^{100}Rb β^- decay (52 ms) 2001Lh02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 172, 1 (2021)	31-Jan-2021

Parent: ^{100}Rb: E=0; J$^\pi$=(4$^-$); T$_{1/2}$=52 ms *2*; Q(β^-)=13574 *21*; %β^- decay=100.0

^{100}Rb-E,J$^\pi$,T$_{1/2}$: From ^{100}Rb Adopted Levels. From the log *ft* values given in Table II of 2001Lh02, it is likely that a low-spin isomer of possible J^π=1$^-$ is mixed with the (4$^-$) activity.

^{100}Rb-Q(β^-): From 2017Wa10.

2001Lh02: ^{100}Rb isotope obtained from U(p,F) at 600 MeV followed by mass separation at ISOLDE facility. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma$(t), $\beta\gamma$ coin. Deduced levels, J, π, decay branching ratios, log *ft*. Earlier studies from the same laboratory: 1995Pf04, 1990Lh01, 1990Lh03.

Others: 1986Wa17, 1982Kr11, 1980JuZY, 1979Az01, 1979Pe01, 1978Ko29.

Isotopic identification and half-life measurements: 1986Wa17, 1979Pe01, 1978Ko29.

Q(β^-) measurement using $\beta\gamma$: 1984Pa19, 1985IaZZ.

%β^-n measurement: 1981JoZV, 1986ReZU, 1986Wa17, 1993Ru01.

Eγ, Iγ: 1995Pf04, 1990Lh01, 1982Kr11, 1979Az01.

βce(t): 1979Az01.

$\gamma\gamma$(t): 1995Pf04, 1990Lh01.

Additional information 1.

Level scheme is from 2001Lh02. Earlier level scheme from 1995Pf04 and 1990Lh03 contained seven excited states up to 1779 keV and γ rays.

^{100}Sr Levels

E(level)†	J$^\pi$‡	T$_{1/2}$	Comments
0.0	0$^+$		
129.18 *9*	(2$^+$)	3.91 ns *16*	T$_{1/2}$: from $\gamma\gamma$(t) (1990Lh01), recommended in the Adopted Levels. Other: 5.15 ns *20* from β(ce)(t) (1979Az01). β_2=0.40 *1* from T$_{1/2}$ and rotational model.
416.99 *19*	(4$^+$)		
851.8 *3*	(6$^+$)		
937.8 *4*	(0$^+$)		
1257.05 *22*	(1,2$^+$)		
1315.35 *23*	(1,2$^+$)		
1326.6 *4*			
1414.5 *3*	(3,4$^+$)		
1418.7 *4*			
1500.68 *23*	(3,4$^+$)		
1521.8 *4*			
1560.4 *3*	(3,4$^+$)		
1618.71 *22*	(4$^-$)	104 ns *19*	T$_{1/2}$: from the Adopted Levels. Other: 85 ns *7* from $\gamma\gamma$(t) (1995Pf04). Possible configuration=ν3/2[411]$\otimes\nu$5/2[532] (1995Pf04).
1648.0 *5*			
1745.7 *5*			
1780.5 *3*	(5$^-$)		
1956.7 *5*	(2$^+$,3,4$^+$)		
1974.9 *4*	(6$^-$)		
2055.99 *23*	(1,2$^+$)		
2115.78 *23*	(2$^+$)		
2211.52 *22*	(1,2$^+$)		
2277.47 *22*	(1,2$^+$)		
2482.7 *4*			
2505.9 *4*			
3097.2 *5*	(1,2$^+$)		
3165.0 *6*	(1,2$^+$)		

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^{100}Rb β^- decay (52 ms) 2001Lh02 (continued)

^{100}Sr Levels (continued)

E(level)†	Comments
3316.3 *6*	
3346.0 *10*	
5371+x	E(level): x<8203 *23* from Q(β^-) (for ^{100}Rb decay)-S(n)(^{100}Sr), where Q(β^-)=13574 *21* and S(n)=5371 *9* from 2017Wa10.
9540+x	E(level): x<4034 *23* from Q(β^-) (for ^{100}Rb decay)-S(2n)(^{100}Sr), where Q(β^-)=13574 *21* and S(2n)=9540 *8* from 2017Wa10.

† From least-squares fit to Eγ data.
‡ From the Adopted Levels.

