

^{122}Cs ε decay (3.70 min) **1977Ge03**

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	T. Tamura	NDS 108, 455 (2007)	30-Sep-2006

Parent: ^{122}Cs : E=140 30; $J^\pi=8^{(-)}$; $T_{1/2}=3.70$ min 11; $Q(\varepsilon)=7220$ 30; $\% \varepsilon + \% \beta^+$ decay=100.0

The decay scheme is that proposed by **1977Ge03** on the basis of $\gamma\gamma$ -coincidence and $E\gamma$ sums; Evaluator added 2564.4-keV level to displace 1097.8-keV γ from 2872.3-keV level. The decay scheme accounts for $\%I(\varepsilon+\beta^+)=80$ and is incomplete in view of $Q_{\varepsilon}-E(\text{highest level})>4200$ keV. See also ^{122}Cs β^+ decay (21.18 s).

1977Ge03: La(p,spallation) E(p)=600 MeV, MS; semi γ , ce, $\gamma\gamma$ -coincidence, $ce\gamma$ -coincidence.

Others: γ ray: (**1972Dr06**,**1969DrZY**,**1969NeZY**).

 ^{122}Xe Levels

E(level)	J^π [‡]	E(level)	J^π [‡]	E(level)	J^π [‡]	E(level)	J^π [‡]
0.0	0 ⁺	1214.02 19	(3) ⁺	2056.4 3	(6) ⁺	2846.9 4	7,8 ⁺
331.13 17	2 ⁺	1402.4 3	(4) ⁺	2217.4 4	8 ⁺	2872.5 5	(7) ⁻
828.31 22	4 ⁺	1466.8 3	6 ⁺	2458.8 4	(7) ⁺	3030.4 6	
842.97 17	(2 ⁺)	1774.21 24	(5) ⁺	2564.6 [†] 4	(7) ⁻	3072.3 5	

[†] The level was added to place 1097.8 γ referring to Adopted Levels (evaluator).

[‡] From Adopted Levels.

 ε, β^+ radiations

Evaluator notes that the apparent $\%(\varepsilon+\beta^+)=22.3$ to 1467 ($J=6^+$) and $\%(\varepsilon+\beta^+)=8.9$ to 2056 ($J=(6)^+$) with $\log f^{1u}_t=8.1$ for both cases might be too strong. There occur also imbalances at 828($J=4^+$), 843($J=(2)^+$) and 1744($J=(5)^+$) levels summing up to 20%.

These feeding problems indicate the incompleteness of the decay scheme in view of $Q_{\varepsilon}-E(\text{highest level})>4200$ keV.

$I\beta, \log ft$ Approximate value.

E(decay)	E(level)	$I\beta^+$ [†]	$I\varepsilon$ [†]	Log ft	$I(\varepsilon+\beta^+)$ [†]	Comments
(4.29×10^3) 4)	3072.3	3.8	0.94	6.2	4.7	av $E\beta=1483$ 20; $\varepsilon K=0.171$ 6; $\varepsilon L=0.0228$ 8; $\varepsilon M+=0.00618$ 20
(4.33×10^3) 4)	3030.4	1.13	0.272	6.8	1.40	av $E\beta=1503$ 20; $\varepsilon K=0.166$ 6; $\varepsilon L=0.0221$ 7; $\varepsilon M+=0.00599$ 19
(4.49×10^3) 4)	2872.5	7.2	1.5	6.1	8.7	av $E\beta=1577$ 20; $\varepsilon K=0.148$ 5; $\varepsilon L=0.0197$ 6; $\varepsilon M+=0.00535$ 17
(4.51×10^3) 4)	2846.9	4.3	0.89	6.3	5.2	av $E\beta=1589$ 20; $\varepsilon K=0.146$ 5; $\varepsilon L=0.0194$ 6; $\varepsilon M+=0.00525$ 17
(4.80×10^3) 4)	2564.6	10.1	1.64	6.1	11.7	av $E\beta=1722$ 20; $\varepsilon K=0.120$ 4; $\varepsilon L=0.0159$ 5; $\varepsilon M+=0.00432$ 13
(4.90×10^3) 4)	2458.8	5.8	0.88	6.4	6.7	av $E\beta=1771$ 20; $\varepsilon K=0.112$ 4; $\varepsilon L=0.0148$ 5; $\varepsilon M+=0.00402$ 12
(5.14×10^3) 4)	2217.4	8.8	1.1	6.3	9.9	av $E\beta=1886$ 21; $\varepsilon K=0.096$ 3; $\varepsilon L=0.0127$ 4; $\varepsilon M+=0.00344$ 10
(5.30×10^3) [‡] 4)	2056.4	7.0	1.9	8.1 ^{1u}	8.9	av $E\beta=1950$ 20; $\varepsilon K=0.180$ 5; $\varepsilon L=0.0241$ 7; $\varepsilon M+=0.00655$ 17
(5.89×10^3) [‡] 4)	1466.8	18.9	3.35	8.1 ^{1u}	22.3	av $E\beta=2225$ 20; $\varepsilon K=0.129$ 3; $\varepsilon L=0.0172$ 4; $\varepsilon M+=0.00467$ 12

[†] For absolute intensity per 100 decays, multiply by ≈ 1.0 .

