^{252}Cf SF decay 2002Lu08

History

Type	Author	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 y *8*; %SF decay=0.108 *7*

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

^{252}Cf-%SF decay: From 3.50 *21* per 100 fissions (1994EnZZ) and %SF=3.092 *8* (^{252}Cf Adopted Levels in the ENSDF database, Mar 2005 update). Other measurement: %SF=0.108(6) (1997Zh23).

2002Lu08: measured Eγ, Iγ, γγ, γγγ and higher fold events using GAMMASPHERE array with 102 Compton-suppressed Ge detectors. Source of 62 μCi sandwiched between two iron foils of 10 mg/cm^2 thickness was used.

1997Zh23 (from the same group as 2002Lu08): measured Eγ, Iγ, γγ- and triple γ-coincidences using arrays of 20 Compton-suppressed Ge detectors, and GAMMASPHERE (early implementation). All levels in this paper are also given in 2002Lu08, except that one band based on 1086 level has opposite parity to that in 2002Lu08. Evaluators assume that 2002Lu08 completely supersedes 1997Zh23.

^{139}Xe Levels

E(level)‡	Jπ#	Comments
0†	3/2$^-$	
22.75†@ *14*	(7/2$^-$)	
31.700†& *20*	(5/2$^-$)	
559.64& *12*	(9/2$^-$)	
593.88@ *16*	(11/2$^-$)	
1084.86& *16*	(13/2$^-$)	
1179.18@ *17*	(15/2$^-$)	
1512.38a *21*	(13/2$^+$)	
1576.70& *18*	(17/2$^-$)	
1809.55@ *19*	(19/2$^-$)	
2014.33a *20*	(17/2$^+$)	B(E1)/B(E2)=0.52×10^{-4} *5*.
2158.47& *20*	(21/2$^-$)	
2192.29b *23*		
2499.83@ *21*	(23/2$^-$)	
2574.58a *22*	(21/2$^+$)	B(E1)/B(E2)=0.19×10^{-4} *3*.
2921.50& *25*	(25/2$^-$)	
2925.06b *25*		
3161.35@ *24*	(27/2$^-$)	
3211.20a *23*	(25/2$^+$)	B(E1)/B(E2)=0.15×10^{-4} *5*.
3304.9 *3*		
3548.0 *3*	(27/2$^+$)	
3585.7& *3*	(29/2$^-$)	
3607.4b *4*		
3792.1a *3*	(29/2$^+$)	
4022.8@ *3*	(31/2$^-$)	
4232.2& *3*	(33/2$^-$)	
4411.8a *4*	(33/2$^+$)	
4984.8?@ *5*	(35/2$^-$)	
5096.1& *4*	(37/2$^-$)	
6091.1?& *6*	(41/2$^-$)	

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^{252}Cf SF decay 2002Lu08 (continued)

^{139}Xe Levels (continued)

† The lowest three levels with J^{π}=3/2$^-$, (7/2$^-$) and (5/2$^-$) probably arise from different couplings of $\nu f^3_{7/2}$ configuration. Higher levels of this band and that of s=+i band based on (7/2$^-$) are probably a mixture of $\nu f_{7/2}$ and $\nu h_{9/2}$ orbitals and quadrupole phonons.
‡ From least-squares fit to Eγ data.
# As proposed in 2002Lu08 based on decay modes and band structures.
@ Band(A): (7/2$^-$) band, simplex s=+i, α=−1/2.
& Band(a): (5/2$^-$) band, α=+1/2. Positive parity was assigned in 1997Zh23 for levels at 1086 and above.
a Band(B): (13/2$^+$) band; simplex s=+i, α=+1/2.
b Band(C): γ sequence.

γ(^{139}Xe)

E_γ †	I_γ †	E_i(level)	J^π_i	E_f	J^π_f	Comments
22.8‡ *2*		22.75	(7/2$^-$)	0	3/2$^-$	
31.70‡ *2*		31.700	(5/2$^-$)	0	3/2$^-$	
232.78 *21*	2.0 *8*	1809.55	(19/2$^-$)	1576.70	(17/2$^-$)	Additional information 10.
341.3 *3*	1.5 *12*	2499.83	(23/2$^-$)	2158.47	(21/2$^-$)	
348.98 *22*	2.5 *10*	2158.47	(21/2$^-$)	1809.55	(19/2$^-$)	Additional information 14.
382.67 *16*	1.2 *10*	2192.29		1809.55	(19/2$^-$)	Additional information 16.
397.53 *11*	17 *3*	1576.70	(17/2$^-$)	1179.18	(15/2$^-$)	Additional information 8.
425.1 *3*		2925.06		2499.83	(23/2$^-$)	
490.88 *14*		1084.86	(13/2$^-$)	593.88	(11/2$^-$)	Additional information 4.
491.77 *14*		1576.70	(17/2$^-$)	1084.86	(13/2$^-$)	Additional information 9.
502.02 *22*	0.4 *3*	2014.33	(17/2$^+$)	1512.38	(13/2$^+$)	Additional information 12.
525.24 *14*	3.0 *12*	1084.86	(13/2$^-$)	559.64	(9/2$^-$)	Additional information 5.
527.92 *14*	12 *2*	559.64	(9/2$^-$)	31.700	(5/2$^-$)	Additional information 1.
536.94 *14*	9 *2*	559.64	(9/2$^-$)	22.75	(7/2$^-$)	Additional information 2.
560.27 *17*	1.1 *9*	2574.58	(21/2$^+$)	2014.33	(17/2$^+$)	Additional information 18.
571.11 *10*	100 *20*	593.88	(11/2$^-$)	22.75	(7/2$^-$)	Additional information 3.
580.94 *18*	0.8 *6*	3792.1	(29/2$^+$)	3211.20	(25/2$^+$)	Additional information 29.
581.74 *12*	18 *4*	2158.47	(21/2$^-$)	1576.70	(17/2$^-$)	Additional information 15.
585.32 *10*	71 *14*	1179.18	(15/2$^-$)	593.88	(11/2$^-$)	Additional information 6.
619.63 *15*		4411.8	(33/2$^+$)	3792.1	(29/2$^+$)	Additional information 32.
626.52 *16*	1.6 *13*	3548.0	(27/2$^+$)	2921.50	(25/2$^-$)	Additional information 26.
630.38 *10*	22 *4*	1809.55	(19/2$^-$)	1179.18	(15/2$^-$)	Additional information 11.
636.65 *18*	2.6 *10*	3211.20	(25/2$^+$)	2574.58	(21/2$^+$)	Additional information 23.
646.53 *13*	1.4 *11*	4232.2	(33/2$^-$)	3585.7	(29/2$^-$)	Additional information 31.
661.52 *12*	3.3 *13*	3161.35	(27/2$^-$)	2499.83	(23/2$^-$)	Additional information 22.
664.16 *14*	4.3 *17*	3585.7	(29/2$^-$)	2921.50	(25/2$^-$)	Additional information 27.
682.30 *26*	0.9 *7*	3607.4		2925.06		Additional information 28.
690.24 *14*	8.0 *16*	2499.83	(23/2$^-$)	1809.55	(19/2$^-$)	Additional information 17.
711.34 *15*	1.7 *14*	3211.20	(25/2$^+$)	2499.83	(23/2$^-$)	Additional information 24.
732.74 *19*	1.8 *14*	2925.06		2192.29		Additional information 21.
763.03 *14*	7.9 *16*	2921.50	(25/2$^-$)	2158.47	(21/2$^-$)	Additional information 20.
765.04 *22*	2.2 *9*	2574.58	(21/2$^+$)	1809.55	(19/2$^-$)	Additional information 19.
805.04 *22*	1.7 *14*	3304.9		2499.83	(23/2$^-$)	Additional information 25.
835.14 *14*	4.9 *20*	2014.33	(17/2$^+$)	1179.18	(15/2$^-$)	Additional information 13.
861.49 *18*	1.0 *8*	4022.8	(31/2$^-$)	3161.35	(27/2$^-$)	Additional information 30.
863.94 *14*	1.2 *10*	5096.1	(37/2$^-$)	4232.2	(33/2$^-$)	Additional information 33.
918.54 *16*	2.0 *8*	1512.38	(13/2$^+$)	593.88	(11/2$^-$)	Additional information 7.
962.0# *4*		4984.8?	(35/2$^-$)	4022.8	(31/2$^-$)	
995.0# *4*		6091.1?	(41/2$^-$)	5096.1	(37/2$^-$)	

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^{252}Cf SF decay 2002Lu08 (continued)

$\gamma(^{139}Xe)$ (continued)

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π
1013.4 *4*	1.6 *13*	2192.29		1179.18	(15/2$^-$)
1115.7 *3*	0.8 *6*	2925.06		1809.55	(19/2$^-$)

[†] From table II of 2002Lu08, except where noted. Energies given in figure 4 of 2002Lu08 are level-energy differences. Systematic uncertainty in Eγ values is stated as 0.1 keV by 2002Lu08. The uncertainties for Iγ values are stated 20% for intense transitions and 80% for weaker γ rays. Evaluators assign ≈20% for Iγ>5, 40% for Iγ=2-5 and ≈80% for Iγ<2. For Eγ values, 2002Lu08 seem to give only the statistical uncertainties. The evaluators have added 0.1 keV systematic uncertainty in quadrature.

