^{92}Y β^- decay 1970Ta05

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 113, 2187 (2012)	15-Sep-2012

Parent: ^{92}Y: E=0.0; $J^\pi=2^-$; $T_{1/2}$=3.54 h *1*; Q(β^-)=3643 *9*; %β^- decay=100.0
Others: 1990Ma40, 1983Ia02, 1973PaYG, 1962Bu16.

^{92}Zr Levels

The decay scheme is essentially that proposed by 1970Ta05. It is based on coincidence results and energy sum relations. The levels at 3040 and 3264 keV, based on only one γ transition, are supported by (n,γ) and other reaction studies.

E(level)[†]	J^π[#]	$T_{1/2}$[‡]	E(level)[†]	J^π[#]	E(level)[†]	J^π[#]
0.0	0^+	stable	1847.32 *8*	2^+	2819.68 *16*	2^+
934.49 *6*	2^+		2066.90 *12*	2^+	3040.1 *3*	3
1382.99 *12*	0^+	88 ps *3*	2339.92 *7*	3^-	3264.0 *9*	2^+
1495.60 *9*	4^+	102 ps *3*	2473.4? *5*	(≤2)	3371.4 *5*	$1^{(-)}$

† From least-squares fit to Eγ.
‡ From $\beta\gamma\gamma$ fast-coin timing (1990Ma40).
# From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^-[‡]	Log *ft*	Comments
(272 *9*)	3371.4	0.012 *3*	7.33 *12*	av Eβ=78.0 *30*
(379 *9*)	3264.0	0.0011 *5*	8.85 *20*	av Eβ=113.8 *32*
(603 *9*)	3040.1	0.019 *4*	8.30 *10*	av Eβ=195.0 *35*
(823 *9*)	2819.68	0.100 *13*	8.06 *6*	av Eβ=281.5 *37*
(1170[#] *9*)	2473.4?	≤0.006	≥9.9	av Eβ=426.1 *39*
(1303 *9*)	2339.92	6.5 *7*	7.00 *5*	av Eβ=483.9 *40*
(1576 *9*)	2066.90	0.24 *3*	8.76 *6*	av Eβ=604.7 *41*
(1796 *9*)	1847.32	0.43 *8*	8.73 *9*	av Eβ=703.9 *41*
(2147 *9*)	1495.60	1.15 *20*	9.75[1u] *8*	av Eβ=872.8 *41*
(2260 *9*)	1382.99	2.3 *3*	9.58[1u] *6*	av Eβ=923.9 *41*
(2709 *9*)	934.49	3.5 *10*	8.56 *13*	av Eβ=1127.3 *43*
3639[†] *15*	0.0	85.7 *16*	9.271[1u] *11*	av Eβ=1567.3 *43* ΔJ=2−yes shape (1962Bu16).

† From 1983Ia02. Others: 3600 *30* (1957Ga59), 3640 *20* (1962Bu16).
‡ Absolute intensity per 100 decays.
# Existence of this branch is questionable.

$\gamma(^{92}Zr)$

Iγ normalization: from measured I(913γ+934γ)/Iβ=0.145 *10* (1962Bu16).

E_γ[‡]	I_γ[‡f]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	δ[#]	α[†]	$I_{(\gamma+ce)}$[f]	Comments
448.5 *1*	16.8 *10*	1382.99	0^+	934.49	2^+	E2[c]		0.00583 *9*		α=0.00583 *9*; α(K)=0.00511 *8*; α(L)=0.000602 *9*; α(M)=0.0001046 *15*; α(N+..)=1.559$\times10^{-5}$ *22* α(N)=1.464$\times10^{-5}$ *21*; α(O)=9.51$\times10^{-7}$ *14*
492.6 *1*	3.49 *21*	2339.92	3^-	1847.32	2^+	(E1(+M2))	≤0.009	0.001344 *19*		α=0.001344 *19*; α(K)=0.001188 *17*; α(L)=0.0001305 *19*; α(M)=2.26$\times10^{-5}$ *4*; α(N+..)=3.42$\times10^{-6}$ α(N)=3.20$\times10^{-6}$ *5*; α(O)=2.23$\times10^{-7}$ *4*
561.1 *1*	17.3 *10*	1495.60	4^+	934.49	2^+	E2[d]		0.00299 *5*		α=0.00299 *5*; α(K)=0.00262 *4*; α(L)=0.000303 *5*; α(M)=5.26$\times10^{-5}$ *8*; α(N+..)=7.88$\times10^{-6}$ *11* α(N)=7.39$\times10^{-6}$ *11*; α(O)=4.93$\times10^{-7}$ *7*
844.3 *1*	9.0 *6*	2339.92	3^-	1495.60	4^+	(E1(+M2))	≤0.02	0.000403 *6*		α=0.000403 *6*; α(K)=0.000356 *5*; α(L)=3.88$\times10^{-5}$ *6*; α(M)=6.72$\times10^{-6}$ *10*; α(N+..)=1.022$\times10^{-6}$ *15* α(N)=9.54$\times10^{-7}$ *14*; α(O)=6.75$\times10^{-8}$ *10*
912.8 *3*	4.5 *4*	1847.32	2^+	934.49	2^+	(M1(+E2))	−0.002 *25*	0.000819 *12*		α=0.000819 *12*; α(K)=0.000723 *11*; α(L)=7.94$\times10^{-5}$ *12*; α(M)=1.377$\times10^{-5}$ *20*; α(N+..)=2.10$\times10^{-6}$ α(N)=1.96$\times10^{-6}$ *3*; α(O)=1.400$\times10^{-7}$ *20*
934.47[a] *7*	100 *6*	934.49	2^+	0.0	0^+	E2		0.000786 *11*		α=0.000786 *11*; α(K)=0.000693 *10*; α(L)=7.73$\times10^{-5}$ *11*; α(M)=1.341$\times10^{-5}$ *19*; α(N+..)=2.03$\times10^{-6}$ α(N)=1.90$\times10^{-6}$ *3*; α(O)=1.320$\times10^{-7}$ *19* %Iγ=13.9 *10* assuming adopted Iγ normalization.
972.3 *2*	0.49 *5*	2819.68	2^+	1847.32	2^+	(M1(+E2))	+0.01 *2*	0.000715 *10*		α=0.000715 *10*; α(K)=0.000631 *9*; α(L)=6.92$\times10^{-5}$ *10*; α(M)=1.200$\times10^{-5}$ *17*; α(N+..)=1.83$\times10^{-6}$ *3* α(N)=1.708$\times10^{-6}$ *24*; α(O)=1.221$\times10^{-7}$ *18*
1132.4 *1*	1.75 *11*	2066.90	2^+	934.49	2^+	(M1+E2)	−3.2 *+5−4*	0.000510 *8*		α=0.000510 *8*; α(K)=0.000449 *7*; α(L)=4.95$\times10^{-5}$ *7*; α(M)=8.59$\times10^{-6}$ *12*; α(N+..)=2.99$\times10^{-6}$ *5* α(N)=1.218$\times10^{-6}$ *17*; α(O)=8.57$\times10^{-8}$ *12*; α(IPF)=1.68$\times10^{-6}$ *3*
(1383.0[b])	[b]	1382.99	0^+	0.0	0^+	E0			≤0.17	
1405.4 *1*	34.4 *21*	2339.92	3^-	934.49	2^+	(E1)[e]		0.000330 *5*		α=0.000330 *5*; α(K)=0.0001380 *20*; α(L)=1.491$\times10^{-5}$ *21*; α(M)=2.58$\times10^{-6}$ *4*; α(N+..)=0.0001750 α(N)=3.67$\times10^{-7}$ *6*; α(O)=2.62$\times10^{-8}$ *4*; α(IPF)=0.0001746 *25*
1847.3 *1*	2.59 *16*	1847.32	2^+	0.0	0^+	E2		0.000422 *6*		α=0.000422 *6*; α(K)=0.0001665 *24*;

