^{149}Ho ε decay (56 s) 1994Me13

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 185, 2 (2022)	23-Aug-2022

Parent: ^{149}Ho: E=48.8 *2*; J^π=(1/2$^+$); $T_{1/2}$=56 s *3*; Q(ε)=6048 *13*; %ε+%$β^+$ decay=100.0

^{149}Ho-E,J^π,$T_{1/2}$: From ^{149}Ho Adopted Levels.

^{149}Ho-Q(ε): From 2021Wa16.

1994Me13 (also 1989Me13): ^{149}Ho ions were produced via fusion-evaporation reactions with 5.4 MeV/nucleon ^{58}Ni beam on ^{94}Mo and ^{95}Mo targets at ISOLDE, GSI, separated by the GSI online separator and deposited on a transport tape. The γ- and x-rays were detected with a planar and two coaxial Ge(Li) detectors. Measured Eγ, Iγ, I(x-ray), γγ-coin, γ(x-ray)-coin, γ(t). Deduced levels, J^π, parent $T_{1/2}$, conversion coefficients, γ-ray multipolarities, GT strengths. Comparisons with theoretical calculations. Configurations are suggested for all levels reported in this decay.

Other:

1988ToZW: measured $T_{1/2}$ of ^{149}Ho isomer:

Total decay energy deposit of 6102 keV *140* calculated by RADLIST code is in agreement with expected value of 6098 keV *13*. However the decay scheme is considered as incomplete since a significant β feedings may have missed detection in view of a large gap of about 3 MeV between Q(ε) value and the highest known populated level at 2938.

^{149}Dy Levels

E(level)†	J^π‡	$T_{1/2}$‡	E(level)†	J^π‡	E(level)†	J^π‡
0.0	7/2$^-$	4.2 min *2*	1572.8 *4*	(3/2$^+$)	2771.0 *7*	(1/2$^+$,3/2$^+$)
1034.6 *2*	(3/2$^-$)		1626.3 *6*	(5/2$^+$)	2788.6 *6*	(1/2$^+$,3/2$^+$)
1406.7 *3*	(1/2$^+$)		1727.5 *7*	(1/2)	2938.1 *6*	(1/2$^+$,3/2$^+$)
1501.0 *5*	(3/2$^+$)		1775.6 *6*	(1/2)		

† From a least-squares fit to γ-ray energies.

‡ From the Adopted Levels.

ε,$β^+$ radiations

E(decay)	E(level)	I$β^+$ ‡	Iε‡	Log *ft*†	I(ε+$β^+$)†‡	Comments
(3159 *13*)	2938.1	1.0 *3*	2 *1*	5.4	3 *1*	av Eβ=964.8 *59*; εK=0.599 *4*; εL=0.0902 *5*; εM+=0.02650 *15*
(3308 *13*)	2788.6	6 *2*	13 *4*	4.7 *2*	19 *6*	av Eβ=1032.4 *59*; εK=0.563 *4*; εL=0.0845 *5*; εM+=0.02483 *15*
(3326 *13*)	2771.0	9 *2*	19 *3*	4.5 *1*	28 *5*	av Eβ=1040.4 *59*; εK=0.558 *4*; εL=0.0838 *5*; εM+=0.02464 *15*
(4321 *13*)	1775.6	0.9 *6*	0.6 *4*	6.2	1.5 *10*	av Eβ=1495.7 *60*; εK=0.3388 *24*; εL=0.0506 *4*; εM+=0.01485 *11*
(4369 *13*)	1727.5	4 *1*	2 *1*	5.7	6 *2*	av Eβ=1517.9 *61*; εK=0.3302 *23*; εL=0.0493 *4*; εM+=0.01447 *11*
(4471# *13*)	1626.3	3 *1*	1 *1*	5.9	4 *2*	av Eβ=1564.7 *61*; εK=0.3128 *22*; εL=0.0467 *4*; εM+=0.01370 *10* Log *ft*: too low for ΔJ=2, Δπ=no transition.
(4524 *13*)	1572.8	3 *1*	1 *1*	5.9	4 *1*	av Eβ=1589.5 *61*; εK=0.3040 *22*; εL=0.0453 *4*; εM+=0.01331 *10*
(4596 *13*)	1501.0	8 *3*	5 *2*	5.4 *2*	13 *5*	av Eβ=1622.8 *61*; εK=0.2925 *21*; εL=0.0436 *3*; εM+=0.01280 *9*
(4690 *13*)	1406.7	4 *4*	2 *2*	>5.5	6 *6*	av Eβ=1666.5 *61*; εK=0.2781 *20*; εL=0.0415 *3*; εM+=0.01217 *9*
(5062 *13*)	1034.6	12 *7*	5 *3*	5.5 *3*	17 *9*	av Eβ=1839.7 *61*; εK=0.2283 *16*; εL=0.03398 *24*; εM+=0.00997 *7*

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^{149}Ho ε decay (56 s) 1994Me13 (continued)

ε,β+ radiations (continued)

† I(ε+β+) are from γ intensity balance at each level. Most of the β feedings should be treated as upper limits and correspondingly, the log *ft* values as lower limits since the decay scheme is considered incomplete by the evaluators. Exception is made for β feedings for the 1034.6, 1501.0, 2771.0 and 2788.6 level, where feedings of ≥10% can be realistic, and where uncertainties for log *ft* values are given.
‡ Absolute intensity per 100 decays.
# Existence of this branch is questionable.

γ(^{149}Dy)

Iγ normalization: 1994Me12 provide photon intensities per 1000 decays, with statistical uncertainties as well as those from spectral complexity. Evaluators divide Iγ values in 1994Me12 by a factor of 10. Methodology of measuring absolute γ intensities is not described in 1994Me13.

E_γ†	I_γ†@	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	δ‡	α&	Comments
94.3 *3*	3.2 *12*	1501.0	(3/2+)	1406.7	(1/2+)	M1(+E2)	<0.7	2.92 *10*	α(K)=2.21 *18*; α(L)=0.56 *21*; α(M)=0.13 *5* α(N)=0.029 *11*; α(O)=0.0039 *13*; α(P)=0.000133 *16* Mult.: α(L)exp=0.59 *16*.
166.1 *2*	2.7# *5*	1572.8	(3/2+)	1406.7	(1/2+)	M1(+E2)	<1.5	0.52 *4*	α(K)=0.41 *7*; α(L)=0.091 *21*; α(M)=0.021 *5* α(N)=0.0047 *12*; α(O)=0.00064 *12*; α(P)=2.4×10^{-5} *6* Mult.: α(K)exp=0.47 *13*.
372.1 *2*	25.3 *15*	1406.7	(1/2+)	1034.6	(3/2−)	E1		0.01017 *14*	α(K)=0.00863 *12*; α(L)=0.001205 *17*; α(M)=0.000263 *4* α(N)=6.04×10^{-5} *8*; α(O)=8.66×10^{-6} *12*; α(P)=4.63×10^{-7} *7* Mult.: α(K)exp=0.0080 *16*.
591.7 *5*	3.8# *14*	1626.3	(5/2+)	1034.6	(3/2−)	(E1)		0.00356 *5*	α(K)=0.00303 *4*; α(L)=0.000412 *6*; α(M)=8.97×10^{-5} *13* α(N)=2.066×10^{-5} *29*; α(O)=2.99×10^{-6} *4*; α(P)=1.666×10^{-7} *24* Mult.: α(K)exp<0.005.
692.9 *6*	5.5# *14*	1727.5	(1/2)	1034.6	(3/2−)				
741.0 *5*	1.5 *10*	1775.6	(1/2)	1034.6	(3/2−)				
1034.6 *2*	99.7 *20*	1034.6	(3/2−)	0.0	7/2−	[E2]		0.00284 *4*	α(K)=0.002386 *33*; α(L)=0.000352 *5*; α(M)=7.75×10^{-5} *11* α(N)=1.785×10^{-5} *25*; α(O)=2.57×10^{-6} *4*; α(P)=1.377×10^{-7} *19*
1531.4 *5*	3.0# *12*	2938.1	(1/2+,3/2+)	1406.7	(1/2+)				
1736.4 *6*	28# *5*	2771.0	(1/2+,3/2+)	1034.6	(3/2−)				
1754.0 *5*	19# *6*	2788.6	(1/2+,3/2+)	1034.6	(3/2−)				

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^{149}Ho ε decay (56 s) 1994Me13 (continued)

$\gamma(^{149}Dy)$ (continued)

