^{140}Cs β^- decay 1986Ro16

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 154, 1 (2018)	20-Nov-2018

Parent: ^{140}Cs: E=0.0; J$^\pi$=1$^-$; $T_{1/2}$=63.7 s *3*; Q(β^-)=6219 *10*; %β^- decay=100.0

^{140}Cs-E,J$^\pi$,$T_{1/2}$: From ^{140}Cs Adopted Levels.

^{140}Cs-Q(β^-): From 2017Wa10.

1997Gr09,1996Gr20,1996GrZY,1996GrZZ,1994He33,1994He45,1992Gr21,1992Gr18 : measured β, $\beta\gamma$ with total absorption γ-ray spectrometer (TAGS) at INEL ISOL and compared with simulated spectra to produce I(β^-) distributions.

1986Ro16,1973Sc18,1974Sc14: measured γ, $\gamma\gamma$.

1986Ro16,1976Al05: measured $\gamma\gamma(\theta)$.

1989Ma38: measured $\gamma\gamma$(t).

1981De25,1973Ad04,1973Sc18,1968Al06: measured β, $\beta\gamma$.

Others: 1961Wa14, 1962Wa34, 1963Zh01, 1966Zh02, 1966Ar08, 1967Bo46, 1969Ca03, 1969NaZT, 1969ToZY, 1971Kr22, 1972AdZV, 1972Eh02, 1974Gr29, 1975Al11.

Decay scheme proposed by 1986Ro16.

^{140}Ba Levels

E(level)†	J$^\pi$‡	$T_{1/2}$@	Comments
0.0	0$^+$	12.751 d *4*	%β^-=100
602.31 *5*	2$^+$	7.2 ps *+15−6*	$T_{1/2}$: other value 9.7 *41* ps (1989Ma38).
1130.54 *7*	4$^+$#		
1510.64 *6*	2$^+$#		
1802.84 *8*	3$^-$#		
1823.80 *10*	0$^+$#		
1951.5 *3*	3$^+$#		
1993.53 *10*	2$^+$#		
2061.2			
2138.27 *12*	3$^{(+)}$#		
2204.11 *11*	2$^+$,3#		
2237.21 *7*	2$^+$#		
2309.89 *15*	2$^+$,1#		
2320.32 *18*	(3$^-$)		
2429.52 *8*	1,2$^+$#		
2521.87 *10*	1,2$^{(+)}$		
2663.9 *4*			
2692.0 *4*	2		
2703.98 *10*	1$^-$#		
2782.05 *23*	2$^{(+)}$,3$^+$		
2787.53 *17*	1$^{(-)}$,2$^{(+)}$		
2870.63 *11*	2$^+$#		
2873.78 *17*	1$^{(+)}$,2$^{(+)}$		
2932.58 *8*	2$^-$#		
2973.35 *21*			
3098.65 *15*	1$^{(+)}$,2$^{(+)}$		
3451.44 *19*	1$^{(-)}$,2$^{(+)}$		
3520.5 *3*	1$^{(+)}$,2		
3526.5 *4*	(1$^+$,2$^+$)		
3601.7 *5*	1$^{(-)}$,2$^{(+)}$		
3656.08 *11*	2#		
3845.3? *6*			

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^{140}Cs β^- decay 1986Ro16 (continued)

^{140}Ba Levels (continued)

E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]
3851.00 *9*	1[#]	4275.1 *3*	1,2	4801.16? *21*	2	5388.65?[&] *17*	1⁻
3944.06 *16*	1[#]	4358.79 *19*	2[#]	4981.9?[&] *6*	0(+),1,2(+)	5588.37? *21*	2⁻
3973.07 *12*	2[#]	4387.8 *3*	1(−),2	5109.90? *18*	1⁻,2⁻	5611.2? *4*	1⁻,2⁻
4032.5? *9*	1,2	4395.4?[&]		5173.69?[&] *18*	1⁻,2⁻	5651.11? *25*	2⁻
4037.37 *16*	2	4416.0[&] *3*	1,2(+)	5183.8?[&] *10*	2⁻	5765.3? *4*	2⁻
4079.93 *13*	1(−),2	4499.93 *15*	1(+),2(+)	5310.42? *25*	1⁻,2⁻		

[†] From a least-squares fit to Eγ data (normalized χ^2=1.61> critical χ^2=1.26).
[‡] Adopted values.
[#] From 1986Ro16 based on mult, δ, and log *ft* (literature results were considered where available).
[@] From Adopted Levels.
[&] Not supported by coincidence information (1974Sc14).

β^- radiations

β feeding is based on Iγ data from 1986Ro16 and β(g.s.)=35.9% *17* (1997Gr09).

1997Gr09 (TAGS) used the level scheme from 1994Pe19 for simulated spectra, while previously 1994He45 (TAGS, same authors and method) had used the level scheme of 1987Pe07. 1997Gr09 comment that the 1987Pe07 level scheme provide a closer fit to the measured TAGS spectrum than does the 1994Pe19 level scheme, which differ essentially by the data from 1986Ro16, taken only by 1994Pe19. However 1994Pe19 ignored that twelve levels of 1986Ro16 are tentative, which account for most of the difference. These levels are properly marked here.

For β measurements see also 1981De25, 1973Ad04, 1973Sc18, 1968Al06, 1966Zh02.

When the calculated feeding overlaps zero within three standard deviations, the code GTOL (part of ENSDF Analysis Programs) calculates estimated upper limits (90% confidence level) which are given by evaluator in the table comments (see “Statistics for Nuclear and Particle Physics”, Louis Lyons, Cambridge University Press, 1986).

E(decay)[†]	E(level)	Iβ⁻[‡#]	Log *ft*	Comments
(454[@] *10*)	5765.3?	0.56 *7*	4.42 *7*	av Eβ=136.6 *35*
(568[@] *10*)	5651.11?	0.73 *6*	4.64 *5*	av Eβ=177.0 *37*
(608[@] *10*)	5611.2?	0.50 *12*	4.90 *11*	av Eβ=191.6 *37*
(631[@] *10*)	5588.37?	0.83 *13*	4.74 *8*	av Eβ=200.0 *37*
(830[@] *10*)	5388.65?	1.04 *14*	5.06 *7*	av Eβ=276.1 *40* Iβ⁻: 0.38 in 1997Gr09.
(909[@] *10*)	5310.42?	0.44 *5*	5.57 *6*	av Eβ=307.1 *40*
(1035[@] *10*)	5183.8?	0.86 *9*	5.49 *5*	av Eβ=358.2 *42* Iβ⁻: 0.24 in 1997Gr09.
(1045[@] *10*)	5173.69?	0.83 *6*	5.52 *4*	av Eβ=362.3 *41* Iβ⁻: 0.36 in 1997Gr09.
(1109[@] *10*)	5109.90?	0.64 *7*	5.73 *5*	av Eβ=388.6 *42*
(1237[@] *10*)	4981.9?	0.23 *6*	6.35 *12*	av Eβ=442.0 *43* Iβ⁻: 0.66 in 1997Gr09.
(1418[@] *10*)	4801.16?	0.53 *6*	6.21 *5*	av Eβ=519.0 *43* Iβ⁻: 0.58 from 1997Gr09.
(1719 *10*)	4499.93	0.52 *8*	6.55 *7*	av Eβ=650.3 *45* Iβ⁻: 0.42 from 1997Gr09.

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^{140}Cs β^- decay 1986Ro16 (continued)

β^- radiations (continued)

E(decay)†	E(level)	Iβ^{-}‡#	Log *ft*	Comments
(1803 *10*)	4416.0	0.28 *6*	6.90 *10*	av Eβ=687.5 *45* Iβ^-: 0.60 in 1997Gr09.
(1824 *10*)	4395.4?	0.23 *4*	7.00 *8*	av Eβ=696.6 *45* Iβ^-: 0.60 from 1997Gr09.
(1831 *10*)	4387.8	0.27 *6*	6.94 *10*	av Eβ=700.0 *45* Iβ^-: 0.66 from 1997Gr09.
(1860 *10*)	4358.79	0.65 *5*	6.59 *4*	av Eβ=712.9 *45* Iβ^-: 0.48 from 1997Gr09.
(1944 *10*)	4275.1	0.48 *6*	6.79 *6*	av Eβ=750.3 *45* Iβ^-: 0.60 from 1997Gr09.
(2139 *10*)	4079.93	1.47 *9*	6.47 *3*	av Eβ=838.0 *46* Iβ^-: 1.20 from 1997Gr09.
(2182 *10*)	4037.37	1.17 *11*	6.61 *5*	av Eβ=857.3 *46* Iβ^-: 0.66 from 1997Gr09.
(2187@ *10*)	4032.5?	0.27 *7*	7.25 *12*	av Eβ=859.5 *46* GTOL upper limit (method 1): 0.01. Iβ^-: 0.36 from 1997Gr09.
(2246 *10*)	3973.07	2.90 *18*	6.26 *3*	av Eβ=886.4 *46* Iβ^-: 3.24 from 1997Gr09.
(2275 *10*)	3944.06	1.34 *11*	6.62 *4*	av Eβ=899.6 *46* Iβ^-: 1.80 in 1997Gr09.
(2368 *10*)	3851.00	1.77 *19*	6.57 *5*	av Eβ=941.9 *46* Iβ^-: 4.19 in 1997Gr09.
(2374 *10*)	3845.3?	0.053 *16*	8.10 *14*	av Eβ=944.5 *46* Iβ^-: 0.54 from 1997Gr09.
(2563 *10*)	3656.08	4.6 *3*	6.30 *3*	av Eβ=1031.0 *46* Iβ^-: 3.18 in 1997Gr09.
(2617 *10*)	3601.7	0.73 *10*	7.13 *6*	av Eβ=1055.9 *46* Iβ^-: 0.90 in 1997Gr09.
(2693 *10*)	3526.5	0.36 *8*	7.49 *10*	av Eβ=1090.4 *46* Iβ^-: 0.36 in 1997Gr09.
(2699 *10*)	3520.5	0.85 *6*	7.12 *4*	av Eβ=1093.2 *46* Iβ^-: 024 in 1997Gr09.
(2768 *10*)	3451.44	0.79 *7*	7.20 *4*	av Eβ=1125.0 *46* Iβ^-: 1.92 in 1997Gr09.
(3120@ *10*)	3098.65	0.14 *13*	8.2 *4*	av Eβ=1288.0 *47* Iβ^-: 0.12 in 1997Gr09.
(3246@ *10*)	2973.35	≤0.06	≥8.6	av Eβ=1346.2 *47* GTOL upper limit (method 1): 0.06. Iβ^-: 2.64 in 1997Gr09.
(3286 *10*)	2932.58	5.42 *24*	6.676 *21*	av Eβ=1365.1 *47* Iβ^-: 4.55 in 1997Gr09.
(3345 *10*)	2873.78	0.22 *13*	8.1 *3*	av Eβ=1392.5 *47* Iβ^-: 0.49 in 1997Gr09.
(3348 *10*)	2870.63	1.03 *9*	7.43 *4*	av Eβ=1393.9 *47* Iβ^-: 1.56 in 1997Gr09.
(3431 *10*)	2787.53	0.25 *6*	8.09 *11*	av Eβ=1432.6 *47* Iβ^-: 0.0 from 1997Gr09.
(3437 *10*)	2782.05	0.13 *6*	8.38 *20*	av Eβ=1435.2 *47* Iβ^-: 0.060 in 1997Gr09.
(3515 *10*)	2703.98	3.36 *15*	7.007 *21*	av Eβ=1471.5 *47* Iβ^-: 3.48 in 1997Gr09.
(3527 *10*)	2692.0	0.13 *5*	8.43 *17*	av Eβ=1477.1 *47* Iβ^-: 0.0 in 1997Gr09.
(3697 *10*)	2521.87	3.0 *3*	7.15 *5*	av Eβ=1556.4 *47* Iβ^-: 2.64 in 1997Gr09.