β^- radiations

Apparent β feedings and corresponding log *ft* values from 2001Lh02 are given in comments, together with evaluators′ deduced apparent β feedings, when different from 2001Lh02. These values cannot be reliable for two reasons: 1. Q(β^-)=13574 keV and the last populated level in ^{100}Sr in the present decay scheme at 3346 keV suggests that higher levels in ^{100}Sr are possibly populated, although above ≈6 MeV excitation, levels are expected to decay by neutron emission, for which the probability has been measured as 5.6% for one-neutron emission and 0.15% for two-neutron emission. 2. Apparent β feedings to levels of J^π=0$^+$, 2$^+$ and 6$^+$ and associated log *ft* values are mutually inconsistent with a single parent of J^π=(4$^-$). It is likely that the several of the low-spin levels such as 0$^+$, 2$^+$ and (1,2$^+$) are fed by an isomer with expected J^π=1$^-$ as proposed in 2002Lh01.

E(decay)	E(level)	Iβ^-†	Comments
(2.0×10^{3}# *20*)	9540+x	0.15 *5*	Iβ^-: %β^-2n=0.15 *5* for the decay of the ^{100}Rb g.s.
(4×10^{3}# *4*)	5371+x	5.6 *12*	Iβ^-: %β^-n=5.6 *12* for the decay of the ^{100}Rb g.s.
(10228 *21*)	3346.0		av Eβ=4744 *10* Iβ=0.4 *2*, log *ft*=6.7 (2001Lh02). Evaluators obtain Iβ=1.5 *13*.
(10258 *21*)	3316.3		av Eβ=4758 *10* Iβ=0.9 *2*, log *ft*=6.3 (2001Lh02).
(10409‡ *21*)	3165.0		av Eβ=4830 *10* Iβ=1.2 *2*, log *ft*=6.2 (2001Lh02). Unrealistic feeding from (4$^-$) parent to (1,2$^+$) state.
(10477‡ *21*)	3097.2		av Eβ=4863 *10* Iβ=1.4 *4*, log *ft*=6.2 (2001Lh02). Unrealistic feeding from (4$^-$) parent to (1,2$^+$) state.
(11068 *21*)	2505.9		av Eβ=5146 *10* Iβ=1.2 *2*, log *ft*=6.3 (2001Lh02).
(11091 *21*)	2482.7		av Eβ=5157 *10* Iβ=2.0 *4*, log *ft*=6.1 (2001Lh02).
(11297‡ *21*)	2277.47		av Eβ=5255 *10* Iβ=5.2 *5*, log *ft*=5.7 (2001Lh02). Evaluators obtain Iβ=5.1 *6*. Unrealistic feeding from (4$^-$) parent to (1,2$^+$) state.
(11362‡ *21*)	2211.52		av Eβ=5287 *10* Iβ=6.1 *7*, log *ft*=5.7 (2001Lh02). Evaluators obtain Iβ=5.9 *8*. Unrealistic feeding from (4$^-$) parent to (1,2$^+$) state.
(11458‡ *21*)	2115.78		av Eβ=5333 *10* Iβ=4.0 *4*, log *ft*=5.9 (2001Lh02). Evaluators obtain Iβ=4.2 *6*. Unrealistic feeding from (4$^-$) parent to (2$^+$) state.
(11518‡ *21*)	2055.99		av Eβ=5361 *10* Iβ=8.2 *7*, log *ft*=5.6 (2001Lh02). Evaluators obtain Iβ=5.8 *7*. Unrealistic feeding from (4$^-$) parent to (1,2$^+$) state.
(11599‡ *21*)	1974.9		av Eβ=5400 *10*

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^{100}Rb β^- decay (52 ms) 2001Lh02 (continued)

β^- radiations (continued)

