^{174}Lu ε decay (142 d) 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=170.83 *5*; $J^\pi=(6)^-$; $T_{1/2}$=142 d *2*; Q(ε)=1374.3 *16*; %ε+%$β^+$ decay=0.62 *2*
Others: 1965Fu01, 1965Ri05, 1967Ka13, 1969Gu15, 1974Sc15.

^{174}Yb Levels

^{174}Lu (142 d) probable Configuration=(π 7/2[404])+(ν 5/2[512]). Experimental μ=2.34 *33* if δ(67γ)=0.09 *1* γ(θ,H,t) (1975Kr11) compares with μ=+1.76 (theory) for this configuration.

E(level)[@]	J^π[†]	$T_{1/2}$	Comments
0.0[‡]	0^+		
76.468[‡] *5*	2^+	1.8 ns *1*	$T_{1/2}$: from 1966Ja16, γγ(t).
253.121[‡] *7*	4^+		
526.04[‡] *3*	6^+		
889.73[‡] *10*	8^+		
1518.10[#] *7*	6^+		J^π: γγ(θ) suggests $J^\pi=6^+$ (1975Kr11).

[†] From Adopted Levels.
[‡] $K^\pi=0^+$ g.s. rotational band.
[#] $K^\pi=(6^+)$ band. Probable Configuration=(ν 7/2[514])+(ν 5/2[512]).
[@] Deduced by evaluator from a least-squares fit to γ-ray energies.

ε,$β^+$ radiations

E(decay)	E(level)	Iε[†]	Log *ft*	I(ε+$β^+$)[†]	Comments
(27.0 *16*)	1518.10	0.62 *2*	6.3 *1*	0.62 *2*	εL= 0.62 *12*; εM+= 0.38 *5* εL/εK>30 (1968Li01).

[†] Absolute intensity per 100 decays.

γ(^{174}Yb)

Iγ normalization: From decay scheme if no ε feeding to ^{174}Yb g.s. from ^{174}Lu(142 d), and Ti(273γ)+Ti(1264γ)+Ti(44γ,IT decay) + Ti(112γ, IT decay)=100%.

E_γ	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[#]	Comments
76.468 *2*	11.7 *3*	76.468	2^+	0.0	0^+	E2	9.46	α(K)= 1.623; α(L)= 5.96; α(M)= 1.467; α(N+..)= 0.403 E_γ: other value: 76.41 *4* (1969Ka19). I_γ: deduced from I(γ+ce)=Ti(176γ), using α(theory,E2)=9.46 for 76γ, and assuming no ε feeding to 76-keV level. Iγ=16 (1987Va34). Mult.: from ce(L1)/ce(L2)/ce(L3) exp:<20/100/110 *10*, ce(L)/ce(M) exp: 3.6 (1969Ka19).
176.653 *2*	86.2 *21*	253.121	4^+	76.468	2^+	E2	0.415	α(K)= 0.2375; α(L)= 0.1354; α(M)= 0.0327;

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^{174}Lu ε decay (142 d) 1987Va34 (continued)

γ(^{174}Yb) (continued)

E_γ	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	α[#]	Comments
									α(N+..)=0.00888 ce(K)/(ce(L1)+ce(L2))exp=2.2 *2* (1969Ka19). E_γ: other values: 175.9 *6* (1967Ka13), 176.66 (1969Gu15), 176.44 *4* (1969Ka19). I_γ: other values: 71 (1969Gu15), 80 *20* (1967Ka13).
272.914 *12*	100.8 *31*	526.04	6+	253.121	4+	E2		0.0992	Mult.: from adopted gammas. α(K)= 0.0688; α(L)=0.02333; α(M)=0.00554; α(N+..)=0.00159 ce(K)/(ce(L1)+ce(L2))exp=3.7 *7* (1969Ka19). E_γ: other values: 272.9 *4* (1967Ka13), 272.87 (1969Gu15), 273.16 *5* (1969Ka19). I_γ: other values: 97 (1969Gu15), 95 *10* (1967Ka13).
363.64 *5*	2.88 *18*	889.73	8+	526.04	6+	[E2]		0.0419	Mult.: from adopted gammas. α(K)= 0.0312; α(L)=0.00818; α(M)=0.00192; α(N+..)=0.00055 E_γ: other value: 365 *4* (1967Ka13).
628.21 *8*	2.65 *31*	1518.10	6+	889.73	8+				E_γ: other value: 630 *3* (1967Ka13).
992.077 *31*	100.0 *21*	1518.10	6+	526.04	6+	M1+E2	−1.63[†] *20*	0.00482 *5*	α(K)=0.00401 *4*; α(L)=0.00061 E_γ: other values: 994 *3*, ce(K):ce(L):ce(M) exp=17/3/1 (1963Ba28); 992.13 (1969Gu15), 991.7 *6* (1967Ka13). Mult.: multipolarity is consistent with α(K)exp=0.0030 *5* measured in (d,pγ) (1967Bo08).
1264.98 *7*	3.02 *23*	1518.10	6+	253.121	4+				E_γ: other value: 1264 *2* (1967Ka13).

[†] From angular distribution coefficient $A_2(992\gamma)=-0.115$ *36* (average value for the 992-176 and 992-273 γ-cascades from $\gamma\gamma(\theta)$) and α(K)exp=0.0030 *5* if the spins of the levels are 6, 6, 4, respectively (1974Sc15). A possible E1+M2+E3 admixture consistent with these data was proposed by 1974Sc15. This has been discarded by 1975Kr11 who measured $A_2(992\gamma)>0$ in an oriented-nuclei angular-distribution experiment. The positive value of $A_2(992\gamma)$ agrees with +0.32 *2* derived by 1975Kr11 from $\gamma\gamma(\theta)$ data of 1974Sc15 only for an M1+E2 multipolarity. The angular correlation coefficients are: A_2=0.038 *21* and A_4=0.040 *32* for the 992-273 γ-cascade; A_2=0.055 *21* and A_4=0.116 *31* for the 992-176 γ-cascade (1974Sc15). Other values: A_2=0.028 *11* and A_4=0.077 *11* for the 992-273 γ-cascade, consistent with M1+E2, α(K)exp=0.0030 *5*, and δ=−1,81 *10* if the spin of the levels are 6,6,4 (1971Gi06).

[‡] For absolute intensity per 100 decays, multiply by 0.00546 *18*.

[#] 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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Decay Scheme

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