† From 1994Me13.
‡ From ce data in 1994Me13, given under comments. The same values are given in the Adopted Gammas.
# Estimated from $\gamma\gamma$ spectra (1994Me13).
@ Absolute intensity per 100 decays.
& 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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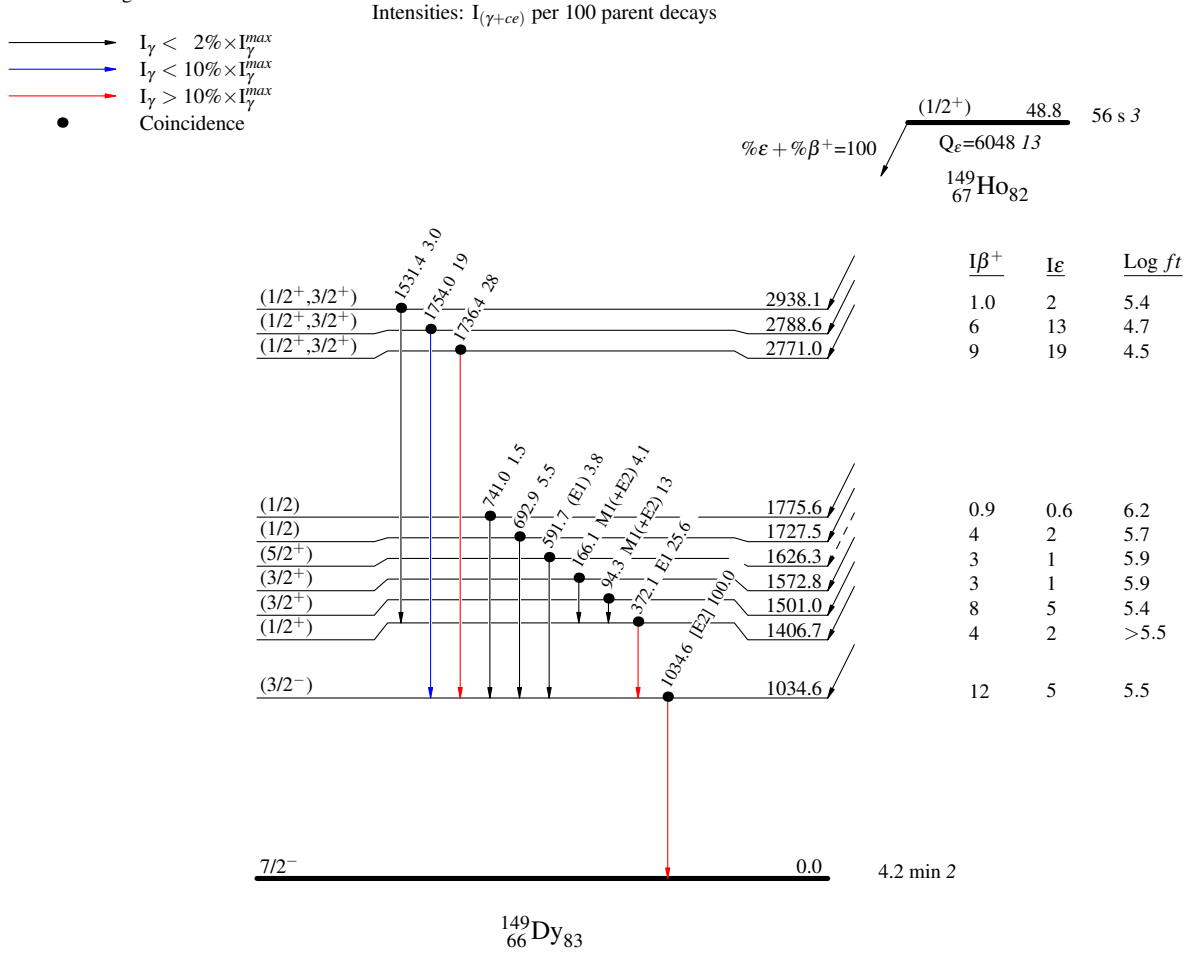
Decay Scheme

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



	Iβ+	Iε	Log *ft*
2938.1	1.0	2	5.4
2788.6	6	13	4.7
2771.0	9	19	4.5
1775.6	0.9	0.6	6.2
1727.5	4	2	5.7
1626.3	3	1	5.9
1572.8	3	1	5.9
1501.0	8	5	5.4
1406.7	4	2	>5.5
1034.6	12	5	5.5