^{103}Ru β^- decay (39.247 d)

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	D. De Frenne	NDS 110, 2081 (2009)	1-Mar-2009

Parent: ^{103}Ru: E=0.0; $J^\pi=3/2^+$; $T_{1/2}$=39.247 d *3*; Q(β^-)=763.4 *21*; %β^- decay=100.0

2008KrZX: ^{103}Ru activity from Ru(n,γ). Measured Eγ,Iγ. Deduced: ^{103}Rh levels, log *ft*.

1970Pe04: ^{103}Ru activity from commercial source and ^{102}Ru(n,γ). Measured Eβ, Iβ, ce(K), ce(L), Eγ, Iγ. Deduced: ^{103}Rh levels, log *ft*, J^π, α(K)exp, K:L1:L2:L3, δ(E2/M1). Enriched isotope, double-focusing β spectrometer, Ge(Li) detector.

1976Ma37: ^{103}Ru activity from ^{102}Ru(n,γ). Measured: Eγ, Iγ, Xγ-coin. Deduced: ^{103}Rh levels, log *ft*, J^π, α, δ(E2/M1), B(E2), B(M1). Enriched targets, Ge(Li) and Si(Li) detectors, anti-Compton spectrometer.

1982Oh04: ^{103}Ru activity from ^{102}Ru(n,γ). Measured: Eβ, Iβ, Ice. Deduced: ^{103}Rh levels, log *ft*, J^π.

1988Ch44: ^{103}Ru activity from commercial source. Measured: Eγ, Iγ, Iγ(K x ray).

Others: 1950Me26, 1952Co16, 1952Ko27, 1952Kn12, 1954De35, 1955Dr43, 1955Sa16, 1956Sh19, 1958Ro07, 1962Na12, 1964Ka23, 1965Mu09, 1966Po05, 1968Ru08, 1968Mu11, 1968Ma08, 1969Zo02, 1969Ra18, 1969Su08, 1970Ma58, 1970Su05, 1970NiZV, 1971Av03, 1972De67, 1974HeYW, 1976Ba36, 1977Ra02.

^{103}Rh Levels

Level scheme and level energies from 2008KrZX.

E(level)	J^π[†]	$T_{1/2}$	Comments
0.0	$1/2^-$	stable	
39.756 *6*	$7/2^+$	56.114 min *9*	$T_{1/2}$: from Adopted Levels.
93.041 *9*	$9/2^+$	1.11 ns *3*	$T_{1/2}$: weighted average: 1.06 ns *5* (1973Ba52) via (557γ)(53γ)(t), 1.13 ns *3* (1972Ja01) via (553γ+444γ)(53γ)(t), 1.13 ns *7* (1972Ja01) via (70-150β)(ce(K) 53γ)(t). $T_{1/2}$: others: 1958Fl40, 1969Zo02, 1970Be10, 1978BeYS.
294.964 *10*	$3/2^-$		
357.408 *20*	$5/2^-$		
536.838 *9*	$5/2^+$	39 ps *12*	$T_{1/2}$: from (225β)(497γ)(t) (1968Ra06). Others: 1953En06, 1969Be81, 1970Be10.
607.414 *13*	($5/2^+$,7/2,9/2)		
650.093 *9*	$5/2^+$	≤0.1 ns	$T_{1/2}$: via $\beta\gamma$(t) (1970Be10). Other: <0.4 ns (1969Zo02).
651.798 *18*	$(3/2)^+$		

[†] From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-[†‡]	Log *ft*	Comments
(111.6 *21*)	651.798	0.110 *5*	7.68 *4*	av Eβ= 30.2 *14*
114 *5*	650.093	6.50 *6*	5.93 *3*	av Eβ= 30.7 *14* E(decay): weighted average: 112 *6* (1965Mu09), 117 *7* (1970Pe04). Iβ^-: other: 5.3 *16* (1970Pe04).
(156.0 *21*)	607.414	0.0031 *2*	9.68 *4*	av Eβ= 42.9 *15*
223 *5*	536.838	92.0 *4*	5.721 *13*	av Eβ= 64.1 *16* E(decay): weighted average of 225 *5* (1970Pe04) and 223 *8* (1982Oh04). Other: 214 *12* (1965Mu09). Iβ^-: others: 91 *2* (1970Pe04), 89 (1965Mu09).
(406.0 *21*)	357.408	0.0083 *5*	10.59 *3*	av Eβ= 123.0 *18*
(468.4 *21*)	294.964	0.280 *5*	9.276 *11*	av Eβ= 144.9 *18*
769 *4*	0.0	0.87 *5*	9.52 *3*	av Eβ= 255.9 *20* E(decay): from 1982Oh04. Others: 716 *40* (1965Mu09), 725 *15* (1970Pe04).

Continued on next page (footnotes at end of table)

^{103}Ru β^- decay (39.247 d) (continued)

β^- radiations (continued)

E(decay)	E(level)	Comments
		Iβ⁻: others: 3 (1965Mu09), 3.5 *2* (1970Pe04), 2.3 calc from absolute Iγ (1975DeYF).

† Calculated by the evaluator based on Iβ(769β)/Iβ(223β)=0.0094 *4* (1982Oh04) and the decay scheme of 2008KrZX.
‡ Absolute intensity per 100 decays.

^{103}Ru β^- decay (39.247 d) (continued)

$\gamma(^{103}Rh)$

Iγ normalization: weighted average: Iγ(497γ)=90.1% *5* (1975DeYF), Iγ(497γ)=90.9% *7* (1981Di01), Iγ(497γ)=91.3% *4* (1982Oh04), Iγ(497γ)=91.08% *76* (1981Mi10).
Eγ and Iγ from 2008KrZX. 1988Ch44 measured: I(Kα x ray)(20.17)=9.35 *20* and I(Kβ x ray)(22.78)=1.92 *4*.

E$_\gamma$	I$_\gamma$[#]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[†]	δ	α[@]	Comments
39.760 *10*	0.0760 *11*	39.756	7/2$^+$	0.0	1/2$^-$	E3		1402 *20*	α(K)exp=143 *20*; α(L)exp=1060 *72* α(K)= 135.2 *19*; α(L)= 1027 *15*; α(M)= 209 *3* Iγ: from I(γ+ce) and α. α=theory times 0.975 *10* (1990Ne01). Others: 0.073 *6* (1969Zo02), 0.072 *8* (1970NiZV), 0.060 *6* (1974HeYW). Eγ: weighted average: 39.755 *12* (1969Ra18), 39.762 *16* (1970Pe04).
42.63 *4*	0.0057 *6*	650.093	5/2$^+$	607.414	(5/2$^+$,7/2,9/2)				Iγ: Iγ=0.0012 *2* (1976Ma37).
53.286 *10*	0.487 *11*	93.041	9/2$^+$	39.756	7/2$^+$	M1		2.08 *3*	α(K)exp=1.74 *17* (1976Ma37); α(L)exp=0.18 *2* (1976Ma37) α(K)= 1.81 *3*; α(L)= 0.223 *4*; α(M)= 0.0415 *6*; α(N+..)=0.00686 *10* L1/L2=12 *4*; L1/L3=41 *20*; L2/L3=3.4 *20* (1970Pe04) Eγ: from 1969Ra18. Other: 53.271 *30* (1970Pe04). Iγ: others: 0.39 *3* (1969Zo02), 0.41 *3* (1974HeYW) 0.42 *2* (1976Ma37).
62.41 *3*	4.8×10^{-4} *4*	357.408	5/2$^-$	294.964	3/2$^-$	M1		1.314 *20*	Iγ: obtained from I(62γ)/I(357γ)=0.0471 *21* in ^{103}Pd decay.
113.191 *36*	0.0035 *3*	650.093	5/2$^+$	536.838	5/2$^+$				Iγ: Iγ=0.0040 *8* (1976Ma37).
114.870 *13*	0.0081 *5*	651.798	(3/2)$^+$	536.838	5/2$^+$	M1(+E2)			α(K)exp=0.28 *8* Mult.: no δ given.
241.875 *10*	0.0157 *3*	536.838	5/2$^+$	294.964	3/2$^-$	E1		0.0118 *2*	Iγ: Iγ=0.0089 *8* (1976Ma37). α(K)exp=0.0116 *30* α(K)=0.01037; α(L)=0.00120; α(M)=0.00022 Iγ: Iγ=0.0165 *17* (1976Ma37). Eγ: others: 241.87 *25* (1970Pe04), 241.9 *2* (1974HeYW).
292.7 *2*	0.001 *1*	650.093	5/2$^+$	357.408	5/2$^-$				Iγ: Iγ=0.003 *3* (1976Ma37).
294.964 *10*	0.317 *3*	294.964	3/2$^-$	0.0	1/2$^-$	M1+E2[‡]	−0.17 *1*	0.0191 *3*	α(K)exp=0.0186 *16* α(K)=0.01675 *3*; α(L)=0.00200; α(M)=0.00037 Iγ: Iγ=0.280 *9* (1976Ma37). Eγ: others: 294.82 *8* (1970Pe04), 294.72 *12* (1969Ra18), 294.89 *8* (1974HeYW). α: calculated with δ=−0.17 *1* (1977Kr13). See also adopted gammas.

^{103}Ru β^- decay (39.247 d) (continued)

$\gamma(^{103}Rh)$ (continued)

E_γ	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	δ	α[@]	Comments
317.72 *5*	<0.01	357.408	5/2$^-$	39.756	7/2$^+$				I_γ: obtained from I(317γ)/I(357γ)=0.00068 *4* in ^{103}Pd decay.
357.382 *23*	0.0095 *4*	357.408	5/2$^-$	0.0	1/2$^-$	E2[‡]		0.01588 *23*	α(K)exp=0.010 *3* (1976Ma37) α(K)=0.01369; α(L)=0.00180; α(M)=0.00034 Mult.: α(K)exp consistent with E2 as mult.
443.810 *10*	0.373 *4*	536.838	5/2$^+$	93.041	9/2$^+$	E2			α(K)exp=0.0072 *7* α(K)=0.00699; α(L)=0.00089; α(M)=0.00017 E_γ: others: 443.77 *12* (1969Ra18), 443.63 *12* (1970Pe04), 443.80 *7* (1974HeYW).
497.085 *10*	100.0 *11*	536.838	5/2$^+$	39.756	7/2$^+$	M1+E2	−0.368 *11*		α(K)exp=0.0048 *5* α(K)=0.00460 *1*; α(L)=0.00054; α(M)=0.00010 E_γ: from 1978Mo22. Others: 496.92 *10* (1970Pe04); 497.08 *2* (1976Ma37). δ: from 1983Kr01. δ: others: −0.36 *8* (1981Ha11); −0.42 *4* (1981Mu18).
514.365 *12*	0.0068 *1*	607.414	(5/2$^+$,7/2,9/2)	93.041	9/2$^+$				I_γ: Iγ=0.0054 *15* (1976Ma37).
557.057 *10*	0.924 *9*	650.093	5/2$^+$	93.041	9/2$^+$	(E2)			α(K)exp=0.0034 *5* α(K)=0.00361; α(L)=0.00044 I_γ: Iγ=0.93 *3* (1976Ma37). E_γ: others: 557.11 *13* (1969Ra18), 557.10 *18* (1970Pe04), 557.08 *7* (1974HeYW).
567.693 *29*	0.0023 *1*	607.414	(5/2$^+$,7/2,9/2)	39.756	7/2$^+$				I_γ: Iγ=0.0018 *8* (1976Ma37).
610.333 *10*	6.33 *5*	650.093	5/2$^+$	39.756	7/2$^+$	M1(+E2)	0.09 *14*		α(K)exp=0.0026 *2* α(K)=0.00280; α(L)=0.00032 E_γ: others: 610.41 *7* (1969Ra18), 610.29 *19* (1970Pe04), 610.30 *8* (1974HeYW). I_γ: Iγ=6.30 *20* (1976Ma37). I_γ: others: 6.24 *31* (1969Ra18), 6.2 *6* (1969Zo02), 6.43 *13* (1970Pe04), 6.20 *12* (1975DeYF). δ: or δ: >+11, <−6 (1983Kr01).
612.094 *60*	0.115 *6*	651.798	(3/2)$^+$	39.756	7/2$^+$	[E2]			α(K)=0.00278; α(L)=0.00034 α(K)exp≈0.01 I_γ: Iγ=0.089 *10* (1976Ma37).
651.69 *15*	0.00024 *3*	651.798	(3/2)$^+$	0.0	1/2$^-$				I_γ: Iγ=0.0002 *1* (1976Ma37).

[†] Unless noted otherwise, α(K)exp=ce(K)(1970Pe04)/Iγ(1976Ma37) normalized to α(K)(53γ)=1.81 (M1 theory). Unless noted otherwise, the mult are from comparison of experimental and BRICC conversion coefficients.

[‡] From adopted gammas.

[#] For absolute intensity per 100 decays, multiply by 0.910 *7*.

[@] 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.

$^{103}_{45}Rh_{58}$-4

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Decay Scheme

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