

^{252}Cf SF decay [2009Li42](#)

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	P. K. Joshi, B. Singh, S. Singh, A. K. Jain		NDS 138, 1 (2016)	15-Oct-2016

Parent: ^{252}Cf : $E=0$; $J^\pi=0^+$; $T_{1/2}=2.645 \text{ y}$ 8; %SF decay=0.056 9

^{252}Cf - $T_{1/2}$: From ^{252}Cf Adopted Levels in the ENSDF database, March 2005 update.

^{252}Cf -%SF decay: From 1.8 3 per 100 fissions ([1994EnZZ](#)) and %SF=3.092 8 (^{252}Cf Adopted Levels in the ENSDF database, March 2005 update).

[2009Li42](#) (also [2010Li24](#)): measured Doppler corrected $E\gamma$, $I\gamma$, $\gamma\gamma$ coin, $\gamma\gamma(\theta)$ using Gammasphere array.

Others:

[1998Hw04](#): a level scheme of ^{139}Cs containing seven γ rays. All, except the 218 γ , have been reassigned to ^{142}Cs .

From studies of ^{248}Cm SF decay and ^{139}Xe β^- decay, [1999No05](#) concluded that the 218.6-408.6-618.4-387.5-503.0 cascade belonged to ^{142}Cs instead of ^{139}Cs . [1999No05](#) also noted that the 218.6 γ belonged to both the ^{139}Cs and ^{142}Cs nuclides.

[1972Ho08](#) reported three γ rays.

 ^{139}Cs Levels

E(level) [†]	J^π [‡]	Comments
0.0 [#]	7/2 ⁺	
218.6 <i>10</i>	(5/2 ⁺)	
595.4 <i>@</i> 9	9/2 ⁺	J^π : 9/2 or 11/2 based on yrast structure, the latter is ruled out based on A_2 value. π is determined based on the conversion coefficient of 236.9 γ .
601.6 [#] 9	11/2 ⁺	
1070.7 <i>@</i> 10	13/2 ⁺	
1146.0 [#] 12	15/2 ⁺	
1498.9 <i>@</i> 12	17/2 ⁺	
1735.8 [#] 13	19/2 ⁺	
1846.6 <i>&</i> 14		
2239.3 <i>@</i> 13	21/2 ⁺	
2391.1 <i>&</i> 15		
2492.4 [#] 14	(23/2 ⁺)	
2781.6 <i>&</i> 15		
2967.2 <i>@</i> 15	25/2 ⁺	
3189.8 17		
3337.6 [#] 17	(27/2 ⁺)	
3343.1 <i>&</i> 16		
3496.1 <i>@</i> 18	(29/2 ⁺)	
4145.1 [#] 20	(31/2 ⁺)	
4323.7 <i>@</i> 21	(33/2 ⁺)	
4669.7 <i>@</i> 23	(37/2 ⁺)	

[†] From least-squares fit to $E\gamma$ data, assuming 0.3 keV uncertainty for each γ ray.

[‡] As proposed in [2009Li42](#) based on multiplicities from $\gamma\gamma(\theta)$ data and band structures.

[#] Band(A): Band based on 7/2⁺, $\alpha=1$.

@ Band(a): Band based on 9/2⁺, $\alpha=0$.

& Band(B): γ cascade.

^{252}Cf SF decay [2009Li42](#) (continued)

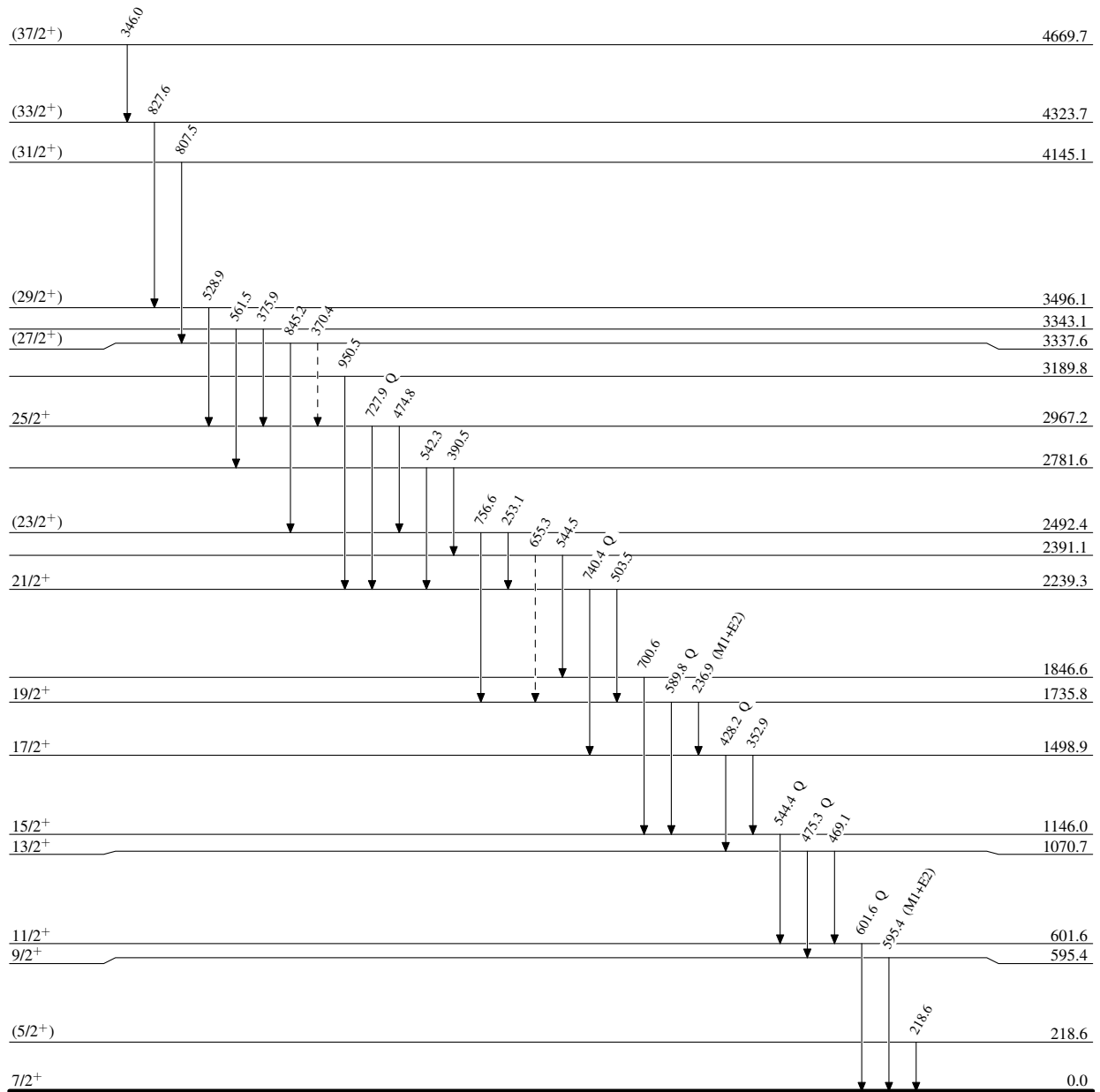
$\gamma(^{139}\text{Cs})$								
E_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [†]	δ	$\alpha^\ddagger$	Comments
218.6	218.6	(5/2 ⁺)	0.0	7/2 ⁺				
236.9	1735.8	19/2 ⁺	1498.9	17/2 ⁺	(M1+E2)		0.089 6	$\alpha(\text{exp})=0.086$ 12 (2009Li42) $\alpha(\text{K})=0.0733$ 23; $\alpha(\text{L})=0.012$ 3; $\alpha(\text{M})=0.0025$ 7 $\alpha(\text{N})=0.00052$ 13; $\alpha(\text{O})=6.9\times 10^{-5}$ 14; $\alpha(\text{P})=2.63\times 10^{-6}$ 17 Mult.: from total conversion coefficient deduced from intensity balance considerations in $\gamma\gamma$ -coincidence analysis (2009Li42).
253.1	2492.4	(23/2 ⁺)	2239.3	21/2 ⁺				
346.0	4669.7	(37/2 ⁺)	4323.7	(33/2 ⁺)				
352.9	1498.9	17/2 ⁺	1146.0	15/2 ⁺				
370.4 [#]	3337.6	(27/2 ⁺)	2967.2	25/2 ⁺				
375.9	3343.1		2967.2	25/2 ⁺				
390.5	2781.6		2391.1					
428.2	1498.9	17/2 ⁺	1070.7	13/2 ⁺	Q			(428 γ)(475 γ)(θ): $A_2=+0.11$ 1, $A_4=0.00$ 2.
469.1	1070.7	13/2 ⁺	601.6	11/2 ⁺				
474.8	2967.2	25/2 ⁺	2492.4	(23/2 ⁺)				
475.3	1070.7	13/2 ⁺	595.4	9/2 ⁺	Q			(475 γ)(595 γ)(θ): $A_2=-0.10$ 1, $A_4=-0.01$ 2.
503.5	2239.3	21/2 ⁺	1735.8	19/2 ⁺				
528.9	3496.1	(29/2 ⁺)	2967.2	25/2 ⁺				
542.3	2781.6		2239.3	21/2 ⁺				
544.4	1146.0	15/2 ⁺	601.6	11/2 ⁺	Q			(544 γ)(602 γ)(θ): $A_2=+0.09$ 2, $A_4=+0.01$ 3.
544.5	2391.1		1846.6					
561.5	3343.1		2781.6					
589.8	1735.8	19/2 ⁺	1146.0	15/2 ⁺	Q			(590 γ)(544 γ)(θ): $A_2=+0.10$ 4, $A_4=0.00$ 7.
595.4	595.4	9/2 ⁺	0.0	7/2 ⁺	(M1+E2)	-4.2 +4-5		δ : -4.2 +4-5 or -0.07 2 from $\gamma\gamma(\theta)$ (2009Li42), shell-model predicted value of -3.6 favors higher value. From RUL, large $\delta(\text{Q/D})$ is consistent with M1+E2 rather than E1+M2, assuming level half-life is less than 10 ns.
601.6	601.6	11/2 ⁺	0.0	7/2 ⁺	Q			
655.3 [#]	2391.1		1735.8	19/2 ⁺				
700.6	1846.6		1146.0	15/2 ⁺				
727.9	2967.2	25/2 ⁺	2239.3	21/2 ⁺	Q			(728 γ)(740 γ)(θ): $A_2=+0.11$ 3, $A_4=-0.01$ 4.
740.4	2239.3	21/2 ⁺	1498.9	17/2 ⁺	Q			(740 γ)(428 γ)(θ): $A_2=+0.11$ 2, $A_4=-0.02$ 3.
756.6	2492.4	(23/2 ⁺)	1735.8	19/2 ⁺				
807.5	4145.1	(31/2 ⁺)	3337.6	(27/2 ⁺)				
827.6	4323.7	(33/2 ⁺)	3496.1	(29/2 ⁺)				
845.2	3337.6	(27/2 ⁺)	2492.4	(23/2 ⁺)				
950.5	3189.8		2239.3	21/2 ⁺				

