^{174}Lu ε decay (3.31 y) 1987Va34

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, Huo Junde	NDS 87, 15 (1999)	1-Nov-1998

Parent: ^{174}Lu: E=0.0; $J^\pi=(1)^-$; $T_{1/2}$=3.31 y *5*; Q(ε)=1374.3 *16*; %ε+%$β^+$ decay=100.0
Others: 1974Sc15, 1969Gu15, 1969BaZK, 1967Ka13.

^{174}Yb Levels

^{174}Lu g.s. Configuration=(π 7/2[404])-(ν 5/2[512]) is consistent with experimental μ=1.94 *28* (μ=+1.85, theory) γ(θ,H,t) (1975Kr11).

E(level)†	J^π‡	$T_{1/2}$	Comments
0.0#	0^+		
76.468# *5*	2^+	1.74 ns *9*	$T_{1/2}$: from 1966Fu03, γ-ce(L)(t).
253.121# *7*	4^+		
1318.314@ *13*	2^-	0.51 ns *3*	J^π: B(M2)(1318γ)/B(M2)(1242γ)=1.9+∞−1.7 (0.70 theory), B(M2)(1065γ)/B(M2)(1242γ)<1.2 (0.05 theory), B(E3)(1065γ)/B(E3)(1242γ)=0.38 *+79−25* (0.40 theory) reduced transition probability ratios are consistent with Alaga′s rules for $K^\pi=2^-$ assignment (1974Sc15). 1318.2 M2 γ to 0^+. $T_{1/2}$: from 1972MaZS, 1973ScYS, γγ(t).

† Deduced by evaluator from a least-squares fit to γ-ray energies.
‡ From Adopted Levels, unless otherwise specified.
# $K^\pi=0^+$ g.s. rotational band.
@ $K^\pi=2^-$ octupole vibrational band. Probable Configuration=(ν 5/2[512])-(ν 9/2[624]).

ε,$β^+$ radiations

E(decay)	E(level)	Iβ+ †	Iε†	Log *ft*	I(ε+β+)†	Comments
(56.0 *16*)	1318.314		5.2 *1*	7.10 *6*	5.2 *1*	εL= 0.71 *8*; εM+= 0.29 *3* εL/εK>200 (1968Li01). εK(exp)≤0.0011% (1987Va34).
(1297.8 *16*)	76.468	0.0038	56.5 *5*	9.61 *4*	56.5 *50*	av Eβ= 142.1 *12*; εK= 0.823 *4*; εL= 0.1357 *6*; εM+= 0.04115 *17* $Iβ^+$: from 1968Kl08, βγ coin, scin. Other value:<0.02 γγγ coin (1968Li01). E(decay): Eβ+=300? βγ coin, scin (1968Kl08).
(1374.3 *16*)	0.0	0.02 *1*	38 *3*	9.84 *4*	38.3 *30*	av Eβ= 177.0 *12*; εK= 0.823 *3*; εL= 0.1352 *5*; εM+= 0.04095 *16* $Iβ^+$: from 1968Kl08, βγ coin. E(decay): Eβ+=380 *5* βγ coin, scin (1968Kl08).

† Absolute intensity per 100 decays.

^{174}Lu ε decay (3.31 y) 1987Va34 (continued)

γ(^{174}Yb)

Iγ normalization: From decay scheme if total K x ray intensity comes from Ice(K)(76γ)+εK(0^+)+εK(2^+); using α(K)(76γ)=1.6, α(76γ)=9.4 (E2, theory), K-fluorescence yield=0.95, and γ ray and K x ray relative intensities from 1987Va34.
Measured x-ray intensities, relative to Iγ(1242γ)=100, are: Kα$_2$ x ray=468 *9*, Kα$_1$ x ray=821 *15*, Kβ$_1$ x ray=260 *5*, Kβ$_2$ x ray=66.4 *13* (1987Va34). Others: 1969Gu15, 1960Wi03.
Measured Eγ, Iγ. Detector:Ge(Li).