$\gamma(^{92}$Zr) (continued)

E_γ[‡]	I_γ[‡f]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#]	α[†]	Comments
									α(L)=1.81×10^{-5} *3*; α(M)=3.14×10^{-6} *5*; α(N+..)=0.000234 *4* α(N)=4.46×10^{-7} *7*; α(O)=3.18×10^{-8} *5*; α(IPF)=0.000234 *4*
1885.1 *3*	0.20 *3*	2819.68	2$^+$	934.49	2$^+$	(E2+M1)		0.000419 *15*	α=0.000419 *15*; α(K)=0.000162 *4*; α(L)=1.76×10^{-5} *4*; α(M)=3.05×10^{-6} *6*; α(N+..)=0.000236 *17* α(N)=4.35×10^{-7} *9*; α(O)=3.12×10^{-8} *7*; α(IPF)=0.000236 *17*
1988.6 *12*	0.044 *15*	3371.4	1$^{(-)}$	1382.99	0$^+$	(E1)		0.000702 *10*	α=0.000702 *10*; α(K)=7.90×10^{-5} *11*; α(L)=8.50×10^{-6} *12*; α(M)=1.470×10^{-6} *21*; α(N+..)=0.000613 α(N)=2.09×10^{-7} *3*; α(O)=1.500×10^{-8} *21*; α(IPF)=0.000613 *9*
2067[g]	<0.01[&]	2066.90	2$^+$	0.0	0$^+$				
2105.6 *3*	0.137 *19*	3040.1	3	934.49	2$^+$	D(+Q)	−0.04 *+4−9*		
2339.9 *1*	0.103 *25*	2339.92	3$^-$	0.0	0$^+$				
2437.0 *8*	0.022 *10*	3371.4	1$^{(-)}$	934.49	2$^+$	(E1(+M2))		0.00073 *25*	α=0.00073 *25*; α(K)=0.00012 *7*; α(L)=1.3×10^{-5} *7*; α(M)=2.3×10^{-6} *12*; α(N+..)=0.0006 *4* α(N)=3.2×10^{-7} *17*; α(O)=2.3×10^{-8} *12*; α(IPF)=0.0006 *4*
2473.4[@] *5*	0.019 *18*	2473.4?	(≤2)	0.0	0$^+$				
2819.8 *3*	0.030 *9*	2819.68	2$^+$	0.0	0$^+$	E2		0.000785 *11*	α=0.000785 *11*; α(K)=7.87×10^{-5} *11*; α(L)=8.48×10^{-6} *12*; α(M)=1.468×10^{-6} *21*; α(N+..)=0.000696 α(N)=2.09×10^{-7} *3*; α(O)=1.502×10^{-8} *21*; α(IPF)=0.000696 *10*
3263.9 *9*	0.008 *3*	3264.0	2$^+$	0.0	0$^+$	E2		0.000956 *14*	α=0.000956 *14*; α(K)=6.17×10^{-5} *9*; α(L)=6.64×10^{-6} *10*; α(M)=1.150×10^{-6} *17*; α(N+..)=0.000886 *1* α(N)=1.639×10^{-7} *23*; α(O)=1.179×10^{-8} *17*; α(IPF)=0.000886 *13*
3371.2 *6*	0.022 *3*	3371.4	1$^{(-)}$	0.0	0$^+$	(E1)		0.001448 *21*	α=0.001448 *21*; α(K)=3.73×10^{-5} *6*; α(L)=3.99×10^{-6} *6*; α(M)=6.90×10^{-7} *10*; α(N+..)=0.001406 *20* α(N)=9.83×10^{-8} *14*; α(O)=7.07×10^{-9} *10*; α(IPF)=0.001406 *20*

† Additional information 1.

‡ From 1970Ta05. Energies above 2100 keV were reported by 1970Ta05 only. Below 2 MeV, energies and intensities from 1962Bu16 and 1970Ta05 are in good agreement.

