^{77}Kr ε decay (71.25 min) 1974Ho37,1973Ba22,1971Bo30

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	30-Sep-2020

Parent: ^{77}Kr: E=0.0; J^{π}=5/2$^+$; $T_{1/2}$=71.25 min *42*; Q(ε)=3065 *3*; %ε+%β^+ decay=100.0
^{77}Kr-J^{π},$T_{1/2}$: From ^{77}Kr Adopted Levels.
^{77}Kr-Q(ε): From 2017Wa10.
Others: 1986Ho22, 1967Ho16, 1955Th01.
γ and $\gamma\gamma$-coin: 1986Ho22, 1974Ho37, 1973Ba22, 1971Bo30, 1967Ho16, 1955Th01.
ce: 1974Ho37, 1967Ho16, 1955Th01.
(ce)γ: 1955Th01.
$\gamma\gamma$(t): 1967Ho16.
$\gamma\gamma(\theta$,H,t): 1991Gr15.
(ce)γ(t): 1972OhZR.
β^+: 1973Ba22, 1955Th01.
$\gamma\beta$+: 1973Ba22, 1974Ro11, 1982Mo10.
$T_{1/2}$ and production of ^{77}Kr: 2019Ze02, 1974Ho37, 1973Ba22, 1971Bo30, 1960Bu22, 1948Wo08.
2001Sa67: calculated Gamow-Teller strengths and half-life of ^{77}Kr decay.
Total decay energy of 3066 keV *65* deduced (by RADLIST code) from proposed decay scheme is in agreement with the expected value of 3065 keV *3*, indicating that decay scheme is well established.

^{77}Br Levels

The 77 and 2335 levels proposed by 1973Ba22 have been omitted by the evaluator.

E(level)	J^{π} †	$T_{1/2}$	Comments
0.0	3/2$^-$		
105.82 *13*	9/2$^+$	4.28 min *10*	%IT=100 $T_{1/2}$: from the Adopted Levels.
129.63 *4*	5/2$^+$	9.3 ns *3*	$T_{1/2}$: $\gamma\gamma$(t) (1967Ho16). g-factor=1.32 *1* from $\gamma\gamma(\theta$,H,t) using PAC technique (1991Gr15).
161.9 *3*	5/2$^-$		
166.6 *3*	(3/2)$^-$		
276.21 *6*	(3/2)$^+$	90 ps *20*	$T_{1/2}$: from ceγ(t) (1972OhZR).
417.69 *16*	7/2$^{(+)}$		
864.51 *15*	(3/2$^+$)		
967.19 *18*	(7/2$^+$)		
1024.45 *20*	(5/2)$^+$		
1097.68 *24*	(5/2$^+$,7/2)		
1576.15 *14*	(5/2$^-$)		
2129.1 *4*	(3/2)$^-$		
2193.6 *6*	(3/2,5/2,7/2)		
2344.3 *5*	(3/2,5/2,7/2$^+$)		

† From the Adopted Levels.

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ε,β^+ radiations

E(decay)	E(level)	Iβ^+ ‡	Iε‡	Log *ft*	I(ε+β^+)†‡	Comments
(721 *3*)	2344.3		0.030 *4*	6.7 *1*	0.030 *4*	εK=0.8762; εL=0.10310 *2*; εM+=0.020702 *3*
(871 *3*)	2193.6		0.017 *3*	7.1 *1*	0.017 *3*	εK=0.8768; εL=0.1026; εM+=0.02058
(936 *3*)	2129.1		0.055 *7*	6.7 *1*	0.055 *7*	εK=0.8770; εL=0.1024; εM+=0.02054
(1489 *3*)	1576.15	0.027 *2*	0.56 *5*	6.06 *4*	0.59 *5*	av Eβ=204.9 *13*; εK=0.8386 *9*; εL=0.09701 *11*; εM+=0.019437 *22*
(1967 *3*)	1097.68	0.021 *5*	0.037 *10*	7.5 *1*	0.058 *15*	av Eβ=411.1 *14*; εK=0.5630 *22*; εL=0.06488 *25*; εM+=0.01299 *5*
(2041 *3*)	1024.45	0.19 *2*	0.27 *2*	6.66 *4*	0.46 *4*	av Eβ=443.2 *14*; εK=0.5112 *21*; εL=0.05888 *25*; εM+=0.01179 *5*
(2098 *3*)	967.19	0.17 *1*	0.19 *2*	6.83 *4*	0.36 *3*	av Eβ=468.5 *14*; εK=0.4721 *21*; εL=0.05436 *24*; εM+=0.01089 *5*
(2200 *3*)	864.51	0.33 *3*	0.28 *3*	6.71 *5*	0.61 *6*	av Eβ=514.0 *14*; εK=0.4067 *19*; εL=0.04680 *21*; εM+=0.00937 *5* Additional information 1.
(2647 *3*)	417.69	2.7 *4*	0.82 *12*	6.4 *1*	3.5 *5*	av Eβ=714.9 *14*; εK=0.2069 *10*; εL=0.02377 *11*; εM+=0.004757 *22* Eβ=1550; Iβ=12 (from β^+, 1973Ba22).
(2789 *3*)	276.21	33.6 *16*	7.9 *4*	5.46 *2*	41.5 *20*	av Eβ=779.5 *14*; εK=0.1684 *8*; εL=0.01933 *9*; εM+=0.003870 *17* Additional information 2.
(2898 *3*)	166.6	0.11 *3*	0.021 *5*	8.1 *1*	0.13 *3*	av Eβ=829.7 *14*; εK=0.1443 *6*; εL=0.01656 *7*; εM+=0.003315 *14*
(2903 *3*)	161.9	0.19 *3*	0.038 *5*	7.8 *1*	0.23 *3*	av Eβ=831.8 *14*; εK=0.1434 *6*; εL=0.01646 *7*; εM+=0.003294 *14*
(2935 *3*)	129.63	41.8 *19*	7.7 *4*	5.521 *21*	49.5 *23*	av Eβ=846.7 *14*; εK=0.1371 *6*; εL=0.01574 *7*; εM+=0.003151 *13* Additional information 3.
(3065# *3*)	0.0	<5	<0.8	>6.6	<6	av Eβ=906.4 *14*; εK=0.1153 *5*; εL=0.01323 *6*; εM+=0.002647 *11*

