^{129}In β^- decay (611 ms) 2004Ga24

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Janos Timar and Zoltan Elekes, Balraj Singh	NDS 121, 143 (2014)	31-May-2014

Parent: ^{129}In: E=0.0; J^π=(9/2$^+$); $T_{1/2}$=611 ms *5*; Q(β^-)=7769 *19*; %β^- decay=100.0

^{129}In-J^π,$T_{1/2}$: From ^{129}In Adopted Levels.

^{129}In-Q(β^-): From 2012Wa38.

2004Ga24: The ^{129}In isotope was obtained by thermal-neutron induced fission of a ^{235}U carbide target inside the combined target and ion source ANUBIS. During the measurements of singles data, surface ionization was used to select the element In and thereby suppress the daughter activities. Measured Eβ, Eγ, Iγ, $\gamma\gamma$, $\beta\gamma$(coin), $\gamma\gamma$(t), $T_{1/2}$(isotope) with three Ge detectors of which one was a low energy photon (LEP). Three Ge detectors were also used for the Q_β measurement, where the LEP detector was used as a β spectrometer.

1980De35: ^{235}U(n,F) E=th, on-line ms; semi, scin β, γ, ce, $\gamma\gamma$-, $\beta\gamma$-coin.

Others:

1978Al18: ^{235}U(n,F) E=th, on-line ms; semi, scin β, γ, $\beta\gamma$-coin.

1987Sp09: ^{235}U(n,F) E=th, on-line ms; HPGE, β, γ, $\beta\gamma$-coin.

^{129}Sn Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[‡]	Comments
0.0	3/2$^+$	2.23 min *4*	
35.11 *6*	11/2$^-$	6.9 min *1*	%β^-=100
315.418 *20*	(1/2)$^+$		
763.67 *6*	(9/2$^-$)		
769.04 *5*	(5/2$^+$)		
1043.62 *5*	(7/2$^-$)		
1047.31 *7*	(7/2$^+$)		
1054.18 *8*	(7/2$^+$)		
1288.68 *9*	(3/2$^+$)		
1455.51 *9*	(5/2$^+$)		
1534.31 *11*	(7/2$^-$,9/2$^+$)		
1701.14 *13*	(7/2$^-$)		
1853.55 *14*	(7/2,9/2)		
1865.02 *4*	(7/2$^+$)		
1906.21 *10*	(7/2)		
2118.31 *5*	(7/2$^+$)		
2790.86 *20*	(7/2,9/2$^+$)		
2835.73 *10*	(7/2$^+$,9/2$^+$)		
2981.79 *17*	(7/2$^+$)		
3140.32 *17*	(7/2$^+$)		

[†] From least-squares fit by evaluators to the Eγ data from 2004Ga24; level scheme is also from 2004Ga24, except as noted.

[‡] From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-[†‡]	Log *ft*	Comments
(4629 *19*)	3140.32	0.67 *4*	6.11 *3*	av Eβ=2012.7 *90*
(4787 *19*)	2981.79	0.74 *4*	6.14 *3*	av Eβ=2087.8 *90*
(4933 *19*)	2835.73	3.36 *15*	5.54 *2*	av Eβ=2157.0 *90*
(4978 *19*)	2790.86	0.47 *9*	6.4 *1*	av Eβ=2178.3 *90*
(5651 *19*)	2118.31	49 *3*	4.63 *3*	av Eβ=2497.2 *91*
				E(decay): measured β end-point energy=5480 *120* (1978Al18).

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^{129}In β^- decay (611 ms) 2004Ga24 (continued)

β^- radiations (continued)

E(decay)	E(level)	Iβ^-[†‡]	Log *ft*	Comments
(5863 *19*)	1906.21	0.13 *3*	7.3 *1*	av Eβ=2597.8 *91*
(5904 *19*)	1865.02	36 *2*	4.85 *3*	av Eβ=2617.4 *91*
(5915 *19*)	1853.55	0.76 *6*	6.53 *4*	av Eβ=2622.8 *91*
(6068 *19*)	1701.14	0.24 *2*	7.08 *4*	av Eβ=2695.1 *91*
(6235 *19*)	1534.31	0.46 *6*	6.85 *6*	av Eβ=2774.2 *90*
(6313[#] *19*)	1455.51	<0.3	>7.1	av Eβ=2811.6 *90*
(6715 *19*)	1054.18	2.1 *3*	6.33 *7*	av Eβ=3001.8 *90*
(6722 *19*)	1047.31	0.35 *6*	7.1 *1*	av Eβ=3005.1 *90*
(6725 *19*)	1043.62	2.0 *4*	6.4 *1*	av Eβ=3006.8 *90*
(7000[#] *19*)	769.04	<2	>6.4	av Eβ=3136.9 *90*
(7005 *19*)	763.67	2.1 *4*	6.4 *1*	av Eβ=3139.5 *90*
(7734[#] *19*)	35.11	<10	>5.9	av Eβ=3484.3 *90* Iβ^-: <10% from log *ft*>5.9.

