^{100}Y β^- decay (732 ms) 1986Wo01

History

Type	Author	Citation	Literature Cutoff Date
Update	Balraj Singh and Jun Chen	ENSDF	12-Dec-2022

Parent: ^{100}Y: E=0.0; J^π=(1)$^-$; $T_{1/2}$=732 ms *5*; Q(β^-)=9051 *14*; %β^- decay=100
^{100}Y-J^π,$T_{1/2}$: From ^{100}Y Adopted Levels.
^{100}Y-Q(β^-): From 2021Wa16.
1986Wo01: measured γ, $\gamma\gamma$, $\gamma\gamma(\theta)$, ce, $\beta\gamma$, half-life of ^{100}Y decay. See also 1990Wo01 for discussion of level structure. The ^{100}Y isotope produced by neutron fission of ^{235}U followed by mass separation of A=100 ion-beam at TRISTAN facility of the Brookhaven National Laboratory. The separated products contained only the ^{100}Rb and ^{100}Sr activities. The β^- decay of ^{100}Sr (J^π(g.s.)=0$^+$) to ^{100}Y is expected to populate only the low spin 735-ms isomer (most likely the g.s. of ^{100}Y). The presence of the 0.94-s isomer is estimated as <1% by 1986Wo01.
1985Mu07, 1983Mu19: measured Eγ, Iγ, $\gamma\gamma$-coin, half-life of ^{100}Y decay using online-separator facility OSTIS at the Institut Laue-Langevin (ILL), Grenoble.
1977Kh03, 1978Kh01: measured Eγ, Iγ, $\gamma\gamma$-coin, ce, (ce)γ-coin, β, β(ce)(t), half-life of ^{100}Y decay using the gas-filled separator JOSEF at Julich.
The decay scheme from γ and $\gamma\gamma$ data of 1986Wo01 represents a significant improvement over the one suggested by 1985Mu07.
Other measurements:
$\gamma\gamma(\theta)$: 1978Se03.
$\gamma\gamma(\theta$,H,t): 1980Wo09.
$\gamma\gamma$(t): 1989Lh01.
β: 1985IaZZ, 1984Pa19.
$\beta\gamma$: 1984Pa19.
$\beta\gamma$(t): 1990Ma01, 1989Oh06, 1989Wo05, 1989Ma47.
Additional information 1.
$T_{1/2}$(^{100}Y isotope): 1986Wa17, 1985IaZZ, 1983Mu19.

^{100}Zr Levels

E(level)†	J^π‡	$T_{1/2}$	Comments
0.0	0$^+$		
212.530 *9*	2$^+$	0.55 ns *2*	$T_{1/2}$: $\beta\gamma$(t) (weighted average of 0.55 ns *2* (1989Ma47) and 0.54 ns *4* (1989Oh06)). Others: 1989Wo05 cite 0.61 ns *8* from literature, 0.40 ns *8* from $\gamma\gamma$(t) (1989Lh01). From $\gamma\gamma(\theta$,H,t), g factor=0.22 *5* (1980Wo09). Sign of g factor is not given by 1980Wo09, but it is likely to be positive.
331.13 *5*	0$^+$	5.53 ns *15*	$T_{1/2}$: weighted average of 5.60 ns *15* ($\beta\gamma\gamma$(t), 1990Ma01) and 5.36 ns *23* ($\gamma\gamma$(t), 1989Lh01). Other: 3.37 ns *30* (βce(t), 1978Kh01). J^π: from (119γ)(213γ)(θ) (1978Se03,1986Wo01).
564.486 *15*	4$^+$	37 ps *4*	$T_{1/2}$: $\beta\gamma\gamma$(t) (1989Oh06).
829.20 *6*	0$^+$		J^π: from (617γ)(213γ)(θ) (1986Wo01).
878.58 *4*	2$^+$		
1196.16 *4*	(2$^+$)		
1294.85 *5*	(2$^-$,3)		
1441.44 *7*	(1,2$^+$)		The branching ratios of γ rays are in disagreement with those from 2002Lh01 in the decay of ^{100}Y β^- decay (0.94 s).
1807.59 *5*	(1,2$^+$)		
1938.14 *5*	(1,2$^+$)		
2182.92 *9*	(1,2$^+$)		
2692.76 *9*	(1,2$^+$)		
2727.4 *2*	(1,2$^+$)		
2770.67 *8*	(1,2$^+$)		
2846.26 *7*	(1,2$^+$)		
2932.02 *13*	(1,2$^+$)		
3069.7 *2*	(1,2$^+$)		
3571.8 *3*	(1,2$^+$)		

