

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	E. Achterberg, O. A. Capurro, G. V. Marti		NDS 110,1473 (2009)	31-May-2008

$Q(\beta^-)=2097.9$ 21; $S(n)=6025.3$ 19; $S(p)=6644.0$ 25; $Q(\alpha)=1.10\times 10^3$ 5 [2012Wa38](#)

Note: Current evaluation has used the following Q record 2101.3 20 6025.3 19 6642.8 25 1100 40 [2003Au03](#).

Early investigations of this nuclide ([1951Bu25](#), [1960At01](#), [1964Ba22](#)) suggested the existence of a short lived activity with $T\approx 5$ min, besides the 23 and 28 min half-lives described in the sections below. This short-lived activity, however, has not been reported in later works.

 ^{178}Lu LevelsCross Reference (XREF) Flags

- A** ^{178}Yb β^- decay
B $^{179}\text{Hf}(t, \alpha)$
C $^{176}\text{Lu}(t, p)$

E(level)	J^π	$T_{1/2}$	XREF	Comments
$0^{\ddagger}$	$1^{(+)}$	28.4 min 2	AB	$\% \beta^- = 100$ (2003Au02) $T_{1/2}$: weighted average of 28.4 min 2 (1973Or03) and 28.1 min 5 (1975Ka15). Other values: 30 min 1 (1967Ta09), 30 min 5 (1971Gu01). J^π : Spin from collinear laser spectroscopy (1998Ge13). Parity from a $\log ft=4.9$ estimate for the β^- -branch from the 0^+ ^{178}Yb g.s. decay (1973Or03). Consistent with $\log ft=6.6$ to the 0^+ g.s., and $\log ft=6.9$ to the 2^+ level, in even-even ^{178}Hf (1973Or03), but these values do not exclude 1 st forbidden β^- decays. Additional support for parity from Nilsson states used to reproduce the measured magnetic moment (1998Ge13). RMS charge radius: 5.386 31 fm (2004An14). Isotope shift: $\delta \langle r^2 \rangle = 0.523$ fm ² relative to ^{170}Lu (1998Ge13). $\mu = -1.377$ 9 μ_N , collinear laser spectroscopy (1998Ge13). $Q_s = 0.708$ 10 b (1998Ge13). $\beta_2 = 0.29$ (1998Ge13).
42.4 ‡ 9	(2 ⁺)		AB	
96 4	(3 ⁺)		B	J^π : possible member of $K^\pi=1^+$ g.s. rotational band.
123.8 $^{\textcircled{a}}$ 26	(9 ⁻)	23.1 min 3	B	$\% \beta^- = 100$ (2003Au02) Additional information 1. $T_{1/2}$: weighted average of 23.8 min 4 (1975Wa24), 22.9 min 9 (1975Ka15), 22.7 min 4 (1973Or03), and 23 min 1 (1967Ta09). Others: 1951Bu25 , 1957St97 , 1960At01 , 1960Po06 , 1961Gl03 , 1961Ku10 . J^π : From $\log ft=5.3$ to 8^- and $\log ft=6.2$ to 9^- levels in ^{178}Hf . Spin is consistent with the agreement between $ft(1147)/ft(1364)(\text{exp})=10.0$ and 8.95 (theory, 1975Wa24), assuming that the 1147 and 1364 levels in ^{178}Hf are the $J=8$ and 9 members, respectively, of a $K=8$ rotational band. E(level): from value adopted in 2003Au02 , based on reaction energy differences. Isotope shift: $\delta \langle r^2 \rangle = 0.599$ fm ² relative to ^{170}Lu (1998Ge13). $\mu = 4.834$ 9 μ_N , collinear laser spectroscopy (1998Ge13). $Q_s = 5.39$ 5 b (1998Ge13). $\beta_2 = 0.30$ (1998Ge13).
133 b 6	7 ⁻		C	J^π : $L=0$ in (t,p).
187 $^\#$ 1	(8 ⁺)		B	
215 3			B	
300 4	(5 ⁺)		B	Possible member of $K^\pi=1^+$ g.s. rotational band.
332 b 6	(8 ⁻)		C	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{178}Lu Levels (continued)

E(level)	$J^\pi^\dagger$	XREF	Comments
334 @ 2	(10 ⁻)	B	
366 3		B	
390.8 9	(1 ⁺)	A	J^π : 348.4 γ to (2 ⁺), 390.8 γ to 1 ⁽⁺⁾ . log ft =4.4 from ^{178}Yb β decay, assuming 10% β^- feeding (1973Or03).
403 6		C	
475 4		B	
499 2	(7 ⁺)	B	
553 ^b 6	(9 ⁻)	C	
656 & 2	(4 ⁺)	B	
756 & 2	(5 ⁺)	B	
821 ^b 6	(10 ⁻)	C	
834 ^a 2	(5 ⁺)	B	
878 & 2	(6 ⁺)	B	
906 3		B	
974 ^a 2	(6 ⁺)	B	
1033 3		B	
1068 2		B	
1133 2		B	
1167 3		B	
1198 6		C	
1215 3		B	
1255 2		B	
1290 3		B	
1341 2		B	
1364 6	7 ⁻	C	J^π : L=0 in (t,p).
1451 7		C	
1512 7		C	
1671 7		C	
1692 7		C	
1726 7		C	
1854 7		C	
1886 7		C	
1958 7		C	

[†] From experimental angular distribution of (t, α) cross-sections (1993Bu02), on L-transfers in (t,p) reactions (1981Gi01), and on suggested rotational band structures.

[‡] Band(A): $K^\pi=1^+$. configuration= $\nu(9/2^+[624])-\pi(7/2^+[404])$.

Band(B): $K^\pi=8^+$. configuration= $\nu(9/2^+[624])+\pi(7/2^+[404])$.

@ Band(C): $K^\pi=9^-$. configuration= $\nu(9/2^+[624])+\pi(9/2^-[514])$.

& Band(D): $K^\pi=(4^+)$. Possible configuration= $\nu(9/2^+[624])-\pi(1/2^+[411])$.

^a Band(E): $K^\pi=(5^+)$. Possible configuration= $\nu(9/2^+[624])+\pi(1/2^+[411])$.

^b Band(F): $K^\pi=7^-$. configuration= $\nu(7/2^-[514])+\pi(7/2^+[404])$.

 $\gamma(^{178}\text{Lu})$

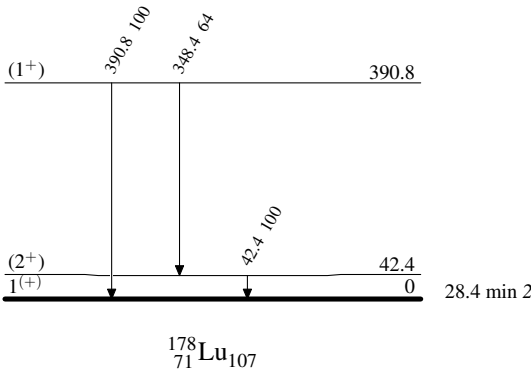
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π
42.4	(2 ⁺)	42.4	100	0	1 ⁽⁺⁾
390.8	(1 ⁺)	348.4	64	42.4	(2 ⁺)
		390.8	100	0	1 ⁽⁺⁾

[†] From ^{178}Yb β^- decay (1973Or03).

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



Adopted Levels, Gammas