[‡] From Adopted Gammas.

[#] Placement of transition in the level scheme is uncertain.

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Level Scheme

Intensities: Relative I_γ

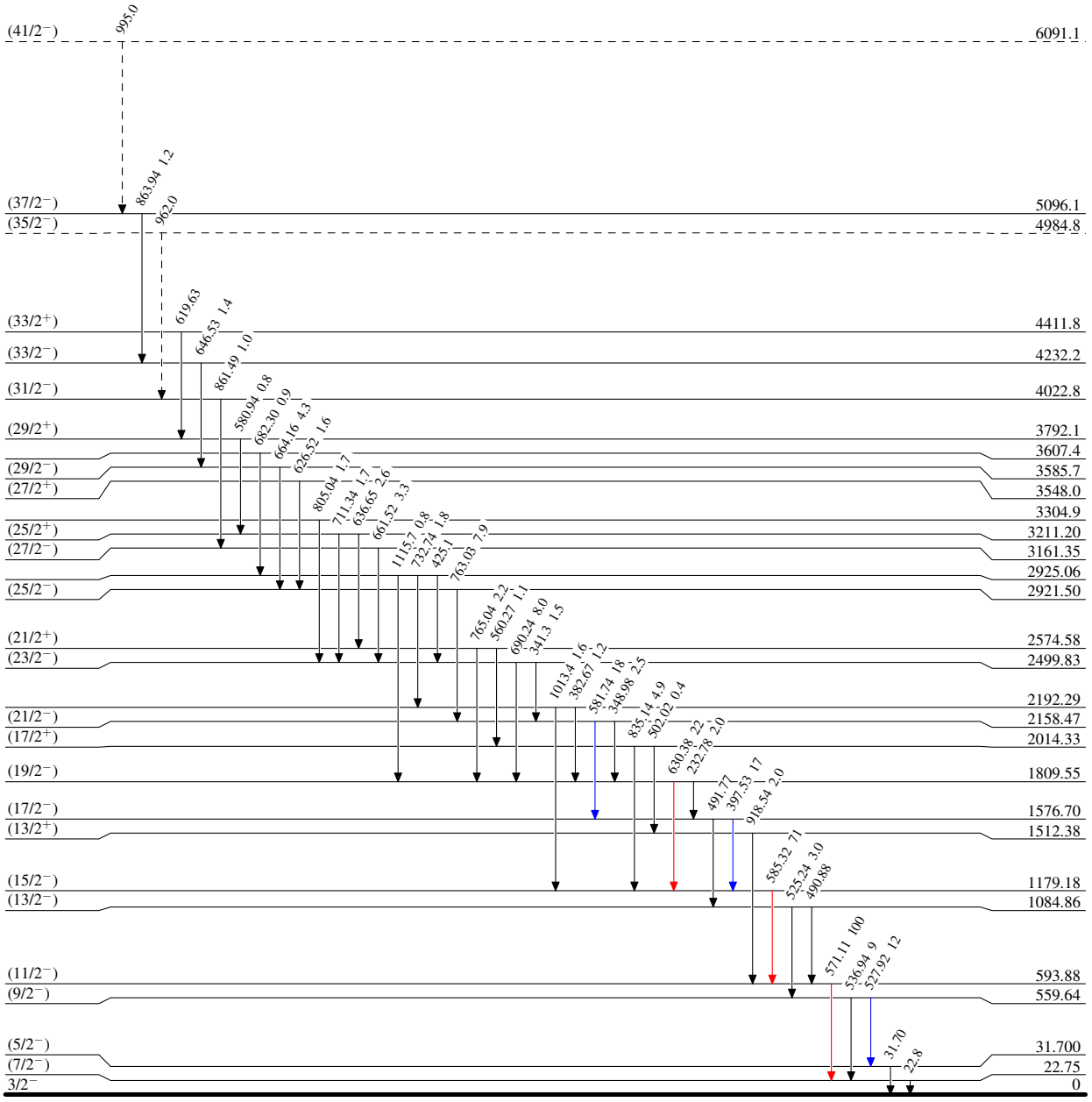
Legend