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^{100}Y β^- decay (732 ms) 1986Wo01 (continued)

^{100}Zr Levels (continued)

E(level)[†]	J^{π}[‡]	Comments
3956.6 *3*	(1,2$^+$)	
4288.4 *4*	(1,2$^+$)	
6827+x		E(level): x<2224 *19* from Q(β^-) (for ^{100}Y decay − S(n)(^{100}Zr), where Q(β^-)=9051 *14*, and S(n)=6827 *13* from 2021Wa16.

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

β^- radiations

1984Pa19 deduced Q(β^-) value from an average of 10 endpoint energies determined from 24 $\beta\gamma$ coincidence spectra.

E(decay)	E(level)	Iβ^-[†‡]	Log *ft*[†]	Comments
(1.1×10^3[@] *11*)	6827+x	1.02 *6*		Iβ^-: %β^-n=1.02 *6* for the decay of the ^{100}Y g.s. and the isomer.
(4763 *14*)	4288.4	<0.55	>6.2	av Eβ=2106.1 *68* Iβ=0.49 *8*, log *ft*=6.3 (1986Wo01). Iβ=0.55 *12* (evaluators).
(5094 *14*)	3956.6	<1.3	>5.9	av Eβ=2265.6 *68* Iβ=0.92 *11*, log *ft*=6.2 (1986Wo01). Iβ=1.3 *2* (evaluators).
(5479 *14*)	3571.8	<1.6	>6.0	av Eβ=2450.6 *68* Iβ=1.45 *15*, log *ft*=6.1 (1986Wo01). Iβ=1.6 *3* (evaluators).
(5981 *14*)	3069.7	<1.6	>6.2	av Eβ=2692.2 *68* Iβ=1.39 *14*, log *ft*=6.3 (1986Wo01). Iβ=1.6 *3* (evaluators).
(6119 *14*)	2932.02	<8.4	>5.5	av Eβ=2758.5 *68* Iβ=7.5 *5*, log *ft*=5.6 (1986Wo01). Iβ=8.4 *13* (evaluators).
(6205 *14*)	2846.26	≈14	≈5.3	av Eβ=2799.7 *68* Iβ=12.4 *7*, log *ft*=5.4 (1986Wo01). Iβ=14 *2* (evaluators).
(6280 *14*)	2770.67	≈15	≈5.3	av Eβ=2836.1 *68* Iβ=13.7 *9*, log *ft*=5.4 (1986Wo01). Iβ=15 *2* (evaluators).
(6324 *14*)	2727.4	<1.4	>6.3	av Eβ=2856.9 *68* Iβ=1.26 *14*, log *ft*=6.5 (1986Wo01). Iβ=1.4 *3* (evaluators).
(6358 *14*)	2692.76	<4.9	>5.8	av Eβ=2873.6 *68* Iβ=4.4 *4*, log *ft*=5.9 (1986Wo01). Iβ=4.9 *8* (evaluators).
(6868 *14*)	2182.92	<0.86	>6.7	av Eβ=3119.0 *68* Iβ=0.77 *9*, log *ft*=6.8 (1986Wo01). Iβ=0.86 *15* (evaluators).
(7113 *14*)	1938.14	≈13	≈5.6	av Eβ=3236.7 *68* Iβ=10.9 *8*, log *ft*=5.7 (1986Wo01). Iβ=13 *2* (evaluators).
(7243 *14*)	1807.59	<4.1	>6.1	av Eβ=3299.5 *68* Iβ=3.7 *4*, log *ft*=6.2 (1986Wo01). Iβ=4.1 *7* (evaluators).
(7610 *14*)	1441.44	<1.5	>6.7	av Eβ=3475.6 *68* Iβ=1.4 *3*, log *ft*=6.8 (1986Wo01). Iβ=1.5 *4* (evaluators).
(7756 *14*)	1294.85	<0.8	>7.0	av Eβ=3546.1 *68* Iβ=0.7 *2*, log *ft*=7.1 (1986Wo01). Iβ=0.8 *3* (evaluators).
(7855 *14*)	1196.16	<3.1	>6.4	av Eβ=3593.6 *68* Iβ=2.8 *4*, log *ft*=6.5 (1986Wo01). Iβ=3.1 *7* (evaluators).
(8172 *14*)	878.58	<5.2	>6.3	av Eβ=3746.2 *68* Iβ=4.7 *7*, log *ft*=6.4 (1986Wo01). Iβ=5.2 *11* (evaluators).
(8222 *14*)	829.20	<3.4	>6.5	av Eβ=3769.9 *68* Iβ=3.0 *5*, log *ft*=6.6 (1986Wo01). Iβ=3.4 *7* (evaluators).
(8487[#] *14*)	564.486			av Eβ=3897.0 *68* Iβ=0.35 *10*, log *ft*=7.6 (1986Wo01). Iβ^-: apparent feeding of 0.39 *13* is probably due to missing γ feeding from higher levels, as log *ft* value of 7.5 is unrealistic for a ΔJ=(3) β transition.

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^{100}Y β^- decay (732 ms) 1986Wo01 (continued)

β^- radiations (continued)

E(decay)	E(level)	Iβ^- [†‡]	Log *ft* [†]	Comments
(8720 *14*)	331.13	≈10	≈6.1	av Eβ=4009.1 *68* Iβ=7.7 *17*, log *ft*=6.3 (1986Wo01). Iβ=10 *5* (evaluators).
(8839 *14*)	212.530	≈23	≈5.8	av Eβ=4066.0 *68* Iβ=20 *5*, log *ft*=5.9 (1986Wo01). Iβ=23 *6* (evaluators).
(9051[#] *14*)	0.0	<2	>6.9	av Eβ=4168.0 *68*

[†] All values are considered as approximate since a large gap of about 5 MeV between Q(β^-) value and the highest known populated level at 4288 allows the possibility of additional levels and undetected gamma rays. Quoted values of Iβ^- are from I(γ+ce) intensity balance at each level. All the Iβ and log *ft* are listed as limits, with only five cases with Iβ≥10% listed as approximate. Values of Iβ and log ft as given in Table II of 1986Wo01 are listed under comments, as are apparent Iβ feedings deduced by the evaluators from γ-intensity intensity balances.

[‡] Absolute intensity per 100 decays.

[#] Existence of this branch is questionable.

[@] Estimated for a range of levels.

$\gamma(^{100}Zr)$

Iγ normalization: From Iγ(absolute) of 212.5γ measured with respect to Iγ(absolute) of 31% *4* (1981DeYV) for 504γ from ^{100}Zr β^-. The absolute Iγ value of 30% *4* in 2007Ri01 corroborates the measurement by 1981DeYV, while 19% *2* in 1989WaZV seems discrepant. An independent normalization, assuming no β^- feeding to the g.s. gives Iγ normalization=0.64 *2*. The normalization factor derived from the equilibrium spectrum suggests that β^- feeding to the g.s. is <3%. The delayed neutron decay is 1.02% *6*.

The following γ rays tentatively assigned to ^{100}Y decay by 1985Mu07 have not been seen by 1986Wo01: 326, 966, 1077, 1262, 1542, 1563, 1929, 2010, 2092, 2509 and 2838. All have a reported intensity of 0.5 (1985Mu07). These γ rays have been omitted by the evaluators.