E(decay)	E(level)	Comments
		Iβ=0.4 *1*, log *ft*=7.0 (2001Lh02).
(11617 *21*)	1956.7	av Eβ=5409 *10* Iβ=1.1 *2*, log *ft*=6.5 (2001Lh02).
(11794 *21*)	1780.5	av Eβ=5493 *10* Iβ=2.1 *5*, log *ft*=6.2 (2001Lh02).
(11828 *21*)	1745.7	av Eβ=5510 *10* Iβ=0.6 *2*, log *ft*=6.8 (2001Lh02).
(11926 *21*)	1648.0	av Eβ=5556 *10* Iβ=0.5 *3*, log *ft*=6.9 (2001Lh02).
(11955 *21*)	1618.71	av Eβ=5570 *10* Iβ=9.2 *15*, log *ft*=5.6 (2001Lh02). Strong β feeding is expected to this level from (4$^-$) parent with possible configuration=π3/2[431]$\otimes\nu$5/2[532], where 3/2[431] proton changes to 3/2[411] neutron in β^- decay, while 5/2[532] neutron remains a spectator.
(12014 *21*)	1560.4	av Eβ=5598 *10* Iβ=1.1 *2*, log *ft*=6.5 (2001Lh02). Evaluators obtain Iβ=0.7 *5*.
(12052 *21*)	1521.8	av Eβ=5617 *10* Iβ=4.5 *5*, log *ft*=6.0 (2001Lh02).
(12073 *21*)	1500.68	av Eβ=5627 *10* Iβ=5.9 *6*, log *ft*=5.8 (2001Lh02).
(12155 *21*)	1418.7	av Eβ=5666 *10* Iβ=1.1 *3*, log *ft*=6.5 (2001Lh02).
(12160 *21*)	1414.5	av Eβ=5668 *10* Iβ=3.4 *4*, log *ft*=6.1 (2001Lh02). Evaluators obtain Iβ=2.8 *5*.
(12247 *21*)	1326.6	av Eβ=5710 *10* Iβ=5.1 *8*, log *ft*=5.9 (2001Lh02).
(12259‡ *21*)	1315.35	av Eβ=5715 *10* Iβ=6.4 *6*, log *ft*=5.8 (2001Lh02). Unrealistic feeding from (4$^-$) parent to (1,2$^+$) state.
(12317‡ *21*)	1257.05	av Eβ=5743 *10* Iβ=9.7 *10*, log *ft*=5.6 (2001Lh02). Evaluators obtain Iβ=7.5 *10*. Unrealistic feeding from (4$^-$) parent to (1,2$^+$) state.
(12636‡ *21*)	937.8	av Eβ=5895 *10* Iβ=2.1 *3*, log *ft*=6.4 (2001Lh02). Unrealistic feeding from (4$^-$) parent to (0$^+$) state.
(12722‡ *21*)	851.8	av Eβ=5936 *10* Iβ=1.9 *2*, log *ft*=6.4 (2001Lh02). Unrealistic feeding from (4$^-$) parent to (6$^+$) state.
(13157 *21*)	416.99	av Eβ=6143 *10* Iβ=2.9 *26*, log *ft*=6.3 (2001Lh02).
(13445‡ *21*)	129.18	av Eβ=6280 *10* Iβ=11.5 *24*, log *ft*=5.7 (2001Lh02). Evaluators obtain Iβ=10 *3*. Unrealistic feeding from (4$^-$) parent to (2$^+$) state.

† Absolute intensity per 100 decays.
‡ Existence of this branch is questionable.
# Estimated for a range of levels.

γ(^{100}Sr)

Iγ normalization: 0.55 *6* from Σ(I(γ+ce) of γs to g.s.)=94.2 *12*, based on %β^-n+%β^-2n=5.8 *12* from ^{100}Rb Adopted Levels, and no β feeding to ^{100}Sr g.s., as expected from ΔJ. However, This γ normalization factor is not recommended as the decay scheme is incomplete, implied from unrealistic β feedings to levels for which no direct β feedings are expected from ΔJ^{π}. There is the possibility of a low-spin isomer contributing to some of the β feedings to low-spin levels. In addition, levels above 3.4 MeV excitation can be populated.

^{100}Rb β^- decay (52 ms) 2001Lh02 (continued)

γ(^{100}Sr) (continued)

The decay scheme is not normalized as it is considered incomplete in several ways.

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^{100}Rb β^- decay (52 ms) 2001Lh02 (continued)