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^{140}Cs β^- decay 1986Ro16 (continued)

β^- radiations (continued)

E(decay)†	E(level)	Iβ^-‡#	Log *ft*	Comments
(3789 *10*)	2429.52	1.25 *9*	7.58 *4*	av Eβ=1599.6 *47* Iβ^-: 2.64 in 1997Gr09.
(3899@ *10*)	2320.32			Iβ^-: 0.097 in 1997Gr09.
(3909 *10*)	2309.89	0.77 *9*	7.84 *6*	av Eβ=1655.5 *47* Iβ^-: 0.48 in 1997Gr09.
(3982 *10*)	2237.21	2.8 *3*	7.32 *5*	av Eβ=1689.4 *47* Iβ^-: 1.44 in 1997Gr09.
(4015 *10*)	2204.11	≤0.19	≥8.5	av Eβ=1704.9 *47* GTOL upper limit (method 1): 0.19. Iβ^-: 0.60 in 1997Gr09.
(4081 *10*)	2138.27	0.60 *8*	8.03 *6*	av Eβ=1735.7 *47* Iβ^-: 0.24 from 1997Gr09.
(4158@ *10*)	2061.2			Iβ^-: 0.30 from 1997Gr09.
(4225 *10*)	1993.53	0.50 *14*	8.18 *13*	av Eβ=1803.5 *47* Iβ^-: 0.48 from 1997Gr09.
(4268@ *10*)	1951.5	≤0.04	≥9.3	av Eβ=1823.2 *47* GTOL upper limit (method 1): 0.04. Iβ^-: 0.04 from 1997Gr09.
(4395 *10*)	1823.80	1.65 *11*	7.73 *3*	av Eβ=1883.0 *47* Iβ^-: 1.46 from 1997Gr09.
(4416 *10*)	1802.84			Iβ^-: negative feeding −1.30 *21* from intensity balence.
(4708 *10*)	1510.64	3.7 *3*	7.51 *4*	av Eβ=2029.8 *47* E(decay): measured value 4700 *70* (1981De25). Iβ^-: 3.36 from 1997Gr09.
(5088@ *10*)	1130.54	0.13 *9*	9.1 *3*	av Eβ=2208.2 *47* Iβ^-: 0.0 from 1997Gr09.
(5617 *10*)	602.31	14.9 *18*	7.24 *6*	av Eβ=2456.2 *47* E(decay): measured value 5646 *50* (1981De25). Others: 5700 *100* (1973Sc18), 5200 *100* (1973Ad04), 5180 *100* (1966Zh02). Iβ^-: 10.07 from 1997Gr09.
(6219 *10*)	0.0	35.9 *17*	7.052 *21*	av Eβ=2738.9 *47* E(decay): measured value 6208 *25* (1981De25). Others: 6210 *50* (2001Ko07); 6199 *25* (1993Gr17); 6210 *20* (1992Pr04); 6330 *100* (1973Sc18); 6177 *40* (1978Wu04). Iβ^-: from 1997Gr09.

† av Eβ=1890 *40* (1982Al01).
‡ Presented in the comments are data of 1997Gr09; see also 1994He45 (Table 2).
\# Absolute intensity per 100 decays.
@ Existence of this branch is questionable.

$\gamma(^{140}$Ba)

Iγ normalization: β(g.s.)=35.9% *17* (1997Gr09).

E_γ [†]	I_γ [†a]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [#]	δ [‡&]	α [@]	Comments
400.8 *5*	0.6 *3*	2204.11	2^+,3	1802.84	3^-				%Iγ=0.032 *16*.
411.7 *8*	1.6 *6*	2932.58	2^-	2521.87	1,$2^{(+)}$				%Iγ=0.08 *4*.
413.4 *3*	3.5 *5*	2237.21	2^+	1823.80	0^+				%Iγ=0.19 *3*.
528.25 *5*	55.2 *8*	1130.54	4^+	602.31	2^+	E2		0.00848	α(K)=0.00715 *10*; α(L)=0.001060 *15*; α(M)=0.000220 *3* α(N)=4.71×10^{-5} *7*; α(O)=7.00×10^{-6} *10*; α(P)=4.32×10^{-7} *6* %Iγ=2.92 *12*.
555.5 *2*	2.8 *2*	4499.93	$1^{(+)}$,$2^{(+)}$	3944.06	1				%Iγ=0.148 *12*.
602.25 *5*	1000 *30*	602.31	2^+	0.0	0^+	E2		0.00600	α(K)=0.00508 *8*; α(L)=0.000729 *11*; α(M)=0.0001513 *22* α(N)=3.24×10^{-5} *5*; α(O)=4.84×10^{-6} *7*; α(P)=3.09×10^{-7} *5* %Iγ=52.9 *18*. %Iγ=53.3 *18*.
627.5 *3*	2.9 *3*	2138.27	$3^{(+)}$	1510.64	2^+				%Iγ=0.153 *17*.
643.5 *5*	0.7 *3*	2782.05	$2^{(+)}$,3^+	2138.27	$3^{(+)}$				%Iγ=0.037 *16*.
672.1 *4*	21.7 *10*	1802.84	3^-	1130.54	4^+	(E1+M2)	+0.13 *+7−6*	0.0020 *4*	α(K)=0.0017 *3*; α(L)=0.00021 *5*; α(M)=4.4×10^{-5} *9* α(N)=9.5×10^{-6} *20*; α(O)=1.4×10^{-6} *3*; α(P)=1.05×10^{-7} *22* %Iγ=1.15 *7*. Mult.: D+Q from $\gamma\gamma(\theta)$; E1+M2 from decay scheme.
693.4 *5*	2.0 *10*	2204.11	2^+,3	1510.64	2^+				%Iγ=0.11 *6*.
695.5 *5*	5.4 *10*	2932.58	2^-	2237.21	2^+				%Iγ=0.29 *6*.
726.2 *5*	1.3 *10*	2237.21	2^+	1510.64	2^+				%Iγ=0.07 *6*.
728.9 *6*	1.7 *5*	2932.58	2^-	2204.11	2^+,3				%Iγ=0.09 *3*.
735.9 *3*	10.9 *5*	2973.35		2237.21	2^+				%Iγ=0.58 *4*.
740.8 *10*	1.1 *4*	2692.0	2	1951.5	3^+				%Iγ=0.058 *22*.
758.5[d] *10*	0.7 *4*	5173.69?	1^-,2^-	4416.0	1,$2^{(+)}$				%Iγ=0.037 *22*.
760.3 *10*	0.7 *4*	4416.0	1,$2^{(+)}$	3656.08	2				%Iγ=0.037 *22*.
[x]771.0 *9*	0.8 *3*								%Iγ=0.042 *16*.
794.6[b] *6*	1.6[b] *4*	2932.58	2^-	2138.27	$3^{(+)}$				%Iγ=0.085 *22*.
794.6[bd] *6*	1.6[b] *4*	5183.8?	2^-	4387.8	$1^{(-)}$,2				%Iγ=0.085 *22*.
798.9 *8*	2.2 *3*	2309.89	2^+,1	1510.64	2^+				%Iγ=0.116 *17*.
809.8 *10*	1.0 *5*	2320.32	(3^-)	1510.64	2^+				%Iγ=0.05 *3*.
820.9 *4*	4.7 *3*	1951.5	3^+	1130.54	4^+	M1+E2		0.0034 *6*	α(K)=0.0029 *5*; α(L)=0.00038 *6*; α(M)=7.8×10^{-5} *11* α(N)=1.68×10^{-5} *24*; α(O)=2.6×10^{-6} *4*; α(P)=1.8×10^{-7} *4* %Iγ=0.249 *19*. δ: δ=−4.6 to −0.43 (for J=3).
826.9[d] *15*	0.5 *3*	5183.8?	2^-	4358.79	2				%Iγ=0.026 *16*.

γ(^{140}Ba) (continued)