† From γ-ray intensity balance. From I($\gamma^{\pm}$)=180 *10* (1974Ho37), the β^+ feeding to g.s. is deduced as <6%. Older direct end-point energy and β^+ intensities measurements are much less precise and inaccurate in several cases. These are listed under document records.

‡ Absolute intensity per 100 decays.

Existence of this branch is questionable.

γ(^{77}Br)

Iγ normalization: From I(γ+ce)(gammas to g.s.)=97 *3*. From I($\gamma^{\pm}$)=180 *10* (1974Ho37), the β^+ feeding to g.s. is deduced as <6%. ε+β^+ feeding to 106 level (with ΔJ^{π}=2,no) is expected to be negligible.

The following γ rays reported by different authors have been omitted by the evaluator: 77 *2*, 1702 *2* (1973Ba22); 1001 *1* (1973Ba22, 1967Ho16); 2335.0 *15* (1973Ba22,1971Bo30); 1044 *2*, 1058 *2* (1967Ho16); 246 *2* (1955Th01).

E$_\gamma$[†]	I$_\gamma$[‡&]	E$_i$(level)	J$^{\pi}_{i}$	E$_f$	J$^{\pi}_{f}$	Mult.	δ	α[a]	I$_{(\gamma+ce)}$[&]	Comments
24.2 *5*	0.045 *7*	129.63	5/2$^+$	105.82	9/2$^+$	(E2)		146 *12*	6.9 *10*	ce(K)/(γ+ce)=0.56 *5*; ce(L)/(γ+ce)=0.37 *4*; ce(M)/(γ+ce)=0.059 *8*; ce(N)/(γ+ce)=0.0040 *6* Transition detected as conversion electrons. I$_{(\gamma+ce)}$: from intensity balance at 106 level. I$_\gamma$: from I(γ+ce) and α. Mult.: from K/(L+M)=1.3 *10* (1955Th01).
105.87 *17*	1.6 *1*	105.82	9/2$^+$	0.0	3/2$^-$	E3		6.30 *10*		α(K)=4.85 *8*; α(L)=1.236 *21*; α(M)=0.198 *4*; α(N)=0.01486 *25* α(K)exp=5.0 (1967Ho16), α(L)exp=1.6 *1* (1974Ho37). K/L=3.0 *2* (1974Ho37), 4.3 *3* (1967Ho16), 3.6 (1955Th01). Mult.: from K/L and α(K)exp.
129.64 *4*	100	129.63	5/2$^+$	0.0	3/2$^-$	E1		0.0391		α(K)=0.0348 *5*; α(L)=0.00370 *6*; α(M)=0.000584 *9*; α(N)=5.34×10^{-5} *8* E$_\gamma$: from 1986Ho22. Mult.: from ce data. α(K)exp=0.033 *3*, α(L)exp=0.0053 *8* (1974Ho37, 1967Ho16, 1955Th01). K/L=6.2 *10* (1974Ho37), 10 *2* (1967Ho16), 8.3 (1955Th01). δ: from ce data δ<0.07.
146.59 *4*	46 *2*	276.21	(3/2)$^+$	129.63	5/2$^+$	M1+E2	0.25 *7*	0.051 *6*		α(K)=0.045 *6*; α(L)=0.0051 *7*; α(M)=0.00081 *11*; α(N)=7.4×10^{-5} *9* E$_\gamma$: from 1986Ho22. Mult.,δ: from ce data. α(K)exp=0.045 *5*, α(L)exp=0.0085 *13* (1974Ho37, 1955Th01). K/L=5.3 (1974Ho37), 7.8 *20* (1967Ho16), 4.7 (1955Th01).
161.9 *3*	0.28[@] *3*	161.9	5/2$^-$	0.0	3/2$^-$	M1+E2	−0.27 *10*	0.039 *7*		α(K)=0.035 *6*; α(L)=0.0039 *7*; α(M)=0.00062 *11*; α(N)=5.7×10^{-5} *10* Mult.,δ: from Adopted Gammas.
166.7[#] *4*	0.20 *3*	166.6	(3/2)$^-$	0.0	3/2$^-$	[M1,E2]		0.08 *6*		α(K)=0.07 *5*; α(L)=0.009 *6*; α(M)=0.0014 *9*; α(N)=0.00012 *8*
276.0 *2*	3.6 *2*	276.21	(3/2)$^+$	0.0	3/2$^-$	(E1)		0.00433 *7*		α(K)=0.00386 *6*; α(L)=0.000407 *6*; α(M)=6.45×10^{-5} *10*; α(N)=5.98×10^{-6} *9* Mult.: from α(K)exp≈0.0043 (1955Th01).

