^{138}Cs β^- decay (32.5 min) 1974Ca02,1975ScZZ,1995Ma75

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 146, 1 (2017)	30-Sep-2017

Parent: ^{138}Cs: E=0.0; J$^\pi$=3$^-$; $T_{1/2}$=32.5 min *2*; Q(β^-)=5375 *9*; %β^- decay=100.0

^{138}Cs-J$^\pi$,$T_{1/2}$: From Adopted Levels of ^{138}Cs.

^{138}Cs-Q(β^-): From 2017Wa10.

1974Ca02,1975ScZZ: source of ^{138}Cs was produced from fission of ^{235}U induced by neutron flux from the Ames Laboratory research reactor. γ rays were detected with a pair of Ge(Li) detectors, a NaI(Tl) crystal, a Ge(Li) planar low-energy photon spectrometer and a Si(Li) detector; β particles were detected with a well-type plastic scintillation detector. Measured Eγ, Iγ, Eβ, $\beta\gamma$-coin, $\gamma\gamma$-coin. Deduced levels, J, π, β-decay branching ratios, log *ft* values, configurations. Comparisons with available data and shell-model calculations. Observed about 86 γ rays that belong to ^{138}Ba. Values of γ-ray intensities from 1975ScZZ supersede those from 1974Ca02. 1974Ca02 supersedes 1972CaYY.

1995Ma75: Source of ^{138}Cs was produced at the OSIRIS fission product mass separator at Studsvik. γ rays were detected with a small BaF_2 scintillator and β particles were detected with a small plastic scintillator. Measured Eγ, Iγ, $\beta\gamma\gamma$(t). Deduced $T_{1/2}$ for 10 levels. Comparisons with available data.

1971Ca21: Source of ^{138}Cs was produced via the thermal-neutron induced fissions of ^{235}U and also the ^{138}Ba(n,p) reaction, at CEN, Grenoble. γ and X rays were detected with Ge(Li) detectors (FWHM=1.2 keV at 122 keV, 3-4 keV at 1333 keV) and NaI(Tl) detectors; β particles and conversion electrons were detected by a β detector. Measured Eγ, Iγ, Eβ, $\beta\gamma$-coin, $\gamma\gamma$-coin, $\beta\gamma$(t). Deduced levels, J, π, half-life, decay branching, conversion coefficient, γ-ray multi polarities. Systematics of neighboring isotones.

1970Na03: Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels, J, π, log *ft*, β-branching. Report 33 γ rays.

1972Hi02: Measured Eγ, Iγ, $\gamma\gamma$-coin. Deduced levels, J, π, log *ft*, γ-branchings. Report 64 γ rays.

1971Be35: Measured Eγ, Iγ, γ(t). Deduced levels, γ-branchings, parent $T_{1/2}$.

1972Ac02: Measured Eγ, Iγ, I(ce). Deduced levels, J, π, conversion coefficients, log *ft*, γ-ray multipolarities. Report 11 γ rays.

1973Si33: Measured Eγ, Iγ, $\gamma\gamma(\theta)$. Deduced levels, J, π, γ-ray mixing ratios.

1975Ba21: Measured Eγ, Iγ, $\gamma\gamma(\theta)$. Deduced levels, J, π, γ-ray mixing ratios.

1979Bo26: Measured Eγ.

1985Be04: Measured g-factor for the 4$^+$ state.

Additional information 1.

2011Ro42: Measured Eγ, Iγ, $\beta\gamma\gamma$(t), $\gamma\gamma$(t). Deduced $T_{1/2}$.

Others: 2016Li20, 2013Xi08, 1993Ka09, 1997Gr09, 1994He33, 1992Gr21, 1982Al01, 1981De25, 1978Au08, 1978Wo15, 1978Wu04, 1975Fr23, 1973Jo02, 1972Eh02, 1972Ho08, 1969Ca03, 1963Cu04.

The total average radiation energy released by ^{138}Cs β^- decay is 5382 keV *67* (calculated by evaluator using the computer program RADLST). This value agrees well with Q(β^-)=5375 keV *9* (2017Wa10) and shows the completeness of the decay scheme.

Level scheme is taken from 1974Ca02.

^{138}Ba Levels

E(level)†	J$^\pi$‡	$T_{1/2}$#	Comments
0.0	0$^+$	stable	$T_{1/2}$: from Adopted Levels.
1435.86 *5*	2$^+$		
1898.64 *5*	4$^+$	2.160 ns *11*	g=0.80 *14* (1985Be04) $T_{1/2}$: weighted average of 2.164 ns *11* (1995Ma75), 2.13 ns *3* (2011Ro42) and 2.17 ns *8* (1963Cu04).
2090.60 *8*	6$^+$		
2203.12 *10*	6$^+$	55 ps *17*	
2217.92 *6*	2$^+$		
2307.59 *6*	4$^+$	7 ps *3*	
2415.48 *8*	5$^+$	16 ps *8*	
2445.64 *6*	3$^+$	5 ps *4*	
2583.14 *8*	1$^+$	≤7 ps	
2639.53 *7*	2$^+$		
2779.44 *8*	4$^+$	≤6 ps	