E_γ[†]	I_γ[†a]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	δ[‡&]	α[@]	Comments
862.3[b] *14*	0.8[b] *5*	3098.65	$1^{(+)},2^{(+)}$	2237.21	2^+				%Iγ=0.04 *3*.
862.3[b] *14*	0.8[b] *5*	3526.5	$(1^+,2^+)$	2663.9					%Iγ=0.04 *3*.
862.3[b] *14*	0.8[b] *5*	4387.8	$1^{(-)},2$	3526.5	$(1^+,2^+)$				%Iγ=0.04 *3*.
873.2 *6*	1.3 *5*	3656.08	2	2782.05	$2^{(+)},3^+$				%Iγ=0.07 *3*.
881.1 *5*	1.1 *3*	2873.78	$1^{(+)},2^{(+)}$	1993.53	2^+				%Iγ=0.058 *16*.
889.1[b] *8*	0.7[b] *4*	2692.0	2	1802.84	3^-				%Iγ=0.037 *22*.
889.1[bd] *8*	0.7[b] *4*	5388.65?	1^-	4499.93	$1^{(+)},2^{(+)}$				%Iγ=0.037 *22*.
893.4 *5*	0.7 *4*	3098.65	$1^{(+)},2^{(+)}$	2204.11	$2^+,3$				%Iγ=0.037 *22*.
908.25 *5*	163 *4*	1510.64	2^+	602.31	2^+	E2+M1	−0.60 +*18*−*17*	0.00289 *11*	α(K)=0.00249 *10*; α(L)=0.000317 *11*; α(M)=6.51×10^{-5} *22* α(N)=1.41×10^{-5} *5*; α(O)=2.16×10^{-6} *8*; α(P)=1.59×10^{-7} *7* %Iγ=8.6 *4*.
918.3 *2*	8.2 *2*	2429.52	$1,2^+$	1510.64	2^+	D+Q			%Iγ=0.434 *19*. δ: for J=1 δ=−0.16 +*32*−*34*; for J=2 δ>−0.04 or <−2.0.
934.9[d] *3*	0.8 *4*	4032.5?	1,2	3098.65	$1^{(+)},2^{(+)}$				%Iγ=0.042 *22*.
939.0[b] *5*	0.4[b] *3*	2932.58	2^-	1993.53	2^+				%Iγ=0.021 *16*.
939.0[b] *5*	0.4[b] *3*	4037.37	2	3098.65	$1^{(+)},2^{(+)}$				%Iγ=0.021 *16*.
944.3[d] *10*	0.7 *3*	4981.9?	$0^{(+)},1,2^{(+)}$	4037.37	2				%Iγ=0.037 *16*.
949.4[bd] *7*	0.9[b] *3*	4801.16?	2	3851.00	1				%Iγ=0.048 *16*.
949.4[bd] *7*	0.9[b] *3*	4981.9?	$0^{(+)},1,2^{(+)}$	4032.5?	1,2				%Iγ=0.048 *16*.
969.4 *7*	0.5 *3*	3944.06	1	2973.35					%Iγ=0.026 *16*.
980.7[b] *10*	1.4[b] *5*	3851.00	1	2870.63	2^+				%Iγ=0.07 *3*.
980.7[b] *10*	1.4[b] *5*	4079.93	$1^{(-)},2$	3098.65	$1^{(+)},2^{(+)}$				%Iγ=0.07 *3*.
984.5 *9*	1.5 *5*	2787.53	$1^{(-)},2^{(+)}$	1802.84	3^-				%Iγ=0.08 *3*.
1000.7[b] *5*	1.9[b] *5*	3973.07	2	2973.35					%Iγ=0.10 *3*.
1000.7[bd] *5*	1.9[b] *5*	5388.65?	1^-	4387.8	$1^{(-)},2$				%Iγ=0.10 *3*.
1008.1 *2*	15.6 *5*	2138.27	$3^{(+)}$	1130.54	4^+	(M1+E2)	−4.5 +*14*−*26*	0.00181 *4*	α(K)=0.00156 *4*; α(L)=0.000203 *5*; α(M)=4.18×10^{-5} *9* α(N)=8.99×10^{-6} *19*; α(O)=1.37×10^{-6} *3*; α(P)=9.67×10^{-8} *24* %Iγ=0.82 *4*.
1010.4 *10*	7.8 *5*	2521.87	$1,2^{(+)}$	1510.64	2^+				%Iγ=0.41 *3*.
[x]1024.1 *3*	2.3 *3*								%Iγ=0.122 *17*.
1031.5[d] *3*	2.5 *3*	5388.65?	1^-	4358.79	2				%Iγ=0.132 *17*.
1040.5 *2*	4.5 *3*	3973.07	2	2932.58	2^-				%Iγ=0.238 *19*.
1057.2[d] *5*	1.2 *4*	4032.5?	1,2	2973.35					%Iγ=0.063 *22*. E_γ: differs by 3σ from ΔE_{levels}.

γ(^{140}Ba) (continued)

E_γ[†]	I_γ[†a]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	δ[‡&]	α[@]	Comments
1064.0[b] 7	2.4[b] 3	3851.00	1	2787.53	$1^{(-)},2^{(+)}$				%Iγ=0.127 17.
1064.0[b] 7	2.4[b] 3	4037.37	2	2973.35					%Iγ=0.127 17.
1068.0 10	1.4 5	2870.63	2^+	1802.84	3^-				%Iγ=0.07 3.
1072.9 10	3.7 4	2204.11	2^+,3	1130.54	4^+				%Iγ=0.196 23.
1098.6[d] 10	2.5 5	4032.5?	1,2	2932.58	2^-				%Iγ=0.13 3.
1101.6 10	1.5 5	3973.07	2	2870.63	2^+				%Iγ=0.08 3.
1104.8 10	1.2 5	4037.37	2	2932.58	2^-				%Iγ=0.06 3.
[x]1109.5 10	1.2 5								%Iγ=0.06 3.
1113.6[d] 10	0.6 4	5388.65?	1^-	4275.1	1,2				%Iγ=0.032 22.
[x]1129.65[c] 5	23[c]								%Iγ=1.22 5.
1129.65[c] 5	≈23[c]	2932.58	2^-	1802.84	3^-	M1+E2	+1.7 2	0.00152 4	α(K)=0.00131 3; α(L)=0.000168 4; α(M)=3.45×10^{-5} 7 α(N)=7.43×10^{-6} 16; α(O)=1.136×10^{-6} 24; α(P)=8.23×10^{-8} 19; α(IPF)=1.088×10^{-6} 16 %Iγ=1.2 6.
1137.5[d] 4	1.8 2	5109.90?	$1^-,2^-$	3973.07	2				%Iγ=0.095 12.
1137.5[d] 4	1.8 2	5173.69?	$1^-,2^-$	4037.37	2				%Iγ=0.095 12.
1146.9[b] 4	1.5[b] 2	3098.65	$1^{(+)},2^{(+)}$	1951.5	3^+				%Iγ=0.079 11.
1146.9[b] 4	1.5[b] 2	3851.00	1	2703.98	1^-				%Iγ=0.079 11.
1154.2 15	0.7 2	2663.9		1510.64	2^+				%Iγ=0.037 11.
1158.5[d] 8	0.3 2	4032.5?	1,2	2873.78	$1^{(+)},2^{(+)}$				%Iγ=0.016 11.
1164.4 20	0.6 4	4037.37	2	2873.78	$1^{(+)},2^{(+)}$				%Iγ=0.032 22.
1171.6[b] 20	0.5[b] 4	3601.7	$1^{(-)},2^{(+)}$	2429.52	$1,2^+$				%Iγ=0.026 22.
1171.6[bd] 20	0.5[b] 4	5588.37?	2^-	4416.0	$1,2^{(+)}$				%Iγ=0.026 22.
1181.4 8	0.4 3	2692.0	2	1510.64	2^+				%Iγ=0.021 16.
1190.0 15	4.1 2	2320.32	(3^-)	1130.54	4^+				%Iγ=0.217 14.
1200.3 1	89.9 6	1802.84	3^-	602.31	2^+	(E1)		5.74×10^{-4}	α(K)=0.000472 7; α(L)=5.76×10^{-5} 8; α(M)=1.175×10^{-5} 17 α(N)=2.53×10^{-6} 4; α(O)=3.89×10^{-7} 6; α(P)=2.88×10^{-8} 4; α(IPF)=3.02×10^{-5} 5 %Iγ=4.75 18. δ: −0.02 2. Mult.: from $\gamma\gamma(\theta)$, E1 from decay scheme.
1221.4 1	45.0 4	1823.80	0^+	602.31	2^+	E2		1.20×10^{-3}	α(K)=0.001024 15; α(L)=0.0001312 19; α(M)=2.69×10^{-5} 4 α(N)=5.80×10^{-6} 9; α(O)=8.86×10^{-7} 13; α(P)=6.37×10^{-8} 9; α(IPF)=9.00×10^{-6} 13 %Iγ=2.38 9.
1262.9[d] 6	1.4 4	5651.11?	2^-	4387.8	$1^{(-)},2$				%Iγ=0.074 22.

^{140}Cs β^- decay 1986Ro16 (continued)

$\gamma(^{140}Ba)$ (continued)

E_γ[†]	I_γ[†a]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	δ[‡&]	α[@]	Comments
1270.9 *4*	2.4 *3*	2782.05	$2^{(+)},3^+$	1510.64	2^+				%Iγ=0.127 *17*.
1276.6 *5*	2.1 *5*	2787.53	$1^{(-)},2^{(+)}$	1510.64	2^+				%Iγ=0.11 *3*.
1281.1 *10*	1.2 *5*	3601.7	$1^{(-)},2^{(+)}$	2320.32	(3^-)				%Iγ=0.06 *3*.
1288.5 *8*	2.2 *6*	3526.5	$(1^+,2^+)$	2237.21	2^+				%Iγ=0.12 *4*.
1291.9[b] *10*	2.8[b] *6*	3601.7	$1^{(-)},2^{(+)}$	2309.89	$2^+,1$				%Iγ=0.15 *4*.
1291.9[b] *10*	2.8[b] *6*	4079.93	$1^{(-)},2$	2787.53	$1^{(-)},2^{(+)}$				%Iγ=0.15 *4*.
1299.2 *15*	4.3 *3*	4275.1	1,2	2973.35					%Iγ=0.227 *18*.
1319.7 *20*	0.4 *3*	4416.0	$1,2^{(+)}$	3098.65	$1^{(+)},2^{(+)}$				%Iγ=0.021 *16*.
1323.4 *7*	1.3 *3*	3526.5	$(1^+,2^+)$	2204.11	$2^+,3$				%Iγ=0.069 *16*.
1339.2 *15*	1.8 *6*	4275.1	1,2	2932.58	2^-				%Iγ=0.10 *4*.
1363.3 *5*	4.9 *3*	2873.78	$1^{(+)},2^{(+)}$	1510.64	2^+				%Iγ=0.259 *19*.
1375.9[b] *4*	2.0[b] *3*	4079.93	$1^{(-)},2$	2703.98	1^-				%Iγ=0.106 *17*.
1375.9[bd] *4*	2.0[b] *3*	5651.11?	2^-	4275.1	1,2				%Iγ=0.106 *17*.
1381.8 *9*	1.1 *3*	3520.5	$1^{(+)},2$	2138.27	$3^{(+)}$				%Iγ=0.058 *16*.
1391.25 *10*	35.1 *6*	1993.53	2^+	602.31	2^+	M1+E2	+0.18 *+5−6*	1.22×10^{-3} *2*	α(K)=0.001014 *15*; α(L)=0.0001263 *19*; α(M)=2.59×10^{-5} *4* α(N)=5.59×10^{-6} *9*; α(O)=8.60×10^{-7} *13*; α(P)=6.46×10^{-8} *10*; α(IPF)=4.30×10^{-5} *6* %Iγ=1.86 *8*.
1396.4 *15*	1.2 *8*	3601.7	$1^{(-)},2^{(+)}$	2204.11	$2^+,3$				%Iγ=0.06 *5*.
[x]1411.1 *10*	1.8 *5*								%Iγ=0.10 *3*.
1418.5 *7*	7.0 *10*	3656.08	2	2237.21	2^+				%Iγ=0.37 *6*.
1422.0[c] *5*	13.8[c] *10*	2932.58	2^-	1510.64	2^+	D+Q	+0.41 *+53−29*		%Iγ=0.73 *6*.
1422.0[c] *5*	1.0[c] *5*	3851.00	1	2429.52	$1,2^+$				%Iγ=0.05 *3*.
1442.4 *3*	2.7 *3*	4416.0	$1,2^{(+)}$	2973.35					%Iγ=0.143 *17*.
1454.7[b] *4*	3.0[b] *4*	4387.8	$1^{(-)},2$	2932.58	2^-				%Iγ=0.159 *22*.
1454.7[bd] *4*	3.0[b] *4*	5109.90?	$1^-,2^-$	3656.08	2				%Iγ=0.159 *22*.
1459.3[d] *4*	2.9 *4*	5310.42?	$1^-,2^-$	3851.00	1				%Iγ=0.153 *22*.
[x]1473.6 *7*	1.2 *3*								%Iγ=0.063 *16*.
[x]1479.2 *9*	1.0 *3*								%Iγ=0.053 *16*.
1492.3 *5*	1.8 *5*	4275.1	1,2	2782.05	$2^{(+)},3^+$				%Iγ=0.10 *3*.
1513.8 *5*	2.6 *5*	3944.06	1	2429.52	$1,2^+$				%Iγ=0.14 *3*.
1517.0[b] *5*	3.8[b] *4*	3656.08	2	2138.27	$3^{(+)}$				%Iγ=0.201 *23*.
1517.0[bd] *5*	3.8[b] *4*	5173.69?	$1^-,2^-$	3656.08	2				%Iγ=0.201 *23*.
1526.8[b] *8*	1.2[b] *4*	3520.5	$1^{(+)},2$	1993.53	2^+				%Iγ=0.063 *22*.
1526.8[bd] *8*	1.2[b] *4*	5183.8?	2^-	3656.08	2				%Iγ=0.063 *22*.
1536.2 *2*	12.0 *4*	2138.27	$3^{(+)}$	602.31	2^+	D+Q			%Iγ=0.63 *4*. δ: +0.04 *+13−12* or +3.6 *+3.7−1.3*.
1542.3 *6*	1.4 *4*	4416.0	$1,2^{(+)}$	2873.78	$1^{(+)},2^{(+)}$				%Iγ=0.074 *22*.

