^{98}Rh ε decay (8.72 min) 1978Ki17,1972Ba37

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen, Balraj Singh	NDS 164, 1 (2020)	15-Feb-2020

Parent: ^{98}Rh: E=0.0; J^π=(2)$^+$; $T_{1/2}$=8.72 min *12*; Q(ε)=5050 *10*; %ε+%β^+ decay=100.0

^{98}Rh-J^π,$T_{1/2}$: From ^{98}Rh Adopted Levels.

^{98}Rh-Q(ε): From 2017Wa10.

1978Ki17 (also 1980ZyZY): ^{98}Rh source was produced via ^{96}Ru(p,2n) at the Institute for Nuclear Physics of the Academy of Sciences of Kazach SSR. γ rays were detected with a Ge(Li) detector. Deduced levels, J^π, decay branching ratios, log *ft*,

1972Ba37: ^{98}Pd sources were produced via ^{89}Y(^{12}C,3n) and also decay of ^{98}Pd in ^{96}Ru(α,2n) reaction, with beams provided from the heavy-ion accelerator at Yale University. γ rays were detected with Si(Li) and Ge(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels, J, π, decay branching ratios, log*ft*.

1994Ba06: measured β^+, $\beta^+\gamma$; deduced Q value. The authors stated that a detailed $\gamma\gamma$ coincidence study of decay of both isomers of ^{98}Rh was planned by their group; but no results seem to have appeared in the literature.

Others:

γ: 1969An32.

β^+: 1956Ka25, 1955At34.

$T_{1/2}$(^{98}Rh isotope): 2001SeZY, 1970As08, 1956Ka25, 1955At34 (also 1953At27,1952At32).

^{98}Ru Levels

E(level)[†]	J^π[#]	E(level)[†]	J^π[#]	E(level)[†]	J^π[#]	E(level)[†]
0.0	0^+	1796.9 *5*	3^+	2619.8 *5*	$(1,2^+)$	3366.8?[‡] *10*
652.7 *3*	2^+	1817.1 *4*	2^+	3179.1 *7*	$(1,2^+)$	3536.9?[‡] *7*
1414.4 *4*	2^+	2467.3 *7*	$(2)^+$	3205.9 *8*	$(2^+,3)$	

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

[‡] Level from 1980ZyZY.

[#] From Adopted Levels.

ε,β^+ radiations

E(decay)	E(level)	Iβ^+ [‡]	Iε[‡]	Log *ft*[†]	I($\varepsilon+\beta^+$)[†‡]	Comments
(1513[#] *10*)	3536.9?	0.0209 *24*	1.07	5.26 *4*	1.09	av Eβ=221.7 *44*; εK=0.8502 *13*; εL=0.10574 *18*; εM+=0.02491 *5*
(1683 *10*)	3366.8?	0.0085	0.146	6.2	0.154	av Eβ=295.1 *44*; εK=0.8193 *25*; εL=0.1016 *4*; εM+=0.02394 *8*
(1844 *10*)	3205.9	0.047	0.37	5.9	0.42	av Eβ=365.0 *44*; εK=0.770 *4*; εL=0.0953 *5*; εM+=0.02245 *11*
(1871 *10*)	3179.1	0.189	1.34	5.4	1.53	av Eβ=376.7 *44*; εK=0.760 *4*; εL=0.0941 *5*; εM+=0.02215 *12*
(2430 *10*)	2619.8	0.798	1.04	5.7	1.84	av Eβ=624.3 *45*; εK=0.492 *5*; εL=0.0606 *6*; εM+=0.01425 *15*
(2583 *10*)	2467.3	0.24	0.23	6.4	0.47	av Eβ=692.9 *46*; εK=0.420 *5*; εL=0.0517 *6*; εM+=0.01217 *13*
(3233 *10*)	1817.1	4.7	1.5	5.8	6.2	av Eβ=989.8 *47*; εK=0.2082 *23*; εL=0.0255 *3*; εM+=0.00601 *7*
(3636 *10*)	1414.4	1.24	0.234	6.7	1.47	av Eβ=1176.6 *47*; εK=0.1381 *14*; εL=0.01692 *17*; εM+=0.00398 *4*
(4397 *10*)	652.7	80.4	7.03	5.4	87.4	av Eβ=1534.5 *48*; εK=0.0698 *6*; εL=0.00854 *7*; εM+=0.002008 *17* E(decay): 4498 *50* from β^+(653γ) (1994Ba06). Others:

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ε,β+ radiations (continued)

E(decay)	E(level)	Comments
		3822 *100* from $\beta^+\gamma$ and 3450 *100* from singles β^+ (1972Ba37); 3522 *200* (1956Ka25), 4322 *400* (1955At34), 5.0 MeV *5* (1953At27).

† All values are considered as approximate, due to poor knowledge of the decay scheme. I(ε+β+) values are deduced from γ+ce intensity imbalance at each level.
‡ Absolute intensity per 100 decays.
# Existence of this branch is questionable.