[‡] Existence of this branch is questionable.

^{122}Cs ε decay (3.70 min) **1977Ge03** (continued) $\gamma(^{122}\text{Xe})$ I γ normalization: from Σ Ti(to g.s.)=100.

E_γ [†]	I_γ ^{‡a}	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [#]	δ [@]	α ^{&}	Comments
^x 278.1 4	1.3 2								
^x 280.4 4	2.0 2								
307.6 3	1.6 2	1774.21	(5) ⁺	1466.8	6 ⁺	[M1,E2]		0.0386	$\alpha(\text{K})_{\text{exp}}=0.041$ 10. $\alpha(\text{K})=0.0326$; $\alpha(\text{L})=0.00483$; $\alpha(\text{M})=0.00098$; $\alpha(\text{N}+..)=0.00025$
331.1 2	100	331.13	2 ⁺	0.0	0 ⁺	E2		0.0307	$\alpha(\text{K})=0.0254$; $\alpha(\text{L})=0.00419$; $\alpha(\text{M})=0.00086$; $\alpha(\text{N}+..)=0.00021$
371.0 ^b 2	2.6 ^b 8	1214.02	(3) ⁺	842.97	(2 ⁺)	(M1)		0.0237	$\alpha(\text{K})=0.02047$; $\alpha(\text{L})=0.00262$; $\alpha(\text{M})=0.00052$; $\alpha(\text{N}+..)=0.00013$ I γ : from I γ (doublet)=3.7 7 and I(γ)/I(983 γ)=0.35 9 in ^{122}Cs ε decay (21.18 s). Mult.: from $\alpha(\text{K})_{\text{exp}}=0.035$ 9 for the doubly placed 371 g's.
371.0 ^{bc} 2	1.1 ^b 11	1774.21	(5) ⁺	1402.4	(4) ⁺	(M1)		0.0237	$\alpha(\text{K})=0.02047$; $\alpha(\text{L})=0.00262$; $\alpha(\text{M})=0.00052$; $\alpha(\text{N}+..)=0.00013$ I γ : from I γ (doublet)=3.7 7 and I(γ) deduced for the alternate placement (see 1214 level). Mult.: from $\alpha(\text{K})_{\text{exp}}=0.035$ 9 for the doubly placed 371 g's.
385.6 3	0.8 2	1214.02	(3) ⁺	828.31	4 ⁺	(M1,E2)		0.0203 12	$\alpha(\text{K})=0.01726$; $\alpha(\text{L})=0.00244$; $\alpha(\text{M})=0.00049$; $\alpha(\text{N}+..)=0.00012$
^x 459.0 4	0.7 3								
^x 467.0 4	0.8 3								
497.1 2	85 5	828.31	4 ⁺	331.13	2 ⁺	E2		0.00912	$\alpha(\text{K})=0.00772$; $\alpha(\text{L})=0.00112$; $\alpha(\text{M})=0.00023$ $\alpha(\text{K})_{\text{exp}}=0.0070$ 17. Mult.: from $^{122}\text{Te}(^3\text{He},$ 3n $\gamma)$, $^{110}\text{Pd}(^{16}\text{O},4n\gamma)$.
512.0 4	8.6 16	842.97	(2 ⁺)	331.13	2 ⁺	[M1,E2]		0.00959	$\alpha(\text{K})=0.00814$; $\alpha(\text{L})=0.00109$ I γ deduced from I(ce) and $\alpha(\text{K})=0.0081$ 10 (M1,E2 ($\delta=1$) theory).
560.1 ^b 5	3.1 ^b 20	1402.4	(4) ⁺	842.97	(2 ⁺)	(E2)		0.00664	$\alpha(\text{K})=0.00648$; $\alpha(\text{L})=0.00086$ I γ : from I γ (doublet)=15.0 20 and intensity balance at 1402 level; intensity balance at 842 level gives I γ =10.7 17.
560.1 ^b 2	12.1 ^b 20	1774.21	(5) ⁺	1214.02	(3) ⁺	(E2)		0.00664	$\alpha(\text{K})=0.00560$; $\alpha(\text{L})=0.00079$ I γ : from I γ (doublet)=15.0 20 and average values of intensity balances at 1214 and 1774 levels. Mult.: from $\alpha(\text{K})_{\text{exp}}=0.0055$ 14 for the doubly placed 560 g's.
574.0 2	6.0 7	1402.4	(4) ⁺	828.31	4 ⁺	M1+E2	>1.9	0.0072 9	$\alpha(\text{K})=0.00609$; $\alpha(\text{L})=0.00080$ $\alpha(\text{K})_{\text{exp}}=0.0050$ 13.
589.5 2	2.5 5	2056.4	(6) ⁺	1466.8	6 ⁺	(M1)		0.00758	$\alpha(\text{K})=0.00650$; $\alpha(\text{L})=0.00081$ $\alpha(\text{K})_{\text{exp}}=0.011$ 5.
638.5 2	67 5	1466.8	6 ⁺	828.31	4 ⁺	E2		0.00472	$\alpha(\text{K})=0.00399$; $\alpha(\text{L})=0.00055$ $\alpha(\text{K})_{\text{exp}}=0.0037$ 9.
654.1 3	8.0 15	2056.4	(6) ⁺	1402.4	(4) ⁺	E2		0.00444	$\alpha(\text{K})=0.00440$; $\alpha(\text{L})=0.00057$ $\alpha(\text{K})_{\text{exp}}=0.0029$ 12.