$^{140}_{56}Ba_{84}$-8

γ(^{140}Ba) (continued)

E_γ[†]	I_γ[†a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[‡&]	α[@]	Comments
1601.8 *1*	9.5 *4*	2204.11	2^+,3	602.31	2^+				%Iγ=0.50 *3*. δ: δ=+0.55 +*23*−*15* (J=2); for J=3 δ=−0.08 *11* or δ>+5.0 or <−33.8.
1607.7 *4*	3.6 *6*	4037.37	2	2429.52	1,2^+				%Iγ=0.19 *4*.
1613.9 *1*	13.9 *3*	3851.00	1	2237.21	2^+				%Iγ=0.74 *4*.
1627.2 *10*	1.8 *8*	3451.44	$1^{(-)}$,$2^{(+)}$	1823.80	0^+				%Iγ=0.10 *5*.
1634.9 *1*	47.9 *6*	2237.21	2^+	602.31	2^+	M1+E2	+1.00 *2*	8.79×10^{-4}	α(K)=0.000648 *10*; α(L)=8.06×10^{-5} *12*; α(M)=1.651×10^{-5} *24* α(N)=3.56×10^{-6} *5*; α(O)=5.48×10^{-7} *8*; α(P)=4.08×10^{-8} *6*; α(IPF)=0.0001300 *19* %Iγ=2.53 *10*.
1648.5 *10*	1.4 *4*	3451.44	$1^{(-)}$,$2^{(+)}$	1802.84	3^-				%Iγ=0.074 *22*.
1651.1[b] *5*	2.8[b] *5*	2782.05	$2^{(+)}$,3^+	1130.54	4^+				%Iγ=0.15 *3*.
1651.1[b] *5*	2.8[b] *5*	4079.93	$1^{(-)}$,2	2429.52	1,2^+				%Iγ=0.15 *3*.
1662.9 *2*	3.5 *3*	3973.07	2	2309.89	2^+,1				%Iγ=0.185 *18*.
1701.8 *15*	2.5 *10*	3526.5	(1^+,2^+)	1823.80	0^+				%Iγ=0.13 *6*.
1707.4 *2*	24.1 *5*	2309.89	2^+,1	602.31	2^+	D+Q			%Iγ=1.27 *6*. δ: −0.31 *5* (for J=1), +0.20 *7* (for J=2).
1718.1 *2*	5.4 *4*	2320.32	(3^-)	602.31	2^+				%Iγ=0.286 *24*.
1735.8 *10*	10.2 *20*	3973.07	2	2237.21	2^+				%Iγ=0.54 *11*.
1737.5[d] *10*	6.1 *20*	5588.37?	2^-	3851.00	1				%Iγ=0.32 *11*.
[x]1767.3 *9*	1.0 *3*								%Iγ=0.053 *16*.
1770.2 *6*	1.1 *3*	4079.93	$1^{(-)}$,2	2309.89	2^+,1				%Iγ=0.058 *16*.
[x]1780.5 *5*	1.0 *3*								%Iγ=0.053 *16*.
1784.0[d] *15*	0.8 *3*	5310.42?	1^-,2^-	3526.5	(1^+,2^+)				%Iγ=0.042 *16*.
1795.0[bd] *10*	1.5[b] *10*	4032.5?	1,2	2237.21	2^+				%Iγ=0.08 *6*.
1795.0[b] *10*	1.5[b] *10*	4499.93	$1^{(+)}$,$2^{(+)}$	2703.98	1^-				%Iγ=0.08 *6*.
1799.3[b] *8*	2.8[b] *10*	3601.7	$1^{(-)}$,$2^{(+)}$	1802.84	3^-				%Iγ=0.15 *6*.
1799.3[b] *8*	2.8[b] *10*	4037.37	2	2237.21	2^+				%Iγ=0.15 *6*.
1807.9 *5*	0.6 *4*	4499.93	$1^{(+)}$,$2^{(+)}$	2692.0	2				%Iγ=0.032 *22*.
1827.3 *2*	7.3 *4*	2429.52	1,2^+	602.31	2^+				%Iγ=0.39 *3*.
1835.0 *4*	3.5 *3*	3973.07	2	2138.27	$3^{(+)}$				%Iγ=0.185 *18*.
1853.4 *1*	66 *3*	3656.08	2	1802.84	3^-	D+Q	−0.24 *11*		%Iγ=3.49 *21*.
1857.9 *6*	9.4 *20*	3851.00	1	1993.53	2^+				%Iγ=0.50 *11*.
1899.6 *9*	2.1 *4*	4037.37	2	2138.27	$3^{(+)}$				%Iγ=0.111 *22*.
[x]1911.7 *15*	1.0 *4*								%Iγ=0.053 *22*.
1918.7 *5*	3.8 *6*	2521.87	1,$2^{(+)}$	602.31	2^+				%Iγ=0.20 *4*.
1928.2 *7*	1.8 *3*	4358.79	2	2429.52	1,2^+				%Iγ=0.095 *17*.
1940.2 *8*	1.9 *5*	3451.44	$1^{(-)}$,$2^{(+)}$	1510.64	2^+				%Iγ=0.10 *3*.
[x]1942.8 *10*	1.2 *5*								%Iγ=0.06 *3*.
1949.9 *7*	9.0 *8*	3944.06	1	1993.53	2^+	D+Q	−0.34 *20*		%Iγ=0.48 *5*.

γ(^{140}Ba) (continued)

E_γ[†]	I_γ[†a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[‡&]	α[@]	Comments
1993.5 3	9.9 4	1993.53	2^+	0.0	0^+				%Iγ=0.52 3. %Iγ=0.53 3.
2009.9 3	14.6 6	3520.5	$1^{(+)}$,2	1510.64	2^+				%Iγ=0.77 5.
2022.6 9	2.0 8	3973.07	2	1951.5	3^+				%Iγ=0.11 5.
2038.5[b] 5	1.8[b] 3	4275.1	1,2	2237.21	2^+				%Iγ=0.095 17.
2038.5[b] 5	1.8[b] 3	4358.79	2	2320.32	(3^-)				%Iγ=0.095 17.
2048.1 3	5.4 3	3851.00	1	1802.84	3^-				%Iγ=0.286 19.
2061.5 4	2.4 4	2663.9		602.31	2^+				%Iγ=0.127 22.
2067.7 3	6.2 3	4387.8	$1^{(-)}$,2	2320.32	(3^-)				%Iγ=0.328 20.
2086.8 10	1.8 5	4079.93	$1^{(-)}$,2	1993.53	2^+				%Iγ=0.10 3.
2089.7[b] 10	0.9[b] 3	2692.0	2	602.31	2^+				%Iγ=0.048 16.
2089.7[bd] 10	0.9[b] 3	5611.2?	$1^-,2^-$	3520.5	$1^{(+)}$,2				%Iγ=0.048 16.
2101.7 1	57.2 6	2703.98	1^-	602.31	2^+	E1+M2	−0.09 3	8.80×10^{-4}	α(K)=0.000191 5; α(L)=2.30×10^{-5} 7; α(M)=4.70×10^{-6} 13 α(N)=1.01×10^{-6} 3; α(O)=1.56×10^{-7} 5; α(P)=1.17×10^{-8} 4; α(IPF)=0.000660 10 %Iγ=3.02 12.
2109.2[d] 4	2.9 5	5765.3?	2^-	3656.08	2				%Iγ=0.15 3.
2120.0 4	1.7 3	3944.06	1	1823.80	0^+				%Iγ=0.090 17.
[x]2147.0 2	7.3 3								%Iγ=0.386 22.
2170.0 2	12.8 4	3973.07	2	1802.84	3^-				%Iγ=0.68 4.
2180.3 8	0.9 5	2782.05	$2^{(+)},3^+$	602.31	2^+				%Iγ=0.05 3.
2185.2 2	5.2 3	2787.53	$1^{(-)},2^{(+)}$	602.31	2^+				%Iγ=0.275 19.
2236.0[b] 15	3.0[b] 10	4037.37	2	1802.84	3^-				%Iγ=0.16 6.
2236.0[bd] 15	3.0[b] 10	5109.90?	$1^-,2^-$	2873.78	$1^{(+)},2^{(+)}$				%Iγ=0.16 6.
2237.3 1	56 3	2237.21	2^+	0.0	0^+				%Iγ=2.96 19. %Iγ=2.99 19.
2250.9[d] 3	2.9 4	5183.8?	2^-	2932.58	2^-				%Iγ=0.153 22.
2268.3 1	22.6 4	2870.63	2^+	602.31	2^+	M1+E2	−0.19 8	8.50×10^{-4}	α(K)=0.000356 6; α(L)=4.37×10^{-5} 7; α(M)=8.94×10^{-6} 13 α(N)=1.93×10^{-6} 3; α(O)=2.98×10^{-7} 5; α(P)=2.25×10^{-8} 4; α(IPF)=0.000440 7 %Iγ=1.20 5.
2277.00 15	12.4 6	4079.93	$1^{(-)}$,2	1802.84	3^-				%Iγ=0.66 4.
2280.3[d] 7	2.1 6	4801.16?	2	2521.87	$1,2^{(+)}$				%Iγ=0.11 4.
2309.3 6	4.9 10	2309.89	2^+,1	0.0	0^+				%Iγ=0.26 6. %Iγ=0.26 6.
2312.4[d] 8	1.6 10	5183.8?	2^-	2870.63	2^+				%Iγ=0.08 6.
2330.5 1	70.2 7	2932.58	2^-	602.31	2^+	D+Q			%Iγ=3.71 15. δ: +0.41 +53−29 or δ<−3.2 or >+2.9.
2340.00 15	4.6 6	3851.00	1	1510.64	2^+	D+Q	−0.67 32		%Iγ=0.24 4.