γ(^{98}Ru)

Iγ normalization: Σ(I(γ+ce) of γ rays to g.s.)=100, assuming no ε feeding to ground state and considered as approximate, due to poor knowledge of the decay scheme.
Intensity of $\gamma^{\pm}$= 162 *4* (1978Ki17).
745.4γ (Iγ=5.6) and 597.7γ (Iγ=0.8) in 1972Ba37 are not observed by 1978Ki17 (Iγ<0.2). Both these γ rays are from the decay of the 3.6-min isomer.
The following γ rays reported by 1969An32 only are omitted here since these are not confirmed by 1978Ki17 and 1972Ba37: 573 (Iγ=4), 607 (Iγ=2.0), 808 (Iγ=7), 966 (Iγ=4), 1012 (Iγ=3.5), 1228 (Iγ=5).

E_γ †	I_γ †#	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	δ	α@	Comments
652.6 *4*	100	652.7	2^+	0.0	0^+	E2		0.00253	α(K)=0.00221 *4*; α(L)=0.000264 *4*; α(M)=4.85×10^{-5} *7* α(N)=7.79×10^{-6} *11*; α(O)=3.89×10^{-7} *6* E_γ,I_γ: others: 652.6 *4*, Iγ=100 (1972Ba37).
670.2 *6*	0.41 *4*	2467.3	$(2)^+$	1796.9	3^+				
761.9 *4*	1.14 *11*	1414.4	2^+	652.7	2^+	E2+M1	+13 *+4−3*	1.69×10^{-3}	α(K)=0.001481 *21*; α(L)=0.0001748 *25*; α(M)=3.20×10^{-5} *5* α(N)=5.16×10^{-6} *8*; α(O)=2.62×10^{-7} *4* E_γ: weighted average of 761.5 *4* (1978Ki17) and 762.3 *4* (1972Ba37). I_γ: other: Iγ=1.8 (1972Ba37).
1144.2 *4*	0.42 *4*	1796.9	3^+	652.7	2^+	M1+E2	<−0.2	7.14×10^{-4}	α(K)=0.000626 *9*; α(L)=7.08×10^{-5} *10*; α(M)=1.295×10^{-5} *19* α(N)=2.10×10^{-6} *3*; α(O)=1.133×10^{-7} *16*; α(IPF)=1.78×10^{-6} *4* Additional information 1.
1164.3 *4*	5.1 *4*	1817.1	2^+	652.7	2^+	M1+E2	−0.27 *6*	6.86×10^{-4}	α(K)=0.000601 *9*; α(L)=6.80×10^{-5} *10*; α(M)=1.244×10^{-5} *18* α(N)=2.02×10^{-6} *3*; α(O)=1.086×10^{-7} *16*;

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^{98}Rh ε decay (8.72 min) 1978Ki17,1972Ba37 (continued)

γ(^{98}Ru) (continued)

E_γ [†]	I_γ [†#]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	α [@]	Comments
								α(IPF)=2.98×10^{-6} *6* E_γ,I_γ: others: 1164.4 *4*, Iγ=4.8 (1972Ba37).
1414.2 *8*	0.64 *6*	1414.4	2$^+$	0.0	0$^+$	E2	4.76×10^{-4}	α(K)=0.000370 *6*; α(L)=4.20×10^{-5} *6*; α(M)=7.69×10^{-6} *11* α(N)=1.245×10^{-6} *18*; α(O)=6.61×10^{-8} *10*; α(IPF)=5.44×10^{-5} *8* E_γ: unweighted average of 1413.4 *4* (1978Ki17) and 1414.9 *4* (1972Ba37). I_γ: other: 1.2 (1972Ba37).
1719.8[&] *5*	1.13 *9*	3536.9?		1817.1	2$^+$			
1764.6	0.09 *1*	3179.1	(1,2$^+$)	1414.4	2$^+$			
1792.3	0.17 *2*	3205.9	(2$^+$,3)	1414.4	2$^+$			
1817.2 *4*	1.92 *15*	1817.1	2$^+$	0.0	0$^+$	[E2]	4.76×10^{-4}	α(K)=0.000228 *4*; α(L)=2.56×10^{-5} *4*; α(M)=4.68×10^{-6} *7* α(N)=7.58×10^{-7} *11*; α(O)=4.06×10^{-8} *6*; α(IPF)=0.000218 *3* E_γ: weighted average of 1817.4 *5* (1978Ki17) and 1817.0 *4* (1972Ba37). I_γ: other: 5 (1972Ba37).
1967.3 *5*	1.71 *15*	2619.8	(1,2$^+$)	652.7	2$^+$			
2467.6	0.08 *1*	2467.3	(2)$^+$	0.0	0$^+$	[E2]	6.79×10^{-4}	α(K)=0.0001309 *19*; α(L)=1.459×10^{-5} *21*; α(M)=2.67×10^{-6} *4* α(N)=4.33×10^{-7} *6*; α(O)=2.34×10^{-8} *4*; α(IPF)=0.000530 *8*
2526.1	1.00 *7*	3179.1	(1,2$^+$)	652.7	2$^+$			
2552.3	0.27 *3*	3205.9	(2$^+$,3)	652.7	2$^+$			
2619.2	0.20 *2*	2619.8	(1,2$^+$)	0.0	0$^+$			
3179.3	0.50 *5*	3179.1	(1,2$^+$)	0.0	0$^+$			
3366.7[&]	0.16 *2*	3366.8?		0.0	0$^+$			

