

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen		NDS 185, 2 (2022)	23-Aug-2022

$Q(\beta^-)=4369$ 14; $S(n)=4343$ 15; $S(p)=11250$ 22; $Q(\alpha)=-1579$ 13 [2021Wa16](#)

$S(2n)=10799$ 13, $S(2p)=20984$ 22 ([2021Wa16](#)).

Production and identification of ^{149}Ce : [1973SeYX](#), [1977Pf01](#), [1979En02](#).

Mass measurements: [2006Sa56](#), [2004CI07](#).

[Additional information 1](#).

[2001Ka50](#): theory: calculated total Routhian surface, and angular momentum vs rotational frequency plot.

Other theoretical studies: consult the NSR database at www.nndc.bnl.gov/nsr/ for four references for nuclear structure, listed under 'document records' which can be accessed through web retrieval of the ENSDF database at www.nndc.bnl.gov/ensdf/.

 ^{149}Ce LevelsCross Reference (XREF) Flags

- A** ^{149}La β^- decay (1.091 s)
B ^{150}La β^-n decay (0.51 s)
C ^{248}Cm SF decay
D ^{252}Cf SF decay

E(level) [†]	J^π [‡]	$T_{1/2}$	XREF	Comments
0.0 ^{&}	(3/2 ⁻) [#]	5.12 s 25	ABCD	$\% \beta^- = 100$ $T_{1/2}$: unweighted average of 4.94 s 3 (58 γ timing, 1996YaZV), 5.4 s 3 (β timing, 1993RuZW); 4.7 s 8 (β timing, 1979En02); 5.7 s 5 (γ timing, 1977ArZS); 5.0 s 5 (γ timing, 1977Pf01); 5.0 s 10 (γ timing, 1973SeYX).
55.08 [@] 6	(5/2 ⁻) [#]		A C	
133.47 ^b 7	(3/2 ⁺)	0.60 ns 10	A C	$T_{1/2}$: from $\beta\gamma\gamma(t)$ in ^{149}La β^- decay (2003Sy01). J^π : 78.4 E1 γ to (5/2 ⁻); 133.5 γ to (3/2 ⁻); band member.
142.61 ^a 7	(5/2 ⁺)		A CD	J^π : 87.5 E1 γ to (5/2 ⁻); 142.6 γ to (3/2 ⁻); band member.
147.73 ^{&} 9	(7/2 ⁻) [#]		A C	
187.29 15	(3/2 ⁻ , 5/2, 7/2 ⁻)		A C	J^π : γ s to (3/2 ⁻) and (5/2 ⁻); 101.5 γ from (7/2 ⁻).
190.88 ^b 9	(7/2 ⁺)		A CD	
206.70 ^a 14	(9/2 ⁺)	3.7 ns 5	CD	$T_{1/2}$: 1974ClZX reported half-lives of 3.5 ns 5 for 135.6 γ and 3.9 ns 5 for 142.2 γ . 2003Sy01 propose that these two half-lives correspond to a common value of 3.7 ns 5, probably for the 206.7 level, since 135.8 γ and 142.6 γ are fed from the 206.7 level by 16.0 γ and 64.2 γ , respectively.
239.51 [@] 10	(9/2 ⁻)		C	J^π : 91.7 γ to (7/2 ⁻); 184.5 γ to (5/2 ⁻); band member.
245.40 ^c 7	(3/2 ⁻)	≤ 0.12 ns	A	J^π : possible bandhead.
288.97 11	(7/2 ⁻)		A C	$T_{1/2}$: from $\beta\gamma\gamma(t)$ in ^{149}La β^- decay (2003Sy01). J^π : 141.3 γ to (7/2 ⁻); 233.9 γ to (5/2 ⁻); yrast pattern of level population.
305.52 ^c 11	(5/2 ⁻)		A	J^π : γ s to (3/2 ⁻), (3/2 ⁺), (7/2 ⁺) and (7/2 ⁻); possible band member.
335.76 ^b 12	(11/2 ⁺)		CD	
347.05 ^a 19	(13/2 ⁺)		CD	
391.22 ^c 17	(7/2 ⁻)		A	J^π : 200.3 γ to (7/2 ⁺); 248.5 γ to (5/2 ⁺); 336.3 γ to (5/2 ⁻); band member.
403.68 ^{&} 15	(11/2 ⁻)		C	
433.25 17			A	
444.10 12			A	
459.76 17			A	
525.69 [@] 14	(13/2 ⁻)		C	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{149}Ce Levels (continued)