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	α[‡]	Comments
76.468 *2*	115.3 *52*	76.468	2^+	0.0	0^+	E2		9.41	α(K)= 1.622; α(L)= 5.93; α(M)= 1.459; α(N+..)= 0.400 Eγ: other values: 76.46 semi (1973Ko13), 76.6 scin (1960Wi03), 76.50 (1969Gu15). Others: 1959Di44, 1960Ha18, 1960Ro14, 1963Ba28, 1967Gi06, 1967Ka13, 1968Li01, 1969Ka19. Iγ: other values: 58 scin (1960Wi03), 90 (1969Gu15). Mult.: from ce(L1):ce(L2):ce(L3):ce(M) exp=<53:260:290:160 (1969Ka19). Other values: ce(K):ce(L):ce(M) exp=200:590:130 (1967Gi06); ce(K):ce(L2):ce(L3):ce(M) exp=140:300:290:160 (1960Ro14); ce(K):ce(L2):ce(L3):ce(M):ce(N)+ce(O) exp=64:300:290:155:45 (1960Ha18).
176.653 *2*	0.21 *1*	253.121	4^+	76.468	2^+	E2		0.415	α(K)= 0.2375; α(L)= 0.1354; α(M)= 0.0327; α(N+..)=0.00888 Eγ: other value: 176.44 (1973Ko13). Mult.: from ce(K)/(ce(L1) + ce(L2)) exp=2.2 *2* (1969Ka19).
1065.04 *8*	0.32 *4*	1318.314	2^-	253.121	4^+	E3(+M2)	>1.64	0.00937 *10*	α(K)=0.00761 *8*; α(L)=0.00133 Eγ: other values: 1065 (1974Sc15), 1064.85 (1973Ko13). Iγ: other value: 0.45 *8* (1974Sc15). δ: from α(K)exp=0.0052 *24* (1974Sc15,1969BaZK).
1241.847 *6*	100 *2*	1318.314	2^-	76.468	2^+	E1+E3(+M2)			Eγ: other values: 1241.64 (1973Ko13), 1241.9 (1974Sc15), 1241.76 (1969Gu15), 1241.5 *10* (1967Ka13), 1235 *5* (1965Ri05), 1228 (1960Wi03). Others: 1959Di44, 1960Ha18, 1962Pr02, 1963Ba28.

Continued on next page (footnotes at end of table)

^{174}Lu ε decay (3.31 y) 1987Va34 (continued)

γ(^{174}Yb) (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[‡]	Comments
								Mult.: the angular distribution coefficients for the 1242-76 γ cascade are $A_2(1242\gamma)=-0.122$ *35* and $A_4(1242\gamma)=-0.113$ *44*, γγ(θ) (1974Sc15). Mixing ratios δ(M2/E3)=0.05 *9* and δ(E3/E1)=0.19 *8* are consistent with these coefficients and with α(K)exp=0.00089 *9* if the spins of the levels are 2, 2, 0, respectively. The angular correlation coefficients are $A_2=+0.062$ *16* and $A_4=+0.090$ *26* (1974Sc15). Other values: $A_2=+0.064$ *28* and $A_4=+0.032$ *46*, consistent with E1+M2 and δ=−0.25 *4* if the spins of the levels are 2, 2, 0, respectively (1966Pr02). δ(1)=0.04 *6* and δ(2)=0.20 *7* are consistent with E1+E3+M2, and with $A_2(1242\gamma)=-0.23$ *12* and α(K)exp=0.00089 *9* if the spins of the levels are 2, 2, 0, respectively, γγ(θ) (1975Kr11).
								ce(K):ce(L):ce(M) exp=23:4:≈1 s (1963Ba28). α(K)exp=0.00066 *33* s, scin, γγ coin (1962Pr02); α(K)exp=0.0012 *4* (1974Sc15,1969BaZK).
1318.296 *10*	0.69 *5*	1318.314	2^-	0.0	0^+	M2	0.00891	α(K)=0.00741; α(L)=0.00112 E_γ: other values: 1318.28 (1973Ko13), 1318.24 (1969Gu15). 1318 (1974Sc15); 1318 *2* (1967Ka13). I_γ: other values: 1.3 (1969Gu15); 0.42 *16* (2.6 quoted by 1973Mi30 is incorrect) semi (1967Ka13), 0.61 *4* (1974Sc15). Mult.: from α(K)exp=0.0077 *14* (1974Sc15).

[†] For absolute intensity per 100 decays, multiply by 0.0514 *8*.

[‡] 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.

^{174}Lu ε decay (3.31 y) 1987Va34

Decay Scheme

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