

²⁵²Cf SF decay [2006Ch24,1995Ha20,1998ZhZH](#)

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 117, 1 (2014)	1-Oct-2013

Parent: ²⁵²Cf: E=0.0; J^π=0⁺; T_{1/2}=2.645 y 8; %SF decay=?

This reaction and level scheme was multiply studied by same group. Almost all references after 1990 (shown In the following two entries) are published by this group.

[2006Ch24](#): measured E_γ, I_γ, γγ using Gammasphere array of 102 Compton suppressed Ge detectors. Deduced octupole correlations. gave the most complete level scheme. All data In the tables are from this source, unless indicated otherwise.

[1971Ch44](#): measured I(γ+ce).

[1995Ha20,1995ZhZV,1998ZhZH,1999HaZV](#): measured E_γ, I_γ, γγx-ray, γX-ray, γγ(θ), γγγ(θ).

[2009Go09](#): measured g-factor of the first 2⁺ state by the method of correlation attenuations in randomly oriented magnetic fields, or Integral Perturbed Angular Correlation technique (IPAC), using the Gammasphere array.

[1999Sm05](#): measured g-factor of the first 2⁺ state using time-integral perturbed angular correlation method.

See also: measured γ, γγ, K x ray ([1995Zh39,1988Ph02,1970Wi16,1970Wa05,1971Ho29,1972Ho08,1974ClZX](#)), γ(t) ([2004Li66,1974JaZN,1974JaYY,1970Wa05,1970Wi16](#)) γ(θ) ([2010SmZZ](#)).

¹⁴⁸Ce Levels

E(level) [†]	J ^π [‡]	T _{1/2}	Comments
0.0 [@]	0 ⁺ [#]		
158.65 [@] 20	2 ⁺ [#]	1.06 ns 8	g=0.38 5 J ^π : ΔJ=2, E2 γ to 0 ⁺ , g.s.. T _{1/2} : from 1974JaZN, 1974JaYY . Others: 0.9 ns 3 (2006Hw01), 1.3 ns 3 (1970Wa05), ≈0.9 ns (1970Wi16). g: weighted average of 0.37 6 (1999Sm05) and 0.39 8 (2009Go09).
453.8 [@] 3	4 ⁺ [#]	0.2 ns +10-2	T _{1/2} : from 2004Li66 (0.2 ns 10 given In this reference was adjusted by evaluator to 0.2 ns +10-2).
839.9 [@] 4	6 ⁺ [#]		
1117.3 ^a 3	(3 ⁺)		
1290.7 [@] 4	8 ⁺ [#]		
1351.8 ^{&} 4	(7 ⁻)		
1423.6 ^a 3	(5 ⁺)		
1487.0 ^b 4	(4 ⁻)		
1682.5 ^b 4	(6 ⁻)		
1754.0 ^{&} 4	(9 ⁻)		
1787.2 ^a 4	(7 ⁺)		
1789.1 ^c 4	(7)		
1791.1 [@] 4	10 ⁺ [#]		
1954.6 ^b 4	(8 ⁻)		
2095.6 ^c 4	(9)		
2199.3 ^a 4	(9 ⁺)		
2225.1 ^{&} 4	(11 ⁻)		
2307.4 ^b 5	(10 ⁻)		
2328.2 [@] 4	12 ⁺ [#]		
2487.2 ^c 4	(11)		
2674.0 ^a 4	(11 ⁺)		
2751.6 ^b 6	(12 ⁻)		
2752.1 ^{&} 4	(13 ⁻)		
2888.3 [@] 5	14 ⁺ [#]		
2969.6 ^c 4	(13)		

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²⁵²Cf SF decay **2006Ch24,1995Ha20,1998ZhZH** (continued)

¹⁴⁸Ce Levels (continued)

E(level) [†]	J ^π [‡]	E(level) [†]	J ^π [‡]	E(level) [†]	J ^π [‡]	E(level) [†]	J ^π [‡]
3287.8 ^b 6	(14 ⁻)	3464.5 [@] 5	16 ^{+ #}	3944.5 ^{&} 5	(17 ⁻)	4685.8 [@] 6	20 ^{+ #}
3326.7 ^{&} 5	(15 ⁻)	3899.2 ^b 6	(16 ⁻)	4066.2 [@] 5	18 ^{+ #}	5311.6 [@] 6	22 ^{+ #}

[†] From least-squares fit to E_γ's.