Continued on next page (footnotes at end of table)

^{138}Cs β^- decay (32.5 min) 1974Ca02,1975ScZZ,1995Ma75 (continued)

^{138}Ba Levels (continued)

E(level)†	Jπ‡	$T_{1/2}$#	E(level)†	Jπ‡	E(level)†	Jπ‡
2851.62 *11*	4^+	≤11 ps	3339.05 *19*	2^+	3693.96 *12*	
2880.92 *14*	3^-	≤11 ps	3352.6 *3*	$(1,2^+)$	3922.54 *18*	$(3)^-$
2931.48 *21*	$(1,2^+)$		3367.02 *25*	2^+	3935.22 *15*	2^+
2991.18 *8*	3^+	≤11 ps	3437.5 *6*	$(1,2^+)$	4012.3? *4*	$(2^+,3,4^+)$
3049.95 *17*	2^+		3442.6? *6*	$2^{(+)}$	4080.2 *5*	$(1)^-$
3163.54 *12*	$(2)^+$		3643.5? *4*	2^+	4242.46? *18*	$(1,2^+)$
3242.59 *12*	3		3647.01 *17*	$(3)^-$	4508.04 *15*	$(2^+,3)$
3257.67? *24*	3		3652.6 *8*	$(1,2^+)$	4629.82 *14*	

† From a least-squares fit to γ-ray energies.

‡ From Adopted Levels.

From $\beta\gamma\gamma$(t) in 1995Ma75, unless otherwise noted. 1995Ma75 use following $T_{1/2}$ values for internal timing calibration: 0.192 ps *5* for 1436 level, 0.123 ps *14* for 2218 level and 0.30 ps *8* for 2640 level.

β^- radiations

E(decay)	E(level)	$I\beta^-$†‡	Log *ft*	Comments
(745 9)	4629.82	0.26 *3*	6.98 *6*	av Eβ=243.1 *35*
(867 9)	4508.04	0.16 *2*	7.43 *6*	av Eβ=290.6 *36*
(1133 9)	4242.46?	0.10 *1*	8.06 *5*	av Eβ=398.3 *38*
(1295 9)	4080.2	0.18 *3*	8.02 *8*	av Eβ=466.4 *39*
(1363 9)	4012.3?	0.08 *2*	8.5 *1*	av Eβ=495.3 *39*
(1440 9)	3935.22	0.48 *6*	7.77 *6*	av Eβ=528.4 *39*
(1452 9)	3922.54	0.21 *3*	8.14 *7*	av Eβ=533.9 *39*
(1681 9)	3693.96	0.30 *3*	8.23 *5*	av Eβ=633.6 *40*
(1722 9)	3652.6	0.005 *2*	10.1 *2*	av Eβ=651.8 *40*
(1728 9)	3647.01	0.43 *7*	8.12 *8*	av Eβ=654.3 *40*
(1932 9)	3442.6?	0.011 *3*	9.9 *1*	av Eβ=745.1 *41*
(1938 9)	3437.5	0.011 *3*	9.9 *1*	av Eβ=747.4 *41*
(2008 9)	3367.02	0.23 *2*	8.65 *4*	av Eβ=779.0 *41*
(2022 9)	3352.6	0.035 *4*	9.48 *5*	av Eβ=785.5 *41*
(2036 9)	3339.05	0.17 *2*	8.81 *6*	av Eβ=791.6 *41*
(2117 9)	3257.67?	0.06 *3*	9.3 *2*	av Eβ=828.2 *41*
(2132 9)	3242.59	0.27 *2*	8.69 *4*	av Eβ=835.0 *41*
(2211 9)	3163.54	0.34 *3*	8.65 *4*	av Eβ=870.8 *41*
(2325 9)	3049.95	0.17 *3*	9.04 *8*	av Eβ=922.4 *41*
(2384 9)	2991.18	0.65 *4*	8.50 *3*	av Eβ=949.1 *41*
(2444 9)	2931.48	0.20 *4*	9.1 *1*	av Eβ=976.4 *42*
(2494 9)	2880.92	0.54 *20*	8.7 *2*	av Eβ=999.5 *42*
(2523 9)	2851.62	0.20 *5*	9.1 *1*	av Eβ=1012.9 *42*
(2596 9)	2779.44	1.59 *8*	8.27 *2*	av Eβ=1046.0 *42*
(2735 9)	2639.53	8.8 *3*	7.62 *2*	av Eβ=1110.3 *42*
(2792 9)	2583.14	1.67 *8*	8.38 *2*	av Eβ=1136.2 *42*
(2929 9)	2445.64	44 *1*	7.04 *1*	av Eβ=1199.7 *42*
(2960 9)	2415.48	0.66 *6*	10.26^{1u} *4*	av Eβ=1200.3 *41*
(3067 9)	2307.59	7.3 *3*	7.91 *2*	av Eβ=1263.6 *42*
(3157 9)	2217.92	12.9 *4*	7.71 *2*	av Eβ=1305.1 *42*
(3476 9)	1898.64	13.7 *7*	7.86 *2*	av Eβ=1453.6 *42*
(3939 9)	1435.86	4.3 *18*	8.6 *2*	av Eβ=1669.6 *42*

† From I(γ+ce) intensity balance at each level, with conversion coefficients calculated using the BrIcc program.

‡ Absolute intensity per 100 decays.

γ(^{138}Ba)

Iγ normalization: From ΣI(γ+ce to g.s.)=100, assuming no direct ground-state β^- feeding.
Iγ normalization: Additional information 3.

E_γ [#]	I_γ [#&]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	δ [‡@]	α [†]	Comments
112.50 *10*	1.7 *3*	2203.12	6$^+$	2090.60	6$^+$	M1+E2	−0.25 *2*	0.739 *12*	%Iγ=0.130 *23* α(K)=0.618 *9*; α(L)=0.096 *3*; α(M)=0.0200 *6* α(N)=0.00428 *13*; α(O)=0.000638 *17*; α(P)=3.98×10^{-5} *6* E_γ: weighted average of 112.60 *13* (1974Ca02) and 112.44 *10* (1972Ac02). Mult.: α(K)exp≤0.83 (1972Ac02).
138.08 *6*	19.5 *11*	2445.64	3$^+$	2307.59	4$^+$	M1,E2		0.51 *11*	%Iγ=1.49 *9* α(K)=0.39 *6*; α(L)=0.09 *5*; α(M)=0.020 *11* α(N)=0.0041 *22*; α(O)=0.0006 *3*; α(P)=2.21×10^{-5} *5* E_γ: weighted average of 138.10 *6* (1974Ca02) and 138.02 *10* (1972Ac02). Mult.: α(K)exp=0.40 *9* (1972Ac02).
191.96 *6*	6.6 *5*	2090.60	6$^+$	1898.64	4$^+$	E2		0.198	%Iγ=0.50 *4* α(K)=0.1524 *22*; α(L)=0.0359 *5*; α(M)=0.00769 *11* α(N)=0.001614 *23*; α(O)=0.000224 *4*; α(P)=8.01×10^{-6} *12*
193.89 *8*	4.3 *3*	2639.53	2$^+$	2445.64	3$^+$				%Iγ=0.328 *24*
212.34 *8*	2.29 *18*	2415.48	5$^+$	2203.12	6$^+$	(M1)		0.1216	%Iγ=0.175 *14* α(K)=0.1042 *15*; α(L)=0.01378 *20*; α(M)=0.00284 *4* α(N)=0.000613 *9*; α(O)=9.39×10^{-5} *14*; α(P)=6.84×10^{-6} *10* E_γ: weighted average of 212.32 *8* (1974Ca02) and 212.38 *10* (1972Ac02). Mult.: α(K)exp=0.21 *5* (1972Ac02).
227.76 *6*	19.8 *5*	2445.64	3$^+$	2217.92	2$^+$	M1,E2		0.106 *6*	%Iγ=1.51 *5* α(K)=0.0871 *15*; α(L)=0.015 *4*; α(M)=0.0031 *8* α(N)=0.00067 *16*; α(O)=9.7×10^{-5} *20*; α(P)=5.2×10^{-6} *5* E_γ: weighted average of 227.76 *6* (1974Ca02) and 227.75 *10* (1972Ac02). Mult.: α(K)exp=0.089 *10* (1972Ac02).
324.90 *8*	3.80 *24*	2415.48	5$^+$	2090.60	6$^+$	M1+E2	−7.8 *+17−26*	0.0352	%Iγ=0.290 *19* α(K)=0.0289 *4*; α(L)=0.00503 *7*; α(M)=0.001059 *15* α(N)=0.000225 *4*; α(O)=3.25×10^{-5} *5*; α(P)=1.660×10^{-6} *24* E_γ: weighted average of 324.90 *8* (1974Ca02) and 324.90 *12* (1972Ac02). Mult.: α(K)exp≤0.034 (1972Ac02).
333.86 *16*	1.17 *20*	2779.44	4$^+$	2445.64	3$^+$				%Iγ=0.089 *16*
363.93 *8*	3.2 *3*	2779.44	4$^+$	2415.48	5$^+$				%Iγ=0.244 *24*
365.29 *13*	2.5 *3*	2583.14	1$^+$	2217.92	2$^+$				%Iγ=0.191 *23*
368.7 *4*	0.29 *11*	4012.3?	(2$^+$,3,4$^+$)	3643.5?	2$^+$				%Iγ=0.022 *9*

$^{138}_{56}$Ba$_{82}$-3

γ(^{138}Ba) (continued)

