^{164}Lu ε decay (3.14 min) 1984Ad09,1977Hu02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen[#]	NDS 147, 1 (2018)	30-Nov-2017

Parent: ^{164}Lu: E=0.0; $J^\pi=1^{(-)}$; $T_{1/2}$=3.14 min *3*; Q(ε)=6380 *30*; %ε+%$β^+$ decay=100.0

^{164}Lu-J^π,$T_{1/2}$: From ^{164}Lu Adopted Levels.

^{164}Lu-Q(ε): from 2017Wa10.

1984Ad09: ^{164}Lu produced from proton spallation (E(p)=660 MeV) on tantalum target followed by isotopic separation. Measured Eγ, Iγ, γγ coin.

1977Hu02: ^{164}Lu produced by ^{155}Gd(^{14}N,5n) E=79 MeV. Measured Eγ, Iγ, γγ coin, $T_{1/2}$. A total of 27 γ rays reported placed amongst 15 excited states.

Others:

1983Ge08: Measured $T_{1/2}$ and Q(ε). The authors mention γγ(θ) and ce measurements, but no results are quoted.

Additional information 1.

1978Bu13: Measured Eγ, Iγ, γγ coin, $T_{1/2}$. A total of 11 γ rays reported, six of which were assigned to five excited states in ^{164}Yb. Five unplaced γ rays with Eγ(Iγ) of 150.2 (9.3), 220.8 (4.0), 302.0 (4.2), 313.8 (4.1) and 396.1 (6.9) were not confirmed in 1984Ad09 and 1977Hu02.

1995Ve05, 1994Po26, 1993Al03: Q value using total-gamma absorption method.

1981By04, 1980Al26: β strength functions.

^{164}Yb Levels

E(level)[†]	J^π[‡]	E(level)[†]	J^π[‡]	E(level)[†]	J^π[‡]	E(level)[†]	J^π[‡]
0.0	0^+	975.6 *1*	(0^+)	1335.9 *1*	$(1,2^+)$	1550.0 *2*	
123.27 *3*	2^+	1003.8 *1*	(3^+)	1365.0 *1*	$(4^+,5,6^+)$	1611.8 *1*	$(1^+,2,3,4^+)$
385.6 *1*	4^+	1073.5 *1*	2^+	1416.0 *1*	$(1^+,2,3,4^+)$	1784.9 *3*	≤4
759.7 *1*	6^+	1144.35 *10*	(4^+)	1500.3 *1*	$(2^+,3,4^+)$	1951.2 *2*	
863.91 *5*	(2^+)	1323.2 *1*	$(2^+,3,4^+)$	1513.03 *10*	$(1,2^+)$		

[†] From least-squares fit to Eγ data.

[‡] From Adopted Levels.

γ(^{164}Yb)

Transitions were assigned to the ^{164}Lu decay based on the excitation function, half-life and coincidence measurements. Sufficient data are lacking to determine Iγ/100 decays and %ε+%$β^+$ feedings, thus no log *ft* values can be calculated.

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[&]	Comments
123.27 *3*	100.0 *15*	123.27	2^+	0.0	0^+	E2	1.46 *2*	α(K)=0.620 *9*; α(L)=0.644 *9*; α(M)=0.1580 *23* α(N)=0.0361 *5*; α(O)=0.00419 *6*; α(P)=2.63×10^{-5} *4* Additional information 2.
[x]228.06[@] *11*	0.75 *6*							
262.22 *4*	31.9 *15*	385.6	4^+	123.27	2^+	E2	0.112	α(K)=0.0767 *11*; α(L)=0.0270 *4*; α(M)=0.00646 *9* α(N)=0.001487 *21*; α(O)=0.000184 *3*; α(P)=3.81×10^{-6} *6* Additional information 3.

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^{164}Lu ε decay (3.14 min) 1984Ad09,1977Hu02 (continued)

γ(^{164}Yb) (continued)