[†] From 2004Ga24, assuming <10% β^- feeding to g.s. These values are in close agreement with those deduced by evaluators using GTOL code.
[‡] Absolute intensity per 100 decays.
[#] Existence of this branch is questionable.

γ(^{129}Sn)

Iγ normalization: from 2004Ga24. Uncertainty estimated by the evaluators. %β^-n=0.23 *7* (from ^{129}In Adopted Levels).
Most of the unplaced γ rays belong to activities $T_{1/2}\leq$10 s in the mass 129 isobaric chain (1980De35) and are tentatively assigned to ^{129}In β^- decay by the evaluators.
A γ ray of energy 2546 keV *1* with Iγ=3.5 *4* assigned by 1980De35 to the decay of 611-ms activity in ^{129}In is assigned by 2004Ga24 totally to the decay of 1.23-s activity, thus 3590-keV level is not populated in this decay.

E$_\gamma$[†]	I$_\gamma$[@a]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.	α[‡]	Comments
212.17 *12*	0.64 *5*	2118.31	(7/2$^+$)	1906.21	(7/2)			
252.99 *16*	0.08 *2*	2118.31	(7/2$^+$)	1865.02	(7/2$^+$)			
265.0 *3*	0.35 *5*	2118.31	(7/2$^+$)	1853.55	(7/2,9/2)			
278.18 *9*	0.42 *10*	1047.31	(7/2$^+$)	769.04	(5/2$^+$)			
279.93 *11*	0.53 *11*	1043.62	(7/2$^-$)	763.67	(9/2$^-$)			
285.24 *12*	3.1 *2*	1054.18	(7/2$^+$)	769.04	(5/2$^+$)	M1,E2[&]	0.037 *5*	α(K)=0.032 *4*; α(L)=0.0045 *10*; α(M)=0.00089 *21* α(N)=0.00016 *4*; α(O)=1.26×10^{-5} *14*
315.42 *2*	0.33 *3*	315.418	(1/2)$^+$	0.0	3/2$^+$			
319.3 *4*	0.53 *6*	1853.55	(7/2,9/2)	1534.31	(7/2$^-$,9/2$^+$)			
330.8 *3*	0.49 *4*	1865.02	(7/2$^+$)	1534.31	(7/2$^-$,9/2$^+$)			
[x]382.5[#] *3*	2.8 *3*							
409.3 *3*	0.25 *3*	1865.02	(7/2$^+$)	1455.51	(5/2$^+$)			
[x]417.1 *3*	0.2 *1*							
[x]473.9 *3*	0.6 *1*							
480.29 *13*	0.97 *9*	1534.31	(7/2$^-$,9/2$^+$)	1054.18	(7/2$^+$)			
[x]501.2 *3*	0.8 *1*							
519.5 *6*	0.15 *4*	1288.68	(3/2$^+$)	769.04	(5/2$^+$)			
[x]570.2[#] *3*	3.8 *4*							
576.1 *5*	0.29 *2*	1865.02	(7/2$^+$)	1288.68	(3/2$^+$)			

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^{129}In β^- decay (611 ms) 2004Ga24 (continued)

$\gamma(^{129}Sn)$ (continued)

