/2^+)$ ^{253}Cf . $T_{1/2}$: from delayed coin (1966As12). It is noted that the evaluator is unable to verify this value as this private communication is not available.
109.6 [@] 10	$(9/2^+)$		A dEFGHI	XREF: F(108.81). J^π : (M1) 60.80 γ to $(7/2^+)$ 48.774-keV level, band member.
110.2 [‡] 10	$7/2^+$		Cd FGHIJ	J^π : 83.922 γ to $3/2^+$ 26.230-keV level, band member.
148.4 [#] 10	$9/2^+$		D FGHIJ	J^π : from (d,p) measurements by 1971Br27 based on DWBA analysis of cross sections and band member.
182.8 [@] 10	$(11/2^+)$		FGHI	J^π : (M1) 73.60 γ to $(9/2^+)$ 109.55-keV level, band member.
208.0 ^{&} 10	$3/2^+$		BCD FGH	J^π : $J=1/2$ or $3/2$ from being populated by primary gamma (4505.0 γ). 159.215 γ to $(7/2^+)$ 48.774-keV level and from (d,p) measurements by 1971Br27 based on DWBA analysis of cross sections and band member.
220 5	$(9/2^+)$		D	J^π : from (d,p) measurements by 1971Br27 based on DWBA analysis of cross sections.
242.0 ^{&} 10	$5/2^+$		CD FGH	J^π : from (d,p) measurements by 1971Br27 based on DWBA analysis of cross sections, and band member.
244.8 [‡] 10	$11/2^+$		FGHIJ	J^π : (E2) 134.60 γ to $7/2^+$ 110.160-keV level, band member.
268.8 [@] 10	$(13/2^+)$		FGHI	J^π : (M1) 86.00 γ to $(11/2^+)$ 182.89-keV level, band member.
289.1 ^{&} 10	$7/2^+$		CD FGH	J^π : from (d,p) measurements by 1971Br27 based on DWBA analysis of cross

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

E(level)	J^π	$T_{1/2}$	XREF	Comments
				sections, and band member.
299.0 [#] 10	(13/2 ⁺)		FGHIJ	J^π : (E2) 150.6 γ to 9/2 ⁺ 148.40-keV level, band member.
300 5	(11/2 ⁺)		D	J^π : from (d,p) measurements by 1971Br27 based on DWBA analysis of cross sections, and band member.
307.1 11			B	
350 ^{&} 1	9/2 ⁺		DE	J^π : from (d,p) measurements by 1971Br27 based on DWBA analysis of cross sections, and band member.
375.3 ^e 10	(11/2 ⁻)	19.4 ns 16	FGHI	E(level): from (d,p). Other: 350 5 from (α , ³ He). J^π : E1 265.7 γ to (9/2 ⁺) 109.55-keV level, 182.89-keV level, and configuration 11/2[725]. Configuration=11/2[725]. $T_{1/2}$: Weighted average of 18.7 ns 9 from (particle)(266 γ)(t) and 23 ns 2 from (particle)(193 γ)(t) in the one-neutron stripping reaction $^{248}\text{Cm}(^{16}\text{O},^{15}\text{O}\gamma)$ (2008Is05).
429.8 [‡] 10	15/2 ⁺		FGHIJ	J^π : (E2) 185.00 γ to 11/2 ⁺ 244.76-keV level, band member.
452 5			E	
470.2 ^a 10	3/2 ⁻		BCD FGH	J^π : from (d,p) measurements by 1971Br27 based on DWBA analysis of cross sections, 470.197 γ to 1/2 ⁺ g.s.
494.5 10	(1/2 ⁻ , 3/2 ⁻)		BC FGH	J^π : J=1/2 or 3/2 from being populated by primary gamma (4219.0 γ). Intense primary gammas are often E1 transitions (1982Ho07).
498.6 [#] 10	(17/2 ⁺)		FGHIJ	J^π : (E2) 199.59 γ to (13/2 ⁺) 299.00-keV level, band member.
502.0 ^a 10	7/2 ⁻		D FGH	J^π : from (d,p) measurements by 1971Br27 based on DWBA analysis of cross sections, and band member.
518? 4			D	
526.5 ^f 10	(9/2 ⁺)		D FGH	XREF: D(528). J^π : from anisotropy data in 2008Is05.
529.7 ^b 10	(5/2 ⁺)		C	J^π : 240.618 γ to 7/2 ⁺ 289.09-keV level, band member.
533 ^e 5	(15/2 ⁻) [‡]		E	
546.9 10	(5/2 ⁻)		CD	J^π : 257.74 γ to 7/2 ⁺ 289.09-keV level, 76.64 γ to 3/2- 470.207-keV level, 339.23 γ to 3/2 ⁺ 208.001-keV level, band member.
577.5 ^a 10	(11/2 ⁻)		D FGH	J^π : (E1) 429.1 γ to 9/2 ⁺ 148.40-keV level, (E1) 278.5 γ to (13/2 ⁺) 299.00-keV level.
578.4 ^b 10	(7/2 ⁺)		C	J^π : 468.259 γ to 7/2 ⁺ 110.160-keV level, band member.
604 ^f 6	(11/2 ⁺) [‡]		E	
634 2			D	
663.5 [‡] 10	19/2 ⁺		FGHIJ	J^π : (E2) 233.71 γ to 15/2 ⁺ 429.76-keV level, band member.
690.7 11			B D	
699.1 ^a 10	(15/2 ⁻)		FGHI	J^π : (E1) 400.1 γ to (13/2 ⁺) 299.00-keV level, band member.
718 5			E	
744.8 [#] 12	(21/2 ⁺)		J	J^π : 246.2 γ to (17/2 ⁺) 498.59-keV, band member.
772.8 ^c 10	(3/2 ⁻)		C	J^π : 772.80 γ to 1/2 ⁺ g.s., configuration from calculation with Coriolis interaction by 1982Ho07, consistent with rotational parameter A=8.0.
818.9 ^c 10	(5/2 ⁻)		C	J^π : 240.451 γ to (7/2 ⁺) to 578.421-keV level, band member.
859.0 10	(1/2, 3/2)		BC	J^π : J=1/2 or 3/2 from being populated by primary gamma (3854.5 γ).
868.3 ^a 11	(19/2 ⁻)		FGHI	J^π : (E1) 369.7 γ to (17/2 ⁺) 498.59-keV level, band member.
870 ^c 4	(7/2 ⁻)		D	J^π : band member. This state is expected to be populated strongly by the (d,p) reaction as suggested by the authors in 1982Ho07.
917.6 ^d 10	(1/2 ⁻)		BCD	J^π : J=1/2 or 3/2 from being populated by primary gamma (3796.1 γ). Band head energy assigned by 1982Ho07 based on calculated excitation energy of the odd-neutron configuration 1/2 ⁻ [501] for ^{243}Cm , ^{245}Cm , ^{247}Cm and ^{249}Cm by 1971Ga20. Configuration=1/2 ⁻ [501].