E_γ[†]	I_γ[†c]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[a]	δ	α[d]	$I_{(\gamma+ce)}$[c]	Comments
118.59 *7*	21.1 *12*	331.13	0^+	212.530	2^+	E2		0.597		A_2=+0.25 *12*, A_4=+1.09 *16* for (119γ)(213γ)(θ) (1978Se03) is typical of a 0-2-0 cascade.
212.531[@] *9*	100 *6*	212.530	2^+	0.0	0^+	E2		0.0723		E_γ: other: 212.62 *7* (1986Wo01).
244.80 *8*	0.75 *6*	2182.92	$(1,2^+)$	1938.14	$(1,2^+)$					
314.3 *3*	0.09 *3*	878.58	2^+	564.486	4^+					
317.8 *2*	0.20 *4*	1196.16	(2^+)	878.58	2^+					
331.1		331.13	0^+	0.0	0^+	E0			16 *4*	E_γ: from level energy. Transition seen in βce data. $I_{(\gamma+ce)}$: from Branching(118γ)=0.68 *6* (1986Wo01), deduced from weighted average of values from singles mode (βce data) and in $\gamma\gamma$ coincidence mode with 2439γ and 2480γ (1986Wo01).
351.960[@] *12*	1.73 *11*	564.486	4^+	212.530	2^+					E_γ: other: 352.08 *8* (1986Wo01).
416.01 *11*	0.34 *4*	1294.85	$(2^-,3)$	878.58	2^+					
496.88 *13*	1.19 *17*	1938.14	$(1,2^+)$	1441.44	$(1,2^+)$					
512.60 *7*	0.24 *7*	1807.59	$(1,2^+)$	1294.85	$(2^-,3)$					
547.37 *7*	2.8 *4*	878.58	2^+	331.13	0^+					
611.60 *11*	0.68 *7*	1807.59	$(1,2^+)$	1196.16	(2^+)					
616.67[&] *7*	9.4 *6*	829.20	0^+	212.530	2^+					
631.84 *8*	1.1 *1*	1196.16	(2^+)	564.486	4^+					
643.43 *12*	0.58 *8*	1938.14	$(1,2^+)$	1294.85	$(2^-,3)$					
665.98 *7*	10.6 *6*	878.58	2^+	212.530	2^+	(M1+E2)	+1.0 *3*			δ: from (666γ)(213γ)(θ) (1986Wo01). Sign(δ) reassigned by the evaluators from the angular distribution pattern shown by the authors for the 666-213 cascade. Mult.: large δ(Q/D) favors M1+E2 over E1+M2.
741.99 *7*	6.0 *4*	1938.14	$(1,2^+)$	1196.16	(2^+)					
754.54 *23*	0.39 *9*	2692.76	$(1,2^+)$	1938.14	$(1,2^+)$					
832.64 *10*	0.90 *7*	2770.67	$(1,2^+)$	1938.14	$(1,2^+)$					
865.05 *8*	3.2 *2*	1196.16	(2^+)	331.13	0^+					
878.54 *8*	5.5 *4*	878.58	2^+	0.0	0^+					
885.18 *11*	0.99 *9*	2692.76	$(1,2^+)$	1807.59	$(1,2^+)$					

$^{100}_{40}Zr_{60}$-4

^{100}Y β^- decay (732 ms) 1986Wo01 (continued)

