^{184}Hf IT decay 2001Ch10,1995Kr04,1989Ry04

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

Parent: ^{184}Hf: E=1272.2; $J^\pi=(8^-)$; $T_{1/2}$=48 s *10*; %IT decay=100.0

2001Ch10: source from ^{180}Hf(^{238}U,X), E=1.6 GeV; GAMMASPHERE detector array (98 HPGe and 3 LEPS detectors); measured Eγ, $\gamma\gamma$ coin (2 transitions).

1989Ry04: sources produced using ^{136}Xe, ^{186}W and ^{238}U beams on natural W + ^{181}Ta stacked targets. Sources were mass separated on-line, and activity was assigned to Lu decay on the basis of low efficiency for Hf in the separator. However, 48 s ^{184}Hf(8^-) was also present In these sources.

1995Kr04: ^{136}Xe (11.4 MeV/nucleon) bombardment of ^{nat}W; on-line mass separation; β detector, two Ge detectors; measured Eγ, Iγ, $\gamma\gamma$ coin, $\beta^-\gamma$ coin for mixed ^{184}Lu and isomeric ^{184}Hf source.

^{184}Hf Levels

E(level)[†]	J^π[‡]	$T_{1/2}$	Comments
0.0[#]	0^+		
107.1[#] *1*	(2^+)		
349.60[#] *23*	(4^+)		
717.2[#] *3*	(6^+)		
1199.5[#] *4*	(8^+)		
1272.2 *4*	(8^-)	48 s *10*	%IT=100 J^π: by analogy with isomeric states In neighboring Hf isotopes. Probably a $K^\pi=8^-$ configuration (1995Kr04). $T_{1/2}$: from I(555γ+482γ+368γ)(t) (1995Kr04).

[†] From least-squares fit to Eγ.
[‡] From Adopted Levels, except As noted.
[#] Band(A): $K^\pi=0^+$ g.s. band.

$\gamma(^{184}Hf)$

Iγ normalization: from Ti(368γ)=100%.

Eγ[†]	Iγ[‡#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[@]	Comments
72.7 *2*	0.28 *6*	1272.2	(8^-)	1199.5	(8^+)	[E1]	0.814 *13*	α(K)=0.659 *11*; α(L)=0.1204 *20*; α(M)=0.0273 *5*; α(N+..)=0.00724 *12* α(N)=0.00633 *10*; α(O)=0.000877 *14*; α(P)=3.85×10^{-5} *6* Eγ: reported only by 1995Kr04. Iγ: from I(γ+ce)=0.5 *1* and authors′ assumed α of 0.820 (1995Kr04).
107.1 *1*	0.27 *2*	107.1	(2^+)	0.0	0^+	[E2]	2.70	α(K)=0.828 *12*; α(L)=1.426 *21*; α(M)=0.356 *6*; α(N+..)=0.0929 *14* α(N)=0.0824 *12*; α(O)=0.01045 *16*; α(P)=5.08×10^{-5} *8* Iγ: from I(γ+ce)=2.29 *20* and authors′ assumed α of 2.724 (1995Kr04), Iγ=0.62 *5*; however, this includes contribution from ^{184}Lu β decay, so evaluator deduces Iγ(IT decay) assuming Ti(107γ)=Ti(243γ)=Ti(368γ). Then Iγ(from β^- decay)=0.35 *6*.
242.5 *2*	0.87 *5*	349.60	(4^+)	107.1	(2^+)	[E2]	0.1531	α(K)=0.0981 *14*; α(L)=0.0420 *6*; α(M)=0.01023 *15*;

Continued on next page (footnotes at end of table)

^{184}Hf IT decay 2001Ch10,1995Kr04,1989Ry04 (continued)

$\gamma(^{184}Hf)$ (continued)

E_γ [†]	I_γ [‡#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α [@]	Comments
								α(N+..)=0.00271 *4* α(N)=0.00239 *4*; α(O)=0.000318 *5*; α(P)=6.71×10^{-6} *10* I_γ: from I(γ+ce)=1.18 *7* and authors′ assumed α of 0.155 (1995Kr04), Iγ=1.02 *6*; however, this includes contribution from ^{184}Lu β decay, so evaluator deduces Iγ(IT decay) assuming Ti(243γ)=Ti(368γ). Then Iγ(from β^- decay)=0.15 *9*.
367.6 *2*	0.96	717.2	(6$^+$)	349.60	(4$^+$)	[E2]	0.0439	α(K)=0.0321 *5*; α(L)=0.00903 *13*; α(M)=0.00215 *3*; α(N+..)=0.000576 *9* α(N)=0.000504 *8*; α(O)=6.99×10^{-5} *10*; α(P)=2.37×10^{-6} *4* I_γ: from I(γ+ce)=1.00 and authors′ assumed α of 0.0443 (1995Kr04).
482.3 *2*	0.59 *10*	1199.5	(8$^+$)	717.2	(6$^+$)	[E2]	0.0212	α(K)=0.01635 *23*; α(L)=0.00373 *6*; α(M)=0.000876 *13*; α(N+..)=0.000236 *4* α(N)=0.000206 *3*; α(O)=2.93×10^{-5} *5*; α(P)=1.247×10^{-6} *18* I_γ: from I(γ+ce)=0.6 *1* and authors′ assumed α of 0.0214 (1995Kr04).
555.0 *2*	0.36 *9*	1272.2	(8$^-$)	717.2	(6$^+$)	[M2]	0.1092	α(K)=0.0889 *13*; α(L)=0.01570 *22*; α(M)=0.00361 *5*; α(N+..)=0.001000 *14* α(N)=0.000861 *12*; α(O)=0.0001312 *19*; α(P)=8.43×10^{-6} *12* E_γ: reported only by 1995Kr04. I_γ: from I(γ+ce)=0.4 *1* and authors′ assumed α of 0.108 (1995Kr04).

[†] From 1995Kr04. data from 1989Ry04 are less precise, but In excellent agreement with those from 1995Kr04.

[‡] Deduced by evaluator from I(γ+ce) given In 1995Kr04; authors report I(γ+ce) deduced from Iγ assuming α from Rosel. Data from 1989Ry04 are much less precise.

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

[@] 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.

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Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

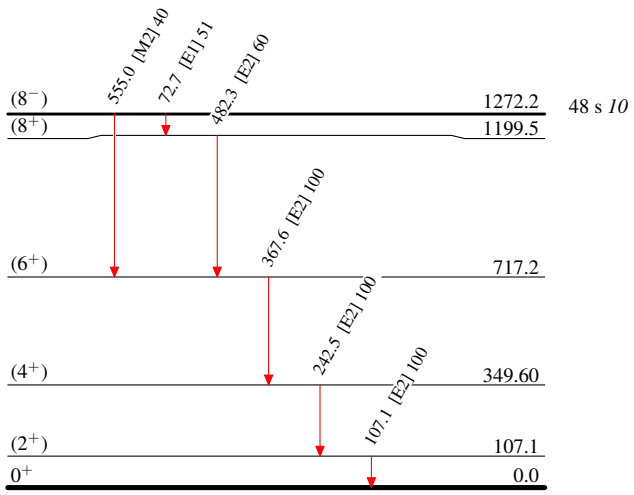
%IT=100.0

Legend

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

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

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



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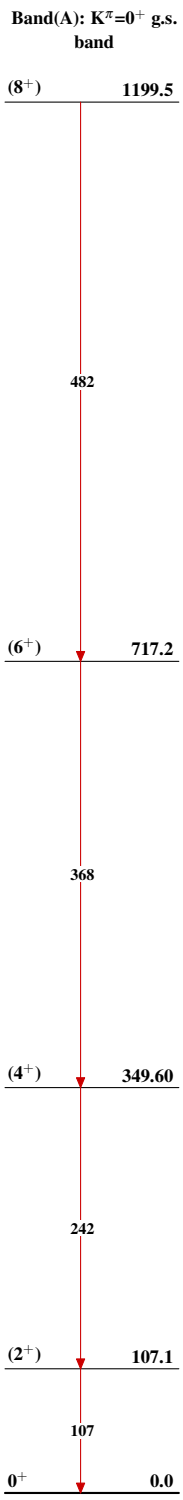

$^{184}_{72}Hf_{112}$