E_γ [#]	I_γ [#&]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	δ [‡@]	α [†]	Comments
408.98 *6*	61.1 *12*	2307.59	4^+	1898.64	4^+	M1+E2	−0.23 *+7−10*	0.0216 *4*	%Iγ=4.66 *12* α(K)=0.0185 *4*; α(L)=0.00242 *4*; α(M)=0.000499 *7* α(N)=0.0001076 *16*; α(O)=1.648×10^{-5} *24*; α(P)=1.201×10^{-6} *25* E_γ: weighted average of 408.98 *6* (1974Ca02) and 408.98 *8* (1972Ac02). Mult.: α(K)exp=0.021 *4* (1972Ac02). δ: 1973Si33 report −0.85<δ<−0.05, 1975Ba21 report δ=0.05 *+20−12*. A_2=+0.27 *3*, A_4=−0.01 *8* (1973Si33), A_2=+0.211 *37*, A_4=+0.009 *40* (1975Ba21), A_2=+0.194 *4*, A_4=−0.008 *20* (1985Be04) for 409-1436 correlation; A_2=+0.192 *10*, A_4=−0.02 *3* (1985Be04) for 409-463 cascade.
421.59 *7*	5.6 *3*	2639.53	2^+	2217.92	2^+				%Iγ=0.427 *24*
462.785 *5*	403 *8*	1898.64	4^+	1435.86	2^+	E2		0.01223	%Iγ=30.8 *7* α(K)=0.01024 *15*; α(L)=0.001578 *22*; α(M)=0.000329 *5* α(N)=7.02×10^{-5} *10*; α(O)=1.037×10^{-5} *15*; α(P)=6.12×10^{-7} *9* E_γ: from 1975Fr23. Others: 462.77 *4* (1979Bo26), 462.79 *7* (1974Ca02), 462.82 *12* (1972Ac02). Mult.: α(K)exp=0.0105 *13* (1972Ac02). A_2=+0.14 *3*, A_4=+0.003 *50* (1973Si33), A_2=+0.117 *15*, A_4=−0.001 *17* (1975Ba21) for 463-1436 cascade.
516.74 *12*	5.6 *6*	2415.48	5^+	1898.64	4^+	M1+E2	−0.11 *4*	0.01209 *18*	%Iγ=0.43 *5* α(K)=0.01041 *15*; α(L)=0.001339 *19*; α(M)=0.000275 *4* α(N)=5.94×10^{-5} *9*; α(O)=9.12×10^{-6} *13*; α(P)=6.73×10^{-7} *10*
546.990 *15*	141 *3*	2445.64	3^+	1898.64	4^+	M1+E2	−0.07 *3*	0.01052	%Iγ=10.8 *3* α(K)=0.00906 *13*; α(L)=0.001163 *17*; α(M)=0.000239 *4* α(N)=5.16×10^{-5} *8*; α(O)=7.92×10^{-6} *12*; α(P)=5.86×10^{-7} *9* E_γ: from 1979Bo26. Others: 546.94 *7* (1974Ca02), 546.87 *15* (1972Ac02). Mult.: α(K)exp=0.0105 *14* (1972Ac02). δ: 1973Si33 report −0.06<δ<−0.015, 1975Ba21 report δ=0.10 *3*. A_2=−0.107 *24*, A_4=−0.002 *40* (1973Si33), A_2=−0.053 *22*, A_4=+0.004 *25* (1975Ba21), A_2=−0.034 *10*, A_4=+0.001 *14* (1985Be04), for 547-1436 correlation.
575.7 *4*	0.27 *11*	2991.18	3^+	2415.48	5^+				%Iγ=0.021 *9*
596.2 *4*	0.34 *13*	3935.22	2^+	3339.05	2^+				%Iγ=0.026 *10*
683.59 *15*	1.42 *18*	2991.18	3^+	2307.59	4^+				%Iγ=0.108 *14*
702.92 *17*	1.10 *17*	3693.96		2991.18	3^+				%Iγ=0.084 *13*
717.7 *3*	0.53 *16*	3163.54	$(2)^+$	2445.64	3^+				%Iγ=0.040 *13*

γ(^{138}Ba) (continued)