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

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

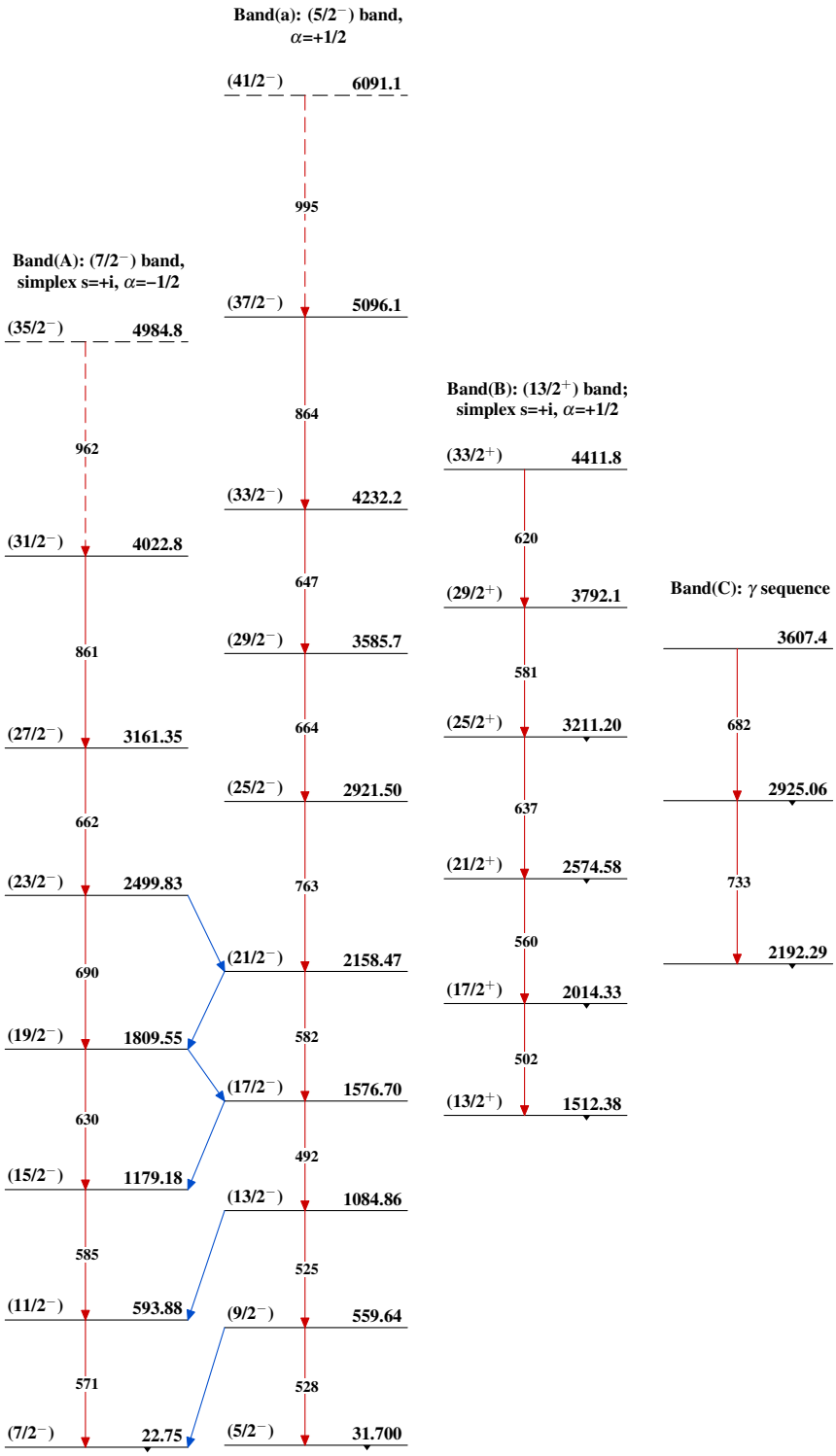
$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



$^{139}_{54}Xe_{85}$

^{252}Cf SF decay 2002Lu08



$^{139}_{54}Xe_{85}$