E_γ [†]	I_γ [@a]	E_i(level)	J_i^π	E_f	J_f^π
657.7 *3*	0.17 *2*	1701.14	(7/2$^-$)	1043.62	(7/2$^-$)
662.92 *16*	1.22 *9*	2118.31	(7/2$^+$)	1455.51	(5/2$^+$)
728.53 *3*	13.4 *9*	763.67	(9/2$^-$)	35.11	11/2$^-$
765.4 *5*	0.67 *6*	1534.31	(7/2$^-$,9/2$^+$)	769.04	(5/2$^+$)
769.31 *18*	24.3 *17*	769.04	(5/2$^+$)	0.0	3/2$^+$
799.41 *14*	1.66 *13*	1853.55	(7/2,9/2)	1054.18	(7/2$^+$)
821.4 *2*	1.65 *1*	1865.02	(7/2$^+$)	1043.62	(7/2$^-$)
830.0 *3*	0.60 *10*	2118.31	(7/2$^+$)	1288.68	(3/2$^+$)
931.96 *19*	0.22 *3*	1701.14	(7/2$^-$)	769.04	(5/2$^+$)
937.54 *19*	0.21 *3*	1701.14	(7/2$^-$)	763.67	(9/2$^-$)
973.5 *2*	0.33 *3*	1288.68	(3/2$^+$)	315.418	(1/2)$^+$
1008.53 *3*	12.4 *9*	1043.62	(7/2$^-$)	35.11	11/2$^-$
[x]1045.2 *3*	0.1 *1*				
1047.41 *10*	0.62 *5*	1047.31	(7/2$^+$)	0.0	3/2$^+$
1054.30 *16*	9.4 *7*	1054.18	(7/2$^+$)	0.0	3/2$^+$
[x]1063.5 *3*	0.3 *1*				
1071.0 *12*	0.2 *10*	2118.31	(7/2$^+$)	1047.31	(7/2$^+$)
1074.71 *3*	6.1 *4*	2118.31	(7/2$^+$)	1043.62	(7/2$^-$)
1096.00 *4*	6.3 *8*	1865.02	(7/2$^+$)	769.04	(5/2$^+$)
1101.39 *6*	4.2 *3*	1865.02	(7/2$^+$)	763.67	(9/2$^-$)
[x]1136.0[#] *3*	4.2 *4*				
[x]1172.8 *3*	0.3 *1*				
1288.64 *11*	0.41 *4*	1288.68	(3/2$^+$)	0.0	3/2$^+$
1301.7 *4*	0.47 *4*	2835.73	(7/2$^+$,9/2$^+$)	1534.31	(7/2$^-$,9/2$^+$)
[x]1308.7 *3*	0.5 *1*				
[x]1323.7[#] *3*	3.4 *3*				
1349.29 *7*	4.6 *3*	2118.31	(7/2$^+$)	769.04	(5/2$^+$)
1354.41 *8*	2.9 *3*	2118.31	(7/2$^+$)	763.67	(9/2$^-$)
[x]1427.3 *3*	1.0 *1*				
1455.53 *11*	1.91 *13*	1455.51	(5/2$^+$)	0.0	3/2$^+$
1499.00 *17*	0.96 *7*	1534.31	(7/2$^-$,9/2$^+$)	35.11	11/2$^-$
[x]1577.5 *3*	0.6 *1*				
[x]1716.1 *3*	0.5 *1*				
1736.7 *6*	0.3 *2*	2790.86	(7/2,9/2$^+$)	1054.18	(7/2$^+$)
1781.54 *13*	4.6 *3*	2835.73	(7/2$^+$,9/2$^+$)	1054.18	(7/2$^+$)
1791.9 *5*	0.33 *3*	2835.73	(7/2$^+$,9/2$^+$)	1043.62	(7/2$^-$)
1830.1 *5*	0.24 *5*	1865.02	(7/2$^+$)	35.11	11/2$^-$
1864.89 *6*	74 *5*	1865.02	(7/2$^+$)	0.0	3/2$^+$
[x]1906.3 *3*	0.9 *1*				
1906.32 *15*	0.96 *6*	1906.21	(7/2)	0.0	3/2$^+$
[x]1977.0 *3*	1.0 *1*				
2021.8 *2*	0.84 *6*	2790.86	(7/2,9/2$^+$)	769.04	(5/2$^+$)
2066.64 *11*	2.6 *2*	2835.73	(7/2$^+$,9/2$^+$)	769.04	(5/2$^+$)
2072.3 *5*	0.16 *4*	2835.73	(7/2$^+$,9/2$^+$)	763.67	(9/2$^-$)
2082.9 *4*	0.42 *4*	2118.31	(7/2$^+$)	35.11	11/2$^-$
2118.26 *10*	100 *7*	2118.31	(7/2$^+$)	0.0	3/2$^+$
[x]2189.5 *3*	3.7 *4*				
2212.70 *17*	1.64 *10*	2981.79	(7/2$^+$)	769.04	(5/2$^+$)
[x]2302 *1*	1.2 *2*				
[x]2367 *1*	1.5 *2*				
2371.5 *9*	0.18 *2*	3140.32	(7/2$^+$)	769.04	(5/2$^+$)
2376.6 *6*	0.33 *3*	3140.32	(7/2$^+$)	763.67	(9/2$^-$)
2982.1 *6*	0.15 *3*	2981.79	(7/2$^+$)	0.0	3/2$^+$
3140.27 *18*	1.11 *9*	3140.32	(7/2$^+$)	0.0	3/2$^+$

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^{129}In β^- decay (611 ms) 2004Ga24 (continued)

$\gamma(^{129}Sn)$ (continued)

† From 2004Ga24, except as noted.
‡ Value overlaps M1 and E2, when δ not given.
# Possibly corresponds to γ ray which 1977He24 regarded as deexciting the 1703-keV isomer (3 μs) in ^{129}Sb (1980De35).
@ From 2004Ga24, except for unplaced gammas which are from 1980De35.
& From α(K)exp=0.03 *1* (1980De35).
[a] For absolute intensity per 100 decays, multiply by 0.42 *2*.
[x] γ ray not placed in level scheme.

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Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays