^{151}Er ε decay (23.5 s) 1991To08,1988Ba02

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 110, 1 (2009)	20-Nov-2008

Parent: ^{151}Er: E=0.0; J^{π}=(7/2$^-$); $T_{1/2}$=23.5 s *20*; Q(ε)=5366 *20*; %ε+%$β^+$ decay=100.0

1991To08: measured γ, γγ. Source produced by ^{95}Mo(^{64}Zn,xnyp) E=291 MeV followed by mass separation of α=155 products. ^{151}Er isotope as a daughter of ^{155}Yb α decay.

1988Ba02: γ, γγ, Xγ, ce, γ(t). Source produced in ^{96}Mo(^{58}Ni,2pn) and ^{92}Mo(^{64}Zn,N4P) reactions. Mass-separated.

1998Fo06: measured βγ coin using plastic scintillator-Ge detector system. Source produced by ^{96}Mo(^{58}Ni,N2P) E=250 MeV followed by mass separation.

Others: 1970To16, 1982Ba75.

Source produced in ^{96}Mo(^{58}Ni,2pn) and ^{92}Mo(^{64}Zn,N4P) reactions. Mass-separated.

log *ft* values are considered only approximate since the decay scheme is probably incomplete in view of the large decay energy available for ε decay.

^{151}Ho Levels

E(level)	J^{π}[†]	Comments
0.0	(11/2$^-$)	
41.08 *22*	(1/2$^+$)	
141.18 *20*	(3/2$^+$)	
397.66 *20*	(5/2$^+$)	
638.30 *9*	(7/2$^-$,9/2$^-$)	
667.19 *10*	(7/2$^-$,9/2$^-$)	
700.00 *22*	(7/2$^+$)	
861.8 *3*		
868.92 *10*		
910.1 *3*		
934.7 *3*		
1001.69 *22*		
1129.14 *19*		
1202.2 *5*		
1279.80 *13*		
1377.80 *13*		
1541.59 *23*		
1563.32 *14*		E(level): the adopted level energy is the average of two values obtained from the (poorly fitted) 694.4γ and 898.0γ.
1832.81 *13*	(5/2$^-$,7/2$^-$)	
1860.92 *22*		
1947.0 *4*		

[†] From 'Adopted Levels'. The 898γ was omitted from the least-squares fitting procedure since its inclusion gave a large normalized χ^2=7.6.

ε,$β^+$ radiations

Q(ε)=5130 *110* (from βγ coin measurement,1998Fo06), this value is ≈ 200 keV lower than 5366 *20* from 2003Au03 evaluation.

E(decay)	E(level)	Iβ$^+$ [‡]	Iε[‡]	Log *ft*[†]	I(ε+β$^+$)[†‡]	Comments
(3419 *20*)	1947.0	1.1 *2*	2.1 *3*	5.2	3.2 *5*	av Eβ=1082.7 *91*; εK=0.549 *5*; εL=0.0834 *8*; εM+=0.02462 *22*
(3505 *20*)	1860.92	1.9 *3*	3.4 *4*	5.0	5.3 *7*	av Eβ=1121.6 *91*; εK=0.529 *5*; εL=0.0802 *8*; εM+=0.02369 *22*
(3533 *20*)	1832.81	7.1 *4*	12 *1*	4.4	19 *1*	av Eβ=1134.5 *91*; εK=0.522 *5*; εL=0.0792 *8*; εM+=0.02338 *22*
(3803 *20*)	1563.32	3.4 *4*	4.2 *4*	5.0	7.6 *8*	av Eβ=1256.9 *92*; εK=0.460 *5*; εL=0.0697 *7*; εM+=0.02056 *21*

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^{151}Er ε decay (23.5 s) 1991To08,1988Ba02 (continued)

ε,β+ radiations (continued)

E(decay)	E(level)	Iβ+ ‡	Iε‡	Log ft†	I(ε+β+)†‡	Comments
(3824 *20*)	1541.59	0.9 *3*	1.1 *3*	5.5	2.0 *6*	av Eβ=1267.4 *92*; εK=0.455 *5*; εL=0.0689 *7*; εM+=0.02033 *21*
(3988 *20*)	1377.80	1.1 *3*	1.1 *4*	5.6	2.2 *7*	av Eβ=1342.2 *92*; εK=0.420 *5*; εL=0.0635 *7*; εM+=0.01874 *19*
(4086 *20*)	1279.80	<0.4	<0.4	>6.1	<0.8	av Eβ=1387.2 *92*; εK=0.400 *4*; εL=0.0604 *7*; εM+=0.01782 *19* E(decay): measured β(endpoint)=2788 *188* (β(641γ) coin,1998Fo06).
(4164 *20*)	1202.2	0.4 *1*	0.4 *1*	6.1	0.8 *2*	av Eβ=1422.9 *92*; εK=0.384 *4*; εL=0.0580 *6*; εM+=0.01712 *18*
(4237 *20*)	1129.14	3.2 *4*	2.6 *3*	5.3	5.8 *7*	av Eβ=1456.5 *92*; εK=0.370 *4*; εL=0.0559 *6*; εM+=0.01649 *18*
(4364 *20*)	1001.69	2.6 *4*	1.8 *2*	5.4	4.4 *6*	av Eβ=1515.2 *93*; εK=0.347 *4*; εL=0.0523 *6*; εM+=0.01543 *17*
(4431 *20*)	934.7	1.0 *4*	0.68 *24*	5.9	1.7 *6*	av Eβ=1546.1 *93*; εK=0.335 *4*; εL=0.0505 *6*; εM+=0.01490 *16*
(4456 *20*)	910.1	1.6 *2*	1.1 *2*	5.7	2.7 *4*	av Eβ=1557.5 *93*; εK=0.331 *4*; εL=0.0499 *6*; εM+=0.01471 *16*
(4497# *20*)	868.92	1.2 *8*	0.7 *5*	5.9	1.9 *13*	av Eβ=1576.4 *93*; εK=0.324 *4*; εL=0.0488 *6*; εM+=0.01440 *16*
(4504 *20*)	861.8	2.0 *4*	1.2 *3*	5.6	3.2 *7*	av Eβ=1579.8 *93*; εK=0.323 *4*; εL=0.0486 *6*; εM+=0.01434 *16*
(4666 *20*)	700.00	4.1 *3*	2.2 *2*	5.4	6.3 *5*	av Eβ=1654.7 *93*; εK=0.297 *3*; εL=0.0447 *5*; εM+=0.01317 *14*
(4699 *20*)	667.19	6.6 *8*	3.6 *5*	5.2	10.2 *13*	av Eβ=1670.0 *93*; εK=0.291 *3*; εL=0.0439 *5*; εM+=0.01295 *14*
(4728 *20*)	638.30	10.6 *9*	5.6 *5*	5.0	16.2 *13*	av Eβ=1683.3 *93*; εK=0.287 *3*; εL=0.0432 *5*; εM+=0.01276 *14* E(decay): measured β(endpoint)=3564 *186* (β(638γ) coin,1998Fo06).
(4968 *20*)	397.66	5.2 *15*	2.3 *7*	5.5	7.5 *22*	av Eβ=1795.2 *94*; εK=0.254 *3*; εL=0.0381 *4*; εM+=0.01125 *12* E(decay): measured β(endpoint)=3661 *184* (β(256γ) coin,1998Fo06).

† All values should be considered as approximate since there there is a gap of about 3.5 MeV between Q value and the highest known populated level.
‡ Absolute intensity per 100 decays.
# Existence of this branch is questionable.

γ(^{151}Ho)

Iγ normalization: Σ(I(γ+ce)(γ's to g.s. and 141 level))=100. No ε decay is expected to g.s., 41 and 141 level.

Eγ†	Iγ†‡	Ei(level)	J_i^π	Ef	J_f^π	Mult.	α#	Comments
100.1 *1*	27 *5*	141.18	(3/2+)	41.08	(1/2+)	M1	2.60	α(K)=2.19 *4*; α(L)=0.325 *5*; α(M)=0.0718 *11*; α(N+..)=0.0192 *3* α(N)=0.01667 *24*; α(O)=0.00242 *4*; α(P)=0.0001357 *20* Iγ: 33 *2* from Σ(I(γ+ce)(in))=I(γ+ce)(100.1γ). Mult.: α(K)exp=2.5 *4* and K/L=7.4 *16* (1988Ba02).