γ(^{77}Br) (continued)

E_γ[†]	I_γ[‡&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	α[a]	Comments
287.9[#] *3*	0.23 *2*	417.69	7/2$^{(+)}$	129.63	5/2$^+$			
311.9 *2*	4.6 *6*	417.69	7/2$^{(+)}$	105.82	9/2$^+$	(M1)	0.00594 *9*	α(K)=0.00527 *8*; α(L)=0.000566 *8*; α(M)=8.99×10^{-5} *13*; α(N)=8.40×10^{-6} *12* Mult.: from α(K)exp≈0.0067 (1955Th01) and Adopted Gammas.
588.2 *3*	0.14 *3*	864.51	(3/2$^+$)	276.21	(3/2)$^+$			
606.5 *4*	0.41 *4*	1024.45	(5/2)$^+$	417.69	7/2$^{(+)}$			
698.1[#] *4*	0.06 *1*	864.51	(3/2$^+$)	166.6	(3/2)$^-$			
734.9 *2*	0.53 *6*	864.51	(3/2$^+$)	129.63	5/2$^+$			
748.3 *3*	0.030 *6*	1024.45	(5/2)$^+$	276.21	(3/2)$^+$			I_γ: value in 1971Bo30 should read 0.034 instead of 0.34.
837.5 *2*	0.19 *2*	967.19	(7/2$^+$)	129.63	5/2$^+$			I_γ: value in 1971Bo30 should read 0.15 instead of 0.105.
861.5 *3*	0.25 *3*	967.19	(7/2$^+$)	105.82	9/2$^+$			
864.4 *3*	0.037 *7*	864.51	(3/2$^+$)	0.0	3/2$^-$			
894.9 *3*	0.13 *2*	1024.45	(5/2)$^+$	129.63	5/2$^+$			
968.2[#] *4*	0.03 *1*	1097.68	(5/2$^+$,7/2)	129.63	5/2$^+$			
991.7 *3*	0.054 *14*	1097.68	(5/2$^+$,7/2)	105.82	9/2$^+$			
1031.3 *4*	0.013 *3*	2129.1	(3/2)$^-$	1097.68	(5/2$^+$,7/2)			
1158.5 *3*	0.057 *5*	1576.15	(5/2$^-$)	417.69	7/2$^{(+)}$			
1300.0 *2*	0.49 *5*	1576.15	(5/2$^-$)	276.21	(3/2)$^+$			
1446.4 *3*	0.14 *2*	1576.15	(5/2$^-$)	129.63	5/2$^+$			
1479.7 *5*	0.018[@] *3*	2344.3	(3/2,5/2,7/2$^+$)	864.51	(3/2$^+$)			
1576.0 *3*	0.038 *4*	1576.15	(5/2$^-$)	0.0	3/2$^-$			
1999.7 *6*	0.034[@] *7*	2129.1	(3/2)$^-$	129.63	5/2$^+$			
2031.7 *8*	0.005 *2*	2193.6	(3/2,5/2,7/2)	161.9	5/2$^-$			
2063.9 *7*	0.016[@] *3*	2193.6	(3/2,5/2,7/2)	129.63	5/2$^+$			
2068.3 *7*	0.019 *3*	2344.3	(3/2,5/2,7/2$^+$)	276.21	(3/2)$^+$			
2129.1 *6*	0.021 *4*	2129.1	(3/2)$^-$	0.0	3/2$^-$			

[†] Weighted average of 1974Ho37, 1973Ba22, 1971Bo30 and 1967Ho16.
[‡] Weighted average of 1974Ho37, 1973Ba22, 1971Bo30 and 1967Ho16. Uncertainties not quoted by 1971Bo30 and 1967Ho16. Evaluator assumes 10% for intense lines and 30% for weak lines.
[#] γ from 1974Ho37 only.
[@] Value from 1973Ba22 not included in the weighted average because of severe disagreement with other reported intensities.
[&] For absolute intensity per 100 decays, multiply by 0.81 *2*.
[a] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

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