γ(^{140}Ba) (continued)

E_γ[†]	I_γ[†a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[‡&]	Comments
2362.00 *15*	4.2 *6*	4499.93	$1^{(+)},2^{(+)}$	2138.27	$3^{(+)}$			%Iγ=0.22 *4*.
2371.5[d] *4*	1.9 *4*	4801.16?	2	2429.52	$1,2^+$			%Iγ=0.100 *22*.
[x]2383.5 *6*	0.9 *4*							%Iγ=0.048 *22*.
2387.1[d] *10*	0.8 *4*	5173.69?	$1^-,2^-$	2787.53	$1^{(-)},2^{(+)}$			%Iγ=0.042 *22*.
2401.1[d] *6*	1.2 *2*	5183.8?	2^-	2782.05	$2^{(+)},3^+$			%Iγ=0.063 *11*.
2429.6 *1*	22.7 *4*	2429.52	$1,2^+$	0.0	0^+			%Iγ=1.20 *5*.
								%Iγ=1.21 *5*.
[x]2452.4 *15*	1.0 *5*							%Iγ=0.05 *3*.
2456.4[d] *10*	1.5 *10*	5388.65?	1^-	2932.58	2^-			%Iγ=0.08 *6*.
2459.5[d] *10*	2.0 *10*	4981.9?	$0^{(+)},1,2^{(+)}$	2521.87	$1,2^{(+)}$			%Iγ=0.11 *6*.
2462.9 *5*	7.0 *10*	3973.07	2	1510.64	2^+	D+Q	+0.31 *+63−39*	%Iγ=0.37 *6*.
2477.5[d] *8*	0.9 *3*	5183.8?	2^-	2703.98	1^-			%Iγ=0.048 *16*.
2496.6 *2*	5.5 *3*	3098.65	$1^{(+)},2^{(+)}$	602.31	2^+			%Iγ=0.291 *20*.
2513.3[bd] *15*	4.0[b] *20*	5388.65?	1^-	2873.78	$1^{(+)},2^{(+)}$			%Iγ=0.21 *11*.
2513.3[bd] *15*	4.0[b] *20*	5611.2?	$1^-,2^-$	3098.65	$1^{(+)},2^{(+)}$			%Iγ=0.21 *11*.
2521.9 *1*	61 *4*	2521.87	$1,2^{(+)}$	0.0	0^+			%Iγ=3.23 *24*.
								%Iγ=3.25 *24*.
2553.6[d] *6*	0.8 *4*	5651.11?	2^-	3098.65	$1^{(+)},2^{(+)}$			%Iγ=0.042 *22*.
2564.1[d] *7*	1.1 *3*	4801.16?	2	2237.21	2^+			%Iγ=0.058 *16*.
2646.8[d] *5*	1.5 *4*	5310.42?	$1^-,2^-$	2663.9				%Iγ=0.079 *22*.
2656.7[d] *10*	0.3 *2*	5588.37?	2^-	2932.58	2^-			%Iγ=0.016 *11*.
2660.8[d] *10*	0.5 *3*	5183.8?	2^-	2521.87	$1,2^{(+)}$			%Iγ=0.026 *16*.
2663.7[b] *10*	0.5[b] *3*	2663.9		0.0	0^+			%Iγ=0.026 *16*.
								%Iγ=0.027 *16*.
2663.7[bd] *10*	0.5[b] *3*	4801.16?	2	2138.27	$3^{(+)}$			%Iγ=0.026 *16*.
2666.7[d] *10*	0.6 *3*	5765.3?	2^-	3098.65	$1^{(+)},2^{(+)}$			%Iγ=0.032 *16*.
2674.6 *5*	1.4 *2*	4499.93	$1^{(+)},2^{(+)}$	1823.80	0^+			%Iγ=0.074 *11*.
[x]2694.3 *15*	1.0 *8*							%Iγ=0.05 *5*.
2703.7 *2*	12.1 *3*	2703.98	1^-	0.0	0^+			%Iγ=0.64 *3*.
								%Iγ=0.65 *3*.
2737.2[d] *13*	0.9 *3*	5611.2?	$1^-,2^-$	2873.78	$1^{(+)},2^{(+)}$			%Iγ=0.048 *16*.
2764.8 *4*	1.9 *3*	4275.1	1,2	1510.64	2^+			%Iγ=0.100 *17*.
2788.2 *6*	1.9 *3*	2787.53	$1^{(-)},2^{(+)}$	0.0	0^+			%Iγ=0.100 *17*.
								%Iγ=0.101 *17*.
2848.2 *2*	11.7 *5*	4358.79	2	1510.64	2^+	D+Q		%Iγ=0.62 *4*.
								δ: +0.25 *+37−20* or $-4.3<\delta<-2.0$.
2873.6 *2*	8.1 *3*	2873.78	$1^{(+)},2^{(+)}$	0.0	0^+			%Iγ=0.428 *23*.
								%Iγ=0.432 *23*.
2969.2[d] *2*	8.2 *3*	5173.69?	$1^-,2^-$	2204.11	$2^+,3$			%Iγ=0.434 *23*.

γ(^{140}Ba) (continued)

E_γ[†]	I_γ[†a]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	δ[‡&]	Comments
2998.2[d] *3*	3.6 *2*	4801.16?	2	1802.84	3^-			%Iγ=0.190 *13*.
[x]3023.2 *2*	3.5 *2*							%Iγ=0.185 *13*.
3053.3 *2*	21.4 *5*	3656.08	2	602.31	2^+	D+(Q)	−0.04 *11*	%Iγ=1.13 *5*.
3066.75[bd] *25*	2.9[b] *3*	5388.65?	1^-	2320.32	(3^-)			%Iγ=0.153 *17*. E_γ: differs by 3σ from ΔE_{levels}.
3066.75[bd] *25*	2.9[b] *3*	5588.37?	2^-	2521.87	$1,2^{(+)}$			%Iγ=0.153 *17*.
3088.7[d] *5*	1.8 *3*	5611.2?	$1^-,2^-$	2521.87	$1,2^{(+)}$			%Iγ=0.095 *17*.
3098.6 *3*	2.6 *3*	3098.65	$1^{(+)},2^{(+)}$	0.0	0^+			%Iγ=0.137 *17*. %Iγ=0.139 *17*.
3115.9[d] *2*	4.3 *4*	5109.90?	$1^-,2^-$	1993.53	2^+			%Iγ=0.227 *23*.
3159.8[d] *10*	0.4 *2*	5588.37?	2^-	2429.52	$1,2^+$			%Iγ=0.021 *11*.
[x]3166.1 *10*	0.5 *2*							%Iγ=0.026 *11*.
3189.5[d] *2*	4.3 *4*	5183.8?	2^-	1993.53	2^+			%Iγ=0.227 *23*.
3242.8[d] *10*	5.4 *10*	5765.3?	2^-	2521.87	$1,2^{(+)}$			%Iγ=0.29 *6*.
3248.5 *10*	3.4 *10*	3851.00	1	602.31	2^+			%Iγ=0.18 *6*.
3267.6[d] *7*	2.1 *4*	5588.37?	2^-	2320.32	(3^-)			%Iγ=0.111 *22*.
[x]3285.2 *5*	3.0 *5*							%Iγ=0.16 *3*.
3303.7[d] *9*	1.3 *4*	5611.2?	$1^-,2^-$	2309.89	$2^+,1$			%Iγ=0.069 *22*.
3318.7[d] *9*	1.5 *4*	5310.42?	$1^-,2^-$	1993.53	2^+			%Iγ=0.079 *22*.
3341.2[b] *5*	8.0[b] *4*	3944.06	1	602.31	2^+			%Iγ=0.42 *3*.
3341.2[bd] *5*	8.0[b] *4*	5651.11?	2^-	2309.89	$2^+,1$			%Iγ=0.42 *3*.
3371.00 *25*	9.7 *4*	3973.07	2	602.31	2^+	D+Q		%Iγ=0.51 *3*. δ: +0.30 +*22*−*5* or >+14.4 or <−3.2.
3383.0[d] *5*	1.1 *4*	5588.37?	2^-	2204.11	$2^+,3$			%Iγ=0.058 *22*.
3394[d] *4*	2.2 *3*	5388.65?	1^-	1993.53	2^+			%Iγ=0.116 *17*.
3407.1[d] *10*	0.5 *3*	5611.2?	$1^-,2^-$	2204.11	$2^+,3$			%Iγ=0.026 *16*.
3412.8[d] *10*	0.5 *3*	5651.11?	2^-	2237.21	2^+			%Iγ=0.026 *16*.
3435.0 *2*	8.5 *4*	4037.37	2	602.31	2^+			%Iγ=0.45 *3*.
3451.45 *20*	9.8 *4*	3451.44	$1^{(-)},2^{(+)}$	0.0	0^+			%Iγ=0.52 *3*. %Iγ=0.52 *3*.
3477.6 *3*	3.4 *3*	4079.93	$1^{(-)},2$	602.31	2^+			%Iγ=0.180 *18*.
3507.1[d] *4*	1.7 *3*	5310.42?	$1^-,2^-$	1802.84	3^-			%Iγ=0.090 *17*.
3526.6 *5*	1.6 *3*	3526.5	$(1^+,2^+)$	0.0	0^+			%Iγ=0.085 *17*. %Iγ=0.085 *17*.
[x]3544.8 *4*	1.7 *3*							%Iγ=0.090 *17*.
3565.00[bd] *25*	2.9[b] *3*	5388.65?	1^-	1823.80	0^+			%Iγ=0.153 *17*.
3601.8 *9*	5.3 *6*	3601.7	$1^{(-)},2^{(+)}$	0.0	0^+			%Iγ=0.28 *4*. %Iγ=0.28 *4*.