[‡] From **2006Ch24** based on presumed rotational-band structure and systematics, unless noted otherwise.

E2 γ to 0⁺ band head and regular band sequence.

@ Band(A): K^π=0⁺ band, α=+1.

& Band(B): K^π=7⁻ band, α=+1.

^a Band(C): K^π=3⁺ band, α=-1.

^b Band(D): K^π=4⁻ band, α=-1.

^c Band(E): Band based on 7.

γ(¹⁴⁸Ce)

E _γ [‡]	I _γ [#]	E _i (level)	J _i ^π	E _f	J _f ^π	Mult.	α [†]	I _(γ+ce)	Comments
103.1 2	0.82 12	2328.2	12 ⁺	2225.1	(11 ⁻)				103.1 (2006Ch24).
104.8 2	4.8 3	1787.2	(7 ⁺)	1682.5	(6 ⁻)	E1	0.214		α(exp)=0.20 4 (2006Ch24) α(K)=0.182 3; α(L)=0.0252 4; α(M)=0.00525 8; α(N+..)=0.001338 19 α(N)=0.001148 16; α(O)=0.000179 3; α(P)=1.103×10 ⁻⁵ 16
108.0 6	3.7 2	2307.4	(10 ⁻)	2199.3	(9 ⁺)	E1	0.197 5		104.8 (2006Ch24). Mult.: based on α(exp). α(exp)=0.16 4 (2006Ch24) α(K)=0.167 4; α(L)=0.0232 5; α(M)=0.00482 11; α(N+..)=0.00123 3 α(N)=0.001054 23; α(O)=0.000164 4; α(P)=1.020×10 ⁻⁵ 21
136.3 2	0.75 10	2888.3	14 ⁺	2752.1	(13 ⁻)				108.6 (2006Ch24), 107.4 (1995Ha20). Mult.: based on α(exp).
137.8 2	0.3 1	3464.5	16 ⁺	3326.7	(15 ⁻)				136.3 (2006Ch24).
158.65 20	115 6	158.65	2 ⁺	0.0	0 ⁺	E2	0.406	2.31 [@] 35	137.8 (2006Ch24). ce(K)/(γ+ce)=0.2076 25; ce(L)/(γ+ce)=0.0635 10; ce(M)/(γ+ce)=0.01396 22; ce(N+)/(γ+ce)=0.00346 6 ce(N)/(γ+ce)=0.00301 5; ce(O)/(γ+ce)=0.000438 7; ce(P)/(γ+ce)=1.214×10 ⁻⁵ 19
166.95 20	8.7 4	1954.6	(8 ⁻)	1787.2	(7 ⁺)	E1	0.0584		158.8 (2006Ch24), 158.5 (1995Ha20). Mult.: K/L=3.7 (1970Wa05). α(exp)=0.044 8 (2006Ch24) α(K)=0.0499 8; α(L)=0.00669 10; α(M)=0.001392 20; α(N+..)=0.000357 6 α(N)=0.000306 5; α(O)=4.83×10 ⁻⁵

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²⁵²Cf SF decay **2006Ch24,1995Ha20,1998ZhZH (continued)**

γ(¹⁴⁸Ce) (continued)

<u>E_γ[‡]</u>	<u>I_γ[#]</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>I_(γ+ce)</u>	<u>Comments</u>
							7; α(P)=3.21×10 ⁻⁶ 5 167.1 (2006Ch24), 166.8 (1995Ha20). Mult.: based on α(exp).
195.7 ^{&}		1682.5	(6 ⁻)	1487.0	(4 ⁻)		195.7 (2006Ch24).
244.95 25	3.3 3	2199.3	(9 ⁺)	1954.6	(8 ⁻)		244.7 (2006Ch24), 245.2 (1995Ha20).
258.85 20	8.9 5	1682.5	(6 ⁻)	1423.6	(5 ⁺)		258.9 (2006Ch24), 258.8 (1995Ha20).
271.75 20	4.3 3	1954.6	(8 ⁻)	1682.5	(6 ⁻)		271.9 (2006Ch24), 271.6 (1995Ha20).
295.15 25	100 5	453.8	4 ⁺	158.65	2 ⁺	1.84 [@] 28	295.4 (2006Ch24), 294.9 (1995Ha20). (295.1γ)(158.5γ)(θ): A ₂ =+0.046 6, A ₄ =+0.001 9 (2009Go09, ÎPAC).
306.3 2	8.8 5	1423.6	(5 ⁺)	1117.3	(3 ⁺)		306.5 (2006Ch24), 306.1 (1995Ha20).
306.5 2	3.7 3	2095.6	(9)	1789.1	(7)		306.5 (2006Ch24).
352.9 4	6.8 6	2307.4	(10 ⁻)	1954.6	(8 ⁻)		353.3 (2006Ch24), 352.6 (1995Ha20).
363.65 20	7.2 4	1787.2	(7 ⁺)	1423.6	(5 ⁺)		363.7 (2006Ch24), 363.6 (1995Ha20).
369.7 2	8.0 5	1487.0	(4 ⁻)	1117.3	(3 ⁺)		369.7 (2006Ch24).
386.15 20	75 5	839.9	6 ⁺	453.8	4 ⁺	1.20 [@] 18	386.1 (2006Ch24), 386.2 (1995Ha20).
391.55 20	2.4 2	2487.2	(11)	2095.6	(9)		391.5 (2006Ch24), 391.6 (1995Ha20).
402.2 2	2.7 2	1754.0	(9 ⁻)	1351.8	(7 ⁻)		402.2 (2006Ch24).
411.9 2	2.2 2	2199.3	(9 ⁺)	1787.2	(7 ⁺)		411.8 (2006Ch24), 412.0 (1995Ha20).
423.9 2	2.3 2	2752.1	(13 ⁻)	2328.2	12 ⁺		423.9 (2006Ch24).
434.1 2	4.8 3	2225.1	(11 ⁻)	1791.1	10 ⁺		434.1 (2006Ch24).
438.4 2	1.4 2	3326.7	(15 ⁻)	2888.3	14 ⁺		438.4 (2006Ch24).
444.2 2	3.9 3	2751.6	(12 ⁻)	2307.4	(10 ⁻)		444.3 (2006Ch24), 444.1 (1995Ha20).
450.75 20	45 3	1290.7	8 ⁺	839.9	6 ⁺		450.7 (2006Ch24), 450.8 (1995Ha20).
463.2 2	5.7 3	1754.0	(9 ⁻)	1290.7	8 ⁺		463.3 (2006Ch24), 463.1 (1995Ha20).
471.1 2	2.0 2	2225.1	(11 ⁻)	1754.0	(9 ⁻)		471.1 (2006Ch24).
474.7 2	1.0 1	2674.0	(11 ⁺)	2199.3	(9 ⁺)		474.7 (2006Ch24).
482.5 2	1.7 2	2969.6	(13)	2487.2	(11)		482.5 (2006Ch24).
500.8 5	35 2	1791.1	10 ⁺	1290.7	8 ⁺		500.3 (2006Ch24), 501.3 (1995Ha20).
511.9 2	10.1 6	1351.8	(7 ⁻)	839.9	6 ⁺		511.8 (2006Ch24), 512.0 (1995Ha20).
527.0 2	1.5 2	2752.1	(13 ⁻)	2225.1	(11 ⁻)		527.0 (2006Ch24).
536.2 2	2.2 2	3287.8	(14 ⁻)	2751.6	(12 ⁻)		536.1 (2006Ch24), 536.3 (1995Ha20).
536.95 25	18 1	2328.2	12 ⁺	1791.1	10 ⁺		537.2 (2006Ch24), 536.7 (1995Ha20).
559.7 5	9.2 5	2888.3	14 ⁺	2328.2	12 ⁺		560.2 (2006Ch24), 559.2 (1995Ha20).
574.7 2	0.9 1	3326.7	(15 ⁻)	2752.1	(13 ⁻)		574.7 (2006Ch24).
576.15 20	7.3 4	3464.5	16 ⁺	2888.3	14 ⁺		576.2 (2006Ch24), 576.1 (1995Ha20).
583.5 3	5.3 3	1423.6	(5 ⁺)	839.9	6 ⁺		583.8 (2006Ch24), 583.2 (1995Ha20).
601.65 20	4.5 3	4066.2	18 ⁺	3464.5	16 ⁺		601.6 (2006Ch24), 601.7 (1995Ha20).
611.4 2	1.2 1	3899.2	(16 ⁻)	3287.8	(14 ⁻)		611.3 (2006Ch24), 611.5 (1995Ha20).
617.8 2	0.22 8	3944.5	(17 ⁻)	3326.7	(15 ⁻)		617.8 (2006Ch24).
619.6 2	2.3 2	4685.8	20 ⁺	4066.2	18 ⁺		619.7 (2006Ch24), 619.5 (1995Ha20).
625.8 2	0.8 2	5311.6	22 ⁺	4685.8	20 ⁺		625.8 (2006Ch24).
641.4 2	1.2 2	2969.6	(13)	2328.2	12 ⁺		641.4 (2006Ch24).
663.45 20	7.6 4	1117.3	(3 ⁺)	453.8	4 ⁺		663.4 (2006Ch24), 663.5 (1995Ha20).
696.1 2	2.4 2	2487.2	(11)	1791.1	10 ⁺		696.1 (2006Ch24).
804.9 2	2.4 2	2095.6	(9)	1290.7	8 ⁺		804.9 (2006Ch24), 804.9 (1995Ha20).
947.3 2	5.8 4	1787.2	(7 ⁺)	839.9	6 ⁺		947.5 (2006Ch24), 947.1 (1995Ha20).
949.1 2	5.8 4	1789.1	(7)	839.9	6 ⁺		949.1 (2006Ch24).
958.65 25	10.5 6	1117.3	(3 ⁺)	158.65	2 ⁺		958.9 (2006Ch24), 958.4 (1995Ha20).
969.65 25	9.2 5	1423.6	(5 ⁺)	453.8	4 ⁺		969.9 (2006Ch24), 969.4 (1995Ha20).