E_γ †	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	α&	Comments
342.48@ *15*	0.8 *1*	1416.0	(1$^+$,2,3,4$^+$)	1073.5	2$^+$			
373.96 *16*	1.6 *3*	759.7	6$^+$	385.6	4$^+$	E2	0.0389	α(K)=0.0292 *4*; α(L)=0.00747 *11*; α(M)=0.001755 *25* α(N)=0.000406 *6*; α(O)=5.22×10^{-5} *8*; α(P)=1.547×10^{-6} *22* Additional information 4.
412.10 *6*	1.7 *2*	1416.0	(1$^+$,2,3,4$^+$)	1003.8	(3$^+$)			Additional information 20.
535.33@ *12*	1.3 *1*	1951.2		1416.0	(1$^+$,2,3,4$^+$)			
552.01 *3*	11.6 *8*	1416.0	(1$^+$,2,3,4$^+$)	863.91	(2$^+$)			Additional information 21.
x565.31@ *5*	0.3 *1*							
x567.83@ *15*	0.9 *1*							
605.25 *10*	0.5	1365.0	(4$^+$,5,6$^+$)	759.7	6$^+$			Additional information 18.
608.02 *4*	6.1 *7*	1611.8	(1$^+$,2,3,4$^+$)	1003.8	(3$^+$)			Additional information 27.
618.23 *5*	2.8 *4*	1003.8	(3$^+$)	385.6	4$^+$			Additional information 8.
x630.3@ *3*	0.6 *1*							
x637.98@ *16*	0.8 *1*							
687.83 *5*	5.7 *7*	1073.5	2$^+$	385.6	4$^+$			Additional information 10.
740.52 *4*	36 *2*	863.91	(2$^+$)	123.27	2$^+$			Additional information 5.
747.82 *4*	15.9 *8*	1611.8	(1$^+$,2,3,4$^+$)	863.91	(2$^+$)			Additional information 28.
758.75 *9*	2.4 *5*	1144.35	(4$^+$)	385.6	4$^+$			Additional information 13.
x833.26@ *15*	0.9 *1*							
x848.26@ *23*	0.7 *1*							
852.24 *4*	8.9 *5*	975.6	(0$^+$)	123.27	2$^+$			Additional information 7.
863.89 *3*	27 *2*	863.91	(2$^+$)	0.0	0$^+$			Additional information 6.
880.51 *4*	20 *1*	1003.8	(3$^+$)	123.27	2$^+$			Additional information 9.
x917.4@ *3*	0.4 *1*							
937.56 *7*	2.8 *5*	1323.2	(2$^+$,3,4$^+$)	385.6	4$^+$			Additional information 14.
950.19 *5*	6.5 *7*	1073.5	2$^+$	123.27	2$^+$			Additional information 11.
979.46 *9*	3.3 *9*	1365.0	(4$^+$,5,6$^+$)	385.6	4$^+$			Additional information 19.
x1065.72@ *16*	1.2 *1*							
1073.56 *5*	10.2 *8*	1073.5	2$^+$	0.0	0$^+$			Additional information 12.
1115.07 *11*	3.0 *9*	1500.3	(2$^+$,3,4$^+$)	385.6	4$^+$			Additional information 23.
x1138.27@ *17*	1.0 *1*							
x1146.72@ *11*	1.9 *2*							
1164.53@ *17*	2.4 *2*	1550.0		385.6	4$^+$			

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^{164}Lu ε decay (3.14 min) 1984Ad09,1977Hu02 (continued)

γ(^{164}Yb) (continued)

E_γ †	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	Comments
1199.87 *7*	7.6 *7*	1323.2	$(2^+,3,4^+)$	123.27	2^+	Additional information 15.
1212.60 *7*	13 *1*	1335.9	$(1,2^+)$	123.27	2^+	Additional information 16.
x1222.36@ *23*	0.9 *2*					
x1236.62@ *18*	1.3 *1*					
x1241.11@ *12*	2.2 *2*					
x1258.52@ *17*	1.5 *2*					
x1267.21@ *19*	1.1 *1*					
1292.54 *17*	6.1 *9*	1416.0	$(1^+,2,3,4^+)$	123.27	2^+	Additional information 22.
x1307.49@ *11*	2.9 *3*					
1335.86 *10*	11 *1*	1335.9	$(1,2^+)$	0.0	0^+	Additional information 17.
x1341.16@ *19*	1.1 *1*					
1376.60 *11*	5.5 *6*	1500.3	$(2^+,3,4^+)$	123.27	2^+	Additional information 24.
1389.56 *11*	6.2 *6*	1513.03	$(1,2^+)$	123.27	2^+	Additional information 25.
x1398.37@ *22*	1.0 *1*					
x1487.76@ *18*	1.6 *2*					
1513.32 *19*	6.1 *11*	1513.03	$(1,2^+)$	0.0	0^+	Additional information 26.
x1520.92@ *23*	2.3 *2*					
1661.6@ *3*	2.2 *2*	1784.9	≤4	123.27	2^+	
x1801.6@ *4*	1.8 *2*					
x1809.5@ *4*	1.4 *2*					

† From 1984Ad09.
‡ Unweighted average from 1984Ad09 and 1977Hu02 for γ rays reported in both the studies.
# From Adopted Gammas.
@ γ reported by 1984Ad09 only.
& 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.
x γ ray not placed in level scheme.