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

E(level)	J^π	$T_{1/2}$	XREF	Comments
943.3 [‡] 11	(23/2 ⁺)		J	J^π : 279.8 γ to 19/2 ⁺ 663.47-keV level, band member.
963.1 ^d 10	(3/2 ⁻)		BC	J^π : 963.06 γ to 1/2 ⁺ g.s., band member.
971.2 ^d 10	(5/2 ⁻) [†]		C	
1011.6 11	(1/2,3/2)		B	J^π : J=1/2 or 3/2 from being populated by primary gamma (3702.1 γ).
1029.9 11	(5/2 ⁺ , 7/2 ⁺ , 9/2 ⁺)	<1.4 ps	EFGH	J^π : (M1) 981.1 γ to (7/2 ⁺) 48.199-keV level. $T_{1/2}$: From estimated lifetime by 2008Is05 to be much shorter than 2 ps stopping time of the Doppler-shifted 981 γ in the thick target backing in the $^{248}\text{Cm}(^{18}\text{O}, ^{17}\text{O}\gamma)$.
1030 ^c 7	(11/2 ⁻)		D	J^π : band member. This state is expected to be populated strongly by the (d,p) reaction as suggested by the authors in 1982Ho07.
1034.0 [#] 13	(25/2 ⁺) [†]		J	
1047.8 10	(1/2,3/2)		BC	J^π : J=1/2 or 3/2 from being populated by primary gamma (3663.5 γ).
1090 5			E	
1153.4 10	(1/2,3/2)		BC	J^π : J=1/2 or 3/2 from being populated by primary gamma (3560.6 γ).
1175.9 10	(1/2,3/2)		BC	J^π : J=1/2 or 3/2 from being populated by primary gamma (3538.3 γ).
1204.0 11	(1/2,3/2)		B D	J^π : J=1/2 or 3/2 from being populated by primary gamma (3509.7 γ).
1263.6 11	(1/2,3/2)		B	J^π : J=1/2 or 3/2 from being populated by primary gamma (3450.1 γ).
1266.0 [‡] 13	(27/2 ⁺) [†]		J	
1269.5 10	(1/2,3/2)		BC E	J^π : J=1/2 or 3/2 from being populated by primary gamma (3444.9 γ).
1314.7 11	(1/2,3/2)		B	J^π : J=1/2 or 3/2 from being populated by primary gamma (3399.0 γ).
1358 5	(13/2 ⁺)		DE	J^π : from $^{248}\text{Cm}(^4\text{He}, ^3\text{He})$ (2009Ah03). Configuration=1/2[880] (2009Ah03). E(level): weighted average of 1353 7 from (d,p) and 1360 5 from (α , ^3He).
1363.9 [#] 14	(29/2 ⁺) [†]		J	
1382 7			D	
1504.8 12	(17/2 ⁺)		EFGH	J^π : from $^{248}\text{Cm}(^4\text{He}, ^3\text{He})$ (2009Ah03). Configuration=1/2[880] (2009Ah03).
1528 7			D	
1550 7			D	
1570 7			D	
1627.9 [‡] 13	(31/2 ⁺) [†]		J	
1650 7			D	
1730.2 [#] 15	(33/2 ⁺) [†]		J	
1838 5	(15/2 ⁻)		E	J^π : from $^{248}\text{Cm}(^4\text{He}, ^3\text{He})$ (2009Ah03). Configuration=13/2[716] (2009Ah03).
2024.6 [‡] 14	(35/2 ⁺) [†]		J	
2128.4 [#] 15	(37/2 ⁺) [†]		J	
2450.2 [‡] 15	(39/2 ⁺) [†]		J	
2553.1 [#] 16	(41/2 ⁺) [†]		J	
2899.1 [‡] 16	(43/2 ⁺) [†]		J	
2998.6 [#] 17	(45/2 ⁺) [†]		J	
3365.1 [‡] 17	(47/2 ⁺) [†]		J	
3461.6 [#] 18	(49/2 ⁺) [†]		J	
3843.0 [‡] 18	(51/2 ⁺) [†]		J	
3937.7 [#] 18	(53/2 ⁺) [†]		J	
4336.8 [‡] 18	(55/2 ⁺) [†]		J	
4429.7 [#] 19	(57/2 ⁺) [†]		J	
(4713.7 10)	1/2 ⁺		B	E(level): Neutron capture state. E=S(n)= 4713.37 keV 25 (2021Wa16) is in agreement with the deduced value of 4713.7 keV 4 by

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

<u>E(level)</u>	<u>J^π</u>	<u>$T_{1/2}$</u>	<u>XREF</u>	<u>Comments</u>
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19802Ho07.
 J^π : from s-wave capture on the 0^+ target, $J^\pi=1/2^+$ or $3/2^+$; no gammas to levels with $J>5/2$.

[†] From band member.

[‡] Band(A): $1/2[620], \alpha=-1/2$ $A=6.5$.

Band(a): $1/2[620], \alpha=+1/2$ $A=6.2$.

@ Band(B): $7/2[613]$ $A=6.7$.

& Band(C): $3/2[622]$ $A=6.8$.

^a Band(D): $1/2[761]$ $A=4.9$. This band was labeled as $1/2^- [750]$ by [1971Br27](#). $A=8.0$. Decrease of value A from the average 6.4 for unperturbed is presumed due to Coriolis interaction ([1982Ho07](#)).

^b Band(E): $5/2[622]$ $A=7.0$.

^c Band(F): $3/2[752]$ $A=8.0$. Increase of value A from the average 6.4 for unperturbed is presumed due to Coriolis interaction ([1982Ho07](#)).

^d Band(G): $1/2[501]$ $A=6.2$.

^e Band(H): $11/2[725]$ $A=5.6$.

^f Band(I): $9/2[615]$ $A=5.6$.

Adopted Levels, Gammas (continued)

$\gamma(^{249}\text{Cm})$

Additional information 1.