[†] Additional information 1.

[‡] Mean value of E_γ's given in comment with uncertainty adopted as half the difference of E_γ's and not smaller than 0.2 keV.

^{252}Cf SF decay [2006Ch24,1995Ha20,1998ZhZH](#) (continued)

$\gamma(^{148}\text{Ce})$ (continued)

Relative intensity.

@ γ +ce per 100 SF decays ([1971Ch44](#)).

& Placement of transition in the level scheme is uncertain.

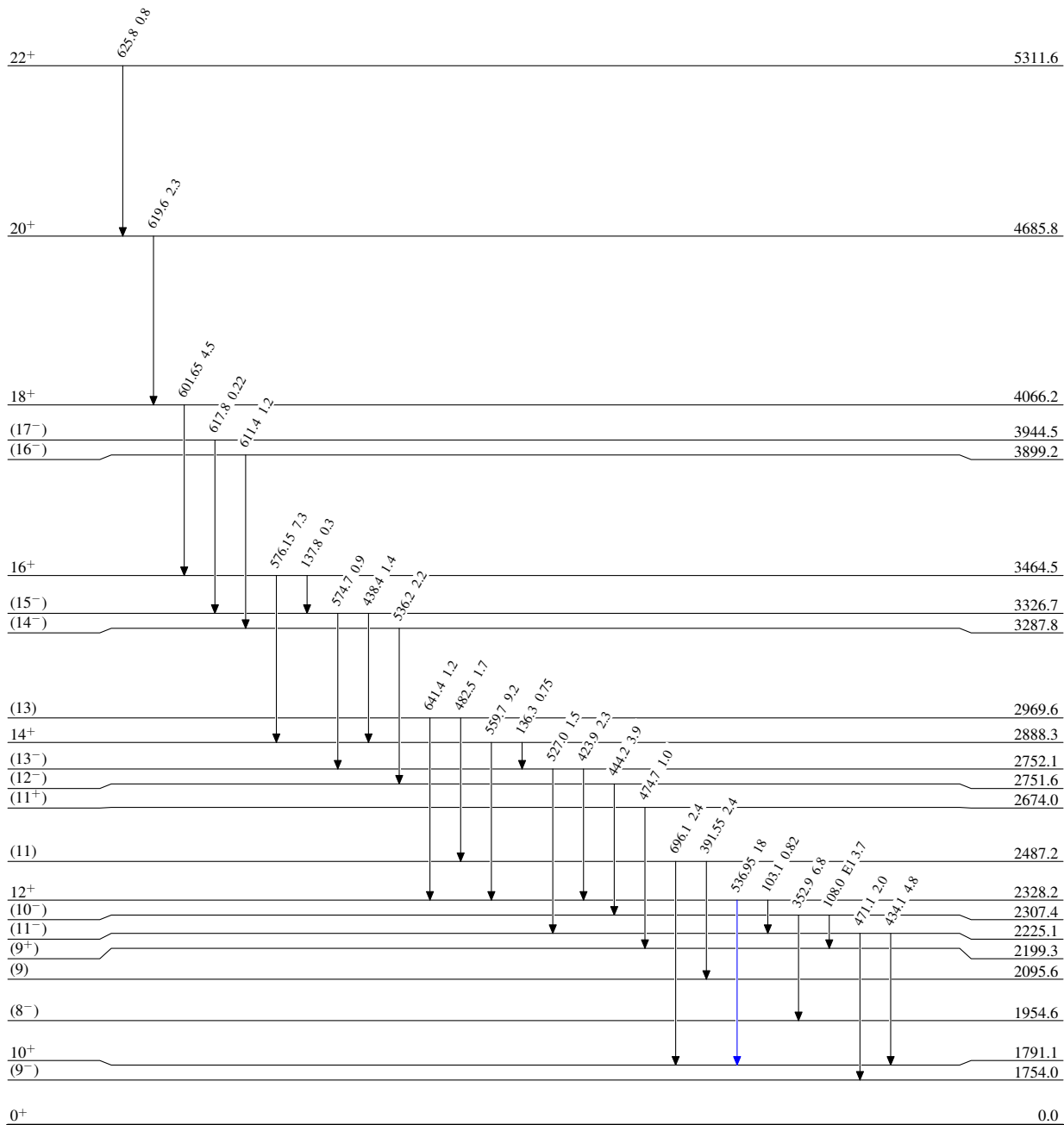
^{252}Cf SF decay 2006Ch24,1995Ha20,1998ZhZH

Level Scheme

Intensities: Relative I_γ

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$



$^{148}_{58}\text{Ce}_{90}$

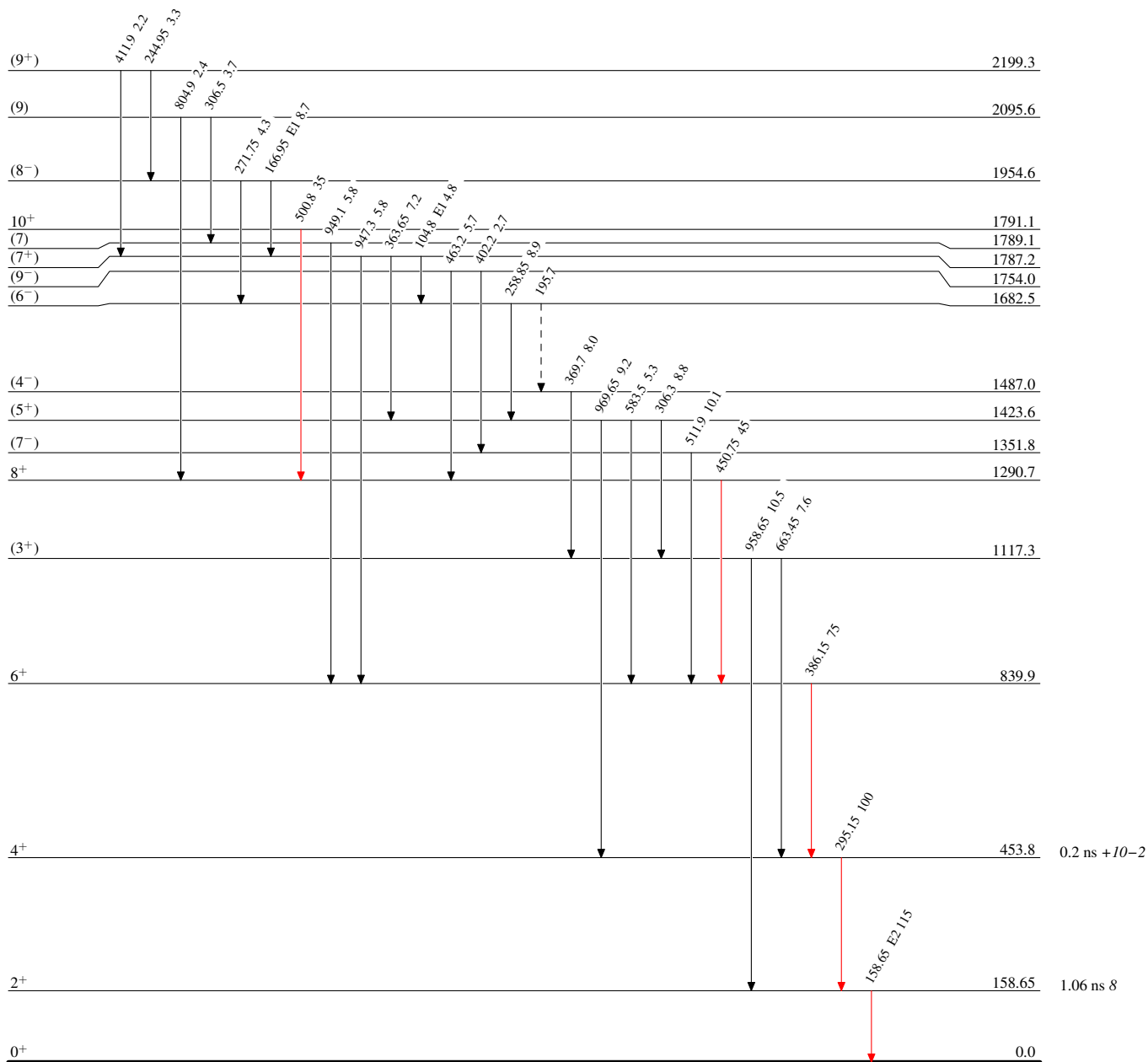
^{252}Cf SF decay 2006Ch24,1995Ha20,1998ZhZH