[†] From 1978Ki17, unless otherwise noted.
[‡] From Adopted Gammas.
[#] For absolute intensity per 100 decays, multiply by 0.965.
[@] 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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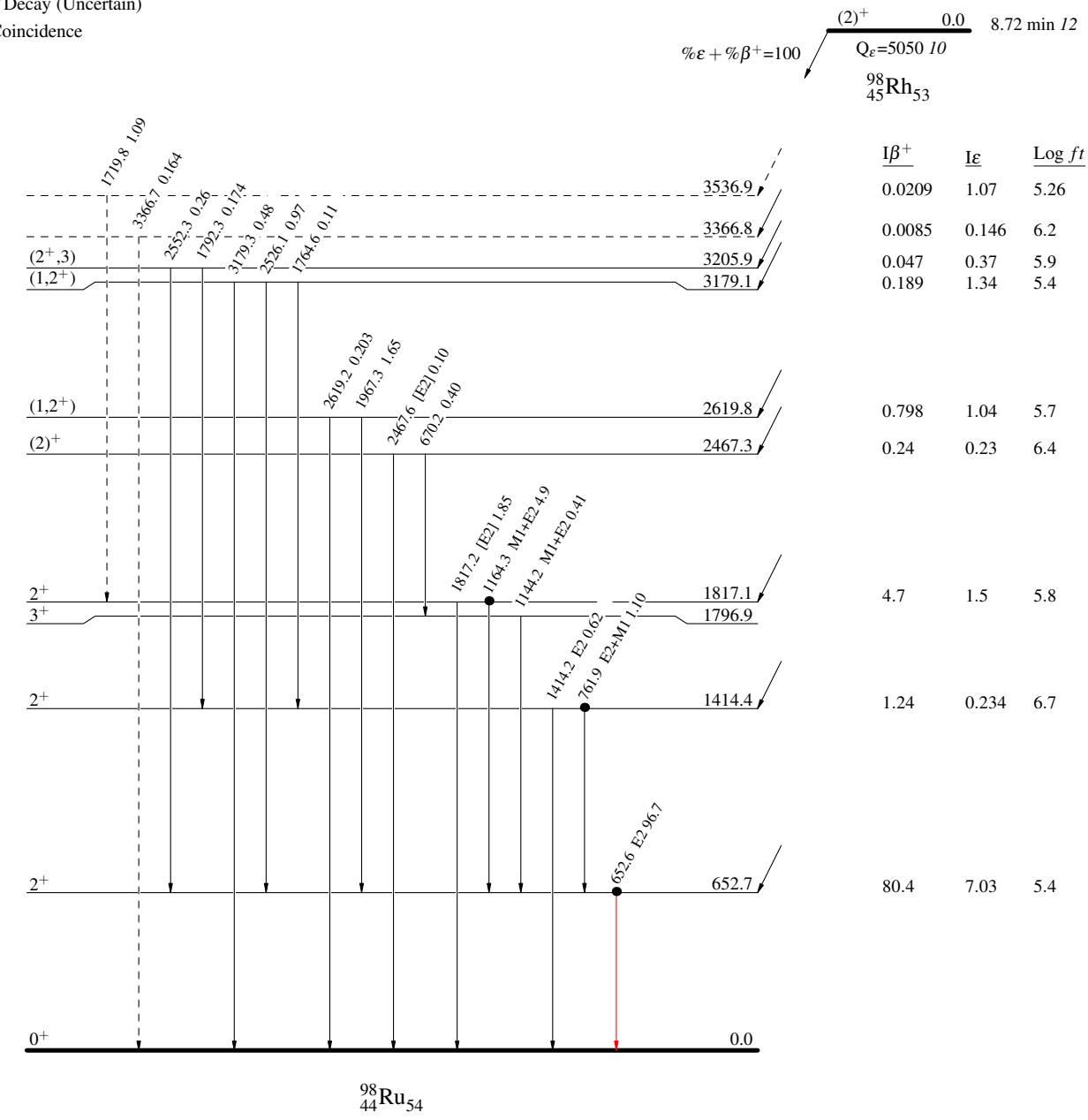
Legend

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

Decay Scheme

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



	Iβ+	Iε	Log *ft*
3536.9	0.0209	1.07	5.26
3366.8	0.0085	0.146	6.2
3205.9	0.047	0.37	5.9
3179.1	0.189	1.34	5.4
2619.8	0.798	1.04	5.7
2467.3	0.24	0.23	6.4
1817.1	4.7	1.5	5.8
1414.4	1.24	0.234	6.7
652.7	80.4	7.03	5.4