<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>α&</u>	<u>Comments</u>
109.6	(9/2 ⁺)	60.80 1	100	48.8	(7/2 ⁺)	(M1)	29.5 4	$\alpha(\text{N})=1.491\ 21$; $\alpha(\text{O})=0.380\ 5$; $\alpha(\text{P})=0.0748\ 10$; $\alpha(\text{Q})=0.00539\ 8$ $\alpha(\text{L})=22.15\ 31$; $\alpha(\text{M})=5.43\ 8$ E _{γ} : from (¹³ C, ¹² C γ). Others: 60.8 1 from (¹⁶ O, ¹⁵ O γ), 60.8 1 from (¹⁸ O, ¹⁷ O γ), and 60.8 1 from (¹⁸ O, ¹⁶ O γ). E _{γ} : from (n, γ)E=th:secondary γ 's.
110.2	7/2 ⁺	83.922 7	100	26.2	3/2 ⁺			
182.8	(11/2 ⁺)	73.6 3	100	109.6	(9/2 ⁺)	(M1)	16.89 31	$\alpha(\text{L})=12.68\ 23$; $\alpha(\text{M})=3.10\ 6$ $\alpha(\text{N})=0.853\ 16$; $\alpha(\text{O})=0.217\ 4$; $\alpha(\text{P})=0.0428\ 8$; $\alpha(\text{Q})=0.00308\ 6$ E _{γ} : from (¹³ C, ¹² C γ). Others: 73.6 3 from (¹⁶ O, ¹⁵ O γ), 73.6 3 from (¹⁸ O, ¹⁷ O γ), and 73.6 3 from (¹⁸ O, ¹⁶ O γ).
208.0	3/2 ⁺	97.799 ^{†b} 10	28 [‡] 5	110.2	7/2 ⁺			
		159.215 [‡] 21	63 [‡] 15	48.8	(7/2 ⁺)			
		159.765 [‡] 16	57 [‡] 12	48.2	5/2 ⁺	[M1]	8.35 12	$\alpha(\text{K})=6.55\ 9$; $\alpha(\text{L})=1.352\ 19$; $\alpha(\text{M})=0.331\ 5$ $\alpha(\text{N})=0.0908\ 13$; $\alpha(\text{O})=0.02314\ 32$; $\alpha(\text{P})=0.00455\ 6$; $\alpha(\text{Q})=0.000326\ 5$
		181.778 [‡] 11	65 [‡] 14	26.2	3/2 ⁺			
		208.011 7	100 14	0.0	1/2 ⁺	[M1]	3.97 6	$\alpha(\text{K})=3.11\ 4$; $\alpha(\text{L})=0.639\ 9$; $\alpha(\text{M})=0.1562\ 22$ $\alpha(\text{N})=0.0429\ 6$; $\alpha(\text{O})=0.01093\ 15$; $\alpha(\text{P})=0.002150\ 30$; $\alpha(\text{Q})=0.0001537\ 22$
242.0	5/2 ⁺	193.24 ^{†b} 6	69 [‡] 16	48.8	(7/2 ⁺)			
		193.805 [‡] 20	100 [‡] 15	48.2	5/2 ⁺			
		242.01 [‡] 8	35 [‡] 5	0.0	1/2 ⁺			
244.8	11/2 ⁺	134.6 1	100	110.2	7/2 ⁺	(E2)	4.94 7	$\alpha(\text{K})=0.1530\ 22$; $\alpha(\text{L})=3.46\ 5$; $\alpha(\text{M})=0.978\ 14$ $\alpha(\text{N})=0.272\ 4$; $\alpha(\text{O})=0.0660\ 10$; $\alpha(\text{P})=0.01106\ 16$; $\alpha(\text{Q})=6.08\times 10^{-5}\ 9$ E _{γ} : from (¹³ C, ¹² C γ). Others: 134.6 1 from (¹⁶ O, ¹⁵ O γ), 134.6 1 from (¹⁸ O, ¹⁷ O γ), and 134.6 1 from (¹⁸ O, ¹⁶ O γ).
268.8	(13/2 ⁺)	86.0 2	100	182.8	(11/2 ⁺)	(M1)	10.74 17	$\alpha(\text{L})=8.06\ 13$; $\alpha(\text{M})=1.971\ 31$ $\alpha(\text{N})=0.542\ 8$; $\alpha(\text{O})=0.1380\ 21$; $\alpha(\text{P})=0.0272\ 4$; $\alpha(\text{Q})=0.001953\ 30$ E _{γ} : from (¹³ C, ¹² C γ). Others: 86.0 2 from (¹⁶ O, ¹⁵ O γ), 86.0 2 from (¹⁸ O, ¹⁷ O γ), and 86.0 2 from (¹⁸ O, ¹⁶ O γ).
289.1	7/2 ⁺	240.51 9	63 10	48.8	(7/2 ⁺)	[M1]	2.64 4	$\alpha(\text{K})=2.074\ 29$; $\alpha(\text{L})=0.425\ 6$; $\alpha(\text{M})=0.1038\ 15$ $\alpha(\text{N})=0.0285\ 4$; $\alpha(\text{O})=0.00726\ 10$; $\alpha(\text{P})=0.001428\ 20$; $\alpha(\text{Q})=0.0001019\ 14$ E _{γ} : unweighted average of 240.253 9 from (n, γ)E=th:secondary γ 's, 240.6 1 from (¹³ C, ¹² C γ), 240.6 1 from (¹⁶ O, ¹⁵ O γ), and 240.6 1 from (¹⁸ O, ¹⁷ O γ). I _{γ} : from (n, γ)E=th:secondary γ 's.
		240.65 [†] 5	100 18	48.2	5/2 ⁺	[M1]	2.64 4	$\alpha(\text{K})=2.070\ 29$; $\alpha(\text{L})=0.424\ 6$; $\alpha(\text{M})=0.1036\ 15$ $\alpha(\text{N})=0.0284\ 4$; $\alpha(\text{O})=0.00725\ 10$; $\alpha(\text{P})=0.001426\ 20$; $\alpha(\text{Q})=0.0001018\ 14$

Adopted Levels, Gammas (continued)

$\gamma(^{249}\text{Cm})$ (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>α &</u>	<u>Comments</u>
								E _{γ} : uncertainty multiplied by a factor of 2 in the fitting; level-energy difference=240.90.
								E _{γ} : unweighted average of 240.780 20 from (n, γ)E=th:secondary γ 's, 240.6 1 from (¹³ C, ¹² C γ), 240.6 1 from (¹⁶ O, ¹⁵ O γ), and 240.6 1 from (¹⁸ O, ¹⁷ O γ).
299.0	(13/2 ⁺)	150.6 1	100	148.4	9/2 ⁺	(E2)	3.07 4	I _{γ} : from (n, γ)E=th:secondary γ 's. α (K)=0.1733 24; α (L)=2.094 30; α (M)=0.590 8 α (N)=0.1642 23; α (O)=0.0399 6; α (P)=0.00670 10; α (Q)=4.20×10 ⁻⁵ 6
								E _{γ} : from (¹³ C, ¹² C γ). Others: 150.6 1 from (¹⁶ O, ¹⁵ O γ), 150.6 1 from (¹⁸ O, ¹⁷ O γ), and 150.6 1 from (¹⁸ O, ¹⁶ O γ).
375.3	(11/2 ⁻)	192.5 1	40.9 32	182.8	(11/2 ⁺)			B(E1)(W.u.)=3.34×10 ⁻⁷ +38-34 α (N)=0.001340 19; α (O)=0.000333 5; α (P)=6.06×10 ⁻⁵ 9; α (Q)=3.05×10 ⁻⁶ 4
								E _{γ} : from (¹³ C, ¹² C γ). Others: 192.5 1 from (¹⁶ O, ¹⁵ O γ), 192.5 1 from (¹⁸ O, ¹⁷ O γ), and 192.5 1 from (¹⁸ O, ¹⁶ O γ).
		265.7 1	100 6	109.6	(9/2 ⁺)	E1	0.0566	I _{γ} : unweighted average of 47.0 28 from (¹³ C, ¹² C γ), 32.3 20 from (¹⁶ O, ¹⁵ O γ), 40.2 20 from (¹⁸ O, ¹⁷ O γ), and 44 5 from (¹⁸ O, ¹⁶ O γ). α (K)=0.0443 6; α (L)=0.00928 13; α (M)=0.002267 32 α (N)=0.000618 9; α (O)=0.0001543 22; α (P)=2.86×10 ⁻⁵ 4; α (Q)=1.561×10 ⁻⁶ 22 B(E1)(W.u.)=3.10×10 ⁻⁷ +29-25
								Mult.: D from the ratio I _{γ} (in-plane)/I _{γ} (out-plane) in the one-neutron stripping reaction ²⁴⁸ Cm(¹⁶ O, ¹⁵ O γ) (2008Is05). M1 can be ruled out from RUL.
429.8	15/2 ⁺	185.0 1	100	244.8	11/2 ⁺	(E2)	1.331 19	E _{γ} : from (¹⁶ O, ¹⁵ O γ). Others: 100 5 from (¹³ C, ¹² C γ), 100 5 from (¹⁸ O, ¹⁷ O γ), and 100 6 from (¹⁸ O, ¹⁶ O γ). α (K)=0.1585 22; α (L)=0.849 12; α (M)=0.2384 34 α (N)=0.0663 9; α (O)=0.01612 23; α (P)=0.00273 4; α (Q)=2.228×10 ⁻⁵ 31
								E _{γ} : from (¹³ C, ¹² C γ). Others: 185.0 1 from (¹⁶ O, ¹⁵ O γ), 185.0 1 from (¹⁸ O, ¹⁷ O γ), 185.0 1 from (¹⁸ O, ¹⁶ O γ), and 185.2 5 from (²⁰⁹ Bi, ²⁰⁸ Bi γ).
470.2	3/2 ⁻	422.015 6	100 17	48.2	5/2 ⁺			E _{γ} : from (n, γ)E=th:secondary γ 's. Others: 422.0 1 from (¹³ C, ¹² C γ), 422.0 1 from (¹⁶ O, ¹⁵ O γ), and 422.0 1 from (¹⁸ O, ¹⁷ O γ).
		444.10 ^b 8	6.9 22	26.2	3/2 ⁺			E _{γ} : from (n, γ)E=th:secondary γ 's.
		470.197 9	83 20	0.0	1/2 ⁺	[E1]	0.01732 24	α (K)=0.01380 19; α (L)=0.00264 4; α (M)=0.000640 9 α (N)=0.0001746 24; α (O)=4.39×10 ⁻⁵ 6; α (P)=8.36×10 ⁻⁶ 12; α (Q)=5.14×10 ⁻⁷ 7
								E _{γ} : weighted average of 470.198 9 from (n, γ)E=th:secondary γ 's, 470.1 2 from (¹³ C, ¹² C γ), 470.1 2 from (¹⁶ O, ¹⁵ O γ), and 470.1 2 from

Adopted Levels, Gammas (continued)

$\gamma(^{249}\text{Cm})$ (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>α &</u>	<u>Comments</u>
								(¹⁸ O, ¹⁷ O γ).
494.5	(1/2 ⁻ ,3/2 ⁻)	468.259 8	78 15	26.2 3/2 ⁺				I _{γ} : from (n, γ)E=th:secondary γ 's. E _{γ} : from (n, γ)E=th:secondary γ 's. Others: 468.1 3 from (¹³ C, ¹² C γ), 468.1 3 from (¹⁶ O, ¹⁵ O γ), and 468.1 3 from (¹⁸ O, ¹⁷ O γ).
		494.484 3	100 22	0.0 1/2 ⁺				I _{γ} : from (n, γ)E=th:secondary γ 's. E _{γ} : from (n, γ)E=th:secondary γ 's. Others: 494.3 2 from (¹³ C, ¹² C γ), 494.3 2 from (¹⁶ O, ¹⁵ O γ), and 494.3 2 from (¹⁸ O, ¹⁷ O γ).
498.6	(17/2 ⁺)	199.6 2	100	299.0 (13/2 ⁺)	(E2)		0.992 14	I _{γ} : from (n, γ)E=th:secondary γ 's. α (K)=0.1461 21; α (L)=0.613 9; α (M)=0.1718 25 α (N)=0.0478 7; α (O)=0.01162 17; α (P)=0.001978 29; α (Q)=1.788×10 ⁻⁵ 26 E _{γ} : from (¹³ C, ¹² C γ). Others: 199.6 2 from (¹⁶ O, ¹⁵ O γ), 199.6 2 from (¹⁸ O, ¹⁷ O γ), 199.6 2 from (¹⁸ O, ¹⁶ O γ), and 199.3 5 from (²⁰⁹ Bi, ²⁰⁸ Bi γ).
502.0	7/2 ⁻	353.6 1	93 13	148.4 9/2 ⁺	[E1]		0.0308 4	α (K)=0.02430 34; α (L)=0.00486 7; α (M)=0.001181 17 α (N)=0.000322 5; α (O)=8.08×10 ⁻⁵ 11; α (P)=1.519×10 ⁻⁵ 21; α (Q)=8.83×10 ⁻⁷ 12 E _{γ} : from (¹⁶ O, ¹⁵ O γ).
		453.8 1	100 5	48.2 5/2 ⁺	[E1]		0.01856 26	I _{γ} : from (¹⁶ O, ¹⁵ O γ). Others 85 5 from (¹³ C, ¹² C γ), and 82 5 from (¹⁸ O, ¹⁷ O γ). α (K)=0.01478 21; α (L)=0.00285 4; α (M)=0.000689 10 α (N)=0.0001881 26; α (O)=4.73×10 ⁻⁵ 7; α (P)=8.98×10 ⁻⁶ 13; α (Q)=5.49×10 ⁻⁷ 8 E _{γ} : from (¹⁶ O, ¹⁵ O γ).
526.5	(9/2 ⁺)	417.0 1	79 9	109.6 (9/2 ⁺)				I _{γ} : from (¹⁸ O, ¹⁷ O γ). E _{γ} : from (¹⁶ O, ¹⁵ O γ). I _{γ} : from (¹⁶ O, ¹⁵ O γ). Others 54 4 from (¹³ C, ¹² C γ), and 54 4 from (¹⁸ O, ¹⁷ O γ).
		477.6 1	100 7	48.8 (7/2 ⁺)				E _{γ} ,I _{γ} : from (¹⁶ O, ¹⁵ O γ).
529.7	(5/2 ⁺)	240.618 [‡] 15	100 [‡] 17	289.1 7/2 ⁺				
		321.9 ^{‡b} 4	31 [‡] 21	208.0 3/2 ⁺				
546.9	(5/2 ⁻)	76.647 ^{a‡} 4	39 ^{a‡} 8	470.2 3/2 ⁻				
		257.74 ^{‡b} 5	100 [‡] 31	289.1 7/2 ⁺				
		339.23 ^{‡‡} 12	26 [‡] 7	208.0 3/2 ⁺				E _{γ} : uncertainty multiplied by a factor of 2 in the fitting; level-energy difference=338.857.
577.5	(11/2 ⁻)	278.5 1	36 4	299.0 (13/2 ⁺)	(E1)		0.0511 7	α (K)=0.0400 6; α (L)=0.00832 12; α (M)=0.002031 28 α (N)=0.000554 8; α (O)=0.0001383 19; α (P)=2.57×10 ⁻⁵ 4;

Adopted Levels, Gammas (continued)