\# From Adopted Gammas, except as noted.

@ 1978Gl04 observe a 2475γ in (n,n′γ) also; however, its threshold clearly indicates that decay is from E(level)>2473, and 1978Gl04 assign it to a level which also deexcites via a 1068γ (absent in ^{92}Y β^- decay). That γ presumably differs from the 2473γ reported here.

& From 1970Ta05, who observe only a sum peak at this energy. 1962Bu16 report I(2067γ)=0.3 *1*. This γ ray is absent in (n,γ), which does reveal weak 571γ and 219γ (≈0.7% branches) deexciting this level in that reaction, yet absent in ^{92}Y β^- decay. Evaluator does not adopt this γ ray.

$^{92}_{40}$Zr$_{52}$-3

γ(^{92}Zr) (continued)

[a] Weighted average of 934.44 *9* (1979Bo26) and 934.5 *1* (1970Ta05).

[b] Transition not observed in ^{92}Y β^- decay. 1962Bu16 report I(1383 ce(K))/I(448γ)≤0.01.

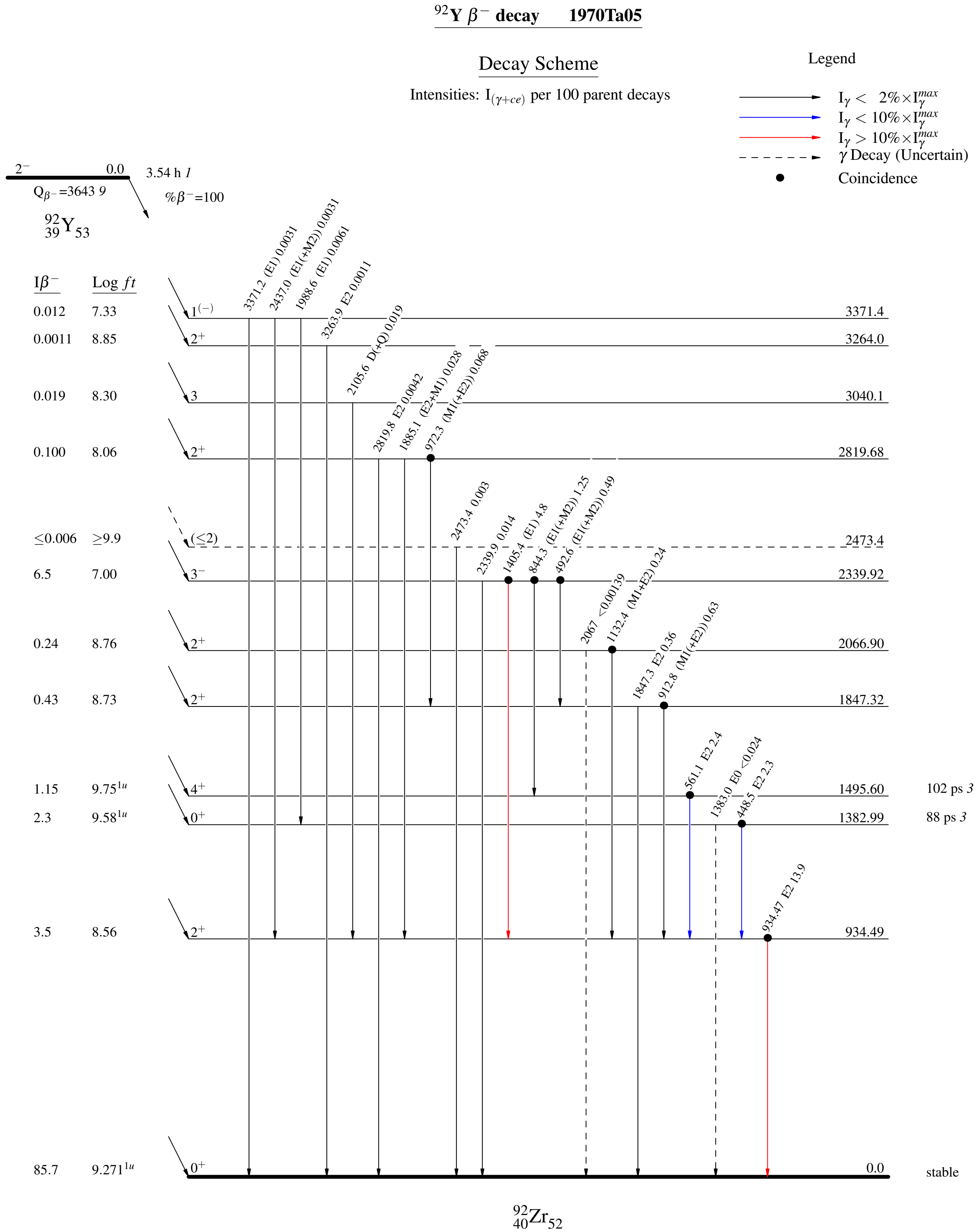
[c] A_2=+0.37 *6*, A_4=+1.15 *8* from 449γ-934$\gamma(\theta)$ (1962Bu16); hence this is a 0-2-0$^+$ cascade and mult(449γ)=Q (1962Bu16).

