^{177}Lu IT decay (160.4 d) 2014La20,2012De24,2012Ko23

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev	NDS 159, 1 (2019)	30-Aug-2019

Parent: ^{177}Lu: E=970.1757 *24*; J^{π}=23/2$^-$; $T_{1/2}$=160.4 d *3*; %IT decay=22.70 *8*

^{177}Lu-%IT decay: From Adopted Levels.

Others: 1988Zh06, 1975Mo14, 1970Ka39, 1969Ro37, 1967Ha09, 1965Sy01, 1965Ma18, 1964Kr01, 1964Al04, 1964Bl16, 1966Bo01, 1967Be34, 1967Ha09, 1969Hu06, 1970Ka39, 1971Gl09, 1972Bo55, 1972Ch48, 1974Kr12, 1990Bu31, 1981Hn03, 1972Ch48, 1989Ma56, 2012Ko07, 2012Ko23, 2012De24, 2014La20.

^{177}Lu Levels

E(level)[†]	J^{π}[‡]	$T_{1/2}$[‡]	Comments
0.0[#]	7/2$^+$	6.6443 d *9*	%β^-=100
121.6211[#] *4*	9/2$^+$	0.117 ns *4*	
150.3991[@] *10*	9/2$^-$	133.1 ns *24*	
268.7849[#] *4*	11/2$^+$		
289.0148[@] *13*	11/2$^-$		
440.6424[#] *6*	13/2$^+$		
451.5146[@] *13*	13/2$^-$		
636.2027[#] *7*	15/2$^+$		
637.1133[@] *16*	15/2$^-$		
844.9119[@] *17*	17/2$^-$		
854.3067[#] *7*	17/2$^+$		
970.1757[&] *24*	23/2$^-$	160.4 d *3*	%β^-=77.30 *8*; %IT=22.70 *8* E(level),%β^-,%IT: From Adopted Levels. $T_{1/2}$: Weighted average (external uncertainty) of 160.10 d *8* (1975Wa19), 160.07 d *12* (2008Ca13) and 160.95 d *10* (1967Ne05). 2008Ca13: Measurements were carried out by γ-ray spectrometry during a time interval of 420 days. A value of $T_{1/2}$=150.33 d *10* was obtained using β spectrometry using liquid-scintillator counter. 1975Wa19: 160.10 d *8*, weighted average of 160.50 d *18*, 159.90 d *10* and 160.30 d *16* values obtained by carrying out measurements during a 3-year period with 3 mass-separated samples. Measurements were carried out using a beta-proportional counter. These results supersede the previous ones of 161.3 d *4*, 160.6 d *4* and 160.8 d *4* (1973Ch18), where the same sources were used, but the measurements were carried out during a 12-month period. 1967Ne05: 161.95 d *10*, weighted average of 160.4 d *2*, 161.4 d *2*, 161.8 d *4*, 160.8 d *2*, and 161.0 d *3* values obtained by carrying out measurements during a 3-year period with 5 chemically-purified samples, produced via the ^{176}Lu(n,γ) reaction. One of the samples was measured using a beta-proportional counter and the others via γ-ray spectrometry using NaI detectors, covering different energy ranges. Others: 160.90 d *23* (1973Ch18, superseded by 1975Wa19); 159.5 d *7* (1982La25), 160 d *20* (1965Sy01) and 155 d *5* (1962Jo08).

[†] From a least-squares fit to Eγ, unless otherwise stated.

[‡] From Adopted Levels, unless otherwise stated.

[#] Band(A): K^{π}=7/2$^+$, π7/2[404].

[@] Band(B): K^{π}=9/2$^-$, π9/2[514].

[&] K^{π}=23/2$^-$, π(7/2[404])$\otimes\nu^2$(7/2[514],9/2[624]).

^{177}Lu IT decay (160.4 d) 2014La20,2012De24,2012Ko23 (continued)

γ(^{177}Lu)

Iγ normalization: From 100/I(γ+ce)(23/2$^-$ isomer IT decay), where I(γ+ce)(23/2$^-$ isomer IT decay)=179.1 *7*, weighted average of 179.2 *25* (Iπ=9/2$^+$), 178.5 *15* (Iπ=11/2$^+$), 179.5 *23* (Iπ=13/2$^+$), 179.1 *14* (Iπ=15/2$^+$) and 179.5 *14* (Iπ=17/2$^+$).

E_γ[†]	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	δ[†]	α[‡]	Comments
115.8682 *23*	5.19 *9*	970.1757	23/2$^-$	854.3067	17/2$^+$	E3		33.5	I_γ: Weighted average of 5.0 *4* (1967Ha09), 5.0 *5* (1972Ch48), 5.5 *3* (1981Hn03), 5.39 *18* (2012Ko23), 4.96 *23* (2012De24), and 5.12 *14* (2014La20). Other: 9 *2* (1964Al04). α: α(exp)=33.5 from intensity balance.
121.6211 *5*	49.6 *5*	121.6211	9/2$^+$	0.0	7/2$^+$	M1+E2	+0.51 *5*	2.00 *4*	α(K)=1.52 *5*; α(L)=0.367 *16*; α(M)=0.086 *5* α(N)=0.0201 *10*; α(O)=0.00275 *11*; α(P)=0.000111 *4* I_γ: Weighted average of 52 *4* (1967Ha09), 48.7 *29* (1972Ch48), 48.3 *14* (1981Hn03), 47.9 *14* (2012Ko23), 52.5 *9* (2012De24), and 48.2 *8* (2014La20). Other: 62 *3* (1964Al04).
125.3 *2*	0.0017 *4*	970.1757	23/2$^-$	844.9119	17/2$^-$	[M3]		94.3 *15*	α(K)=45.8 *7*; α(L)=36.2 *6*; α(M)=9.59 *16* α(N)=2.29 *4*; α(O)=0.305 *5*; α(P)=0.01123 *18*
138.616 *1*		289.0148	11/2$^-$	150.3991	9/2$^-$	M1+E2	+0.23 *8*	1.43 *3*	α(K)=1.17 *4*; α(L)=0.197 *9*; α(M)=0.0448 *24* α(N)=0.0106 *6*; α(O)=0.00154 *6*; α(P)=8.7×10^{-5} *3*
147.1637 *5*	28.3 *4*	268.7849	11/2$^+$	121.6211	9/2$^+$	M1+E2	+0.59 *7*	1.114 *25*	α(K)=0.86 *4*; α(L)=0.198 *8*; α(M)=0.0463 *21* α(N)=0.0108 *5*; α(O)=0.00149 *5*; α(P)=6.2×10^{-5} *3* I_γ: Weighted average of 27 *3* (1964Al04), 29 *2* (1967Ha09), 30.2 *23* (1972Ch48), 28.4 *14* (1981Hn03), 29.4 *14* (2012De24), and 28.1 *4* (2014La20). Other: 27.8 *8* (2012Ko23).
150.399 *1*		150.3991	9/2$^-$	0.0	7/2$^+$	E1		0.512 *32*	α: Experimental value of α_{tot}=0.512 *32* (1972Ag05).
162.500 *1*		451.5146	13/2$^-$	289.0148	11/2$^-$	M1+E2	0.33 *13*	0.89 *3*	α(K)=0.754 *11*; α(L)=0.1219 *18*; α(M)=0.0276 *4* α(N)=0.00650 *10*; α(O)=0.000953 *14*; α(P)=5.61×10^{-5} *8*
171.8574 *6*	37.9 *4*	440.6424	13/2$^+$	268.7849	11/2$^+$	M1+E2	+0.47 *21*	0.73 *5*	α(K)=0.59 *6*; α(L)=0.112 *9*; α(M)=0.0258 *23* α(N)=0.0061 *6*; α(O)=0.00086 *5*; α(P)=4.3×10^{-5} *5* I_γ: Weighted average of 41 *4* (1964Al04), 37 *4* (1967Ha09), 41.0 *22* (1972Ch48), 39.0 *12* (1981Hn03), 38.0 *6* (2012De24), 35.3 *11* (2012Ko23) and 38.1 *6* (2014La20).
185.599 *1*		637.1133	15/2$^-$	451.5146	13/2$^-$	M1(+E2)		0.638	α(K)=0.533 *8*; α(L)=0.0816 *12*; α(M)=0.0183 *3* α(N)=0.00433 *6*; α(O)=0.000642 *9*; α(P)=3.98×10^{-5} *6*
195.5602 *7*	6.75 *10*	636.2027	15/2$^+$	440.6424	13/2$^+$	M1+E2	+0.48 *17*	0.50 *3*	α(K)=0.41 *4*; α(L)=0.075 *3*; α(M)=0.0172 *8* α(N)=0.00403 *18*; α(O)=0.000575 *15*; α(P)=3.0×10^{-5} *3* I_γ: Weighted average of 7.0 *6* (1967Ha09), 7.2 *7* (1972Ch48), 6.9 *3* (1981Hn03), 7.4 *3* (2012Ko23), and 6.60 *12* (2014La20). Others: 9 *2* (1964Al04) and 5.80 *18* (2012De24).

^{177}Lu IT decay (160.4 d) 2014La20,2012De24,2012Ko23 (continued)

γ(^{177}Lu) (continued)

E_γ[†]	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	δ[†]	α[‡]	Comments
207.799 *1*		844.9119	17/2$^-$	637.1133	15/2$^-$	M1(+E2)		0.466	α(K)=0.389 *6*; α(L)=0.0595 *9*; α(M)=0.01337 *19* α(N)=0.00316 *5*; α(O)=0.000469 *7*; α(P)=2.90×10^{-5} *4*
218.1038 *6*	26.6 *3*	854.3067	17/2$^+$	636.2027	15/2$^+$	M1+E2	+0.52 *5*	0.365 *9*	α(K)=0.296 *8*; α(L)=0.0537 *8*; α(M)=0.01230 *20* α(N)=0.00289 *5*; α(O)=0.000413 *6*; α(P)=2.16×10^{-5} *7* I$_\gamma$: Weighted average of 27 *3* (1967Ha09), 25.1 *30* (1972Ch48), 27.0 *10* (1981Hn03), 26.2 *9* (2012Ko23), 26.5 *5* (2012De24), and 26.8 *5* (2014La20). Other: 37 *6* (1964Al04).
268.7847 *5*	27.5 *4*	268.7849	11/2$^+$	0.0	7/2$^+$	E2		0.1071	α(K)=0.0728 *11*; α(L)=0.0263 *4*; α(M)=0.00633 *9* α(N)=0.001467 *21*; α(O)=0.000190 *3*; α(P)=4.47×10^{-6} *7* I$_\gamma$: Weighted average of 28.3 *15* (1972Ch48), 28.2 *11* (1981Hn03), 27.1 *7* (2012De24), and 27.4 *7* (2014La20). Others: 32 *5* (1964Al04), 25 *3* (1967Ha09) and 24.8 *8* (2012Ko23).
301.115 *1*		451.5146	13/2$^-$	150.3991	9/2$^-$	E2		0.0757	α(K)=0.0533 *8*; α(L)=0.01719 *24*; α(M)=0.00411 *6* α(N)=0.000954 *14*; α(O)=0.0001250 *18*; α(P)=3.35×10^{-6} *5*
319.0210 *6*	82.9 *9*	440.6424	13/2$^+$	121.6211	9/2$^+$	E2		0.0637	α(K)=0.0456 *7*; α(L)=0.01393 *20*; α(M)=0.00332 *5* α(N)=0.000771 *11*; α(O)=0.0001016 *15*; α(P)=2.90×10^{-6} *4* I$_\gamma$: Weighted average of 86 *4* (1964Al04), 78 *8* (1967Ha09), 85.7 *47* (1972Ch48), 85.6 *25* (1981Hn03), 83.3 *14* (2012De24), 78.1 *23* (2012Ko23) and 83.1 *23* (2014La20).
333.1 *2*	0.014 *3*	970.1757	23/2$^-$	637.1133	15/2$^-$	[E4]		1.007	α(K)=0.324 *5*; α(L)=0.514 *8*; α(M)=0.1330 *20* α(N)=0.0310 *5*; α(O)=0.00383 *6*; α(P)=3.61×10^{-5} *6*
334	≤0.0145	970.1757	23/2$^-$	636.2027	15/2$^+$	[M4]		5.58	α(K)=3.52 *5*; α(L)=1.556 *22*; α(M)=0.398 *6* α(N)=0.0946 *14*; α(O)=0.01287 *18*; α(P)=0.000527 *8*
348.098 *3*		637.1133	15/2$^-$	289.0148	11/2$^-$	E2		0.0494	α(K)=0.0361 *5*; α(L)=0.01021 *15*; α(M)=0.00242 *4* α(N)=0.000564 *8*; α(O)=7.49×10^{-5} *11*; α(P)=2.33×10^{-6} *4*
367.4174 *7*	24.7 *3*	636.2027	15/2$^+$	268.7849	11/2$^+$	E2		0.0424	α(K)=0.0314 *5*; α(L)=0.00847 *12*; α(M)=0.00200 *3* α(N)=0.000466 *7*; α(O)=6.24×10^{-5} *9*; α(P)=2.04×10^{-6} *3* I$_\gamma$: Weighted average of 25 *5* (1964Al04), 23 *2* (1967Ha09), 24.8 *16* (1972Ch48), 26.1 *7* (1981Hn03), 24.0 *5* (2012De24), 24.3 *8* (2012Ko23) and 25.1 *6* (2014La20).
393.395 *2*		844.9119	17/2$^-$	451.5146	13/2$^-$	E2		0.0350	α(K)=0.0263 *4*; α(L)=0.00672 *10*; α(M)=0.001585 *23* α(N)=0.000369 *6*; α(O)=4.97×10^{-5} *7*; α(P)=1.725×10^{-6} *25*
413.6637 *6*	139.0 *13*	854.3067	17/2$^+$	440.6424	13/2$^+$	E2		0.0305	α(K)=0.0231 *4*; α(L)=0.00569 *8*; α(M)=0.001339 *19* α(N)=0.000312 *5*; α(O)=4.22×10^{-5} *6*; α(P)=1.528×10^{-6} *22* I$_\gamma$: Weighted average of 131 *10* (1967Ha09), 137.5 *70* (1972Ch48), 143 *3* (1981Hn03), 129 *4* (2012Ko23), 140.6 *22* (2012De24), and 138.8 *21* (2014La20). Other: 163 *16* (1964Al04).

[†] From adopted gammas.

$^{177}_{71}Lu_{106}$-3

^{177}Lu IT decay (160.4 d) 2014La20,2012De24,2012Ko23 (continued)

$\gamma(^{177}Lu)$ (continued)

‡ Additional information 1.
# For absolute intensity per 100 decays, multiply by 0.1267 *7*.

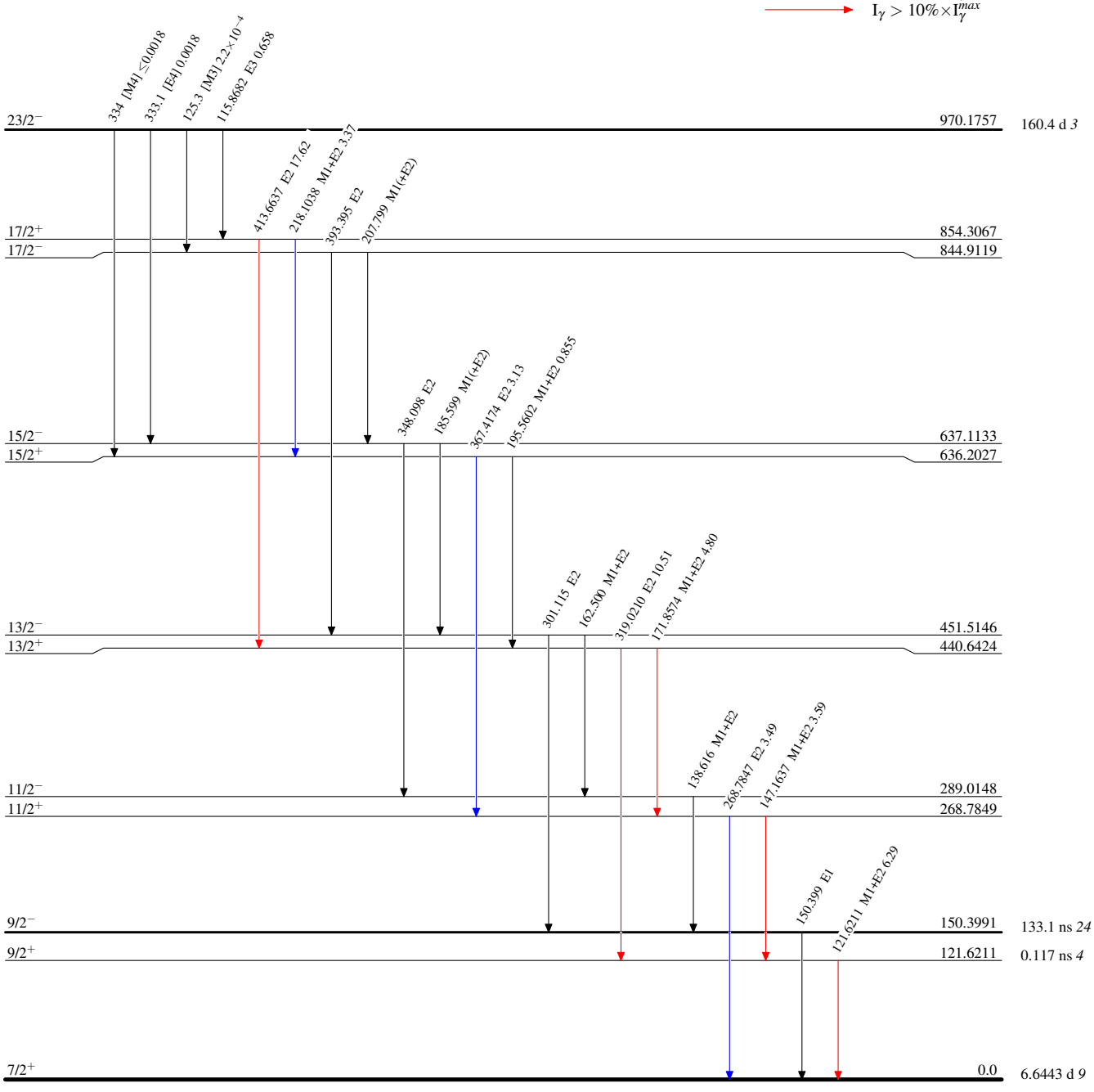
$^{177}_{71}Lu_{106}$-4

^{177}Lu IT decay (160.4 d) 2014La20,2012De24,2012Ko23

Decay Scheme

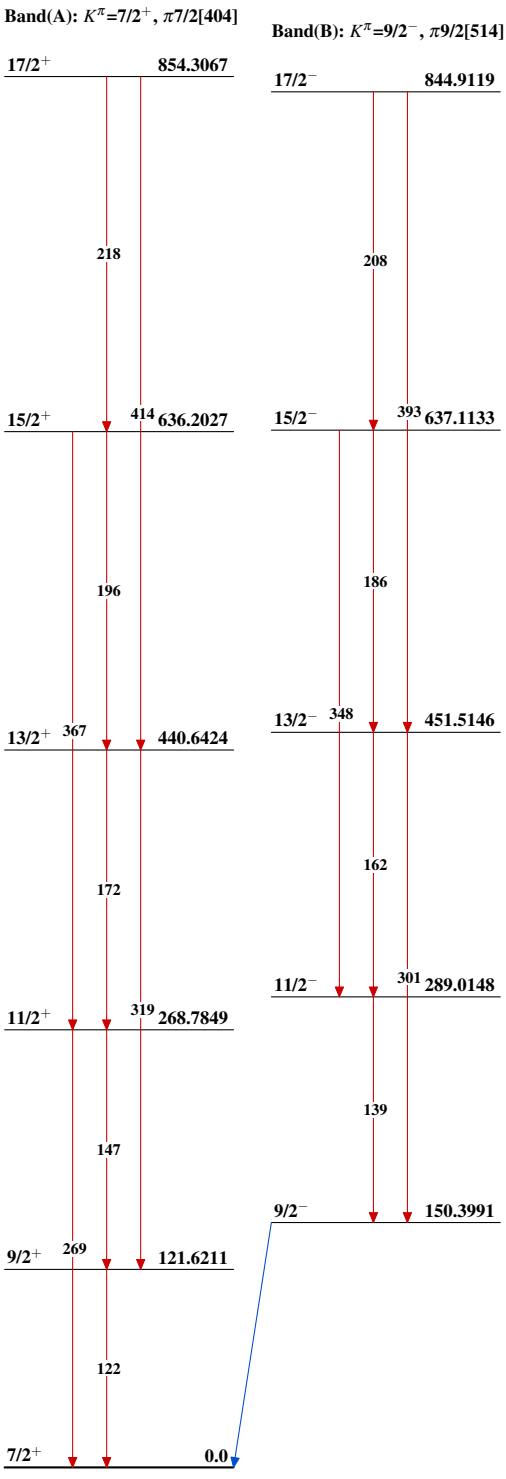
Intensities: I_γ per 100 parent decays
%IT=22.70 *8*

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



$^{177}_{71}Lu_{106}$

^{177}Lu IT decay (160.4 d) 2014La20,2012De24,2012Ko23



$^{177}_{71}Lu_{106}$