γ(^{140}Ba) (continued)

E$_\gamma$[†]	I$_\gamma$[†a]	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Comments
						%Iγ=0.28 *4*.
3627.9[d] *10*	1.6 *3*	5765.3?	2$^-$	2138.27	3$^{(+)}$	%Iγ=0.085 *17*.
3635.4[d] *9*	2.2 *3*	5588.37?	2$^-$	1951.5	3$^+$	%Iγ=0.116 *17*.
3657.7[d] *10*	0.4 *2*	5651.11?	2$^-$	1993.53	2$^+$	%Iγ=0.021 *11*.
3671.7[d] *5*	1.7 *3*	5183.8?	2$^-$	1510.64	2$^+$	%Iγ=0.090 *17*.
3698.9[d] *7*	0.7 *3*	5651.11?	2$^-$	1951.5	3$^+$	%Iγ=0.037 *16*.
[x]3756.4 *5*	2.2 *4*					%Iγ=0.116 *22*.
[x]3786.4 *8*	1.4 *5*					%Iγ=0.07 *3*.
3793.3[d] *4*	4.3 *6*	4395.4?		602.31	2$^+$	%Iγ=0.23 *4*.
[x]3825.4 *15*	0.4 *2*					%Iγ=0.021 *11*.
[x]3829.5 *10*	0.5 *2*					%Iγ=0.026 *11*.
3845.2[d] *6*	1.0 *3*	3845.3?		0.0	0$^+$	%Iγ=0.053 *16*.
3851.1 *10*	0.4 *3*	3851.00	1	0.0	0$^+$	%Iγ=0.021 *16*.
3944.1 *3*	6.4 *13*	3944.06	1	0.0	0$^+$	%Iγ=0.34 *7*.
4053.2 *10*	0.5 *3*	5183.8?	2$^-$	1130.54	4$^+$	%Iγ=0.026 *16*.
[x]4075.7 *6*	0.9 *3*					%Iγ=0.048 *16*.
[x]4108.1 *8*	1.0 *3*					%Iγ=0.053 *16*.
[x]4210.1 *8*	1.0 *4*					%Iγ=0.053 *22*.
[x]4237.6 *8*	0.7 *3*					%Iγ=0.037 *16*.
[x]4381.4 *8*	0.6 *2*					%Iγ=0.032 *11*.
4416.5 *6*	1.2 *3*	4416.0	1,2$^{(+)}$	0.0	0$^+$	%Iγ=0.063 *16*.
[x]4472.8 *8*	1.0 *3*					%Iγ=0.053 *16*.
[x]4499.6 *10*	0.6 *2*					%Iγ=0.032 *11*.
[x]4525.3 *8*	1.3 *4*					%Iγ=0.069 *22*.
[x]4531.4 *6*	1.0 *3*					%Iγ=0.053 *16*.
4572.1[d] *10*	0.4 *2*	5173.69?	1$^-$,2$^-$	602.31	2$^+$	%Iγ=0.021 *11*.
[x]4786.3 *10*	0.4 *2*					%Iγ=0.021 *11*.
4786.3[d] *10*	0.4 *2*	5388.65?	1$^-$	602.31	2$^+$	%Iγ=0.021 *11*.
[x]4813.2 *10*	0.4 *2*					%Iγ=0.021 *11*.
4982.4[d] *8*	0.7 *3*	4981.9?	0$^{(+)}$,1,2$^{(+)}$	0.0	0$^+$	%Iγ=0.037 *16*.
[x]5228.2 *15*	0.2 *2*					%Iγ=0.011 *11*.

† From 1986Ro16 for Eγ<3700 and from 1974Sc14 for Eγ>3700.

‡ From γγ(θ) (1986Ro16). No transitions of significant intensities have multipole order greater than two (1986Ro16).

From γγ(θ). It was assumed that M2 cannot compete with E1; therefore, D+Q are M1+E2 and Q γ′s are E2.

@ Additional information 1.

& 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.

[a] For absolute intensity per 100 decays, multiply by 0.0529 *20*.

γ(^{140}Ba) (continued)

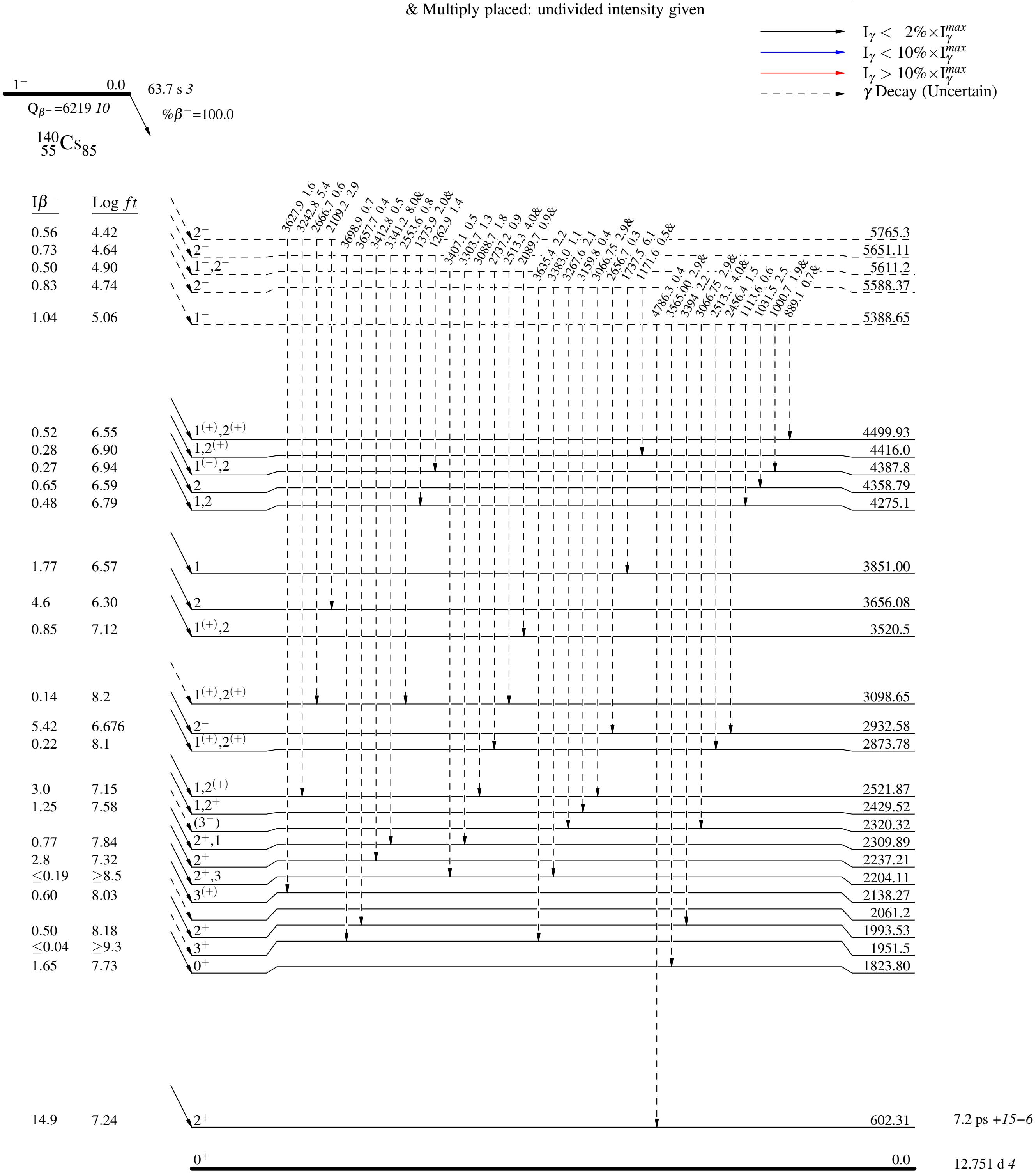
[b] Multiply placed with undivided intensity.
[c] Multiply placed with intensity suitably divided.
[d] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

$^{140}_{56}$Ba$_{84}$-14

^{140}Cs β^- decay 1986Ro16

Decay Scheme

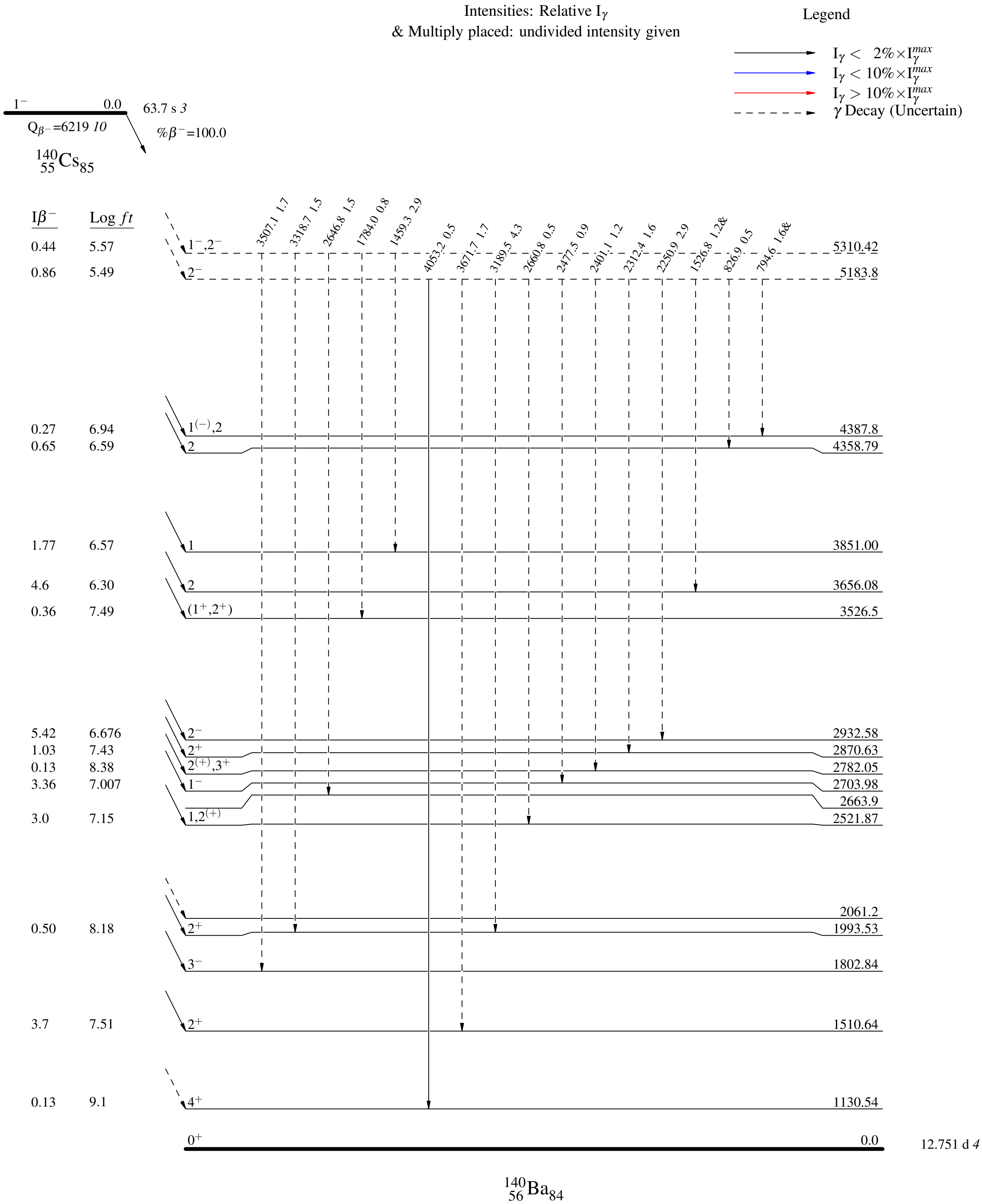
Intensities: Relative I_γ
& Multiply placed: undivided intensity given