$\gamma(^{100}Sr)$ (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[a]
58.3 2	0.20 5	1618.71	(4−)	1560.4	(3,4+)	[D,E2]	3.9 34
106.4[c] 6	0.16 9	1521.8		1414.5	(3,4+)	[D,E2]	0.045 36
118.0 2	1.1 2	1618.71	(4−)	1500.68	(3,4+)	[D,E2]	0.31 25
129.2 1	100	129.18	(2+)	0.0	0+	[E2]	0.397
161.8 2	4.9 8	1780.5	(5−)	1618.71	(4−)	[M1+E2]	0.11 7
194.4[c] 3	0.6 2	1974.9	(6−)	1780.5	(5−)	[M1+E2]	0.06 4
204.4 3	1.1 2	1618.71	(4−)	1414.5	(3,4+)	[D,E2]	0.044 31
287.8 2	41 4	416.99	(4+)	129.18	(2+)	[E2]	0.0222
434.8 2	3.3 4	851.8	(6+)	416.99	(4+)		
x593.8[†‡] 4	1.0 4						
x614.8[†#] 4	1.2 4						
637.4[c] 3	1.7 3	2055.99	(1,2+)	1418.7			
702.3[bc] 4	0.8[b] 3	2115.78	(2+)	1414.5	(3,4+)		
702.3[b] 4	0.8[b] 3	2482.7		1780.5	(5−)		
740.7 5	0.9 3	2055.99	(1,2+)	1315.35	(1,2+)		
808.6 3	3.6 4	937.8	(0+)	129.18	(2+)		
864.0 3	2.8 7	2482.7		1618.71	(4−)		
x871.1[@] 4	0.5 2						
997.5 4	1.8 4	1414.5	(3,4+)	416.99	(4+)		
1083.7 3	2.9 6	1500.68	(3,4+)	416.99	(4+)		
1127.8 3	4.0 5	1257.05	(1,2+)	129.18	(2+)		
1143.4 3	1.7 3	1560.4	(3,4+)	416.99	(4+)		
1186.2 3	7.5 8	1315.35	(1,2+)	129.18	(2+)		
1197.4 4	9.0 15	1326.6		129.18	(2+)		
1201.7 2	21 3	1618.71	(4−)	416.99	(4+)		
1231.0 4	0.9 5	1648.0		416.99	(4+)		
1257.1 3	9.7[&] 17	1257.05	(1,2+)	0.0	0+		
1285.5 4	5.4 6	1414.5	(3,4+)	129.18	(2+)		
1289.5[b] 3	3.7[b] 5	1418.7		129.18	(2+)		
1289.5[bc] 3	3.7[b] 5	3346.0		2055.99	(1,2+)		
1315.3 4	4.6 8	1315.35	(1,2+)	0.0	0+		
1328.7 4	1.0 3	1745.7		416.99	(4+)		
1371.3 4	8.7 10	1500.68	(3,4+)	129.18	(2+)		
1392.6 3	7.6 9	1521.8		129.18	(2+)		
1431.8[c] 5	0.6 4	1560.4	(3,4+)	129.18	(2+)		
x1504.0[†] 5	1.0 5						
1539.4 7	1.0 4	1956.7	(2+,3,4+)	416.99	(4+)		
1699.0 5	1.3 4	2115.78	(2+)	416.99	(4+)		
x1807.8[†] 8	0.9 5						
1827.8 6	1.0 5	1956.7	(2+,3,4+)	129.18	(2+)		
x1883.0[†] 6	0.8 3						
1926.8 3	8.4 9	2055.99	(1,2+)	129.18	(2+)		
x1945.9[†] 7	0.8 4						
1986.7 4	1.9 5	2115.78	(2+)	129.18	(2+)		
2055.9 4	3.3 6	2055.99	(1,2+)	0.0	0+		
2082.2 3	3.6 7	2211.52	(1,2+)	129.18	(2+)		
2115.6 3	3.7 7	2115.78	(2+)	0.0	0+		
2148.4 3	7.4 9	2277.47	(1,2+)	129.18	(2+)		
2211.6 3	7.1 12	2211.52	(1,2+)	0.0	0+		
2277.3 3	1.8 4	2277.47	(1,2+)	0.0	0+		
x2336.9[†] 9	0.8 5						
2376.7[c] 4	2.1 5	2505.9		129.18	(2+)		

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^{100}Rb β^- decay (52 ms) 2001Lh02 (continued)

$\gamma(^{100}Sr)$ (continued)

E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f	E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f
^{x}2635.9[†] *8*	0.8 *5*					3164.9 *8*	0.2 *1*	3165.0	(1,2$^+$)	0.0	0$^+$
2929.0 *9*	0.7 *4*	3346.0		416.99	(4$^+$)	3187.1[c] *6*	1.6 *6*	3316.3		129.18	(2$^+$)
2967.8 *7*	1.0 *6*	3097.2	(1,2$^+$)	129.18	(2$^+$)	^{x}4306.4[†] *9*	0.9 *5*				
3035.9 *8*	1.8 *5*	3165.0	(1,2$^+$)	129.18	(2$^+$)	^{x}4483.3[†] *8*	1.2 *7*				
3097.3 *7*	1.4 *5*	3097.2	(1,2$^+$)	0.0	0$^+$						