E_γ[#]	I_γ[#&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	δ[‡@]	α[†]	Comments
754.5 *4*	0.45 *16*	4012.3?	(2$^+$,3,4$^+$)	3257.67?	3				%Iγ=0.034 *13*
766.10 *12*	1.91 *19*	3647.01	(3)$^-$	2880.92	3$^-$				%Iγ=0.146 *15*
773.31 *10*	3.05 *24*	2991.18	3$^+$	2217.92	2$^+$	M1+E2	−2.0 +*4*−*6*	0.00350 *12*	%Iγ=0.233 *19* α(K)=0.00300 *11*; α(L)=0.000401 *12*; α(M)=8.27×10^{-5} *23* α(N)=1.78×10^{-5} *5*; α(O)=2.70×10^{-6} *8*; α(P)=1.87×10^{-7} *8*
782.08 *9*	4.3 *4*	2217.92	2$^+$	1435.86	2$^+$				%Iγ=0.33 *3*
^{x}797.7 *5*	0.7 *3*								%Iγ=0.053 *23*
^{x}802.6 *3*	0.5 *3*								%Iγ=0.038 *23*
813.0 *3*	0.79 *23*	3693.96		2880.92	3$^-$				%Iγ=0.060 *18*
842.21 *16*	1.07 *15*	3693.96		2851.62	4$^+$				%Iγ=0.082 *12*
855.6 *5*	0.30 *12*	3163.54	(2)$^+$	2307.59	4$^+$				%Iγ=0.023 *10*
871.72 *7*	67.0 *17*	2307.59	4$^+$	1435.86	2$^+$	E2		0.00245	%Iγ=5.11 *15* α(K)=0.00210 *3*; α(L)=0.000281 *4*; α(M)=5.79×10^{-5} *9* α(N)=1.244×10^{-5} *18*; α(O)=1.88×10^{-6} *3*; α(P)=1.299×10^{-7} *19* E_γ: weighted average of 871.80 *8* (1974Ca02) and 871.66 *7* (1972Ac02). Mult.: α(K)exp=0.0028 *8* (1972Ac02). A_2=+0.05 *10*, A_4=−0.12 *18* (1973Si33), A_2=+0.130 *31*, A_4=−0.024 *34* (1975Ba21), A_2=+0.126 *20*, A_4=−0.006 *30* (1985Be04), for 872-1436 cascade.
880.8 *3*	1.5 *4*	2779.44	4$^+$	1898.64	4$^+$				%Iγ=0.11 *3*
935.03 *12*	2.37 *21*	3242.59	3	2307.59	4$^+$				%Iγ=0.181 *17*
946.0 *5*	0.41 *17*	3163.54	(2)$^+$	2217.92	2$^+$				%Iγ=0.031 *13*
953.0 *3*	0.69 *19*	2851.62	4$^+$	1898.64	4$^+$				%Iγ=0.053 *15*
1009.78 *7*	391 *8*	2445.64	3$^+$	1435.86	2$^+$	M1+E2		0.0021 *4*	%Iγ=29.8 *6* α(K)=0.0018 *3*; α(L)=0.00023 *4*; α(M)=4.8×10^{-5} *7* α(N)=1.03×10^{-5} *15*; α(O)=1.57×10^{-6} *24*; α(P)=1.15×10^{-7} *21* E_γ: weighted average of 1009.78 *8* (1974Ca02) and 1009.78 *7* (1972Ac02). Mult.: α(K)exp=0.0022 *4* (1972Ac02). δ: 1973Si33 report −0.015<δ<0.020, 1975Ba21 report 0.01 *3*. A_2=−0.065 *14*, A_4=−0.002 *40* (1973Si33), A_2=−0.084 *20*, A_4=−0.010 *22* (1975Ba21), A_2=−0.096 *32*, A_4=+0.014 *45* (1985Be04), for 1010-1436 cascade.
1041.4 *3*	0.83 *22*	3922.54	(3)$^-$	2880.92	3$^-$				%Iγ=0.063 *17*
1054.32 *15*	2.08 *25*	3935.22	2$^+$	2880.92	3$^-$				%Iγ=0.159 *20*
1147.22 *9*	16.3 *9*	2583.14	1$^+$	1435.86	2$^+$				%Iγ=1.24 *7*
^{x}1199.15 *24*	2.2 *4*								%Iγ=0.17 *3*
1203.69 *13*	5.2 *5*	2639.53	2$^+$	1435.86	2$^+$				%Iγ=0.40 *4*
1264.94 *16*	1.80 *22*	3163.54	(2)$^+$	1898.64	4$^+$				%Iγ=0.137 *17*
1343.59 *9*	15.0 *7*	2779.44	4$^+$	1435.86	2$^+$				%Iγ=1.14 *6*

From ENSDF

$^{138}_{56}$Ba$_{82}$-5

γ(^{138}Ba) (continued)

E_γ #	I_γ #&	E_i(level)	J^π_i	E_f	J^π_f	Mult. @	δ ‡@	α †	Comments
1359.1 *5*	0.63 *25*	3257.67?	3	1898.64	4+				%Iγ=0.048 *19*
1386.39 *21*	0.99 *15*	3693.96		2307.59	4+				%Iγ=0.076 *12*
1415.68 *13*	4.8 *4*	2851.62	4+	1435.86	2+	(Q)			%Iγ=0.37 *3*
1435.77 *7*	1000 *20*	1435.86	2+	0.0	0+	E2		9.18×10^{-4}	%Iγ=76.3 *5*
									α(K)=0.000743 *11*; α(L)=9.37×10^{-5} *14*; α(M)=1.92×10^{-5} *3*
									α(N)=4.14×10^{-6} *6*; α(O)=6.34×10^{-7} *9*; α(P)=4.62×10^{-8} *7*; α(IPF)=5.72×10^{-5} *8*
									E_γ: weighted average of 1435.86 *9* (1974Ca02) and 1435.72 *7* (1972Ac02).
1445.04 *25*	12.7 *25*	2880.92	3−	1435.86	2+	D+(Q)	−0.14 *+2−5*		%Iγ=0.97 *19*
x1477.9 *13*	0.3 *1*								%Iγ=0.023 *8*
									E_γ,I_γ: from 1972Hi02, also observed in 1970Na03 but not in 1974Ca02. 1972Hi02 place this γ from the 3922 level and a level at 4358.
1495.63 *23*	2.4 *5*	2931.48	(1,2+)	1435.86	2+				%Iγ=0.18 *4*
1555.31 *10*	4.8 *3*	2991.18	3+	1435.86	2+	M1+E2	+0.21 *+6−4*	1.01×10^{-3}	%Iγ=0.366 *24*
									α(K)=0.000792 *12*; α(L)=9.84×10^{-5} *15*; α(M)=2.01×10^{-5} *3*
									α(N)=4.35×10^{-6} *7*; α(O)=6.70×10^{-7} *10*; α(P)=5.04×10^{-8} *8*; α(IPF)=9.82×10^{-5} *14*
x1572.9 *12*	0.4 *2*								%Iγ=0.031 *16*
									E_γ,I_γ: from 1972Hi02 only, placed from a level at 3880.
1614.09 *20*	1.8 *3*	3049.95	2+	1435.86	2+	D+Q	−0.08 *+6−7*		%Iγ=0.137 *23*
1717.1 *3*	1.4 *3*	3935.22	2+	2217.92	2+				%Iγ=0.107 *23*
1727.68 *18*	1.46 *17*	3163.54	(2)+	1435.86	2+				%Iγ=0.111 *13*
1748.7 *5*	0.9 *4*	3647.01	(3)−	1898.64	4+				%Iγ=0.07 *3*
1778.25 *23*	1.8 *3*	4629.82		2851.62	4+				%Iγ=0.137 *23*
									E_γ: other: 1978.3 *6*, placed from a level at 4358 by 1972Hi02.
1806.65 *18*	1.21 *14*	3242.59	3	1435.86	2+				%Iγ=0.092 *11*
1821.7 *3*	0.59 *13*	3257.67?	3	1435.86	2+				%Iγ=0.045 *10*
x1844.0 *8*									E_γ: from 1972Hi02 only.
1903.2 *4*	0.60 *18*	3339.05	2+	1435.86	2+				%Iγ=0.046 *14*
x1941.0 *3*	1.03 *20*								%Iγ=0.079 *16*
x1981.3 *10*	1.8 *8*								%Iγ=0.14 *6*
									E_γ,I_γ: from 1972Hi02 only, placed from a level at 3880.
2023.93 *20*	1.54 *20*	3922.54	(3)−	1898.64	4+				%Iγ=0.118 *16*
2062.34 *17*	1.45 *15*	4508.04	(2+,3)	2445.64	3+				%Iγ=0.111 *12*
x2105.9 *3*	0.72 *13*								%Iγ=0.055 *10*
2114.3 *7*	0.27 *12*	4012.3?	(2+,3,4+)	1898.64	4+				%Iγ=0.021 *10*
2210.7 *4*	2.8 *8*	3647.01	(3)−	1435.86	2+				%Iγ=0.21 *7*
2218.00 *10*	199 *4*	2217.92	2+	0.0	0+	E2		7.80×10^{-4}	%Iγ=15.2 *4*
									α(K)=0.000330 *5*; α(L)=4.05×10^{-5} *6*; α(M)=8.28×10^{-6} *12*
									α(N)=1.79×10^{-6} *3*; α(O)=2.75×10^{-7} *4*; α(P)=2.05×10^{-8} *3*; α(IPF)=0.000400 *6*

γ(^{138}Ba) (continued)

E_γ[#]	I_γ[#&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[@]	α[†]	Comments
2487.1 *6*	0.30 *10*	3922.54	(3)$^-$	1435.86	2$^+$			%Iγ=0.023 *8*
2499.4 *3*	2.2 *6*	3935.22	2$^+$	1435.86	2$^+$			%Iγ=0.17 *5*
^{x}2510.5 *8*	0.20 *9*							%Iγ=0.015 *7*
2583.15 *13*	3.13 *20*	2583.14	1$^+$	0.0	0$^+$			%Iγ=0.239 *16*
2609.3 *3*	0.44 *7*	4508.04	(2$^+$,3)	1898.64	4$^+$			%Iγ=0.034 *6*
2639.59 *13*	100 *3*	2639.53	2$^+$	0.0	0$^+$	E2	8.78×10^{-4}	%Iγ=7.63 *25* α(K)=0.000242 *4*; α(L)=2.96×10^{-5} *5*; α(M)=6.04×10^{-6} *9* α(N)=1.304×10^{-6} *19*; α(O)=2.01×10^{-7} *3*; α(P)=1.506×10^{-8} *21*; α(IPF)=0.000599 *9*
2731.12 *15*	1.57 *10*	4629.82		1898.64	4$^+$			%Iγ=0.120 *8*
2806.57 *17*	1.31 *10*	4242.46?	(1,2$^+$)	1435.86	2$^+$			%Iγ=0.100 *8*
^{x}2922.0 *13*	0.11 *5*							%Iγ=0.008 *4* E_γ,I_γ: from 1972Hi02 only, placed from a level at 4358.
2931.4 *4*	0.26 *5*	2931.48	(1,2$^+$)	0.0	0$^+$			%Iγ=0.020 *4*
3049.9 *3*	0.41 *6*	3049.95	2$^+$	0.0	0$^+$			%Iγ=0.031 *5*
3072.5 *4*	0.25 *5*	4508.04	(2$^+$,3)	1435.86	2$^+$			%Iγ=0.019 *4*
^{x}3180.4 *7*	0.11 *3*							%Iγ=0.0084 *23*
3339.01 *25*	1.98 *12*	3339.05	2$^+$	0.0	0$^+$			%Iγ=0.151 *10*
3352.6 *3*	0.46 *5*	3352.6	(1,2$^+$)	0.0	0$^+$			%Iγ=0.035 *4*
3366.98 *25*	2.98 *17*	3367.02	2$^+$	0.0	0$^+$			%Iγ=0.227 *14*
3437.5 *6*	0.15 *4*	3437.5	(1,2$^+$)	0.0	0$^+$			%Iγ=0.011 *3*
3442.6 *6*	0.15 *4*	3442.6?	2$^{(+)}$	0.0	0$^+$			%Iγ=0.011 *3*
3643.3 *4*	0.30 *4*	3643.5?	2$^+$	0.0	0$^+$			%Iγ=0.023 *3*
3652.5 *8*	0.07 *2*	3652.6	(1,2$^+$)	0.0	0$^+$			%Iγ=0.0053 *16*
3935.2 *5*	0.23 *4*	3935.22	2$^+$	0.0	0$^+$			%Iγ=0.018 *3*
4080.1 *5*	0.23 *3*	4080.2	(1)$^-$	0.0	0$^+$			%Iγ=0.0176 *23*

