

¹⁶⁶Hf ε decay 1974De09

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 109, 1103 (2008)	1-Mar-2008

Parent: ¹⁶⁶Hf: E=0.0; J^π=0⁺; T_{1/2}=6.77 min 30; Q(ε)=2160 40; %ε+%β⁺ decay=100.0

¹⁶⁶Lu Levels

E(level) [†]	J ^π [‡]	T _{1/2} [‡]
0.0	6 ⁻	2.65 min 10
34.37 22	3 ⁽⁻⁾	1.41 min 10
43.0 4	0 ⁻	2.12 min 10
57.2 3	(1) ⁻	
60.5 4	(3) ⁺	
135.9 3	1 ⁺	
341.2 4	1	
399.1 3	1 ⁽⁺⁾	
434.7 4	1 ⁽⁺⁾	
543.7 4	1 ⁺	

[†] From least-squares fit to E_γ.

[‡] From Adopted Levels.

ε,β⁺ radiations

E(decay)	E(level)	Iβ ⁺ [†]	Iε [†]	Log ft	I(ε+β ⁺) [†]	Comments
(1.62×10 ³ 4)	543.7	0.029 9	9.2 13	5.22 7	9.2 13	av Eβ=284 18; εK=0.8210 5; εL=0.1347 3; εM+=0.04113 11
(1.73×10 ³ 4)	434.7	0.034 12	5.7 14	5.49 11	5.7 14	av Eβ=332 18; εK=0.8192 10; εL=0.1339 4; εM+=0.04084 12
(1.76×10 ³ 4)	399.1	0.054 14	7.3 11	5.39 7	7.4 11	av Eβ=347 18; εK=0.8184 11; εL=0.1336 4; εM+=0.04074 12
(1.82×10 ³ 4)	341.2	0.034 10	3.5 8	5.75 11	3.5 8	av Eβ=373 18; εK=0.8168 14; εL=0.1330 4; εM+=0.04057 13
(2.02×10 ³ 4)	135.9	1.5 3	69 6	4.54 5	71 6	av Eβ=463 18; εK=0.8078 24; εL=0.1308 6; εM+=0.03984 17
(2.10×10 ³ [‡] 4)	57.2	<0.098	<3.4	>5.9	<3.5	av Eβ=497 18; εK=0.803 3; εL=0.1297 6; εM+=0.03951 19
(2.12×10 ³ [‡] 4)	43.0	<0.10	<3.4	>5.9	<3.5	av Eβ=504 18; εK=0.802 3; εL=0.1295 6; εM+=0.03944 19

[†] Absolute intensity per 100 decays.

[‡] Existence of this branch is questionable.

γ(¹⁶⁶Lu)

I_γ normalization: Assuming <7% feeding to the five lowest-energy levels. Negligible feeding is expected to the 6⁻ g.s., 3⁽⁻⁾ 35 level and (3⁺) 61 level. feeding to the 0⁻ 43 level and (1)⁻ 57 level would be first-forbidden and log ft>5.9 would imply %ε+%β⁺<3.5 to each level.

γγ coin: (78.8γ)(Lu x-ray, 298.8γ, 407.9γ) semi-semi (1974De09).

I(Lu K x-ray)=208 128 if I_γ(78.76γ)=100.

¹⁶⁶Hf ε decay 1974De09 (continued)

γ(¹⁶⁶Lu) (continued)

<u>E_γ[†]</u>	<u>I_γ^{‡#}</u>	<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.</u>	<u>α[@]</u>	<u>I_(γ+ce)^{‡#}</u>	<u>Comments</u>
(14.2)		57.2	(1) ⁻	43.0	0 ⁻	[M1]	191	74	ce(L)/(γ+ce)=0.772 8; ce(M)/(γ+ce)=0.175 4; ce(N+)/(γ+ce)=0.0477 10 ce(N)/(γ+ce)=0.0413 8; ce(O)/(γ+ce)=0.00610 12; ce(P)/(γ+ce)=0.000375 8 E _γ : from level-energy difference; transition not observed.
22.85 22		57.2	(1) ⁻	34.37	3 ⁽⁻⁾	[E2]	3.11×10 ³ 16	137	ce(L)/(γ+ce)=0.76 3; ce(M)/(γ+ce)=0.187 13; ce(N+)/(γ+ce)=0.048 4 ce(N)/(γ+ce)=0.043 3; ce(O)/(γ+ce)=0.0051 4; ce(P)/(γ+ce)=2.56×10 ⁻⁶ 19 E _γ : the conversion line at E(ce)=20.74 22 was interpreted as the M-conversion line of an E2 transition.
(26.1)		60.5	(3) ⁺	34.37	3 ⁽⁻⁾	[E1]	2.55	12.9	ce(L)/(γ+ce)=0.557 5; ce(M)/(γ+ce)=0.1283 21; ce(N+)/(γ+ce)=0.0323 6 ce(N)/(γ+ce)=0.0288 5; ce(O)/(γ+ce)=0.00338 6; ce(P)/(γ+ce)=9.74×10 ⁻⁵ 17 E _γ : from level-energy difference; transition not observed.
34.37 22		34.37	3 ⁽⁻⁾	0.0	6 ⁻	(M3)	8.6×10 ⁴ 4		α(L)=6.2×10 ⁴ 3; α(M)=1.86×10 ⁴ 9; α(N+..)=5.02×10 ³ 22 α(N)=4.46×10 ³ 20; α(O)=549 24; α(P)=10.1 4 E _γ : conversion lines at E(ce)=25.05 22 and 32.44 22 were interpreted as the L- and M-conversion lines of the isomeric M3 transition. L:M=36 20:20 12.
78.76 10	100 5	135.9	1 ⁺	57.2	(1) ⁻	E1	0.651		α(K)=0.531 8; α(L)=0.0932 14; α(M)=0.0210 3; α(N+..)=0.00553 8 α(N)=0.00485 7; α(O)=0.000652 10; α(P)=2.77×10 ⁻⁵ 4 Mult.: from α(L)exp=0.13 4 (1974De09). %I _γ =43.6 20 assuming recommended normalization.
93.05 20	8.0 10	135.9	1 ⁺	43.0	0 ⁻	(E1)	0.423 7		α(K)=0.347 6; α(L)=0.0588 9; α(M)=0.01323 21; α(N+..)=0.00349 6 α(N)=0.00306 5; α(O)=0.000416 7; α(P)=1.85×10 ⁻⁵ 3 Mult.: from α(L)exp<1.3 (1974De09).
^x 170.0 6	1.1 4								
^x 244.6 4	3.8 12								
283.92 20	3.9 15	341.2	1	57.2	(1) ⁻				
298.77 20	3.2 10	434.7	1 ⁽⁺⁾	135.9	1 ⁺				

Continued on next page (footnotes at end of table)

^{166}Hf ε decay **1974De09** (continued) $\gamma(^{166}\text{Lu})$ (continued)

E_γ^\dagger	$I_\gamma^{\ddagger\#}$	$E_i(\text{level})$	J_i^π	E_f	J_f^π	E_γ^\dagger	$I_\gamma^{\ddagger\#}$	$E_i(\text{level})$	J_i^π	E_f	J_f^π
306.8 4	4.2 10	341.2	1	34.37	3 ⁽⁻⁾	377.6 5	9.8 28	434.7	1 ⁽⁺⁾	57.2	(1) ⁻
338.98 15	2.9 14	399.1	1 ⁽⁺⁾	60.5	(3 ⁺)	407.91 10	11.0 21	543.7	1 ⁺	135.9	1 ⁺
341.82 10	11.4 10	399.1	1 ⁽⁺⁾	57.2	(1) ⁻	^x 430.74 10	3.2 7				
355.1 5	2.6 13	399.1	1 ⁽⁺⁾	43.0	0 ⁻	483.05 10	10.0 18	543.7	1 ⁺	60.5	(3 ⁺)

[†] From **1974De09**, except As noted.

[‡] From **1974De09**.

[#] For absolute intensity per 100 decays, multiply by 0.436 24.

[@] 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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- Legend
- I_γ < 2% × I_γ^{max}
 - I_γ < 10% × I_γ^{max}
 - I_γ > 10% × I_γ^{max}
 - - - - - γ Decay (Uncertain)
 - Coincidence

Decay Scheme
 Intensities: I_(γ+ce) per 100 parent decays