E(level) [†]	J^π [‡]	XREF	Comments
557.39 20		A	
575.2 4		A	
588.00 ^b 15	(15/2 ⁺)	CD	
588.45 ^a 22	(17/2 ⁺)	CD	
605.10 22		A	
615.4 3		A	
630.6 3		A	
638.9 3		A	
654.8 3		A	
661.7 7		A	
694.6 4		A	
752.18 ^{&} 18	(15/2 ⁻)	C	
760.3 5		A	
826.1 5		A	
896.79 [@] 17	(17/2 ⁻)	C	
931.65 ^a 24	(21/2 ⁺)	CD	
945.20 ^b 18	(19/2 ⁺)	CD	
1163.2 ^{&} 3	(19/2 ⁻)	C	
1329.0 [@] 3	(21/2 ⁻)	C	
1362.7 ^a 3	(25/2 ⁺)	CD	
1395.6 ^b 3	(23/2 ⁺)	CD	
1621.0 ^{&} 4	(23/2 ⁻)	C	
1791.2 5		A	
1803.9 [@] 4	(25/2 ⁻)	C	
1842.1 7		A	
1864.7 ^a 4	(29/2 ⁺)	CD	
1868.9 10		A	
1923.5 ^b 4	(27/2 ⁺)	CD	
2313.4 [@] 10	(29/2 ⁻)	C	
2421.9 ^a 4	(33/2 ⁺)	CD	
2510.5 ^b 5	(31/2 ⁺)	CD	
3018.1 ^a 5	(37/2 ⁺)	CD	
3141.8 ^b 7	(35/2 ⁺)	D	E(level), J^π : this level corresponds to 3087.2, $J^\pi=(33/2^-)$ in ^{252}Cf SF decay dataset.
3635.6 ^a 7	(41/2 ⁺)	D	E(level), J^π : this level corresponds to 3568.9 ξ , $J^\pi=(41/2^+)$ in ^{252}Cf SF decay dataset.

[†] From least-squares fit to E γ data, assuming $\Delta E_\gamma=0.5$ keV, when not stated.

[‡] From probable band structures for levels of $J^\pi=7/2^+$ and higher, assuming (3/2⁺) and (5/2⁺) for bandheads. Exceptions are noted.

From systematic trends of spacings of band members in N=91 isotones from ^{151}Nd to ^{161}Yb .

@ Band(A): $\nu 3/2[532], \alpha=+1/2$.

& Band(a): $\nu 3/2[532], \alpha=-1/2$.

^a Band(B): $\nu 3/2[651], \alpha=+1/2$. Decoupled $\nu i_{13/2}$ band. Dominant component is proposed as 3/2[651] (2002Sy01), with strong Coriolis mixing with other Nilsson orbitals.

^b Band(b): $\nu 3/2[651], \alpha=-1/2$. Decoupled $\nu i_{13/2}$ band. Dominant component is proposed as 3/2[651] (2002Sy01), with strong Coriolis mixing with other Nilsson orbitals.

^c Band(C): Band based on (3/2⁻). Band suggested by 2002Sy01.

Adopted Levels, Gammas (continued)

$\gamma(^{149}\text{Ce})$										
$E_i(\text{level})$	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult. [‡]	δ [‡]	α ^{&}	$I_{(\gamma+ce)}$	Comments
55.08	(5/2 ⁻)	55.1 1	100	0.0	(3/2 ⁻)	M1(+E2)	≤0.42	7.5 9		
133.47	(3/2 ⁺)	78.4 1	9.3 14	55.08	(5/2 ⁻)	E1		0.474 7		B(E1)(W.u.)=6.2×10 ⁻⁵ +15-12 I _γ : from β ⁻ decay. Value of 35 11 from ²⁴⁸ Cm SF decay is in poor agreement. Intrinsic dipole moment D ₀ =0.034 7 efm (2003Sy01).
		133.5 1	100 3	0.0	(3/2 ⁻)	[E1]		0.1096 16		B(E1)(W.u.)=1.35×10 ⁻⁴ +27-20 Intrinsic dipole moment D ₀ =0.041 5 efm (2003Sy01).
142.61	(5/2 ⁺)	(9.1) 87.5 1 142.6 1	26 4 100 4	133.47 (3/2 ⁺) 55.08 (5/2 ⁻) 0.0 (3/2 ⁻)		E1		0.351 5	40 6	T _{1/2} =3.9 ns 5 (1974ClZX) for a 142.2γ (see comment for 206.9 level).
147.73	(7/2 ⁻)	92.6 1 147.7 2	100 10 36 5	55.08 (5/2 ⁻) 0.0 (3/2 ⁻)		E2(+M1)		2.1 6		
187.29	(3/2 ⁻ ,5/2,7/2 ⁻)	132.2 3 187.2 2	43 6 100 6	55.08 (5/2 ⁻) 0.0 (3/2 ⁻)						
190.88	(7/2 ⁺)	48.3 2 57.4 3	10 3 24 6	142.61 (5/2 ⁺) 133.47 (3/2 ⁺)						E _γ : γ from ²⁴⁸ Cm SF, not reported in β ⁻ decay. T _{1/2} =3.5 ns 3 (1974ClZX) for 135.6γ (see comment for 206.7 level).
		135.8 1	100 12	55.08 (5/2 ⁻)						
206.70	(9/2 ⁺)	(15.8@) 64.0@ 2	10 3	190.88 (7/2 ⁺) 142.61 (5/2 ⁺)					100 33	
239.51	(9/2 ⁻)	91.7 2 184.5 1	44 6 100 9	147.73 (7/2 ⁻) 55.08 (5/2 ⁻)						
245.40	(3/2 ⁻)	102.8 1	11 3	142.61 (5/2 ⁺)		[E1]		0.2253 32		B(E1)(W.u.)≥6.6×10 ⁻⁵ Intrinsic dipole moment D ₀ ≥0.045 e fm (2003Sy01).
		112.0 2	36 3	133.47 (3/2 ⁺)		[E1]		0.1779 26		B(E1)(W.u.)≥2.1×10 ⁻⁴ Intrinsic dipole moment D ₀ ≥0.058 e fm (2003Sy01).
		190.3 2	28.8 24	55.08 (5/2 ⁻)		[M1+E2]		0.206 11		B(M1)(W.u.)≥0.0031 if M1, B(E2)(W.u.)≥47 if E2.
		245.4 1	100 19	0.0 (3/2 ⁻)		[M1+E2]		0.0956 29		B(M1)(W.u.)≥0.0053 if M1, B(E2)(W.u.)≥48 if E2.
288.97	(7/2 ⁻)	101.5 3 141.3 3 233.9 1	43 14 100 12 33 5	187.29 (3/2 ⁻ ,5/2,7/2 ⁻) 147.73 (7/2 ⁻) 55.08 (5/2 ⁻)						E _γ : γ from ²⁴⁸ Cm SF only.
305.52	(5/2 ⁻)	114.6 3 157.8 2 162.9 3	14.3 13 29 5 23 6	190.88 (7/2 ⁺) 147.73 (7/2 ⁻) 142.61 (5/2 ⁺)						E _γ : γ from β ⁻ only.

Adopted Levels, Gammas (continued)

$\gamma(^{149}\text{Ce})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π	$I_{(\gamma+ce)}$	Comments
305.52	(5/2 ⁻)	172.1 3	33 7	133.47	(3/2 ⁺)		
		250.4 8	22 3	55.08	(5/2 ⁻)		
		305.5 2	100 9	0.0	(3/2 ⁻)		
335.76	(11/2 ⁺)	96.3 3	15.0 22	239.51	(9/2 ⁻)		
		129.0 1	78 11	206.70	(9/2 ⁺)		I _γ : 28 in ²⁵² Cf SF is in poor agreement.
		144.9 1	100 11	190.88	(7/2 ⁺)		
347.05	(13/2 ⁺)	(11.3)		335.76	(11/2 ⁺)	13 4	
		140.5 2	100 5	206.70	(9/2 ⁺)		
391.22	(7/2 ⁻)	200.3 2	81 19	190.88	(7/2 ⁺)		
		248.5 4	69 19	142.61	(5/2 ⁺)		
		336.3 3	100 25	55.08	(5/2 ⁻)		
403.68	(11/2 ⁻)	164.2 2	44 6	239.51	(9/2 ⁻)		
		255.8 2	100 11	147.73	(7/2 ⁻)		
433.25		243.0 9	15 4	190.88	(7/2 ⁺)		
		246.1 8	38 19	187.29	(3/2 ⁻ , 5/2, 7/2 ⁻)		
		290.5 3	13 4	142.61	(5/2 ⁺)		
		299.8 2	100 13	133.47	(3/2 ⁺)		
444.10		198.7 1	100 29	245.40	(3/2 ⁻)		
		310.6 7	30 5	133.47	(3/2 ⁺)		
459.76		154.2 2	69 42	305.52	(5/2 ⁻)		
		214.5 5	25 8	245.40	(3/2 ⁻)		
		317.2 3	42 12	142.61	(5/2 ⁺)		
		404.6 5	100 15	55.08	(5/2 ⁻)		
525.69	(13/2 ⁻)	121.9 2	17 4	403.68	(11/2 ⁻)		
		286.2 1	100 8	239.51	(9/2 ⁻)		
557.39		409.7 5	100 18	147.73	(7/2 ⁻)		
		502.3 2	22 7	55.08	(5/2 ⁻)		
575.2		520.1 4	100	55.08	(5/2 ⁻)		
588.00	(15/2 ⁺)	241.1 2	74 11	347.05	(13/2 ⁺)		
		252.2 1	100 11	335.76	(11/2 ⁺)		
588.45	(17/2 ⁺)	241.4 1	100	347.05	(13/2 ⁺)		
605.10		462.5 3	18 5	142.61	(5/2 ⁺)		
		605.1 3	100 36	0.0	(3/2 ⁻)		
615.4		481.9 3	100 17	133.47	(3/2 ⁺)		
		560.3 10	56 17	55.08	(5/2 ⁻)		
630.6		497.1 3	100	133.47	(3/2 ⁺)		
638.9		393.5 3	100	245.40	(3/2 ⁻)		
654.8		409.5 5	46 14	245.40	(3/2 ⁻)		
		507.1 3	100 20	147.73	(7/2 ⁻)		
661.7		519.1 7	100	142.61	(5/2 ⁺)		
694.6		639.5 4	100	55.08	(5/2 ⁻)		
752.18	(15/2 ⁻)	226.3 ^a 4	12 6	525.69	(13/2 ⁻)		
		348.5 1	100 6	403.68	(11/2 ⁻)		