[d] A_2=+0.11 *6*, A_4=−0.02 *8* for 561γ-934$\gamma(\theta)$ (1962Bu16). This allows J=1 to 4 for 1496 level; if J=4, δ(561γ)=+0.01 *+11−9* or +1.6 *+4−3*. Evaluator adopts the former δ and assigns mult(561γ)=E2 for this 4$^+$ to 2$^+$ transition (see Adopted Levels).

[e] A_2=−0.086 *16*, A_4=−0.005 *26* for 1405γ-934$\gamma(\theta)$ (1962Bu16). This allows J=1,3,4, not 2 for 2340 level. If J=3, δ(1405γ)=−0.019 *+21−20* and mult(1405γ)=E1(+M2), assuming adopted J$^\pi$. See comment on δ(1405γ) in (n,γ) source dataset.

[f] For absolute intensity per 100 decays, multiply by 0.139 *13*.

[g] Placement of transition in the level scheme is uncertain.


92Y β− decay 1970Ta05
Decay Scheme
Intensities: I(γ+ce) per 100 parent decays
Legend
Iγ < 2%×Iγmax
Iγ < 10%×Iγmax
Iγ > 10%×Iγmax
γ Decay (Uncertain)
Coincidence
2− 0.0 3.54 h 1
Qβ−=3643 9
%β−=100
92 39 Y53
Iβ− Log ft
0.012 7.33 1(−) 3371.4
0.0011 8.85 2+ 3264.0
0.019 8.30 3 3040.1
0.100 8.06 2+ 2819.68
≤0.006 ≥9.9 (≤2) 2473.4
6.5 7.00 3− 2339.92
0.24 8.76 2+ 2066.90
0.43 8.73 2+ 1847.32
1.15 9.75 1u 4+ 1495.60 102 ps 3
2.3 9.58 1u 0+ 1382.99 88 ps 3
3.5 8.56 2+ 934.49
85.7 9.271 1u 0+ 0.0 stable
3371.2 (E1) 0.0031
2437.0 (E1(+M2)) 0.0031
1988.6 (E1) 0.0061
3263.9 E2 0.0011
2105.6 D(+Q) 0.019
2819.8 E2 0.0042
1885.1 (E2+M1) 0.028
972.3 (M1(+E2)) 0.068
2473.4 0.003
2339.9 0.014
1405.4 (E1) 4.8
844.3 (E1(+M2)) 1.25
492.6 (E1(+M2)) 0.49
2067 <0.00139
1132.4 (M1+E2) 0.24
1847.3 E2 0.36
912.8 (M1(+E2)) 0.63
561.1 E2 2.4
1383.0 E0 <0.024
448.5 E2 2.3
934.47 E2 13.9
92 40 Zr52