† Additional information 2.

‡ If No value given it was assumed δ=1.00 for E2/M1, δ=1.00 for E3/M2 and δ=0.10 for the other multipolarities.

\# Quoted values of Eγ are from 1974Ca02 and values of Iγ are from 1975ScZZ, unless otherwise noted. Data are also available in 1972Hi02 and 1971Ca21 that agree well with quoted values but less precise and complete. Quoted values of Iγ are relative intensities normalized to Iγ(1435.77γ)=1000.

@ From Adopted Gammas. Arguments from this data set for the assignments are measured α(K)exp and $\gamma(\theta)$ data given in comments. α(K)exp were normalized to α(K)(1436γ)=7.43×10^{-4} (E2) (1972Ac02).

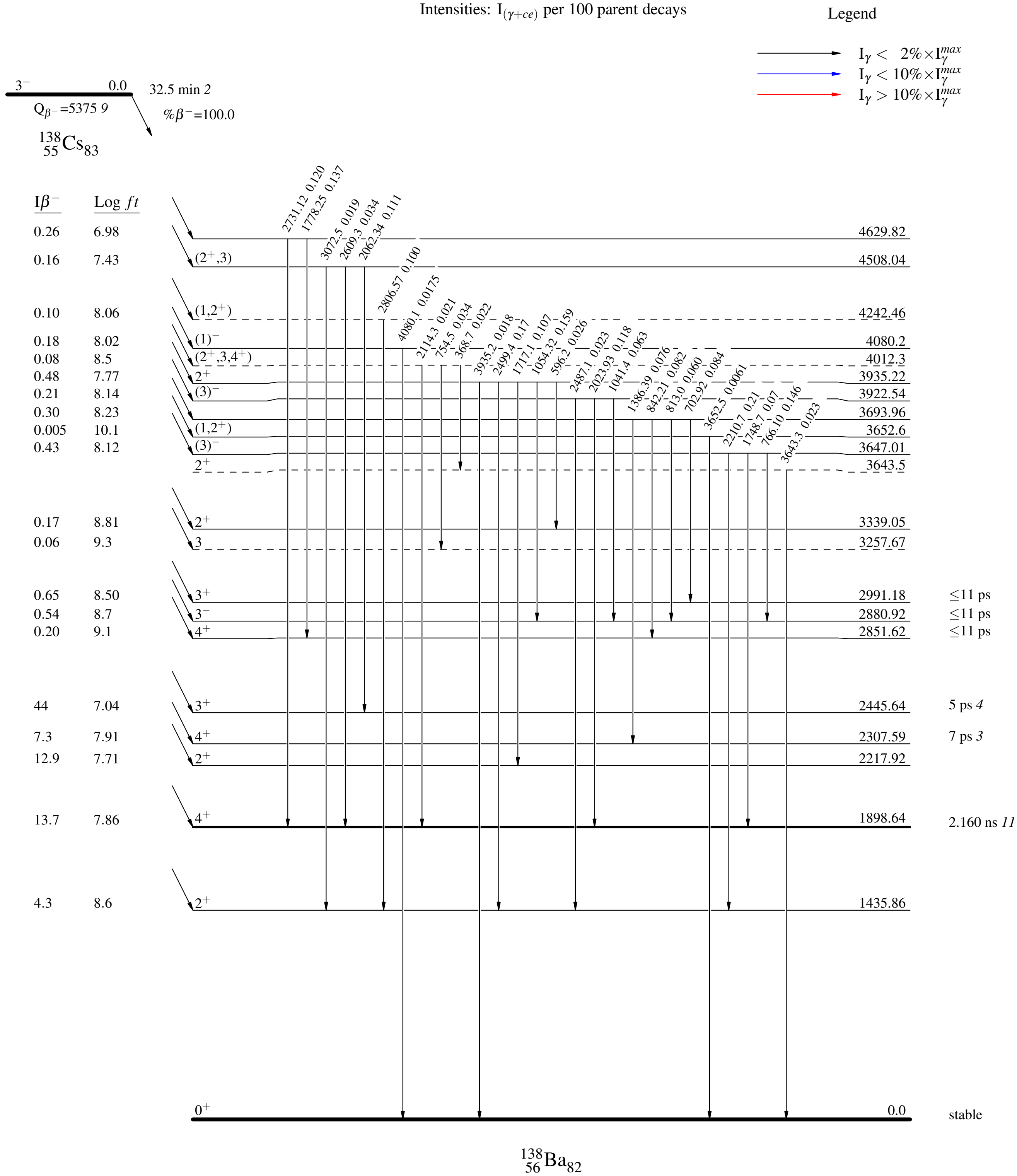
& For absolute intensity per 100 decays, multiply by 0.0763 *12*.