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Decay Scheme

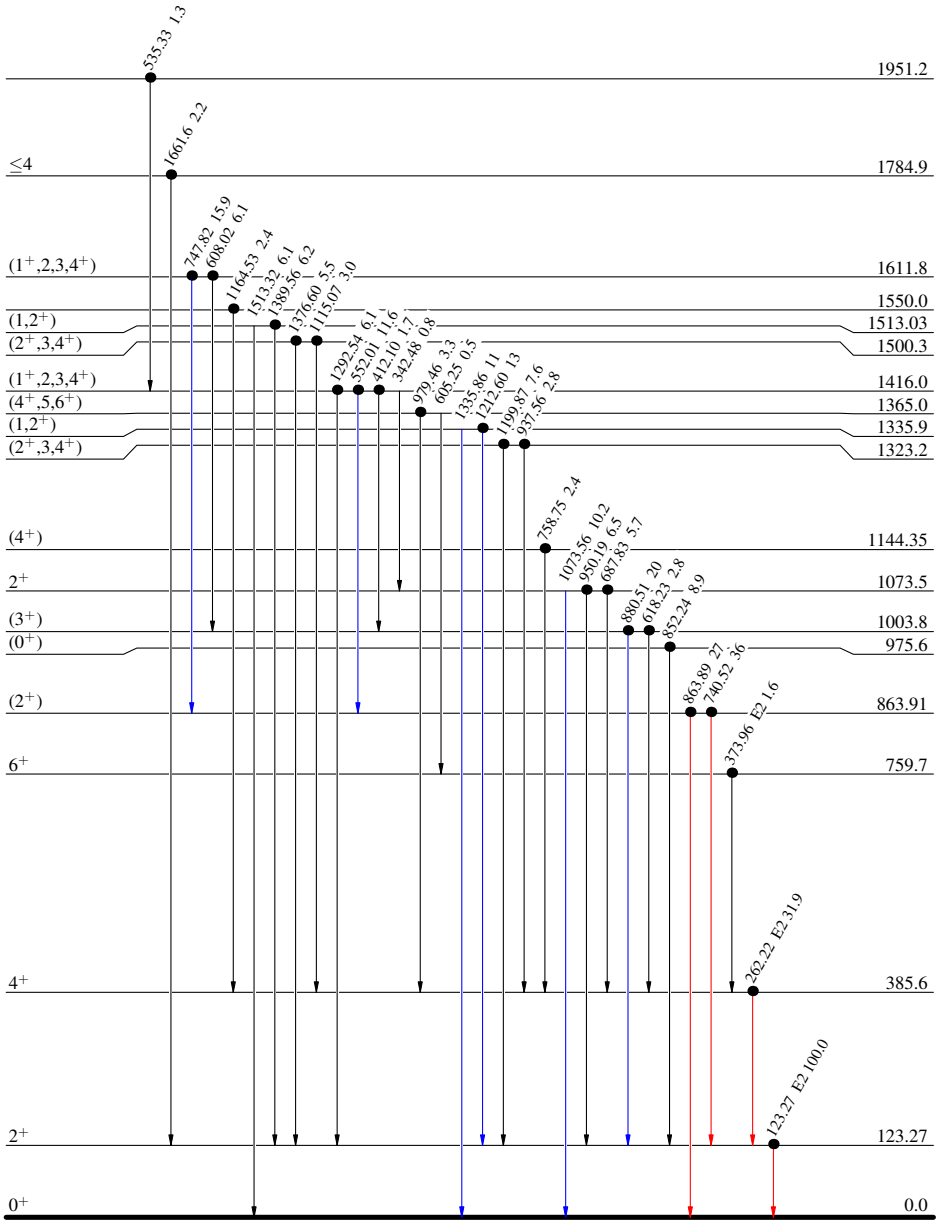
Intensities: Relative I_γ

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- Coincidence

$1^{(-)}$ 0.0 3.14 min *3*

$\%\varepsilon + \%\beta^+ = 100$ $Q_\varepsilon = 6380$ *30*

$^{164}_{71}Lu_{93}$



$^{164}_{70}Yb_{94}$