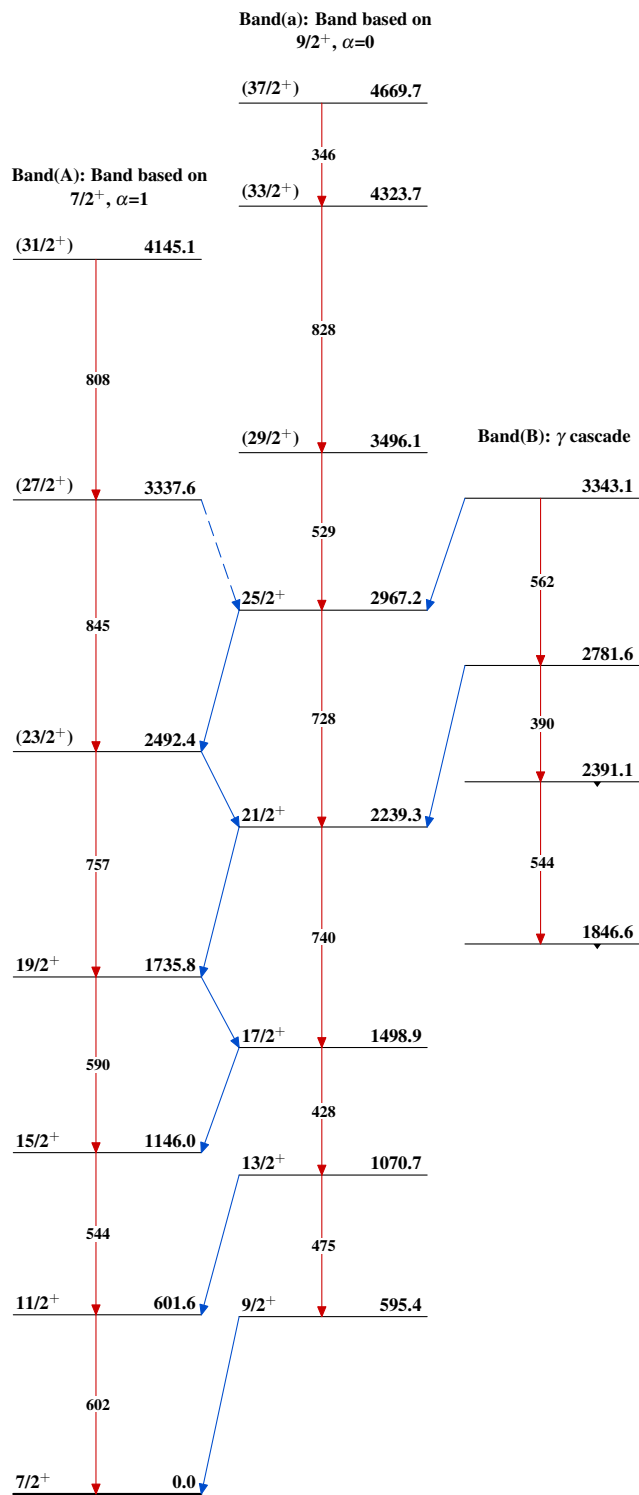
[†] From $\gamma\gamma(\theta)$ data, except as stated.[‡] Total theoretical internal conversion coefficients, calculated using the BrIcc code ([2008Ki07](#)) with Frozen orbital approximation based on γ -ray energies, assigned multiplicities, and mixing ratios, unless otherwise specified.[#] Placement of transition in the level scheme is uncertain.

^{252}Cf SF decay 2009Li42

Legend

Level Scheme

-----► γ Decay (Uncertain)

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