^{163}Hf ε decay (40.0 s) 1982Sc15

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich, Balraj Singh	NDS 111, 1211 (2010)	12-Apr-2010

Parent: ^{163}Hf: E=0.0; $T_{1/2}$=40.0 s *6*; Q(ε)=5510 *40*; %ε+%$β^+$ decay=100.0
^{163}Hf-$T_{1/2}$: From the ^{163}Hf Adopted Levels.
^{163}Hf-Q(ε): From 2009AuZZ, 2003Au03.
^{163}Hf-%ε+%$β^+$ decay: %α<0.0001 (1995Hi12).
Additional information 1.
1982Sc15: ^{142}Nd(^{24}Mg,3n) E=105-133 MeV. He-jet. Measured x-rays, γ′s, γγ-coin, γ(t), and α′s. Identification by cross-bombardment (^{141}Pr(^{24}Mg,X) E=110-130 MeV) and excitation functions.
Others:
1995Hi12: ^{163}Hf produced by ^{135}Ba(^{32}S,xn) E=172 MeV. Measured γ, α. Authors state that the decay scheme proposed by 1982Sc15 is confirmed and %α(measured)<0.0001.
1982Br31 (also 1989Br19,1987Es08,1981Br30): ^{147}Sm(^{20}Ne,4n) E=110, 139 MeV. Chem separation. Measured γ′s and $T_{1/2}$. Identification by ^{163}Lu 163γ.
1981LiZM: Yb(^{3}He,xn). On-line separation; fluoride compounds. Measured x-rays, γ′s, and K x ray(t).

^{163}Lu Levels

E(level)[†]	Jπ[‡]	Comments
0.0	1/2(+)	
17.0	(3/2+)	E(level): level proposed based on (^{29}Si,5nγ) results of 1999Do34, 2002Je05.
62.39[#] *8*	(5/2+)	
124.5[#]	(7/2+)	E(level): order of 62γ-71γ cascade is from 1999Do34 and 2002Je05 in (^{29}Si,5nγ).
195.47[#] *13*	(7/2−)	Jπ: parity is based on the present ordering of 71γ-62γ cascade.
224.64 *17*	(7/2+)	
250.35 *10*	(7/2+)	
280.37? *17*		
691.54 *17*		
715.79 *17*		
730.72 *24*		
883.72 *17*		

[†] The level scheme from 1982Sc15 is now built on the top of the 17.0 level, as proposed in the (^{29}Si,5nγ) study of 1999Do34 and 2002Je05 from the observation of parallel γ rays of 191.0 and 174.0 from a level at 191 keV.
[‡] From Adopted Levels.
[#] Width of prompt peak (FWHM) is <30 ns.

γ(^{163}Lu)

All gammas are observed in coincidence with Lu x-rays and $γ^±$ and, except for the 688.2γ, measured $T_{1/2}$′s are consistent with the mean value of ^{163}Hf ground state $T_{1/2}$. In addition excitation function measured for all γ′s except the three weakest γ rays in the (^{24}Mg,3n) reaction are in agreement with those expected for a three-particle evaporation reaction.

Eγ	Iγ	Ei(level)	$J_i^π$	Ef	$J_f^π$	Mult.[†]	α[‡]	Comments
45.39 *8*	48 *2*	62.39	(5/2+)	17.0	(3/2+)	M1	6.12	α(L)=4.76 *8*; α(M)=1.071 *16*; α(N+..)=0.293 *5* α(N)=0.253 *4*; α(O)=0.0374 *6*; α(P)=0.00230 *4*
62.14 *5*	64 *5*	124.5	(7/2+)	62.39	(5/2+)	M1	2.43	α(L)=1.89 *3*; α(M)=0.426 *6*; α(N+..)=0.1163 *17* α(N)=0.1005 *15*; α(O)=0.01488 *22*; α(P)=0.000917 *13* Iγ: from comparison with Iγ(71γ) in γγ spectrum gated

Continued on next page (footnotes at end of table)

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γ(^{163}Lu) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[‡]	Comments
								on 45γ.
								Additional information 2.
70.98 *8*	100	195.47	(7/2⁻)	124.5	(7/2⁺)	E1	0.849	α(K)=0.689 *10*; α(L)=0.1244 *18*; α(M)=0.0281 *4*; α(N+..)=0.00736 *11* α(N)=0.00646 *10*; α(O)=0.000861 *13*; α(P)=3.56×10^{-5} *5* Also assigned to ^{163}Hf decay by 1982Br31.
84.9[#] *1*	<1.6	280.37?		195.47	(7/2⁻)			
133.08 *10*	24 *1*	195.47	(7/2⁻)	62.39	(5/2⁺)			
162.25 *15*	16 *1*	224.64	(7/2⁺)	62.39	(5/2⁺)			
233.35 *10*	17 *1*	250.35	(7/2⁺)	17.0	(3/2⁺)			
496.07 *10*	13 *1*	691.54		195.47	(7/2⁻)			
520.32 *10*	19 *1*	715.79		195.47	(7/2⁻)			
535.25 *20*	4 *1*	730.72		195.47	(7/2⁻)			
688.25 *10*	33 *4*	883.72		195.47	(7/2⁻)			

[†] From a comparison of experimental intensity ratios in γγ with the predicted values using α′s (for M1 and E1). Based on width of prompt peak, multipolarities higher than E1, M1, E2 are excluded.

[‡] 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.

[#] Placement of transition in the level scheme is uncertain.

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Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)
- Coincidence

Decay Scheme

Intensities: Relative I_γ