^{111}Ru β^- decay 1998Lh02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jean Blachot	NDS 110, 1239 (2009)	1-Feb-2008

Parent: ^{111}Ru: E=0.0; J$^\pi$=(5/2$^+$); $T_{1/2}$=2.12 s *7*; Q(β^-)=5.69×10^3 *8*; %β^- decay=100.0

Additional information 1.

1998Lh02: ^{249}Cf(n,F), chemically separated, γ, $\gamma\gamma$, t, $\beta\gamma$(t). Preliminary results: 1992PeZX: ^{238}U(p,F), E=20 MeV, on-line isotope separator IGISOL.

Measured: γ, $\gamma\gamma$, γ(t), ce, Ge(Li), Ge, Si(Li), ELLI spectrometer.

1990Ro13: ^{249}Cf(n,F), chemically separated, γ, $\gamma\gamma$, $T_{1/2}$.

1990Ro13 have postulated a intruder band for levels At 395, 440, 568, and 663 keV. They fit α=19.77 keV, β=−1.701.

1991ShZX: ^{252}Cf SF, chemically separated, report 4 gammas.

The level scheme is as given by 1998Lh02. They have added the 568, 732 *860*, 960, 977, 1018, 1039, 1096, 1160, 1349, 2127, 2215 levels to the level scheme of 1992PeZX.

^{111}Rh Levels

E(level)	J$^\pi$	$T_{1/2}$†	Comments
0.0	(7/2$^+$)		
211.42 *13*	(9/2$^+$)	<0.5 ns	
303.52 *13*	(3/2$^+$)	<0.5 ns	
382.00 *12*	(5/2$^+$)	0.3 ns *2*	
394.98 *18*	(3/2$^+$)	87 ns *8*	$T_{1/2}$: from $\gamma\gamma$ (1990Ro13).
417.2 *5*			
440.47 *23*	(1/2$^+$)	4.8 ns *5*	
491.3 *5*			
492.72 *19*	(1/2$^-$)	6.8 ns *4*	
567.45 *18*	(7/2$^+$)		
586.3 *3*			
608.4 *5*			
632.34 *13*	(7/2$^+$)	<0.5 ns	
661.1 *5*			
663.17 *21*	(5/2$^+$)	<0.5 ns	
681.3 *3*	(3/2$^-$)		
684.9 *6*			
732.6 *3*	(5/2$^-$)		
860.3 *3*	(3/2$^-$)		
936.0 *6*			
960.5 *4*	(3/2,5/2)		
976.8 *4*	(5/2$^-$)		
1018.05 *22*	(3/2)		
1038.9 *3*	(5/2,7/2)		
1054.94 *18*	(5/2,7/2)		
1096.5 *3*	(3/2,5/2)		
1159.5 *5*	(3/2,5/2,7/2)		
1348.81 *17*	(3/2,5/2,7/2)		
1780.2 *7*			
1898.01 *17*	(5/2,7/2)		
2033.92 *18*	(5/2,7/2)		
2126.78 *22*	(3/2)		
2214.80 *25*	(3/2,5/2,7/2)		

† From $\beta\gamma$(t) 1998Lh02.

^{111}Ru β^- decay 1998Lh02 (continued)