$\gamma(^{249}\text{Cm})$ (continued)								
$E_i(\text{level})$	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult. @	$\alpha^\&$	Comments
577.5	(11/2 ⁻)	429.1 1	100 6	148.4	9/2 ⁺	(E1)	0.02074 29	$\alpha(\text{Q})=1.419\times 10^{-6}$ 20 E_γ, I_γ : from ($^{16}\text{O}, ^{15}\text{O}\gamma$). $\alpha(\text{K})=0.01649$ 23; $\alpha(\text{L})=0.00320$ 4; $\alpha(\text{M})=0.000776$ 11 $\alpha(\text{N})=0.0002117$ 30; $\alpha(\text{O})=5.32\times 10^{-5}$ 7; $\alpha(\text{P})=1.008\times 10^{-5}$ 14; $\alpha(\text{Q})=6.10\times 10^{-7}$ 9
578.4	(7/2 ⁺)	468.259 ^a 8	100 ^a	110.2	7/2 ⁺	(E2)	0.554 8	E_γ, I_γ : from ($^{16}\text{O}, ^{15}\text{O}\gamma$). E_γ, I_γ : from ($^{16}\text{O}, ^{15}\text{O}\gamma$). $\alpha(\text{N})=0.02452$ 35; $\alpha(\text{O})=0.00598$ 8; $\alpha(\text{P})=0.001025$ 14; $\alpha(\text{Q})=1.156\times 10^{-5}$ 16 $\alpha(\text{K})=0.1183$ 17; $\alpha(\text{L})=0.316$ 4; $\alpha(\text{M})=0.0882$ 12
663.5	19/2 ⁺	233.7 1	100	429.8	15/2 ⁺			E_γ : from ($^{13}\text{C}, ^{12}\text{C}\gamma$). Others: 233.7 1 from ($^{16}\text{O}, ^{15}\text{O}\gamma$), 233.7 1 from ($^{18}\text{O}, ^{17}\text{O}\gamma$), 233.7 1 from ($^{18}\text{O}, ^{16}\text{O}\gamma$), and 234.4 5 from ($^{209}\text{Bi}, ^{208}\text{Bi}\gamma$). $\alpha(\text{K})=0.01894$ 27; $\alpha(\text{L})=0.00371$ 5; $\alpha(\text{M})=0.000901$ 13 $\alpha(\text{N})=0.0002459$ 34; $\alpha(\text{O})=6.17\times 10^{-5}$ 9; $\alpha(\text{P})=1.167\times 10^{-5}$ 16; $\alpha(\text{Q})=6.96\times 10^{-7}$ 10
699.1	(15/2 ⁻)	400.1 1	100	299.0	(13/2 ⁺)	(E1)	0.02387 33	E_γ, I_γ : from ($^{16}\text{O}, ^{15}\text{O}\gamma$). E_γ : from ($^{209}\text{Bi}, ^{208}\text{Bi}\gamma$).
744.8	(21/2 ⁺)	246.2 5	100	498.6	(17/2 ⁺)	(E1)	0.0281 4	$\alpha(\text{K})=0.02220$ 31; $\alpha(\text{L})=0.00441$ 6; $\alpha(\text{M})=0.001071$ 15 $\alpha(\text{N})=0.000292$ 4; $\alpha(\text{O})=7.33\times 10^{-5}$ 10; $\alpha(\text{P})=1.380\times 10^{-5}$ 19; $\alpha(\text{Q})=8.10\times 10^{-7}$ 11 E_γ : from ($^{16}\text{O}, ^{15}\text{O}\gamma$).
772.8	(3/2 ⁻)	225.94 [‡] 7	47 ^{‡#} 16	546.9	(5/2 ⁻)			
		278.23 [‡] 7	36 ^{‡#} 11	494.5	(1/2 ⁻ , 3/2 ⁻)			
		302.59 7	100 33	470.2	3/2 ⁻			
		531.7 ^{‡b} 5	244 ^{‡#} 78	242.0	5/2 ⁺			
		724.44 ^{‡b} 7	100 ^{‡#} 32	48.2	5/2 ⁺			
		772.80 ^{‡b} 10	55 ^{‡#} 14	0.0	1/2 ⁺			
818.9	(5/2 ⁻)	240.451 [‡] 10	42 [‡] 8	578.4	(7/2 ⁺)			
		272.04 [‡] 5	31 [‡] 18	546.9	(5/2 ⁻)			
		348.75 [‡] 4	100 [‡] 26	470.2	3/2 ⁻			
859.0	(1/2, 3/2)	312.120 [‡] 16	22 [‡] 6	546.9	(5/2 ⁻)	(E1)	0.0281 4	$\alpha(\text{K})=0.02220$ 31; $\alpha(\text{L})=0.00441$ 6; $\alpha(\text{M})=0.001071$ 15 $\alpha(\text{N})=0.000292$ 4; $\alpha(\text{O})=7.33\times 10^{-5}$ 10; $\alpha(\text{P})=1.380\times 10^{-5}$ 19; $\alpha(\text{Q})=8.10\times 10^{-7}$ 11 E_γ : from ($^{16}\text{O}, ^{15}\text{O}\gamma$).
		832.70 [‡] 10	100 [‡] 17	26.2	3/2 ⁺			
868.3	(19/2 ⁻)	369.7 1	100	498.6	(17/2 ⁺)			
917.6	(1/2 ⁻)	422.94 [‡] 10	57 [‡] 15	494.5	(1/2 ⁻ , 3/2 ⁻)	(E1)	0.0281 4	$\alpha(\text{K})=0.02220$ 31; $\alpha(\text{L})=0.00441$ 6; $\alpha(\text{M})=0.001071$ 15 $\alpha(\text{N})=0.000292$ 4; $\alpha(\text{O})=7.33\times 10^{-5}$ 10; $\alpha(\text{P})=1.380\times 10^{-5}$ 19; $\alpha(\text{Q})=8.10\times 10^{-7}$ 11 E_γ : from ($^{16}\text{O}, ^{15}\text{O}\gamma$).
		447.31 [‡] 7	34 [‡] 11	470.2	3/2 ⁻			
		891.25 [‡] 21	100 [‡] 31	26.2	3/2 ⁺			

Adopted Levels, Gammas (continued) $\gamma(^{249}\text{Cm})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult. @	$\alpha^\&$	Comments
943.3	(23/2 ⁺)	279.8 5	100	663.5	19/2 ⁺			
963.1	(3/2 ⁻)	914.74 ^{$\dagger$} 11	100 ^{$\dagger$} 22	48.2	5/2 ⁺			
		963.06 ^{$\dagger$} 9	57 ^{$\dagger$} 14	0.0	1/2 ⁺			
971.2	(5/2 ⁻)	441.55 ^{$\dagger$} 11	23 ^{$\dagger$} 7	529.7	(5/2 ⁺)			
		860.80 ^{$\dagger$} 13	100 ^{$\dagger$} 25	110.2	7/2 ⁺			
1029.9	(5/2 ⁺ , 7/2 ⁺ , 9/2 ⁺)	981.1 5	100	48.8	(7/2 ⁺)	(M1)	0.0575 8	$\alpha(\text{K})=0.0454$ 6; $\alpha(\text{L})=0.00904$ 13; $\alpha(\text{M})=0.002200$ 31 $\alpha(\text{N})=0.000603$ 8; $\alpha(\text{O})=0.0001537$ 22; $\alpha(\text{P})=3.02\times 10^{-5}$ 4; $\alpha(\text{Q})=2.163\times 10^{-6}$ 30 B(M1)(W.u.)>0.016 E_γ : from (^{16}O , $^{15}\text{O}\gamma$).
1034.0	(25/2 ⁺)	289.2 5		744.8	(21/2 ⁺)			
1047.8	(1/2, 3/2)	76.647 ^{$\dagger$} 4	42 ^{$\dagger$} 9	971.2	(5/2 ⁻)			
		84.700 ^{$\dagger$} 6	43 ^{$\dagger$} 9	963.1	(3/2 ⁻)			
		130.260 ^{$\dagger$} 12	100 ^{$\dagger$} 27	917.6	(1/2 ⁻)			
		228.95 ^{$\dagger$} 3	20.7 ^{$\dagger$} 33	818.9	(5/2 ⁻)			
1153.4	(1/2, 3/2)	182.15 ^{$\dagger$} 4	75 ^{$\dagger$} 8	971.2	(5/2 ⁻)			
		606.73 ^{$\dagger$} 14	75 ^{$\dagger$} 20	546.9	(5/2 ⁻)			
		683.35 ^{$\dagger$} 16	75 ^{$\dagger$} 28	470.2	3/2 ⁻			
		1127.37 ^{$\dagger$} 22	100 ^{$\dagger$}	26.2	3/2 ⁺			
1175.9	(1/2, 3/2)	705.65 ^{$\dagger$} 5	48 ^{$\dagger$} 14	470.2	3/2 ⁻			
		968.23 ^{$\dagger$} 12	71 ^{$\dagger$} 19	208.0	3/2 ⁺			E_γ : uncertainty multiplied by a factor of 2 in the fitting; level-energy difference=967.86.
		1175.8 ^{$\dagger$} 3	100 ^{$\dagger$} 19	0.0	1/2 ⁺			
1266.0	(27/2 ⁺)	322.7 5		943.3	(23/2 ⁺)			
1269.5	(1/2, 3/2)	1269.50 ^{$\dagger$} 15	100 ^{$\dagger$}	0.0	1/2 ⁺			
1363.9	(29/2 ⁺)	329.9 5		1034.0	(25/2 ⁺)			
1504.8	(17/2 ⁺)	636.5 5	100	868.3	(19/2 ⁻)	[E1]	0.00975 14	$\alpha(\text{K})=0.00784$ 11; $\alpha(\text{L})=0.001444$ 20; $\alpha(\text{M})=0.000348$ 5 $\alpha(\text{N})=9.50\times 10^{-5}$ 13; $\alpha(\text{O})=2.397\times 10^{-5}$ 34; $\alpha(\text{P})=4.60\times 10^{-6}$ 6; $\alpha(\text{Q})=2.98\times 10^{-7}$ 4 E_γ : from (^{16}O , $^{15}\text{O}\gamma$).
1627.9	(31/2 ⁺)	361.9 5		1266.0	(27/2 ⁺)			
1730.2	(33/2 ⁺)	366.3 5		1363.9	(29/2 ⁺)			
2024.6	(35/2 ⁺)	396.7 5		1627.9	(31/2 ⁺)			
2128.4	(37/2 ⁺)	398.2 5		1730.2	(33/2 ⁺)			
2450.2	(39/2 ⁺)	425.6 5		2024.6	(35/2 ⁺)			
2553.1	(41/2 ⁺)	424.7 5		2128.4	(37/2 ⁺)			
2899.1	(43/2 ⁺)	448.9 5		2450.2	(39/2 ⁺)			

Adopted Levels, Gammas (continued)

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

$E_i(\text{level})$	J_i^π	E_γ	I_γ	E_f	J_f^π	Comments
2998.6	(45/2 ⁺)	445.5	5	2553.1	(41/2 ⁺)	
3365.1	(47/2 ⁺)	466.0	5	2899.1	(43/2 ⁺)	
3461.6	(49/2 ⁺)	463.0	5	2998.6	(45/2 ⁺)	
3843.0	(51/2 ⁺)	477.9		3365.1	(47/2 ⁺)	
3937.7	(53/2 ⁺)	476.1	5	3461.6	(49/2 ⁺)	
4336.8	(55/2 ⁺)	493.8	5	3843.0	(51/2 ⁺)	
4429.7	(57/2 ⁺)	492.0		3937.7	(53/2 ⁺)	
(4713.7)	1/2 ⁺	3399.0	4	1314.7	(1/2,3/2)	
		3444.9	6	1269.5	(1/2,3/2)	
		3450.1 ^b	5	1263.6	(1/2,3/2)	
		3509.7	3	1204.0	(1/2,3/2)	
		3538.3	3	1175.9	(1/2,3/2)	
		3560.6	10	1153.4	(1/2,3/2)	
		3663.5	3	1047.8	(1/2,3/2)	E _γ : very poor fit and omitted in the fitting; level-energy difference=3665.84.
		3702.1	4	1011.6	(1/2,3/2)	
		3750.7	3	963.1	(3/2 ⁻)	
		3796.1	3	917.6	(1/2 ⁻)	
		3854.5 ^b	8	859.0	(1/2,3/2)	
		4022.9	4	690.7		
		4219.0	3	494.5	(1/2 ⁻ ,3/2 ⁻)	
		4243.5	3	470.2	3/2 ⁻	
		4406.5	4	307.1		
		4505.0	3	208.0	3/2 ⁺	
		4713.4	4	0.0	1/2 ⁺	

[†] Poor fit; uncertainty multiplied by a factor in the fitting.

[‡] From (n,γ) E=th:secondary γ's.

Normalized to strongest branch. Note that the gamma with the strongest branch is considered tentative.

@ From the ratio $I_\gamma(\text{in-plane})/I_\gamma(\text{out-plane})$ in the one-neutron stripping reaction $^{248}\text{Cm}(^{16}\text{O},^{15}\text{O}\gamma)$ (2008Is05) and from assignment to rotational band except, as noted.

& Additional information 2.

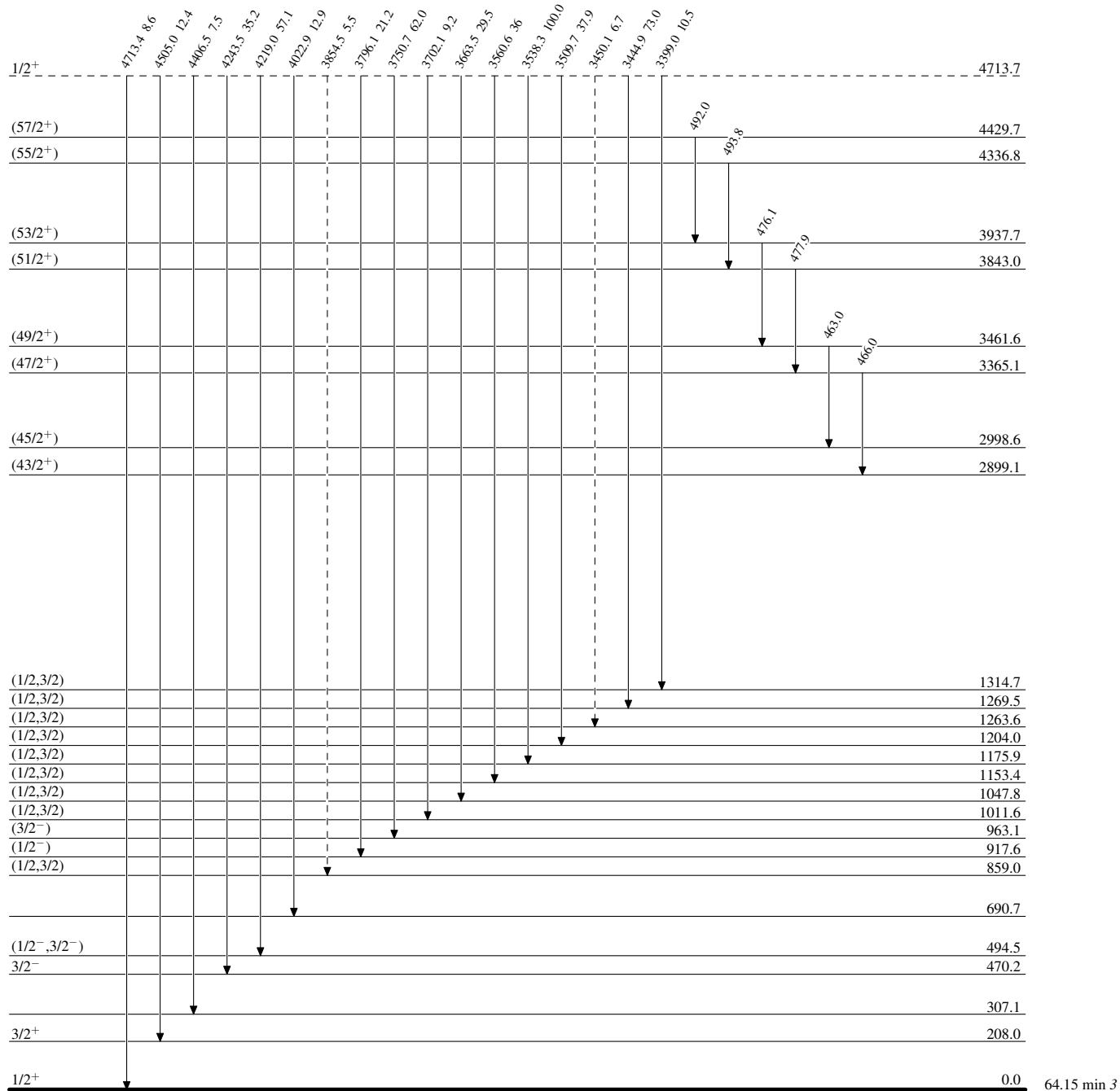
^a Multiply placed with undivided intensity.

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

Legend

Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)

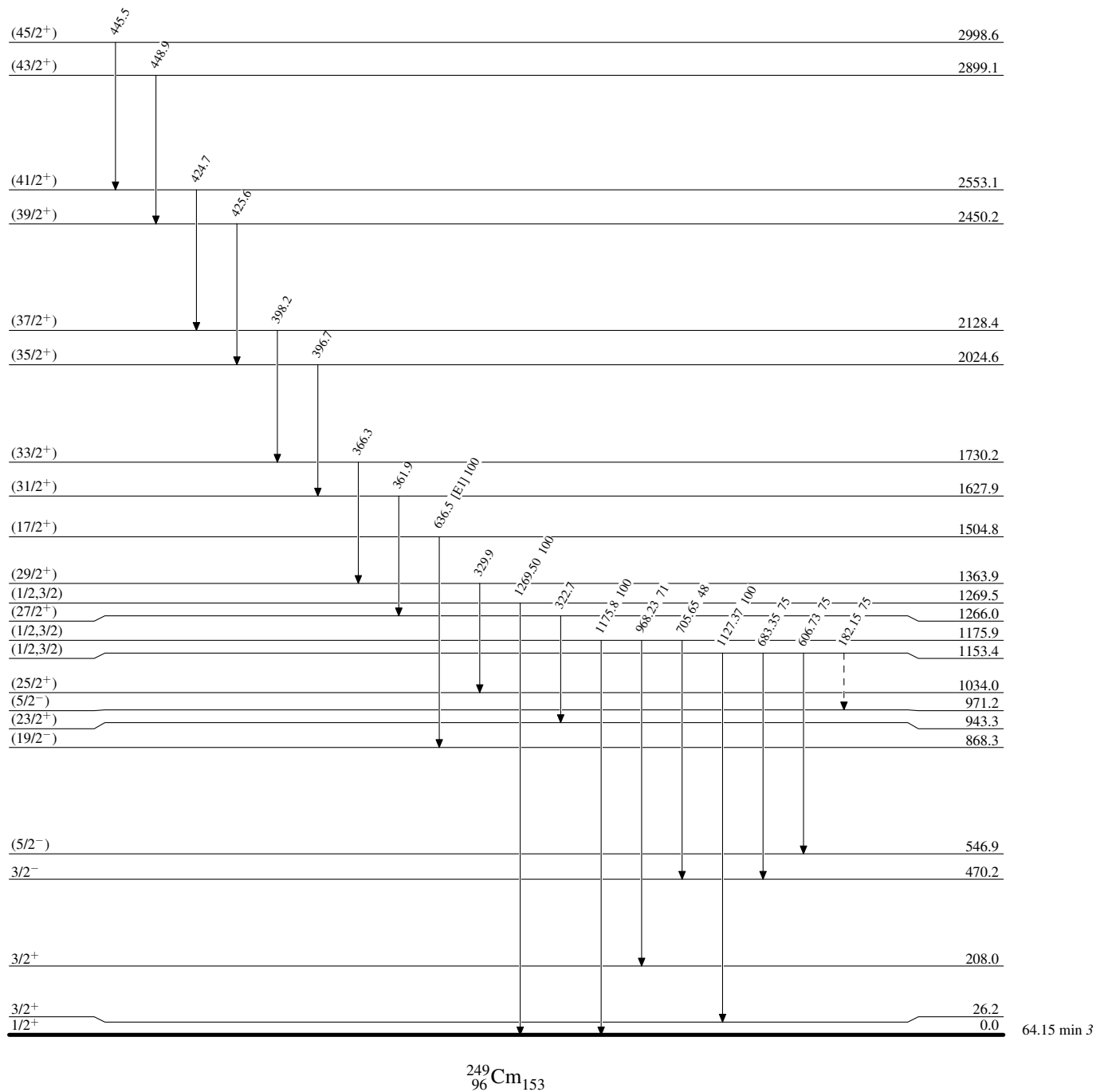
 ${}_{96}^{249}\text{Cm}_{153}$

Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

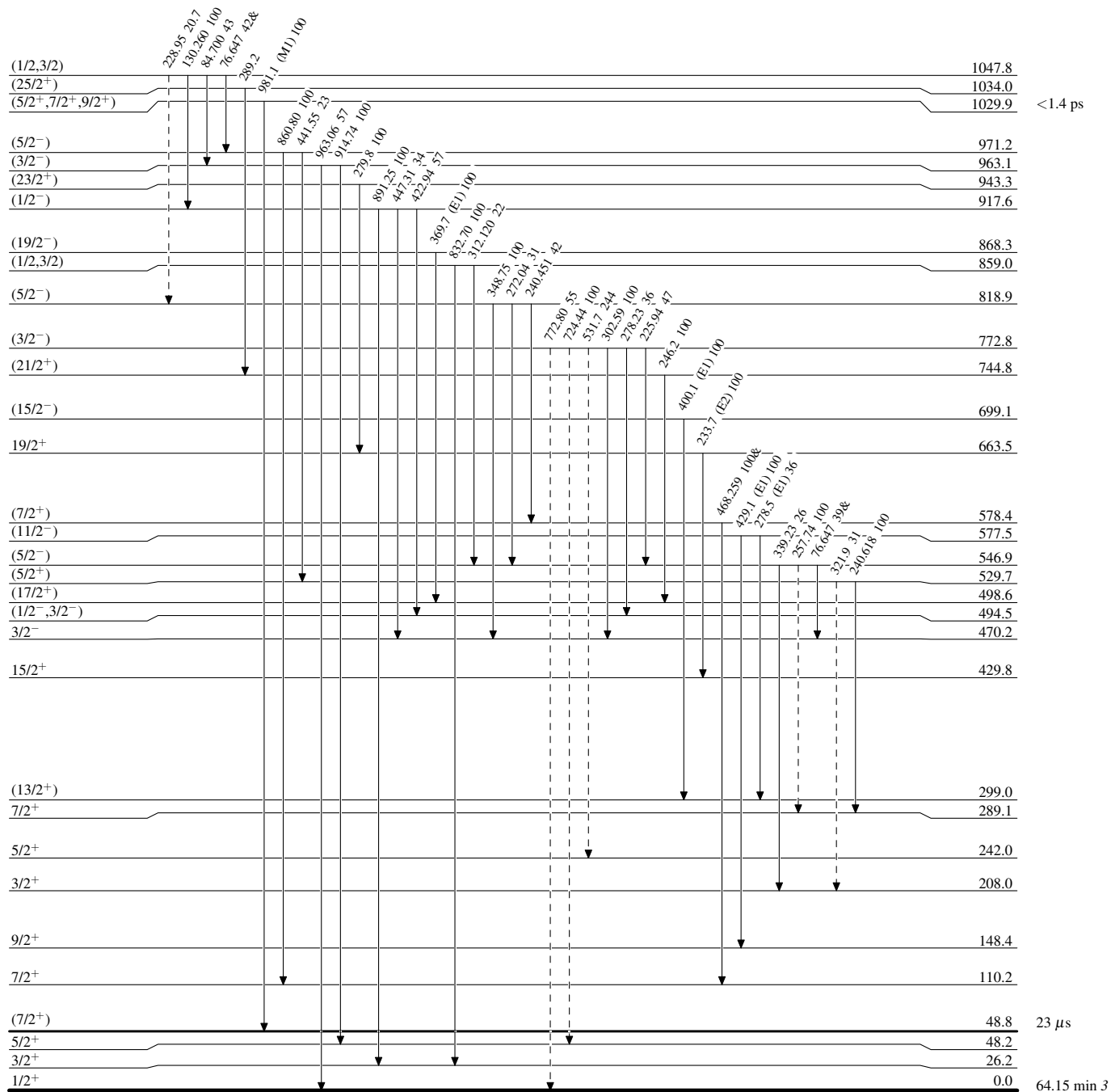
-----► γ Decay (Uncertain)


Adopted Levels, Gammas

Legend

Level Scheme (continued)

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

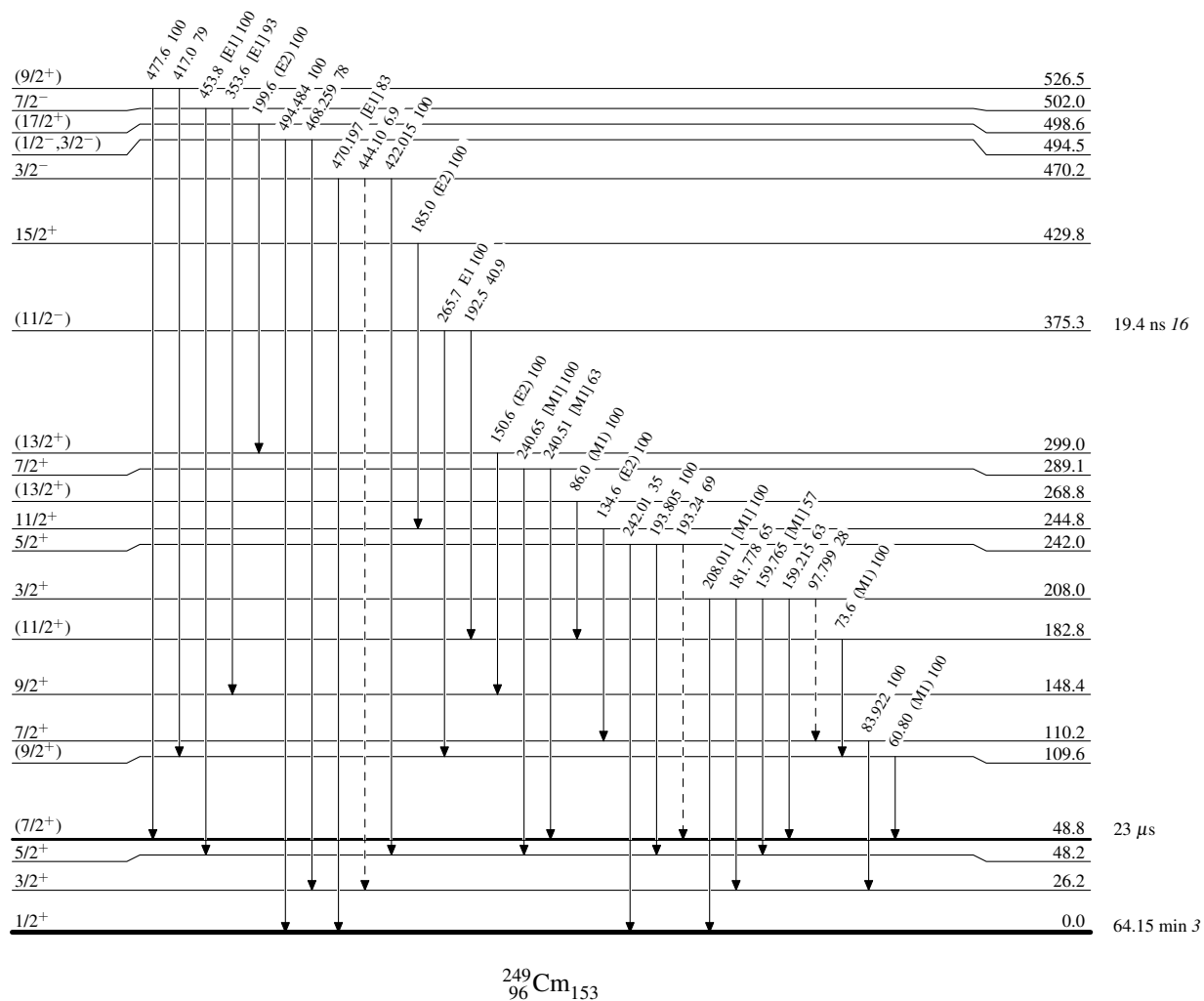
-----► γ Decay (Uncertain) $^{249}_{96}\text{Cm}_{153}$

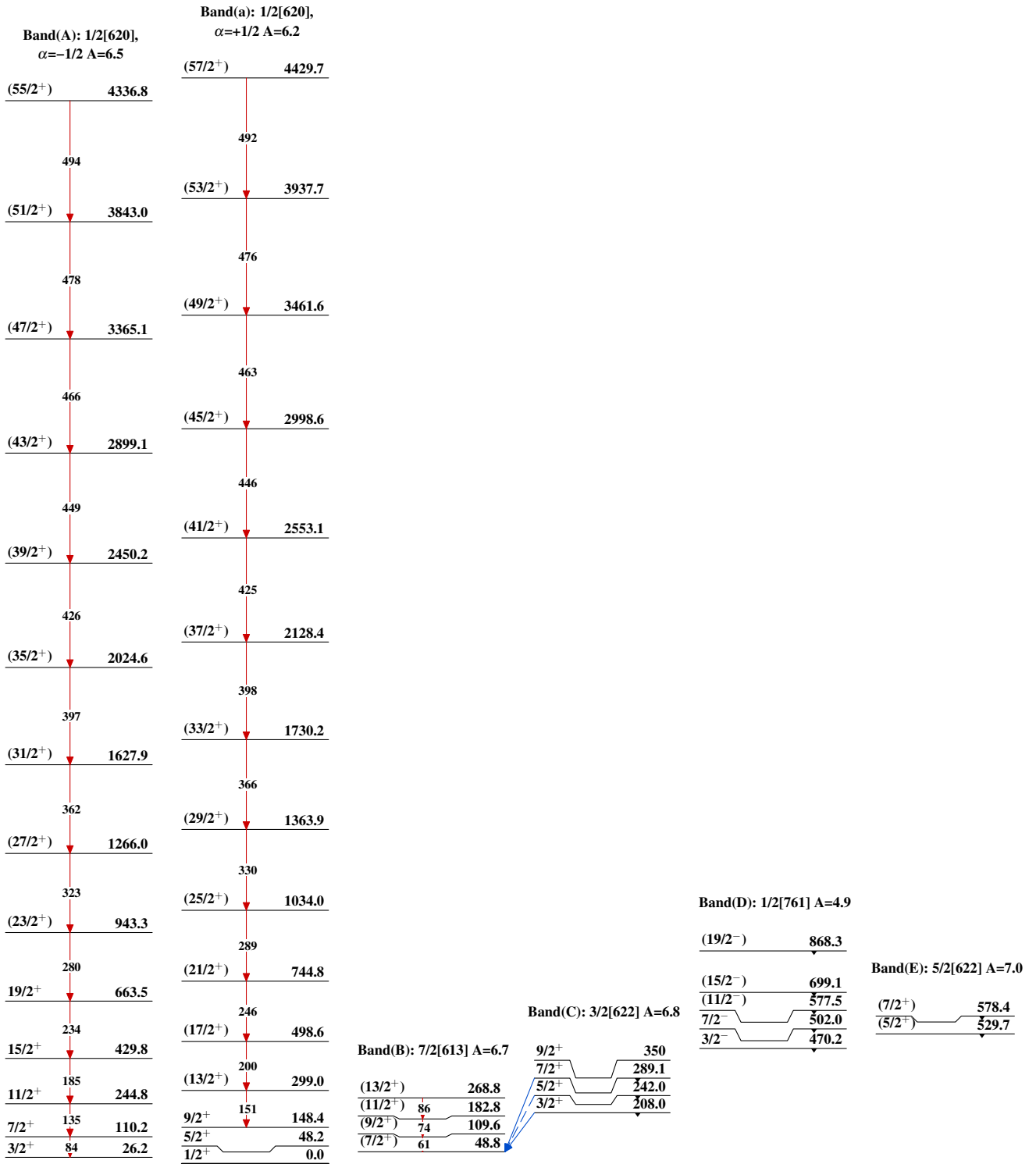
Adopted Levels, Gammas

Legend

Level Scheme (continued)

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

-----► γ Decay (Uncertain)

Adopted Levels, Gammas

Adopted Levels, Gammas (continued)

Band(F): 3/2[752] A=8.0

(11/2⁻) 1030

Band(G): 1/2[501] A=6.2

(5/2⁻) 971.2
(3/2⁻) 963.1

(1/2⁻) 917.6

(7/2⁻) 870

(5/2⁻) 818.9

(3/2⁻) 772.8

Band(I): 9/2[615] A=5.6

(11/2⁺) 604

Band(H): 11/2[725] A=5.6

(15/2⁻) 533 (9/2⁺) 526.5

(11/2⁻) 375.3