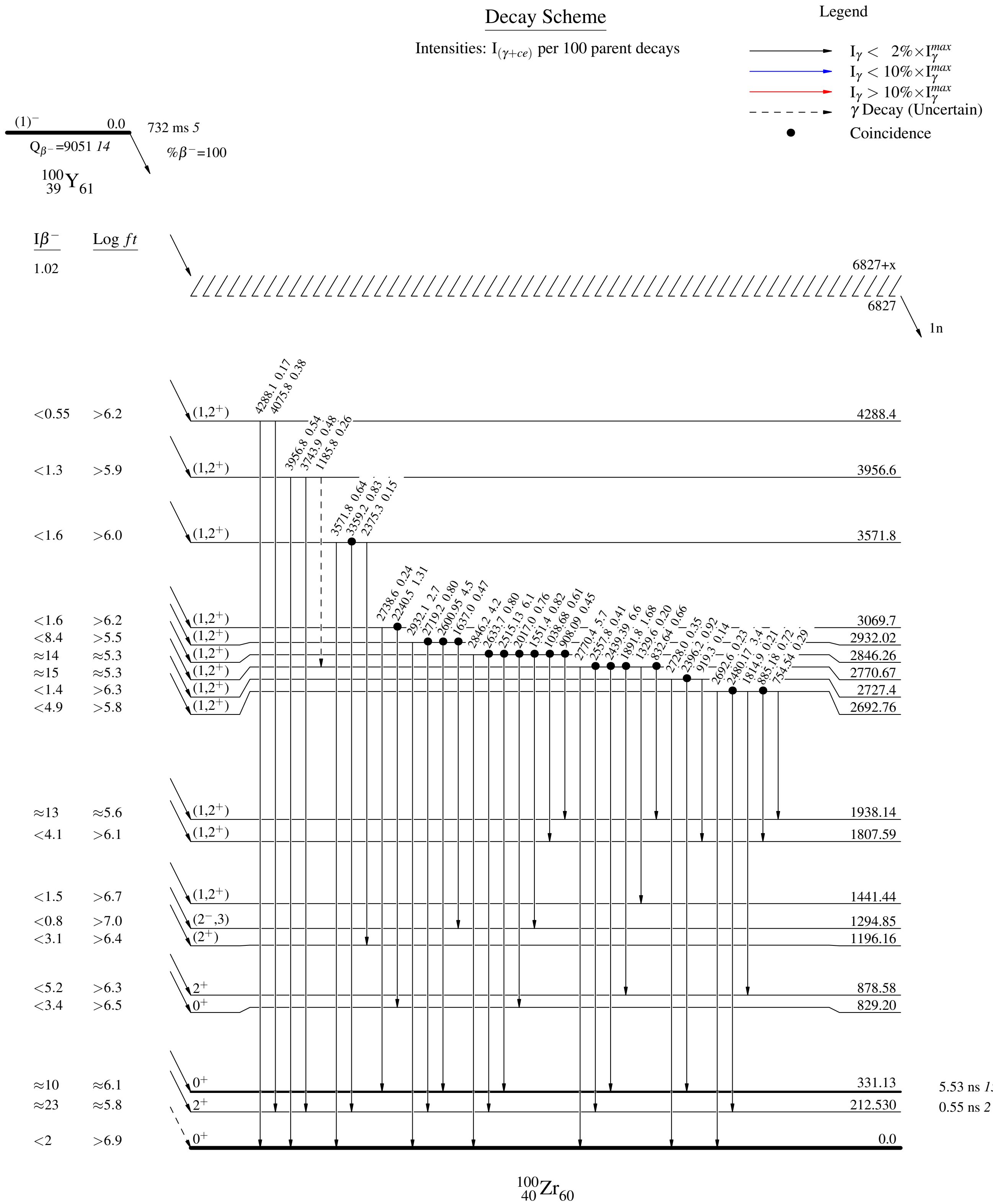
γ(^{100}Zr) (continued)