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^{151}Er ε decay (23.5 s) 1991To08,1988Ba02 (continued)

γ(^{151}Ho) (continued)

E_γ [†]	I_γ [†‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α [#]	Comments
230.7 *2*	3.2 *4*	868.92		638.30	(7/2⁻,9/2⁻)			
256.5 *1*	52 *5*	397.66	(5/2⁺)	141.18	(3/2⁺)	M1	0.187	α(K)=0.1577 *23*; α(L)=0.0230 *4*; α(M)=0.00508 *8*; α(N+..)=0.001360 *20* α(N)=0.001179 *17*; α(O)=0.0001718 *25*; α(P)=9.70×10⁻⁶ *14* Mult.: α(K)exp=0.16 *3* (1988Ba02).
302.4 *2*	6.5 *5*	700.00	(7/2⁺)	397.66	(5/2⁺)			
455.0 *2*	5.8 *4*	1832.81	(5/2⁻,7/2⁻)	1377.80				
462.0 *2*	4.9 *4*	1129.14		667.19	(7/2⁻,9/2⁻)			I_γ: 2.2 *6* (1988Ba02).
537.0 *2*	5.3 *16*	934.7		397.66	(5/2⁺)			I_γ: 9.7 *30* (1988Ba02).
553.0 *1*	17.2 *15*	1832.81	(5/2⁻,7/2⁻)	1279.80				
558.8 *1*	12.6 *12*	700.00	(7/2⁺)	141.18	(3/2⁺)			
638.3 *1*	100	638.30	(7/2⁻,9/2⁻)	0.0	(11/2⁻)			
641.5 *1*	17 *2*	1279.80		638.30	(7/2⁻,9/2⁻)			
667.2 *1*	51 *3*	667.19	(7/2⁻,9/2⁻)	0.0	(11/2⁻)			
694.4 *1*	14.4 *16*	1563.32		868.92				
720.6 *2*	9.8 *20*	861.8		141.18	(3/2⁺)			
739.5 *1*	12.6 *20*	1377.80		638.30	(7/2⁻,9/2⁻)			
768.9 *2*	8.2 *10*	910.1		141.18	(3/2⁺)			
860.5 *1*	13.3 *18*	1001.69		141.18	(3/2⁺)			
868.9 *1*	33 *3*	868.92		0.0	(11/2⁻)			I_γ: 22 *3* (1988Ba02).
874.4 *2*	6.0 *17*	1541.59		667.19	(7/2⁻,9/2⁻)			
898.0 *2*	8.9 *15*	1563.32		667.19	(7/2⁻,9/2⁻)			E_γ: poor fit. Level-energy difference=896.1. This γ ray energy was not included in the least-squares fit procedure.
987.9 *2*	12.8 *18*	1129.14		141.18	(3/2⁺)			I_γ: 5.0 *11* (1988Ba02).
992.0 *2*	16.1 *20*	1860.92		868.92				
1061.0 *4*	≈2.5	1202.2		141.18	(3/2⁺)			
[x]1073.0[@] *2*	≈3.6							γ reported only by 1988Ba02, isotopic assignment uncertain.
1194.5 *2*	17.8 *20*	1832.81	(5/2⁻,7/2⁻)	638.30	(7/2⁻,9/2⁻)			
1435.2 *2*	17.7 *13*	1832.81	(5/2⁻,7/2⁻)	397.66	(5/2⁺)			
1549.3 *3*	9.7 *15*	1947.0		397.66	(5/2⁺)			
[x]1935.1 *3*	11 *2*							
[x]2133.7 *3*	4.0 *10*							

[†] From 1991To08. Values from 1988Ba02 are in general agreement with 1991To08 but less complete.
[‡] For absolute intensity per 100 decays, multiply by 0.328 *9*.
[#] 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.
[x] γ ray not placed in level scheme.