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

^{138}Cs β^- decay (32.5 min) 1974Ca02,1975ScZZ,1995Ma75

Decay Scheme

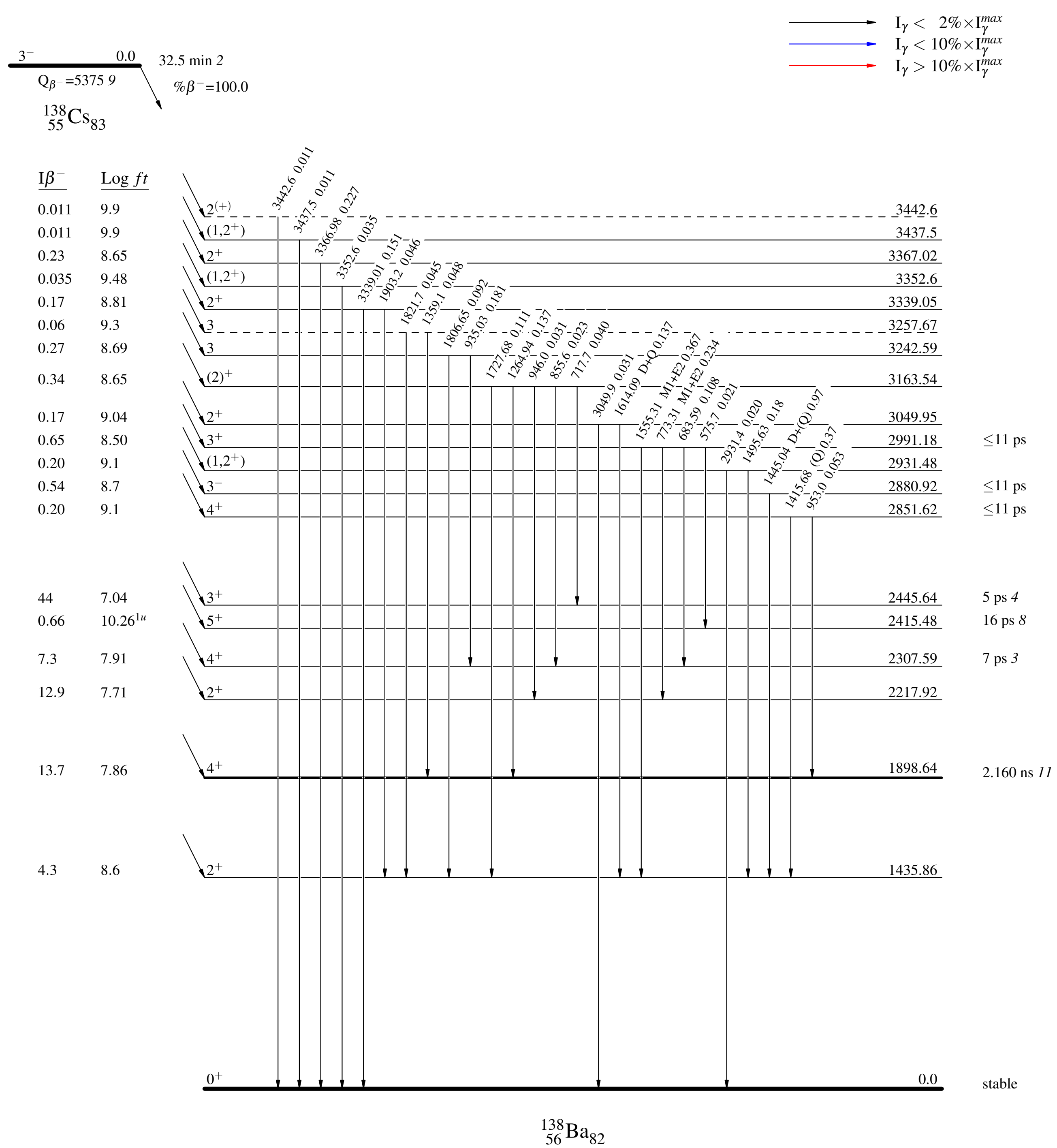
Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



$^{138}Cs\ \beta^-$ decay (32.5 min) 1974Ca02,1975ScZZ,1995Ma75

Decay Scheme (continued)

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



^{138}Cs β^- decay (32.5 min) 1974Ca02,1975ScZZ,1995Ma75

Decay Scheme (continued)

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