$^{140}Cs\ \beta^-$ decay 1986Ro16

Decay Scheme (continued)

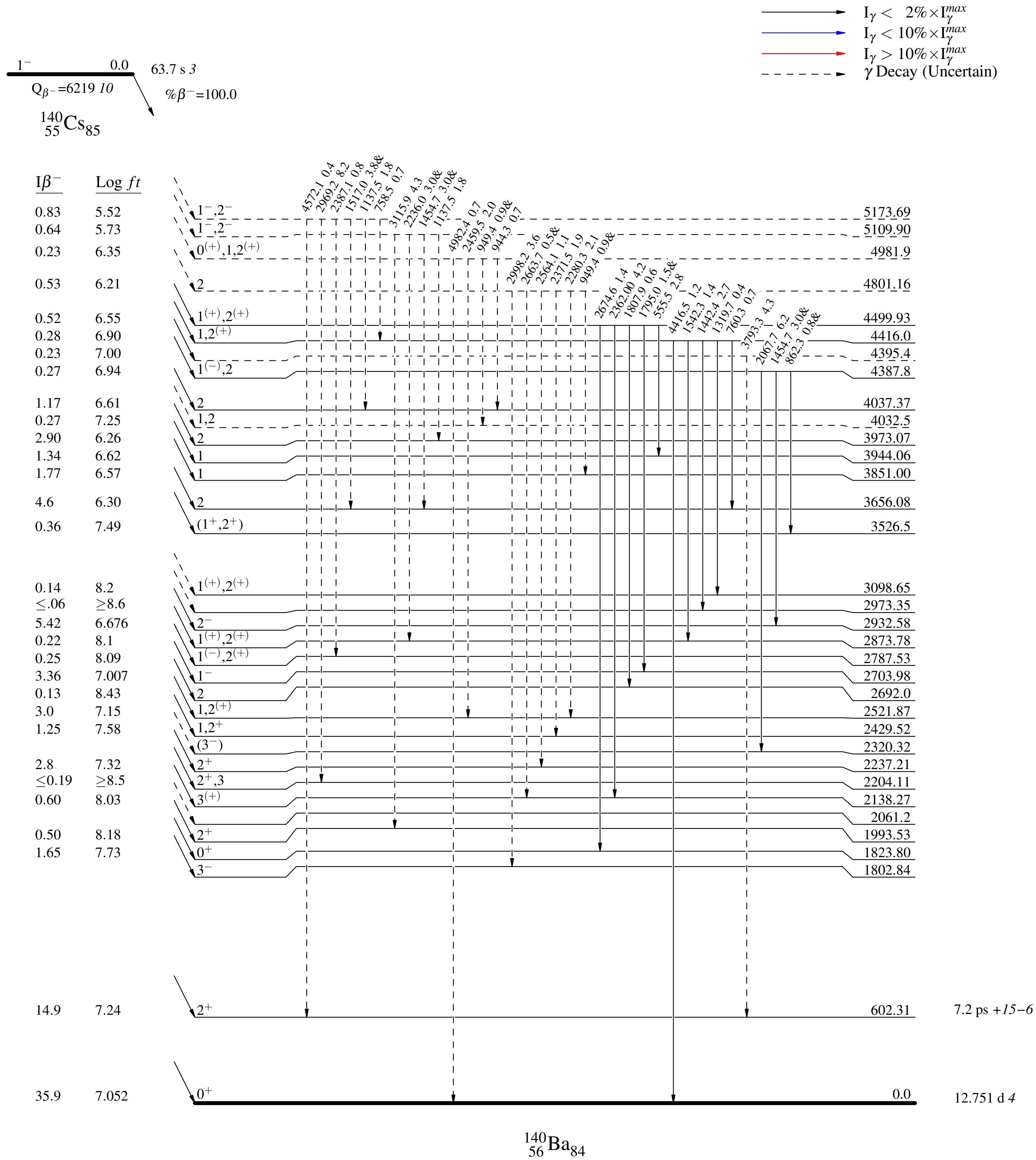
Intensities: Relative I_γ
& Multiply placed: undivided intensity given



^{140}Cs β^- decay 1986Ro16

Decay Scheme (continued)

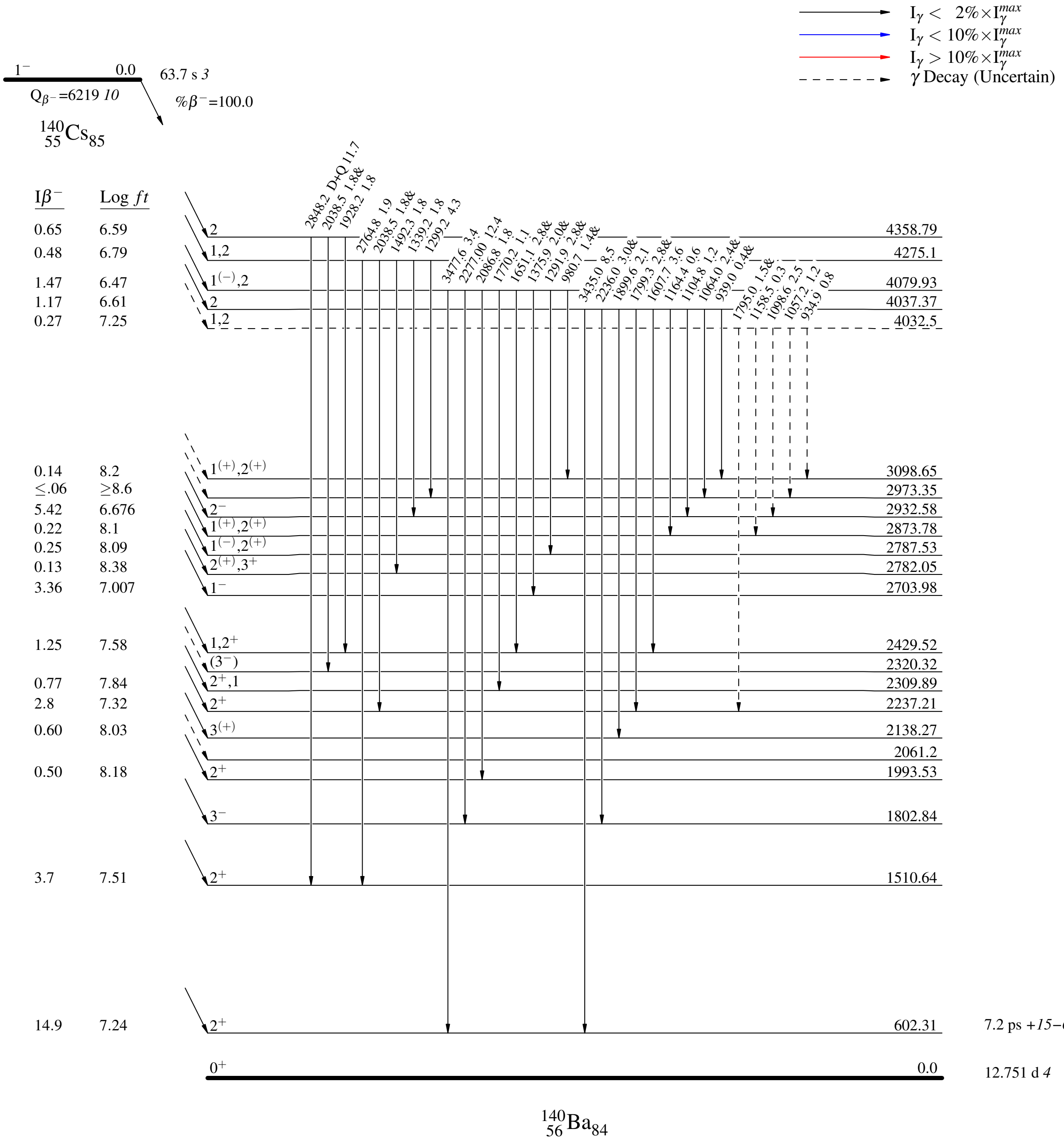
Intensities: Relative I_γ
& Multiply placed: undivided intensity given



^{140}Cs β^- decay 1986Ro16

Decay Scheme (continued)