β^- radiations

E(decay)	E(level)	Iβ^- †	Log *ft*	Comments
(3.48×10^3 *8*)	2214.80	2.1 *3*	4.9 *4*	av Eβ=1014 *187*
(3.56×10^3 *8*)	2126.78	5.3 *5*	4.6 *3*	av Eβ=1055 *188*
(3.66×10^3 *8*)	2033.92	14.7 *12*	4.2 *3*	av Eβ=1099 *188*
(3.79×10^3 *8*)	1898.01	12.7 *10*	4.4 *3*	av Eβ=1162 *189*
(4.34×10^3 *8*)	1348.81	1.49 *20*	5.62 *25*	av Eβ=1421 *190*
(4.53×10^3 *8*)	1159.5	0.48 *15*	6.2 *3*	av Eβ=1511 *190*
(4.59×10^3 *8*)	1096.5	0.13 *13*	6.8 *5*	av Eβ=1540 *190*
(4.64×10^3 *8*)	1054.94	8.6 *8*	5.02 *22*	av Eβ=1560 *190*
(4.65×10^3 *8*)	1038.9	1.19 *14*	5.89 *23*	av Eβ=1568 *190*
(4.67×10^3 *8*)	1018.05	0.4 *4*	6.4 *5*	av Eβ=1578 *191*
(4.71×10^3 *8*)	976.8	0.45 *7*	6.34 *23*	av Eβ=1597 *191*
(4.73×10^3 *8*)	960.5	0.51 *12*	6.29 *24*	av Eβ=1605 *191*
(4.83×10^3 *8*)	860.3	0.40 *16*	6.4 *3*	av Eβ=1653 *191*
(4.96×10^3 *8*)	732.6	0.38 *10*	6.53 *23*	av Eβ=1713 *191*
(5.01×10^3 *8*)	681.3	0.35 *19*	6.6 *3*	av Eβ=1738 *191*
(5.03×10^3 *8*)	663.17	0.8 *4*	6.2 *3*	av Eβ=1746 *191*
(5.06×10^3 *8*)	632.34	0.1 *1*	7.2 *5*	av Eβ=1761 *191*
(5.12×10^3 *8*)	567.45	1.0 *5*	6.2 *3*	av Eβ=1792 *191*
(5.20×10^3 *8*)	492.72	0.1 *1*	7.2 *5*	av Eβ=1827 *191*
(5.25×10^3 *8*)	440.47	0.1 *1*	7.2 *5*	av Eβ=1852 *191*
(5.30×10^3 *8*)	394.98	0.5 *5*	6.6 *5*	av Eβ=1874 *191*
(5.30×10^3 *8*)		1.6	6.4	av Eβ=2207.89 *10*
(5.31×10^3 *8*)	382.00	0.10 *5*	7.3 *3*	av Eβ=1880 *191*
(5.39×10^3 *8*)	303.52	0.5 *5*	6.6 *5*	av Eβ=1918 *191*
(5.48×10^3 *8*)	211.42	0.10 *5*	7.3 *3*	av Eβ=1961 *191*
(5.69×10^3 *8*)	0.0	50 *20*	4.74 *25*	av Eβ=2062 *191*

† Absolute intensity per 100 decays.

γ(^{111}Rh)

E$_\gamma$ ‡	I$_\gamma$ ‡@	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.†	α&	Comments
45.5	<0.5	440.47	(1/2$^+$)	394.98	(3/2$^+$)	M1+E2	2.1 *8*	I(γ+ce)=2.1 *8*.
78.7 *2*	27 *4*	382.00	(5/2$^+$)	303.52	(3/2$^+$)	M1	0.686	α(K)=0.597; α(L)=0.0729; α(M)=0.01355; α(N+..)=0.00265 α(K)exp=0.78 *13* (1992PeZX)
91.3 *3*	6.1 *9*	394.98	(3/2$^+$)	303.52	(3/2$^+$)	M1+E2		α(K)exp=0.9 *6*
136.9 *3*	9.8 *15*	440.47	(1/2$^+$)	303.52	(3/2$^+$)	M1	0.1446	α(K)=0.1259; α(L)=0.01525; α(M)=0.00283; α(N+..)=0.00055 α(K)exp=0.12 *3*
157.5 *3*	2.5 *4*	1018.05	(3/2)	860.3	(3/2$^-$)			
170.6 *2*	1.1 *3*	382.00	(5/2$^+$)	211.42	(9/2$^+$)			
172.6 *5*	1.8 *6*	567.45	(7/2$^+$)	394.98	(3/2$^+$)			
179.1 *4*	0.8 *2*	860.3	(3/2$^-$)	681.3	(3/2$^-$)			
185.5 *2*	1.0 *2*	567.45	(7/2$^+$)	382.00	(5/2$^+$)			
188.8 *5*	4.5 *10*	681.3	(3/2$^-$)	492.72	(1/2$^-$)			
189.1 *2*	14.5 *21*	492.72	(1/2$^-$)	303.52	(3/2$^+$)			
191.3# *2*	3.6 *4*	586.3		394.98	(3/2$^+$)			
205.8# *4*	0.5 *2*	417.2		211.42	(9/2$^+$)			
211.4 *2*	75 *6*	211.42	(9/2$^+$)	0.0	(7/2$^+$)	M1	0.0447	α(K)=0.0390; α(L)=0.00465; α(M)=0.00086; α(N+..)=0.00017 α(K)exp=0.037 *3* (1992PeZX)

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^{111}Ru β^- decay 1998Lh02 (continued)

$\gamma(^{111}Rh)$ (continued)

E_γ[‡]	I_γ[‡@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[†]	α[&]	Comments
222.9 *4*	6.9 *7*	663.17	(5/2+)	440.47	(1/2+)			
240.0 *3*	2.4 *4*	732.6	(5/2−)	492.72	(1/2−)			
244.4 *5*	1.3 *3*	976.8	(5/2−)	732.6	(5/2−)			
250.5 *2*	22.3 *8*	632.34	(7/2+)	382.00	(5/2+)	M1	0.0288	α(K)=0.0251; α(L)=0.00298; α(M)=0.00055; α(N+..)=0.00011 α(K)exp=0.023 *10*
268.1 *3*	7.8 *11*	663.17	(5/2+)	394.98	(3/2+)			
279.9[#] *4*	1.6 *3*	491.3		211.42	(9/2+)			
280.9 *4*	1.9 *4*	663.17	(5/2+)	382.00	(5/2+)			
295.4 *3*	0.7 *2*	976.8	(5/2−)	681.3	(3/2−)			
303.6 *2*	100.0 *23*	303.52	(3/2+)	0.0	(7/2+)	E2	0.0271	α(K)=0.02320; α(L)=0.00316; α(M)=0.00059; α(N+..)=0.00011 α(K)exp=0.027 *4* (1992PeZX)
328.7 *4*	1.2 *3*	632.34	(7/2+)	303.52	(3/2+)			
350.7 *4*	1.2 *3*	732.6	(5/2−)	382.00	(5/2+)			
355.7 *4*	1.7 *4*	567.45	(7/2+)	211.42	(9/2+)			
367.3 *3*	4.1 *8*	860.3	(3/2−)	492.72	(1/2−)			
381.4[#] *5*	1.2 *4*	684.9		303.52	(3/2+)			
382.0 *2*	33 *3*	382.00	(5/2+)	0.0	(7/2+)	M1,E2	0.012 *85*	α(K)=0.01109; α(L)=0.00144; α(M)=0.00027 α(K)exp=0.011 *5* (1992PeZX)
395.0 *3*	14 *3*	394.98	(3/2+)	0.0	(7/2+)			
397.0[#] *4*	2.4 *4*	608.4		211.42	(9/2+)			
420.9 *2*	15.5 *14*	632.34	(7/2+)	211.42	(9/2+)			
449.7[#] *4*	1.1 *3*	661.1		211.42	(9/2+)			
483.9 *5*	0.7 *2*	976.8	(5/2−)	492.72	(1/2−)			
519.5 *5*	0.4 *2*	960.5	(3/2,5/2)	440.47	(1/2+)			
525.5 *4*	1.7 *6*	1018.05	(3/2)	492.72	(1/2−)			
[x]550.0 *5*								
554.0[#] *5*	1.1 *3*	936.0		382.00	(5/2+)			
565.8 *5*	2.1 *6*	960.5	(3/2,5/2)	394.98	(3/2+)			
567.5 *4*	1.8 *3*	567.45	(7/2+)	0.0	(7/2+)			
577.4 *5*	0.4 *2*	1018.05	(3/2)	440.47	(1/2+)			
603.6 *3*	3.7 *6*	1096.5	(3/2,5/2)	492.72	(1/2−)			
632.4 *3*	4.5 *9*	632.34	(7/2+)	0.0	(7/2+)			
672.8 *4*	4.3 *8*	1054.94	(5/2,7/2)	382.00	(5/2+)			
714.8 *3*	7.6 *14*	1018.05	(3/2)	303.52	(3/2+)			
717.6 *5*	1.7 *4*	1348.81	(3/2,5/2,7/2)	632.34	(7/2+)			
777.5 *4*	2.9 *9*	1159.5	(3/2,5/2,7/2)	382.00	(5/2+)			
827.4 *3*	5.6 *8*	1038.9	(5/2,7/2)	211.42	(9/2+)			
843.7 *2*	35 *4*	1054.94	(5/2,7/2)	211.42	(9/2+)			
961.4 *11*	0.6 *3*	960.5	(3/2,5/2)	0.0	(7/2+)			
967.2 *4*	3.7 *7*	1348.81	(3/2,5/2,7/2)	382.00	(5/2+)			
1030.1 *3*	2.9 *6*	2126.78	(3/2)	1096.5	(3/2,5/2)			
1038.9 *4*	1.6 *3*	1038.9	(5/2,7/2)	0.0	(7/2+)			
1046.1 *12*	1.6 *8*	1348.81	(3/2,5/2,7/2)	303.52	(3/2+)			
1054.6 *3*	12.8 *17*	1054.94	(5/2,7/2)	0.0	(7/2+)			
1108.8 *3*	9.5 *13*	2126.78	(3/2)	1018.05	(3/2)			
1265.7 *2*	32 *4*	1898.01	(5/2,7/2)	632.34	(7/2+)			
1348.5 *2*	2.0 *4*	1348.81	(3/2,5/2,7/2)	0.0	(7/2+)			
1398.2[#] *7*	1.8 *6*	1780.2		382.00	(5/2+)			
1401.3 *4*	13.5 *18*	2033.92	(5/2,7/2)	632.34	(7/2+)			
1445.6 *5*	0.9 *4*	2126.78	(3/2)	681.3	(3/2−)			
1463.6 *3*	8.5 *12*	2126.78	(3/2)	663.17	(5/2+)			