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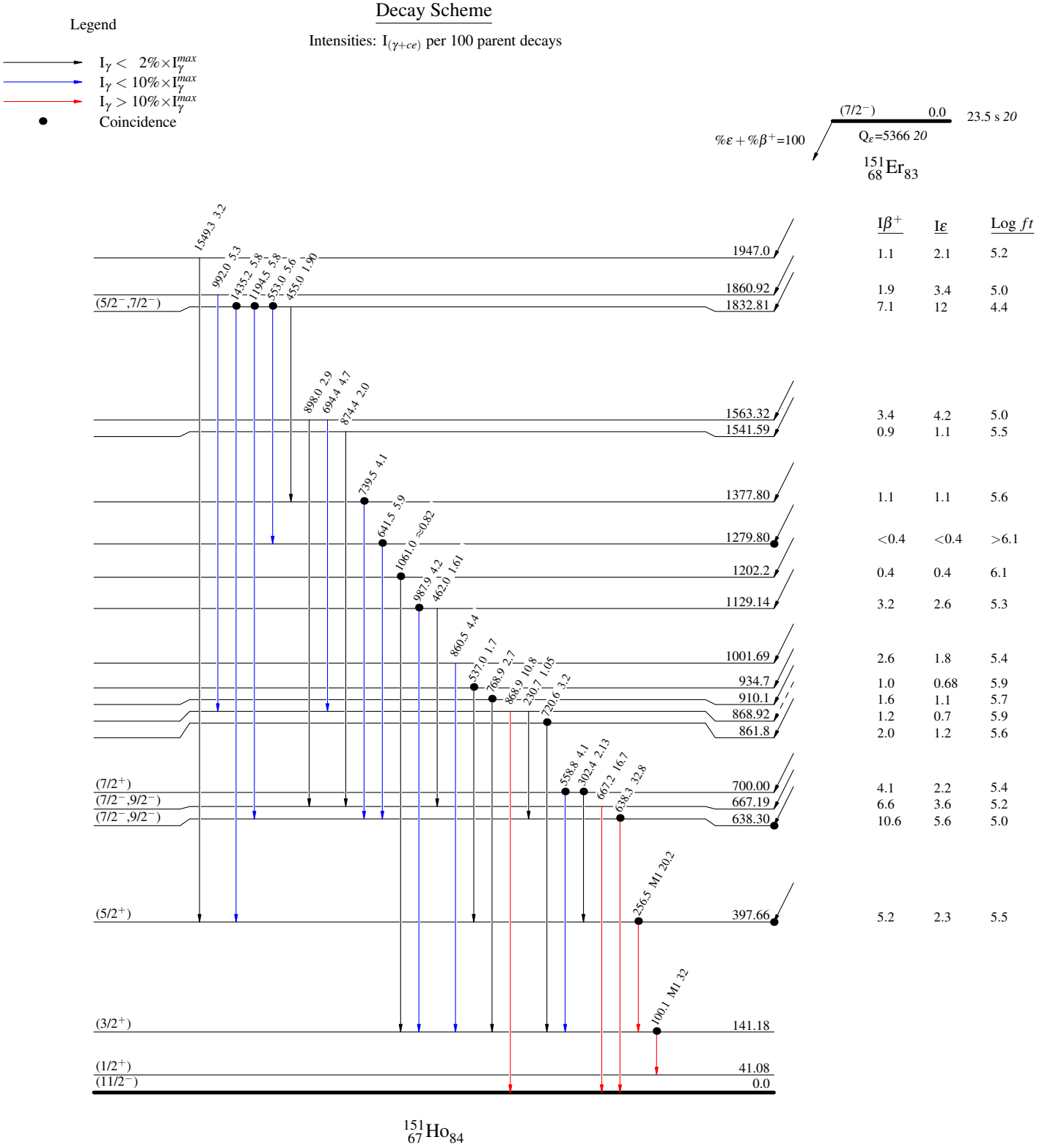
Decay Scheme

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



$^{151}_{67}Ho_{84}$