Continued on next page (footnotes at end of table)

^{122}Cs ε decay (3.70 min) **1977Ge03** (continued) $\gamma(^{122}\text{Xe})$ (continued)

$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [#]	$\delta^\oplus$	$\alpha^\&$	Comments
684.6 3	5.0 7	2458.8	(7) ⁺	1774.21	(5) ⁺	E2		0.00395	$\alpha(\text{K})=0.00394$; $\alpha(\text{L})=0.00051$ $\alpha(\text{K})_{\text{exp}}=0.0034$ 13.
^x 738.3 4	0.7 3								
750.6 2	12.0 20	2217.4	8 ⁺	1466.8	6 ⁺	E2		0.00315	$\alpha(\text{K})=0.00268$; $\alpha(\text{L})=0.00036$ $\alpha(\text{K})_{\text{exp}}=0.0023$ 9.
^x 781.4 4	1.3 3								
790.5 3	1.8 3	2846.9	7,8 ⁺	2056.4	(6) ⁺				
^x 797.5 4	0.8 3								
813.0 4	1.5 2	3030.4		2217.4	8 ⁺				
^x 815.4 4	2.6 4								
^x 828.3 4	0.7 3								
843.0 2	3.9 7	842.97	(2) ⁺	0.0	0 ⁺				
882.9 2	7.5 14	1214.02	(3) ⁺	331.13	2 ⁺	M1+E2	-3 +1-3	0.00223 8	$\alpha(\text{K})_{\text{exp}}=0.0011$ 5.
^x 921.9 4	0.8 3								
945.9 3	4.5 7	1774.21	(5) ⁺	828.31	4 ⁺	M1+E2	+0.9 +20-4	0.0022 3	
^x 971.2 3	1.5 2								
994.2 ^c 3	2.1 4	2458.8	(7) ⁺	1466.8	6 ⁺				E_γ : Level energy difference is 992.0; other data: 991.9 (2003Mo27).
^x 1024.6 3	1.0 4								
^x 1058.8 4	1.0 3								
^x 1088.8 3	4.0 10								
1097.8 2	12.5 20	2564.6	(7) ⁻	1466.8	6 ⁺				This γ belongs to 2872-keV level in 1977Ge03 , but displaced referring to Adopted Levels (evaluator).
^x 1123.5 6	1.0 4								
^x 1126.6 8	0.9 4								
^x 1164.8 5	1.4 3								
^x 1202.0 6	1.1 5								
1228.1 6	0.8 4	2056.4	(6) ⁺	828.31	4 ⁺				
1298.1 4	5.0 7	3072.3		1774.21	(5) ⁺				
^x 1334.0 6	0.7 4								
1380.1 5	3.8 10	2846.9	7,8 ⁺	1466.8	6 ⁺				
1405.7 4	9.3 20	2872.5	(7) ⁻	1466.8	6 ⁺				
^x 1411.5 8	0.7 4								
^x 1460.0 4	4.6 7								
^x 1495.5 4	3.5 13								
^x 1561.5 5	1.1 4								
^x 1572.6 4	1.1 5								
^x 1588.8 6	0.8 5								
^x 1634.0 4	1.0 4								
^x 1684.6 4	1.9 8								
^x 1697.5 6	1.0 5								
^x 1765.9 8	1.1 4								
^x 2052.1 5	2.7 3								
^x 2102.1 5	2.5 5								
^x 2162.2 8	0.6 2								
^x 2173.0 8	0.5 2								
^x 2208.4 8	0.5 2								
^x 2224.6 6	0.9 4								

[†] From **1977Ge03**.[‡] Relative to I(331.1 γ)=100.

Continued on next page (footnotes at end of table)

^{122}Cs ε decay (3.70 min) **1977Ge03** (continued)

$\gamma(^{122}\text{Xe})$ (continued)

From Adopted Levels; values of $\alpha(K)\text{exp}$ quoted from this data set are normalized to $\alpha(K)(331\ \gamma)=0.025$ (E2 theory).

@ From Adopted Gammas.

& $\delta=1$ is assumed for all E2,M1 transitions with unknown δ value.

^a For absolute intensity per 100 decays, multiply by 0.935 42.

^b Multiply placed with intensity suitably divided.

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

^x γ ray not placed in level scheme.

^{122}Cs ε decay (3.70 min) $^{1977}\text{Ge03}$

Decay Scheme

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)
- Coincidence

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
 @ Multiply placed: intensity suitably divided

$^{122}_{55}\text{Cs}_{67}$ 3.70 min 11
 $Q_\varepsilon = 7220.30$
 $8(-)$ 140
 $\% \varepsilon + \% \beta^+ = 100$