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^{111}Ru β^- decay 1998Lh02 (continued)

$\gamma(^{111}Rh)$ (continued)

E_γ [‡]	I_γ [‡@]	E_i(level)	J_i^π	E_f	J_f^π
1515.9 *3*	32 *4*	1898.01	(5/2,7/2)	382.00	(5/2$^+$)
1551.4 *4*	3.2 *7*	2214.80	(3/2,5/2,7/2)	663.17	(5/2$^+$)
1594.7 *5*	4.2 *9*	1898.01	(5/2,7/2)	303.52	(3/2$^+$)
1634.4 *7*	1.6 *7*	2126.78	(3/2)	492.72	(1/2$^-$)
1652.1 *4*	8.4 *12*	2033.92	(5/2,7/2)	382.00	(5/2$^+$)
1686.3 *5*	5.0 *9*	1898.01	(5/2,7/2)	211.42	(9/2$^+$)
1686.5 *5*	2.1 *6*	2126.78	(3/2)	440.47	(1/2$^+$)
1730.3 *4*	6.3 *10*	2033.92	(5/2,7/2)	303.52	(3/2$^+$)
1731.5 *5*	6.4 *15*	2126.78	(3/2)	394.98	(3/2$^+$)
1819.3 *6*	2.9 *9*	2214.80	(3/2,5/2,7/2)	394.98	(3/2$^+$)
1822.3 *4*	13.6 *19*	2033.92	(5/2,7/2)	211.42	(9/2$^+$)
1898.1 *4*	4.0 *9*	1898.01	(5/2,7/2)	0.0	(7/2$^+$)
1910.8 *5*	4.3 *9*	2214.80	(3/2,5/2,7/2)	303.52	(3/2$^+$)
2034.1 *3*	47 *6*	2033.92	(5/2,7/2)	0.0	(7/2$^+$)
2215.5 *4*	2.5 *6*	2214.80	(3/2,5/2,7/2)	0.0	(7/2$^+$)

† From 1992PeZX. Different methods were used: simultaneous measurement of conversion electrons and gammas and also electron intensity from the K-α x-ray coincident spectrum.

‡ From 1998Lh02.

Tentative placement from 1998Lh02.

@ For absolute intensity per 100 decays, multiply by 0.165.

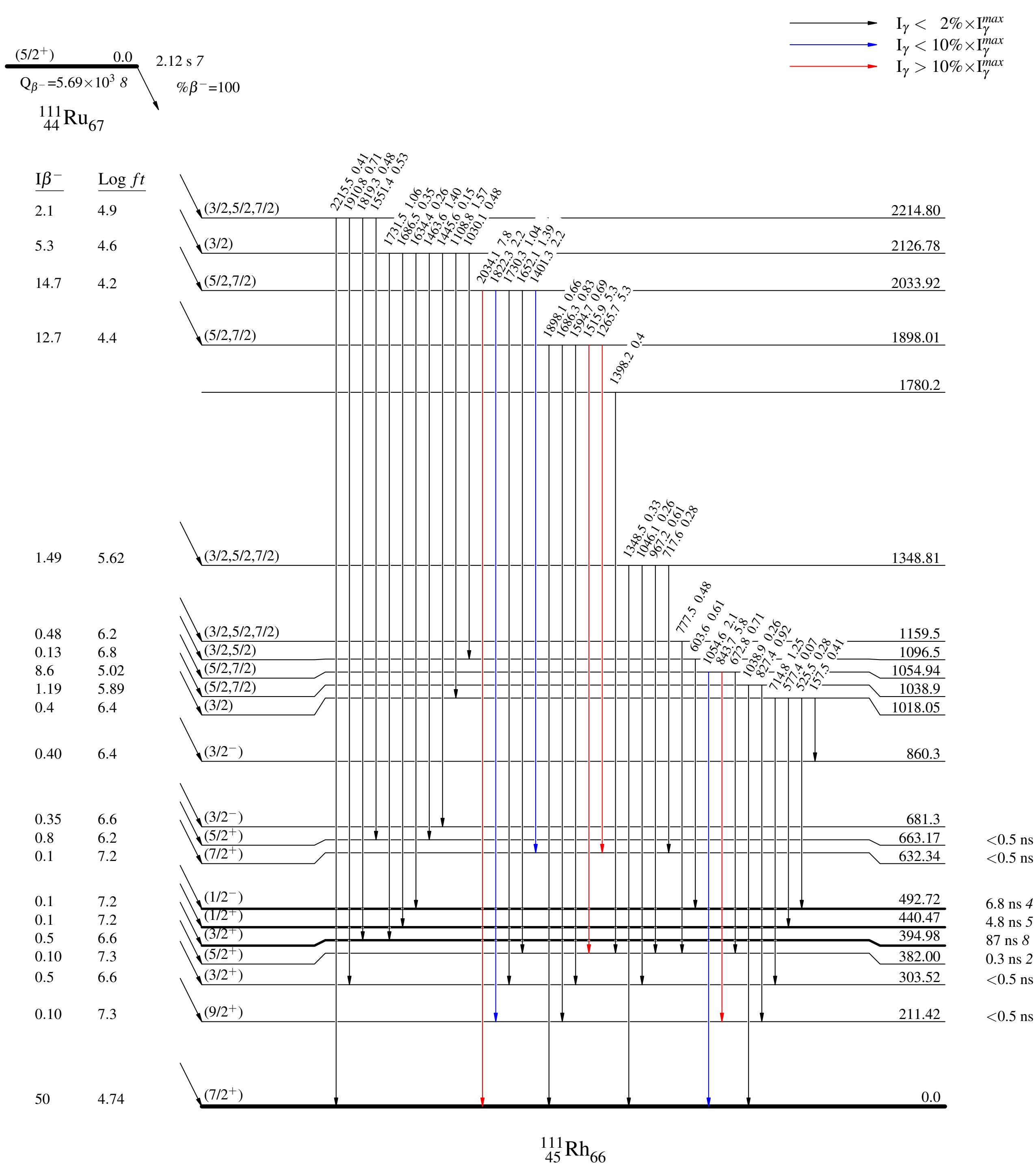
& Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

^{x} γ ray not placed in level scheme.

^{111}Ru β^- decay 1998Lh02

Decay Scheme

Intensities: I_γ per 100 parent decays



^{111}Ru β^- decay 1998Lh02

Decay Scheme (continued)

Intensities: I_γ per 100 parent decays