† Possibly in coincidence with 129γ.
‡ Since this γ is also placed in ^{99}Nb, its appearance in 129γ-gated spectrum might be due to accidental coincidence.
# Since this γ is also placed in ^{99}Zr and ^{100}Zr, its appearance in 129γ-gated spectrum might be due to accidental coincidence.
@ Possibly in coincidence with 162γ.
& About 25% of the intensity is contributed by ^{100}Mo.
a 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.
b Multiply placed with undivided intensity.
c Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

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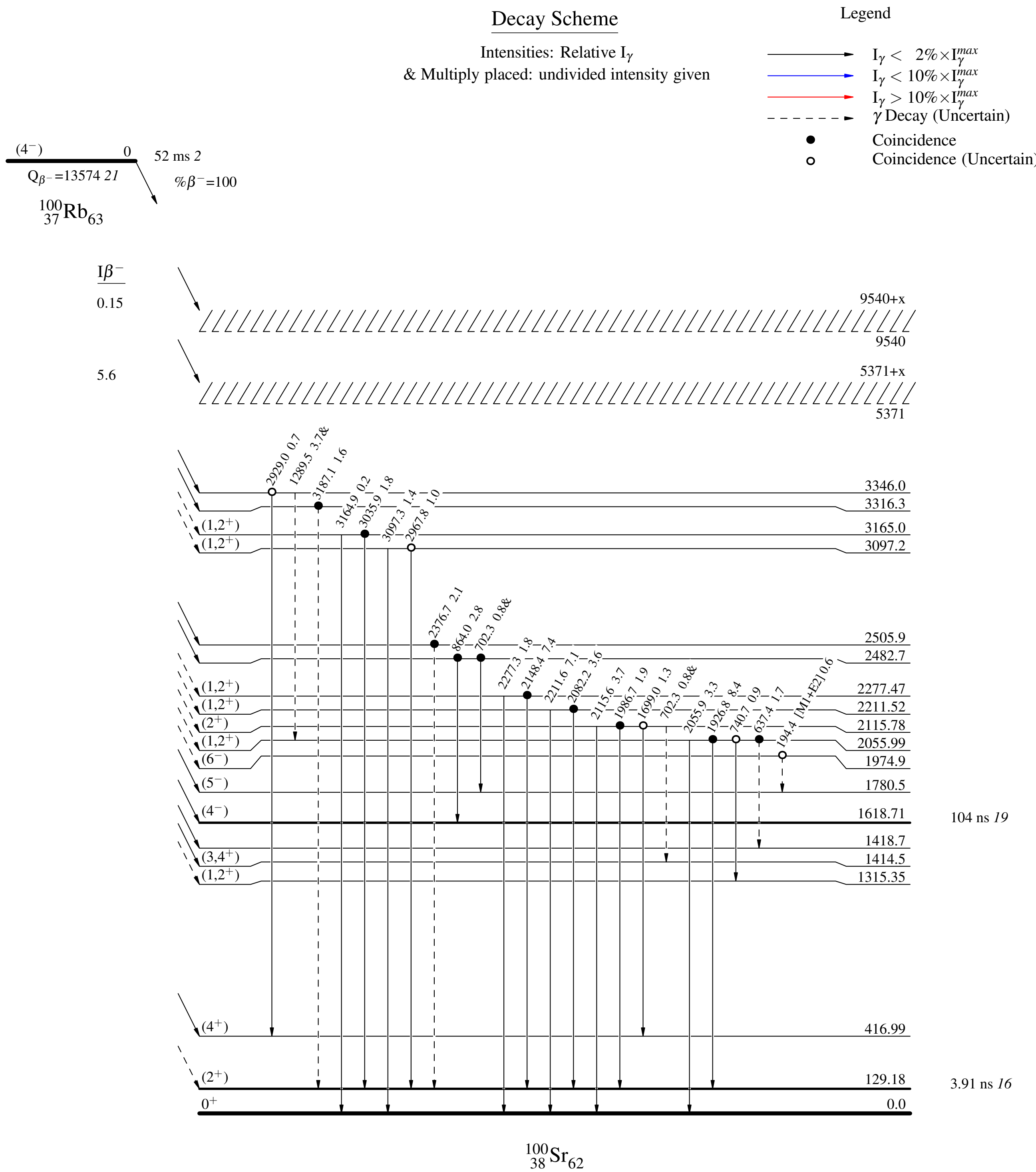
Decay Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given



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Decay Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given