Legend

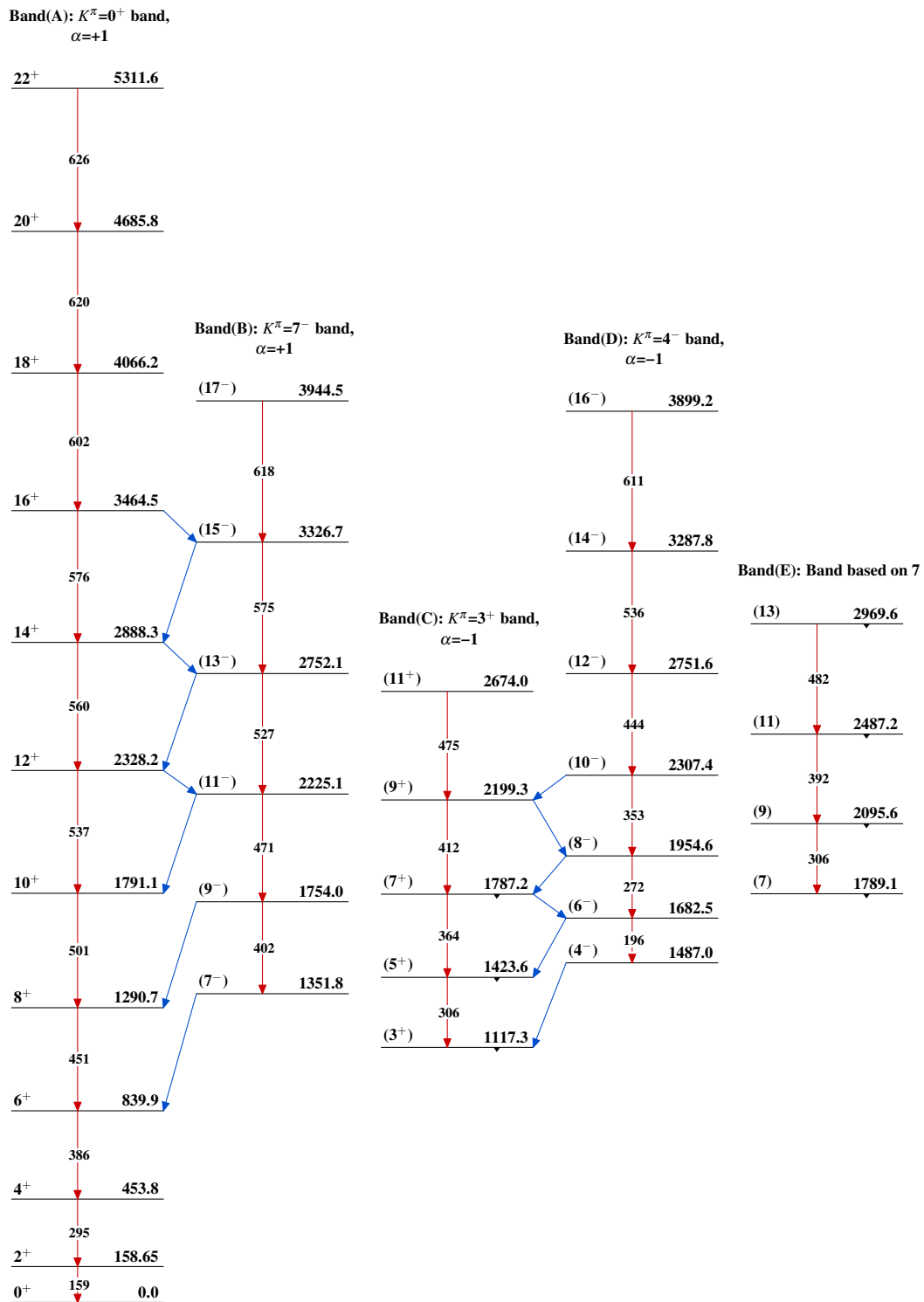
Level Scheme (continued)

Intensities: Relative I_γ

- ▶ $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
- ▶ $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
- ▶ $I_\gamma > 10\% \times I_\gamma^{\text{max}}$
- - -▶ γ Decay (Uncertain)



$^{148}_{58}\text{Ce}_{90}$

^{252}Cf SF decay 2006Ch24,1995Ha20,1998ZhZH $^{148}_{58}\text{Ce}_{90}$