Adopted Levels, Gammas (continued)

$\gamma(^{149}\text{Ce})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π	Mult. [‡]	Comments
760.3		626.8 5	100	133.47	(3/2 ⁺)		
826.1		638.4 8	71 36	187.29	(3/2 ⁻ , 5/2, 7/2 ⁻)		
		692.8 6	100 21	133.47	(3/2 ⁺)		
896.79	(17/2 ⁻)	371.1 1	100	525.69	(13/2 ⁻)		
931.65	(21/2 ⁺)	343.2 1	100	588.45	(17/2 ⁺)	Q [#]	
945.20	(19/2 ⁺)	357.2 1	100	588.00	(15/2 ⁺)		
1163.2	(19/2 ⁻)	411.0 2	100	752.18	(15/2 ⁻)		
1329.0	(21/2 ⁻)	432.2 2	100	896.79	(17/2 ⁻)		
1362.7	(25/2 ⁺)	431.0 1	100	931.65	(21/2 ⁺)	Q [#]	
1395.6	(23/2 ⁺)	450.4 2	100	945.20	(19/2 ⁺)		
1621.0	(23/2 ⁻)	457.8 3	100	1163.2	(19/2 ⁻)		
1791.2		1648.5 10	26 11	142.61	(5/2 ⁺)		
		1657.7 5	100 19	133.47	(3/2 ⁺)		
1803.9	(25/2 ⁻)	474.9 2	100	1329.0	(21/2 ⁻)		
1842.1		1700.0 13	57 29	142.61	(5/2 ⁺)		
		1708.5 7	100 29	133.47	(3/2 ⁺)		
1864.7	(29/2 ⁺)	502.0 2	100	1362.7	(25/2 ⁺)		
1868.9		1681.6 9	100	187.29	(3/2 ⁻ , 5/2, 7/2 ⁻)		
1923.5	(27/2 ⁺)	527.9 2	100	1395.6	(23/2 ⁺)		
2313.4	(29/2 ⁻)	509.5 9	100	1803.9	(25/2 ⁻)		
2421.9	(33/2 ⁺)	557.2 2	100	1864.7	(29/2 ⁺)		
2510.5	(31/2 ⁺)	587.0 3	100	1923.5	(27/2 ⁺)		
3018.1	(37/2 ⁺)	596.2 3	100	2421.9	(33/2 ⁺)		
3141.8?	(35/2 ⁺)	631.3 ^a	100	2510.5	(31/2 ⁺)		E _γ : this γ was not seen in ²⁴⁸ Cm SF decay (2012Ur04).
3635.6?	(41/2 ⁺)	617.5 ^a	100	3018.1	(37/2 ⁺)		E _γ : this γ was not seen consistently in γγ-coin data in ²⁴⁸ Cm SF decay (2012Ur04).

[†] Weighted averages taken when a level is populated in ¹⁴⁹La β⁻ and ²⁴⁸Cm SF. Otherwise, values are from either of the two datasets.

[‡] Estimated from I(x ray)/I_γ in ¹⁴⁹La β⁻ decay, unless otherwise stated.

[#] From DCO ratio in ²⁴⁸Cm SF.

@ From ²⁴⁸Cm SF decay, the placement is based on analysis and discussion in 2002Sy01.

& Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

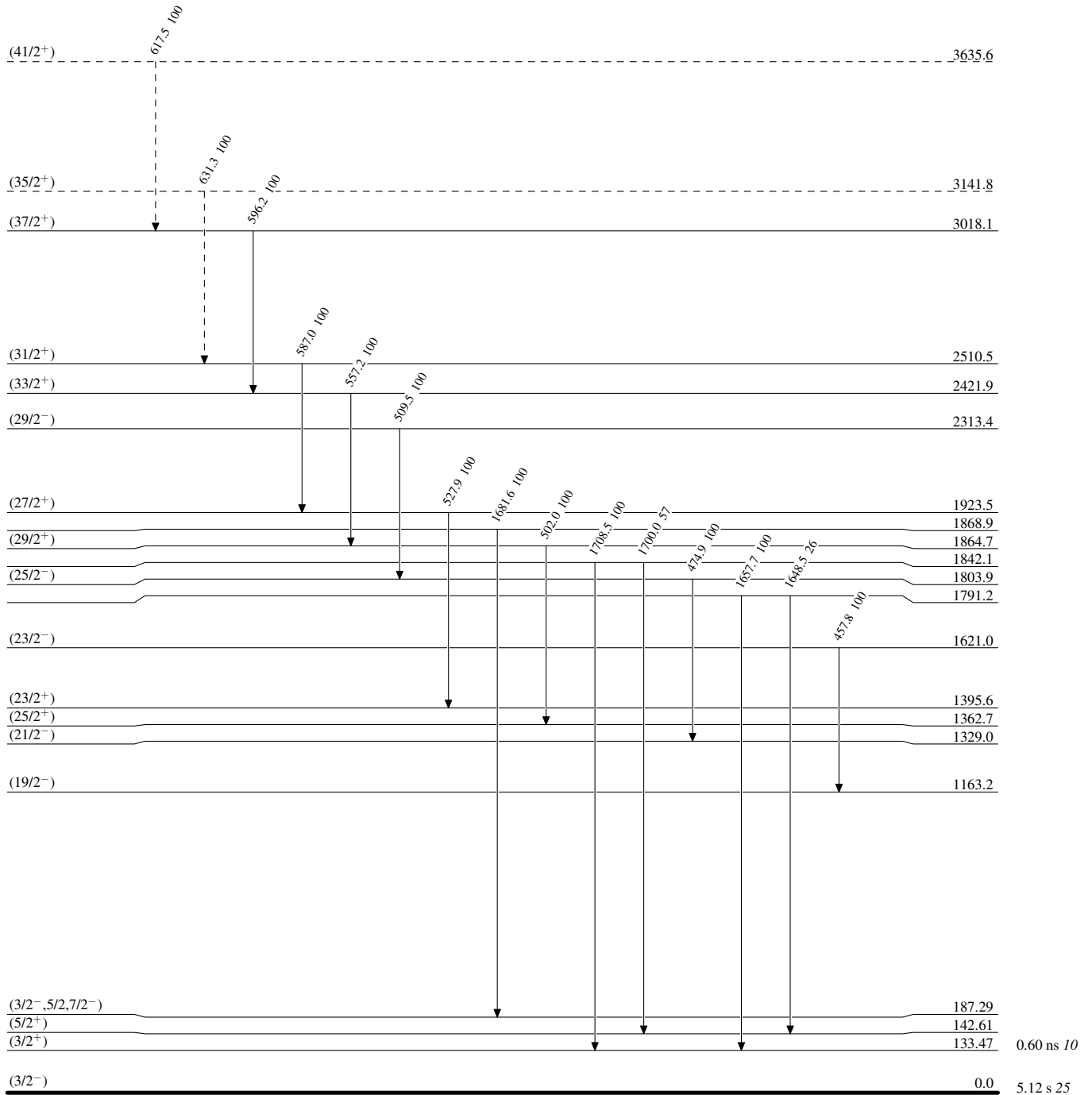
^a Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

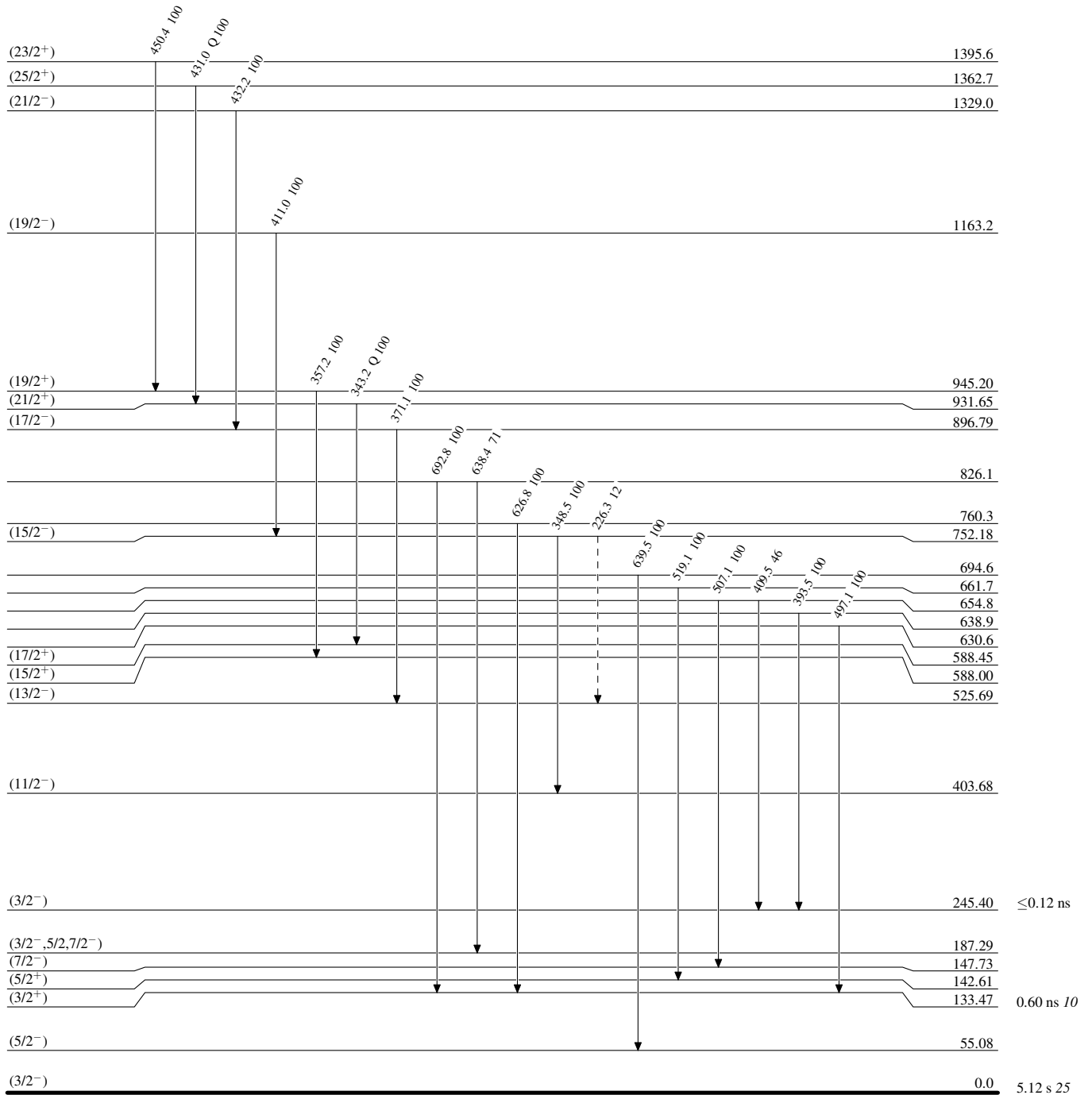
-----► γ Decay (Uncertain)


Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

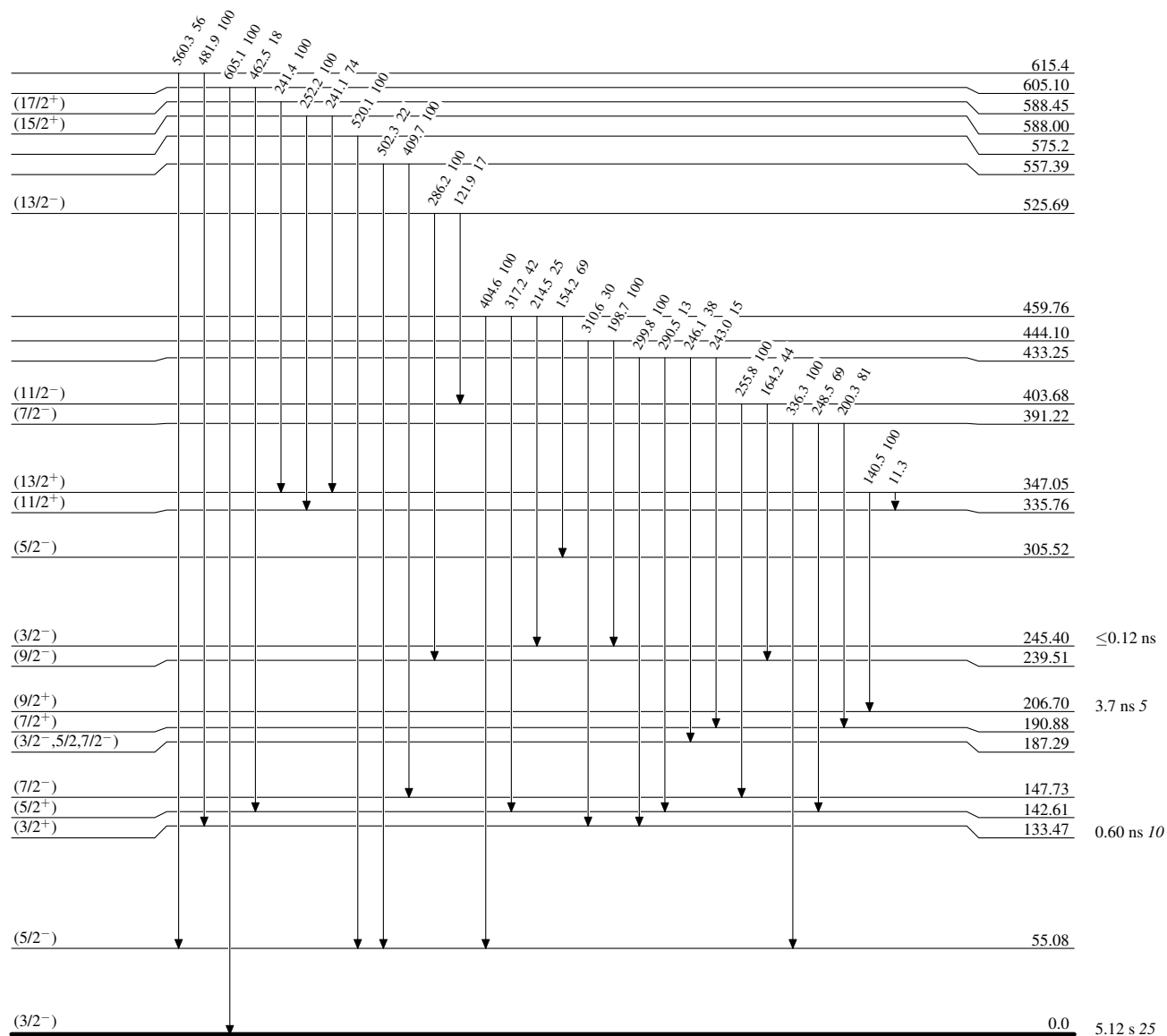
----- ► γ Decay (Uncertain)

Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

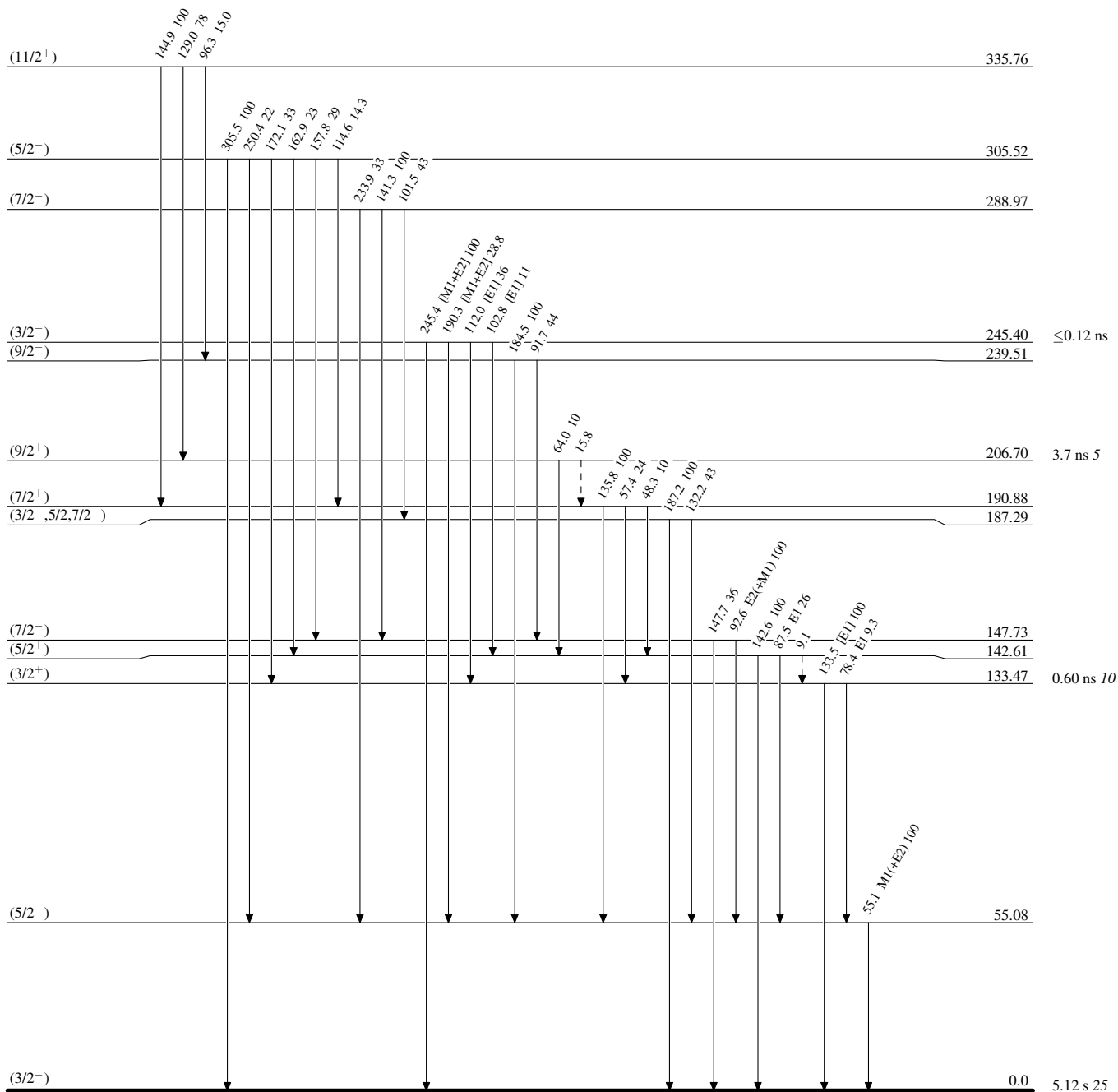
-----► γ Decay (Uncertain)

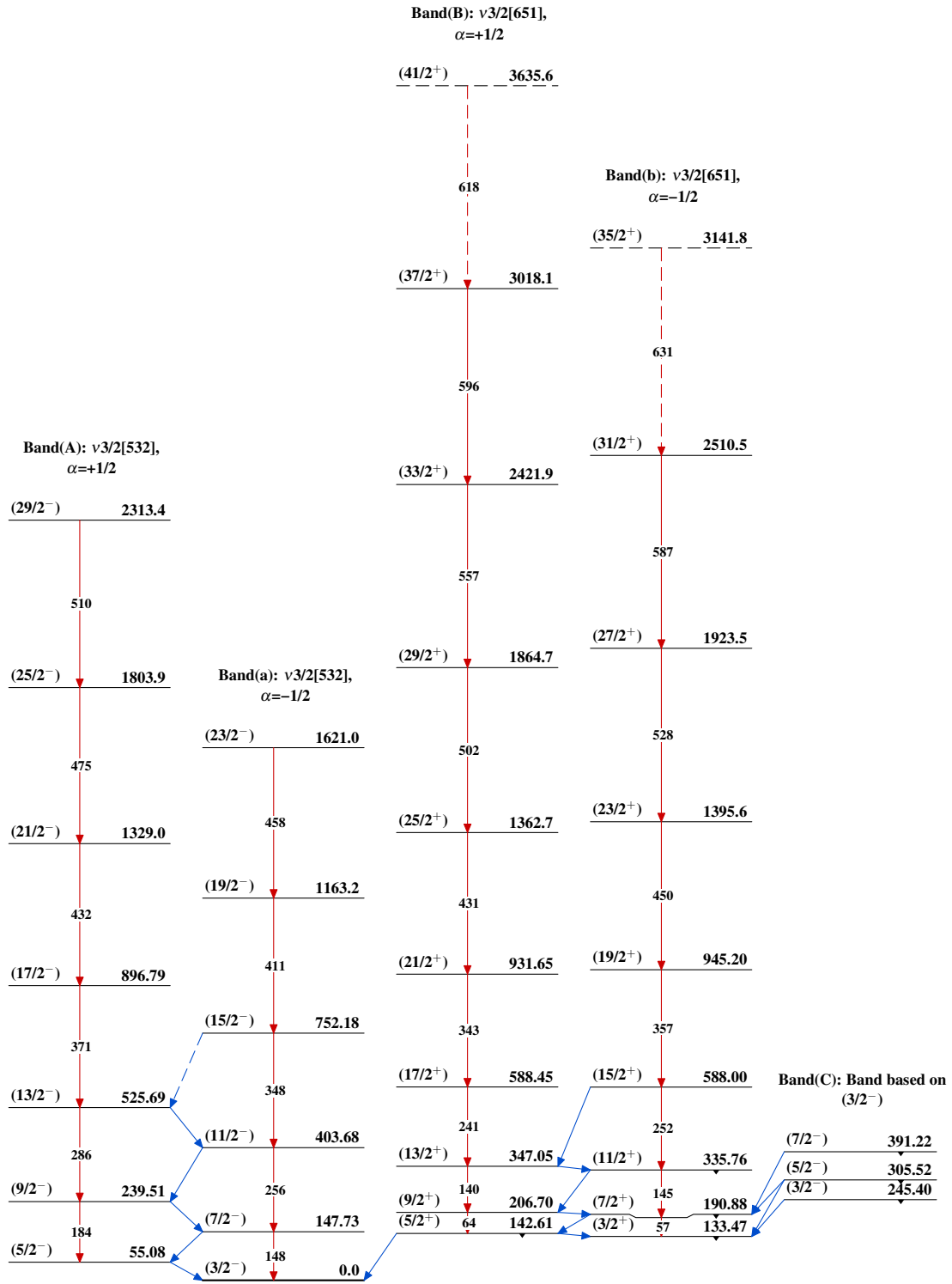
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)

Adopted Levels, Gammas $^{149}_{58}\text{Ce}_{91}$