E_γ [†]	I_γ [†c]	E_i(level)	J^π_i	E_f	J^π_f
908.09 *12*	0.62 *7*	2846.26	(1,2$^+$)	1938.14	(1,2$^+$)
919.3 *4*	0.19 *5*	2727.4	(1,2$^+$)	1807.59	(1,2$^+$)
978.37 *12*	0.95 *9*	1807.59	(1,2$^+$)	829.20	0$^+$
983.59 *8*	1.7 *2*	1196.16	(2$^+$)	212.530	2$^+$
1038.68 *12*	0.83 *15*	2846.26	(1,2$^+$)	1807.59	(1,2$^+$)
1059.51 *7*	8.7 *6*	1938.14	(1,2$^+$)	878.58	2$^+$
1082.33 *8*	3.4 *3*	1294.85	(2$^-$,3)	212.530	2$^+$
1109.1 *3*	1.0 *3*	1938.14	(1,2$^+$)	829.20	0$^+$
1110.5 *3*	1.0 *3*	1441.44	(1,2$^+$)	331.13	0$^+$
1185.8[be] *3*	0.36 *7*	3956.6	(1,2$^+$)	2770.67	(1,2$^+$)
1196.08 *7*	5.0 *3*	1196.16	(2$^+$)	0.0	0$^+$
1228.99 *8*	2.1 *2*	1441.44	(1,2$^+$)	212.530	2$^+$
1329.6 *4*	0.27 *7*	2770.67	(1,2$^+$)	1441.44	(1,2$^+$)
1441.2 *3*	0.45 *9*	1441.44	(1,2$^+$)	0.0	0$^+$
1476.53 *14*	1.74 *18*	1807.59	(1,2$^+$)	331.13	0$^+$
1551.4 *2*	1.12 *13*	2846.26	(1,2$^+$)	1294.85	(2$^-$,3)
1595.16 *17*	2.4 *3*	1807.59	(1,2$^+$)	212.530	2$^+$
1608.0[‡e]	1.5	1938.14	(1,2$^+$)	331.13	0$^+$
1637.0 *3*	0.64 *10*	2932.02	(1,2$^+$)	1294.85	(2$^-$,3)
[x]1670.8[#] *3*	0.83 *11*				
1725.44 *16*	0.93 *15*	1938.14	(1,2$^+$)	212.530	2$^+$
[x]1750[‡]	1.0				
1807.9 *2*	1.6 *3*	1807.59	(1,2$^+$)	0.0	0$^+$
1814.9 *6*	0.29 *9*	2692.76	(1,2$^+$)	878.58	2$^+$
1891.8 *2*	2.3 *3*	2770.67	(1,2$^+$)	878.58	2$^+$
1937.9 *3*	0.97 *12*	1938.14	(1,2$^+$)	0.0	0$^+$
2017.0 *3*	1.04 *10*	2846.26	(1,2$^+$)	829.20	0$^+$
2182.3 *5*	0.43 *11*	2182.92	(1,2$^+$)	0.0	0$^+$
2240.5 *2*	1.80 *16*	3069.7	(1,2$^+$)	829.20	0$^+$
2375.3 *10*	0.21 *11*	3571.8	(1,2$^+$)	1196.16	(2$^+$)
2396.2 *3*	1.26 *14*	2727.4	(1,2$^+$)	331.13	0$^+$
2439.39 *18*	9.1 *7*	2770.67	(1,2$^+$)	331.13	0$^+$
[x]2469.6[#] *3*	1.45 *14*				
2480.17 *17*	4.7 *4*	2692.76	(1,2$^+$)	212.530	2$^+$
2515.13 *14*	8.4 *5*	2846.26	(1,2$^+$)	331.13	0$^+$
2557.8 *4*	0.56 *9*	2770.67	(1,2$^+$)	212.530	2$^+$
2600.95 *18*	6.1 *4*	2932.02	(1,2$^+$)	331.13	0$^+$
2633.7 *3*	1.10 *14*	2846.26	(1,2$^+$)	212.530	2$^+$
2692.6 *4*	0.32 *9*	2692.76	(1,2$^+$)	0.0	0$^+$
2719.2 *3*	1.09 *13*	2932.02	(1,2$^+$)	212.530	2$^+$
2728.0 *5*	0.48 *12*	2727.4	(1,2$^+$)	0.0	0$^+$
2738.6 *5*	0.33 *10*	3069.7	(1,2$^+$)	331.13	0$^+$
2770.4 *3*	7.8 *6*	2770.67	(1,2$^+$)	0.0	0$^+$
2846.2 *2*	5.8 *4*	2846.26	(1,2$^+$)	0.0	0$^+$
2932.1 *3*	3.7 *3*	2932.02	(1,2$^+$)	0.0	0$^+$
[x]2980.8 *5*	0.42 *10*				
3359.2 *4*	1.14 *14*	3571.8	(1,2$^+$)	212.530	2$^+$
3571.8 *4*	0.87 *11*	3571.8	(1,2$^+$)	0.0	0$^+$
3743.9 *5*	0.66 *11*	3956.6	(1,2$^+$)	212.530	2$^+$
3956.8 *5*	0.74 *10*	3956.6	(1,2$^+$)	0.0	0$^+$
4075.8 *4*	0.52 *9*	4288.4	(1,2$^+$)	212.530	2$^+$
4288.1 *6*	0.23 *7*	4288.4	(1,2$^+$)	0.0	0$^+$

[†] From 1986Wo01, unless otherwise noted.
[‡] γ reported by 1985Mu07 only. Treated as uncertain by the evaluators.
[#] γ in coincidence with 212.5γ, but no unique assignment possible.
[@] From curved-crystal spectrometer data (1979Bo26).
[&] (617γ)(213γ)(θ) (1986Wo01).
[a] From ce data in 1986Wo01, unless otherwise noted.
[b] Tentative placement (evaluators) from level energy difference.
[c] For absolute intensity per 100 decays, multiply by 0.73 *10*.
[d] 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.
[e] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

$^{100}_{40}Zr_{60}$-5

^{100}Y β^- decay (732 ms) 1986Wo01



$^{100}Y\ \beta^-$ decay (732 ms) 1986Wo01

Decay Scheme (continued)

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