

**Adopted Levels, Gammas**

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 111,275 (2010)	1-Oct-2009

Q( $\beta^-$ )=1.34×10<sup>3</sup> 3; S(n)=6.29×10<sup>3</sup> 5; S(p)=9.07×10<sup>3</sup> 10; Q( $\alpha$ )=7.×10<sup>2</sup> *syst* 2012Wa38  
 Note: Current evaluation has used the following Q record 1340 30 6287 50 9270 *syst* 480 *syst* 2003Au03,2009AuZZ.  
 Uncertainties are 300 and 400 for S(p) and Q( $\alpha$ ), respectively (2003Au03, 2009AuZZ).  
 S(n): From 2009AuZZ; 6286 50 in 2003Au03.

<sup>184</sup>Hf Levels

Cross Reference (XREF) Flags

- A <sup>184</sup>Lu  $\beta^-$  decay (19 s)
- B <sup>184</sup>Hf IT decay

E(level) <sup>†</sup>	J $\pi$ <sup>‡</sup>	T <sub>1/2</sub>	XREF	Comments
0.0 <sup>#</sup>	0 <sup>+</sup>	4.12 h 5	AB	% $\beta^-$ =100 J $\pi$ : g.s. of even-even nuclide. T <sub>1/2</sub> : from 1973Wa18.
107.1 <sup>#</sup> 1	(2 <sup>+</sup> )		AB	
349.60 <sup>#</sup> 23	(4 <sup>+</sup> )		AB	
717.2 <sup>#</sup> 3	(6 <sup>+</sup> )		B	
1199.5 <sup>#</sup> 4	(8 <sup>+</sup> )		B	J $\pi$ : assigned as 8 <sup>-</sup> by 1989Ry04 because systematics of even-even Hf(8 <sup>-</sup> ) isomers predict a state with approximately this excitation energy; however, if the 482 $\gamma$ were M2, systematics would predict T <sub>1/2</sub> >1 h and 1989Ry04 did not observe such a long-lived activity. 1995Kr04 subsequently observed the expected isomer at E=1272, as adopted here.
1272.2 4	(8 <sup>-</sup> )	48 s 10	B	%IT=100 J $\pi$ : by analogy with isomeric states in neighboring Hf isotopes. Probably a K $\pi$ =8 <sup>-</sup> ( $\pi$ 9/2[514])+( $\pi$ 7/2[404]) configuration (1989Ry04). T <sub>1/2</sub> : from I(555 $\gamma$ +482 $\gamma$ +368 $\gamma$ )(t) (1995Kr04).

<sup>†</sup> From least-squares fit to adopted E $\gamma$ .

<sup>‡</sup> From systematics, except where noted. The levels with E<1200 have energies consistent with those for the g.s. rotational bands in neighboring Hf isotopes.

<sup>#</sup> Band(A): K $\pi$ =0<sup>+</sup> ground state band. Band parameters: A=17.7, B=-14 (J=0 through 8 levels).

$\gamma$ (<sup>184</sup>Hf)

E <sub>i</sub> (level)	J $\pi$ <sub>i</sub>	E $\gamma$ <sup>†</sup>	I $\gamma$ <sup>†</sup>	E <sub>f</sub>	J $\pi$ <sub>f</sub>	Mult.	$\alpha$ <sup>‡</sup>	Comments
107.1	(2 <sup>+</sup> )	107.1 1	100	0.0	0 <sup>+</sup>	[E2]	2.70	
349.60	(4 <sup>+</sup> )	242.5 2	100	107.1	(2 <sup>+</sup> )	[E2]	0.1531	
717.2	(6 <sup>+</sup> )	367.6 2	100	349.60	(4 <sup>+</sup> )	[E2]	0.0439	
1199.5	(8 <sup>+</sup> )	482.3 2	100	717.2	(6 <sup>+</sup> )	[E2]	0.0212	
1272.2	(8 <sup>-</sup> )	72.7 2	78 17	1199.5	(8 <sup>+</sup> )	[E1]	0.814 13	B(E1)(W.u.)=3.5×10 <sup>-15</sup> 12
		555.0 2	100 25	717.2	(6 <sup>+</sup> )	[M2]	0.1092	B(M2)(W.u.)=1.5×10 <sup>-10</sup> 6

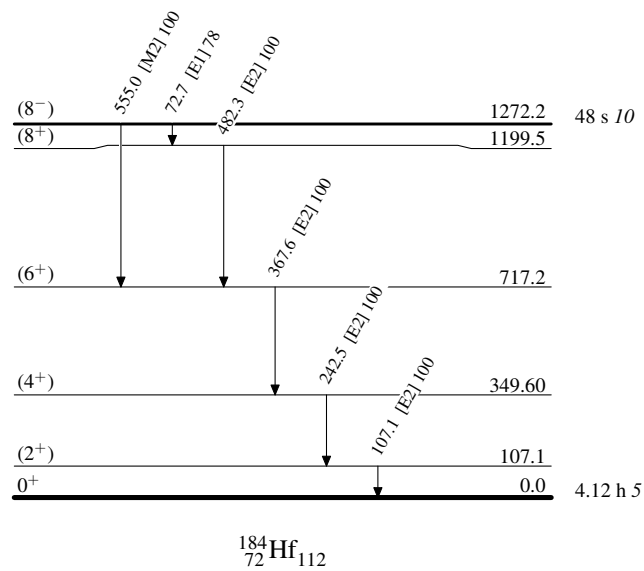
<sup>†</sup> From <sup>184</sup>Hf IT decay.

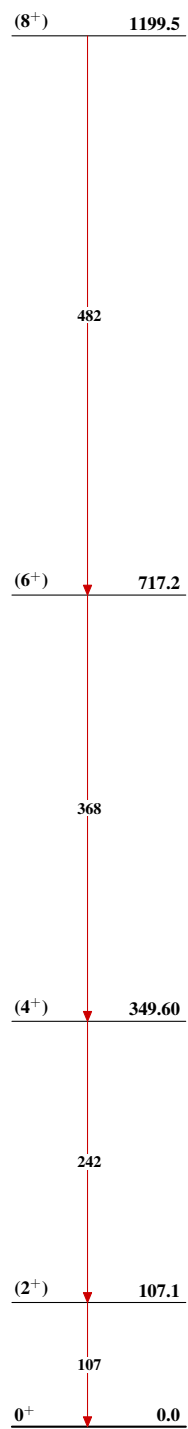
**Adopted Levels, Gammas (continued)** $\gamma(^{184}\text{Hf})$  (continued)

‡ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on  $\gamma$ -ray energies, assigned multiplicities, and mixing ratios, unless otherwise specified.

**Adopted Levels, Gammas**Level Scheme

Intensities: Relative photon branching from each level



**Adopted Levels, Gammas****Band(A):  $K^\pi=0^+$  ground  
state band** $^{184}_{72}\text{Hf}_{112}$