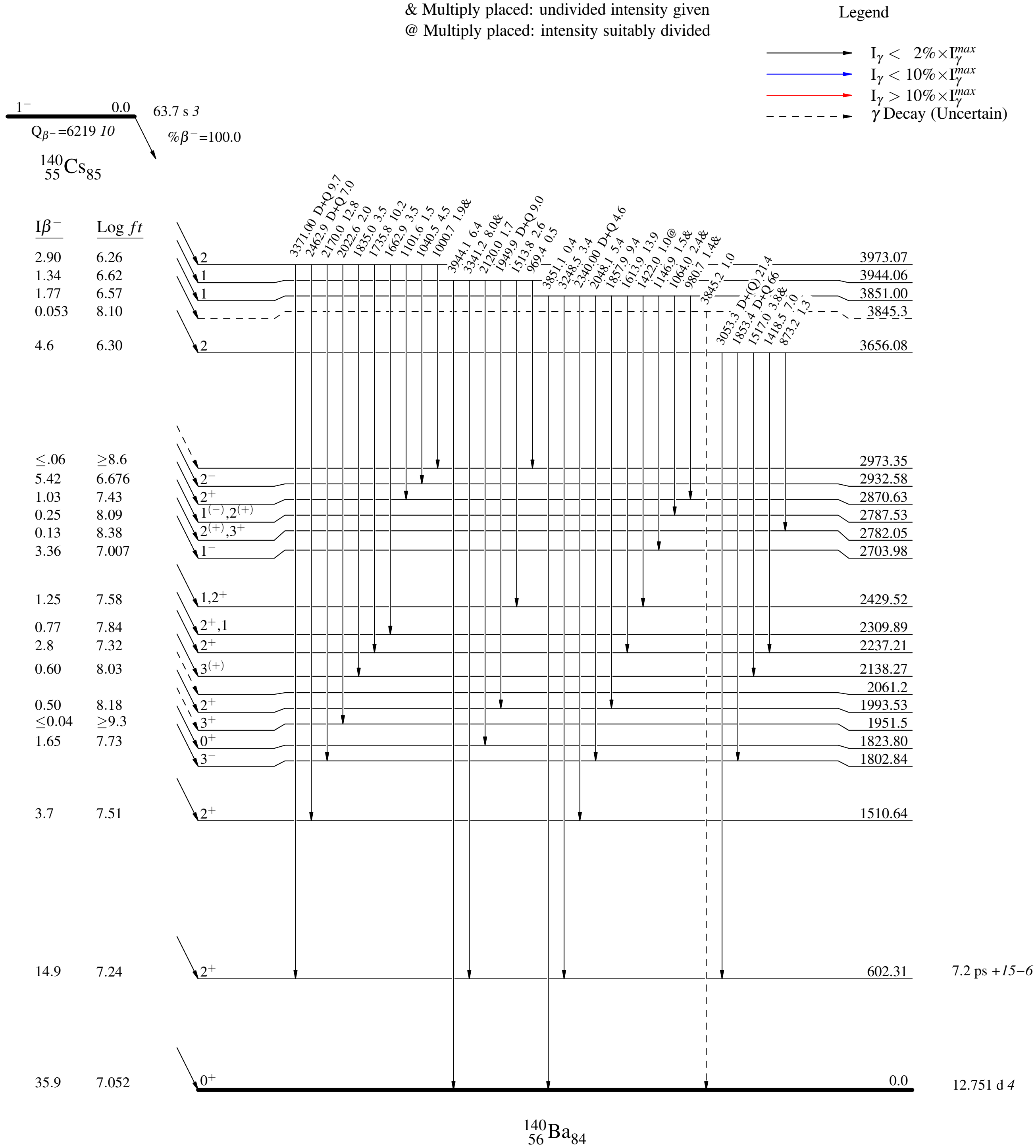
Intensities: Relative I_γ
& Multiply placed: undivided intensity given



^{140}Cs β^- decay 1986Ro16

Decay Scheme (continued)

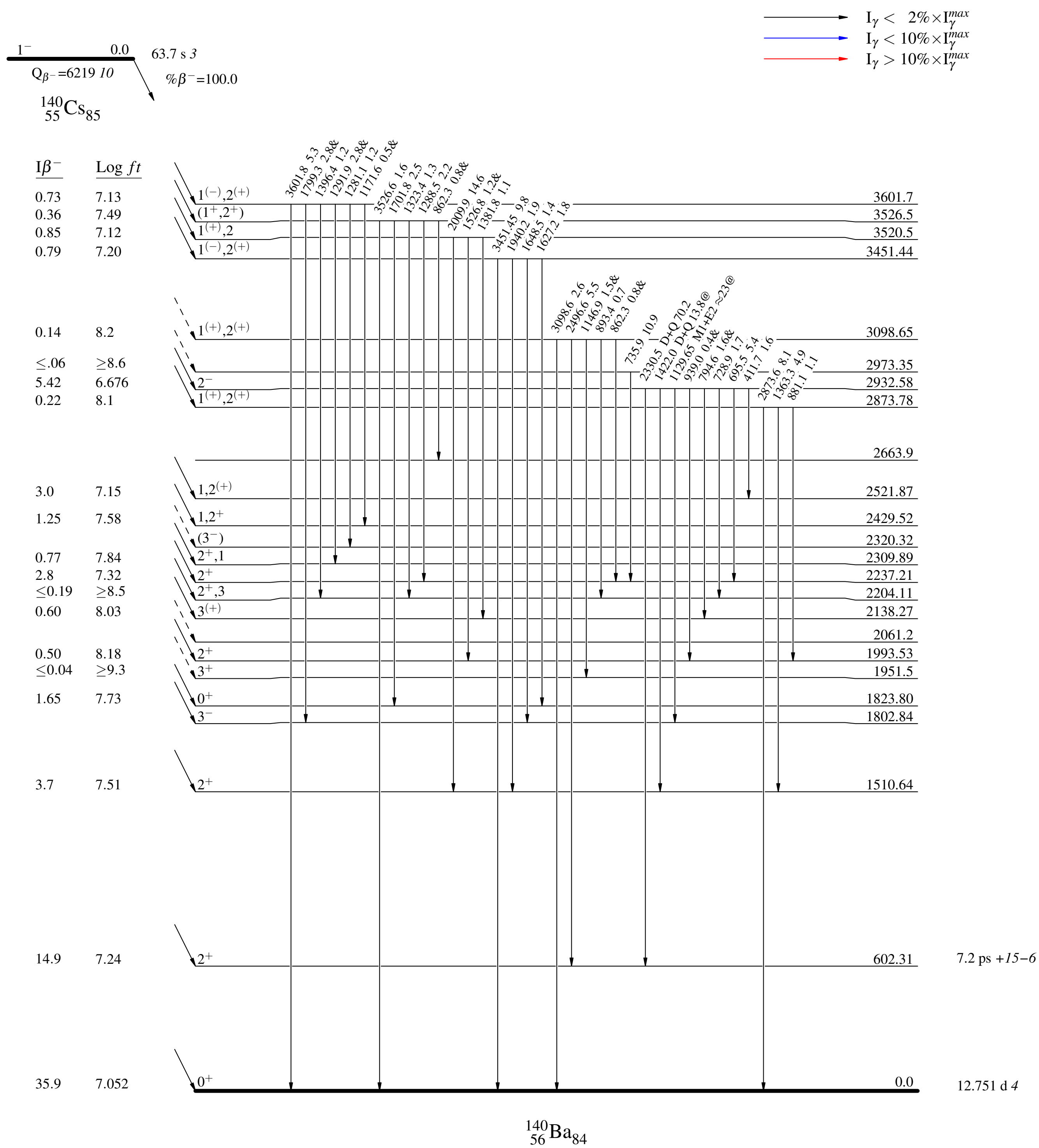
Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



^{140}Cs β^- decay 1986Ro16

Decay Scheme (continued)

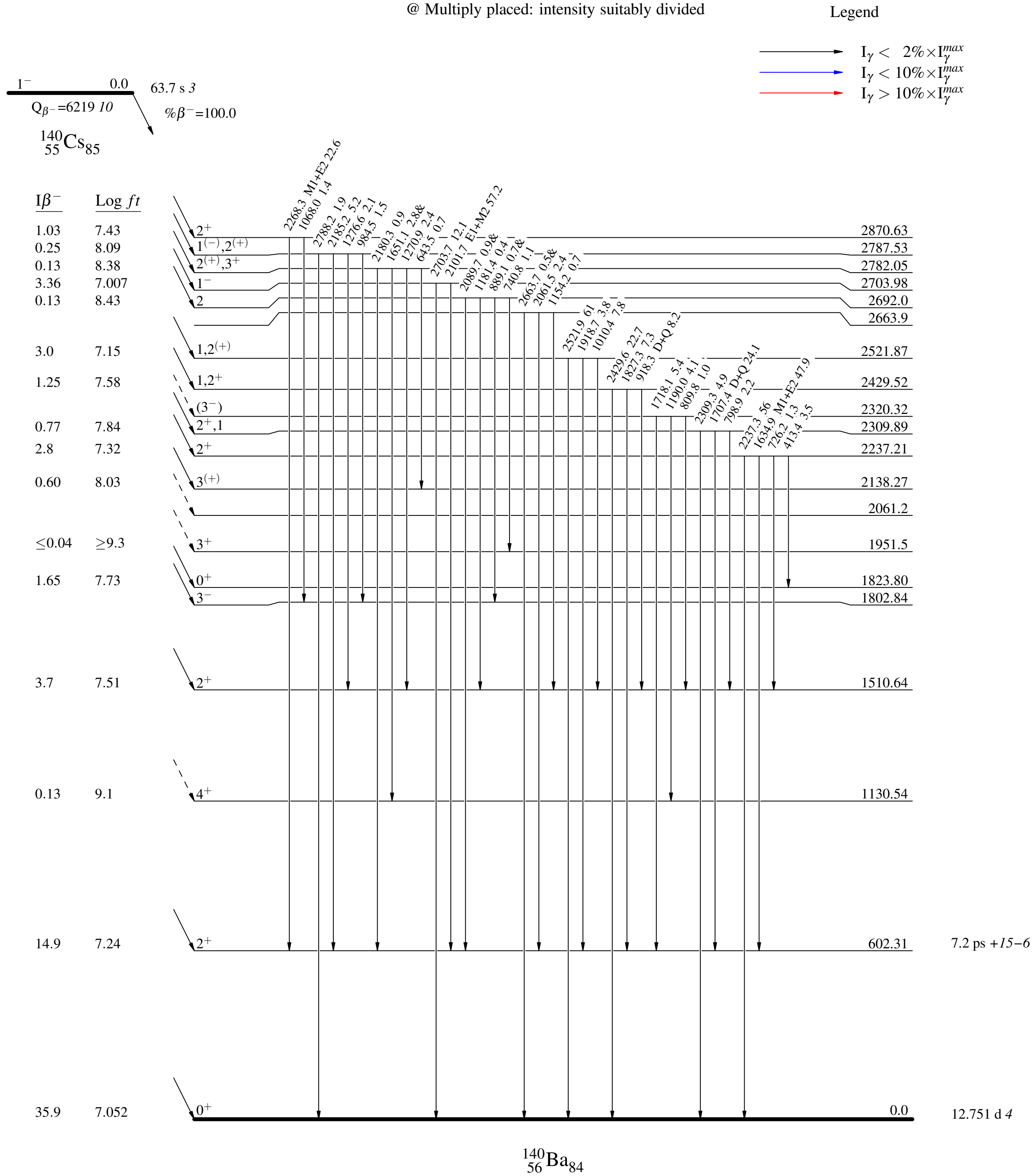
Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



^{140}Cs β^- decay 1986Ro16

Decay Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



^{140}Cs β^- decay 1986Ro16

Decay Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided