^{142}Ba β^- decay 1983Ch39

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	T. D. Johnson, D. Symochko(a), M. Fadil(b), and J. K. Tuli	NDS 112, 1949 (2011)	1-Jun-2010

Parent: ^{142}Ba: E=0.0; $J^\pi=0^+$; $T_{1/2}$=10.6 min *2*; Q(β^-)=2212 *5*; %β^- decay=100.0

Measured: γ, $\gamma\gamma$, K x ray, γ(t), $\gamma\gamma(\theta)$, β, $\beta\gamma$ (1983Ch39), γ, $\gamma\gamma$ (1971La04); absolute Iγ (1984So18);

1997Gr09: determined Iβ using total-absorption γ-ray spectrometer (TAGS) others: 1972Ho08, 1971Ho29, 1970Mc22, 1969WiZX, 1968Al06, 1962Fr04, 1959Sc36.

Measured Eβ=1011 *30*, 1103 *30*, 1775 *35* $\beta\gamma$ (1983Ch39), 1000 *100*, ≈1700 $\beta\gamma$ (1962Fr04).

β feedings were calculated from I(γ+ce) balance assuming: 1. No β^- to 2^- g.s. (Iβ (0.0+77.6 level))=2.0 *19* (1997Gr09) TAGS; 2. All gammas from levels ≤604.5 are M1 (except 68γ E2 from 145.9-keV level). The values given by 1997Gr09 measured by TAGS are in excellent agreement and are given as comments.

Decay scheme is that of 1983Ch39.

^{142}La Levels

E(level)	J^π†	$T_{1/2}$	E(level)	J^π†	E(level)	J^π†
0.0	2^-		335.02 *6*	$1^{(-)}$	866.91 *6*	
77.594 *3*	$(2)^-$		361.44 *11*		969.57 *14*	
145.82 *8*	$(4)^-$	0.87 μs *17*	363.94 *3*	$2^{(-)}$	984.39 *8*	
147.24 *5*	$^-$		417.80 *9*		1009.68 *10*	
231.3? *7*			425.00 *3*	$1^{(-)}$	1078.71 *5*	(1^+)
255.303 *12*	1^-		432.30 *5*	1^-	1204.35 *4*	$(1)^+$
300.37 *6*			604.46 *6*	1,2	1457.90 *4*	$(1)^+$
309.210 *11*	2^-		666.14 *14*		1539.26 *16*	(1)

† Adopted values.

β^- radiations

E(decay)	E(level)	Iβ^-†	Log *ft*	Comments
(673 *5*)	1539.26	0.28 *5*	6.33 *8*	av Eβ=215.3 *19* Iβ^-: 0.28 (1997Gr09) TAGS.
(754 *5*)	1457.90	15.4 *6*	4.759 *22*	av Eβ=246.2 *20* Iβ^-: 14.0 (1997Gr09) TAGS.
(1008 *5*)	1204.35	46 *2*	4.737 *22*	av Eβ=346.4 *21* E(decay): 1011 *30*. Iβ^-: 46.0 (1997Gr09) TAGS.
(1133 *5*)	1078.71	22 *1*	5.246 *23*	av Eβ=397.9 *21* E(decay): 1103 *30*. Iβ^-: 22.0 (1997Gr09) TAGS.
(1780 *5*)	432.30	4.3 *2*	6.705 *23*	av Eβ=675.9 *23* Iβ^-: 4.8 (1997Gr09) TAGS.
(1787 *5*)	425.00	5.4 *2*	6.614 *19*	av Eβ=679.1 *23* E(decay): 1775 *35*. Iβ^-: 6.0 (1997Gr09) TAGS.
(1877 *5*)	335.02	0.3 *1*	7.95 *15*	av Eβ=719.1 *23* Iβ^-: 0.3 (1997Gr09) TAGS.
(1957 *5*)	255.303	3.5 *7*	6.96 *9*	av Eβ=754.6 *23* Iβ^-: 4.6 (1997Gr09) TAGS.

† Absolute intensity per 100 decays.

γ(^{142}La)

Iγ normalization: From I(255γ)=20.6% *6* (average of 21.1% *6* (1983Ch39) and 20.0% *20* (1984So18)).
I(γ+ce) given are those derived by 1983Ch39 from Iγ and assumed multipolarities.

E_γ	I_γ [@a]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	α[†]	$I_{(\gamma+ce)}$ [a]	Comments
(8.7)		309.210	2$^-$	300.37				32 *3*	$I_{(\gamma+ce)}$: deduced from coincidence spectra.
63.6 *1*	4.4 *6*	363.94	2$^{(-)}$	300.37		M1,E2	7 *4*	23 *3*	ce(K)/(γ+ce)=0.46 *18*; ce(L)/(γ+ce)=0.33 *21*; ce(M)/(γ+ce)=0.07 *7*; ce(N+)/(γ+ce)=0.017 *16* ce(N)/(γ+ce)=0.015 *14*; ce(O)/(γ+ce)=0.0022 *20*; ce(P)/(γ+ce)=2.9×10^{-5} *12* Mult.: α(K)exp=3.8 *9*.
68.3[b] *1*	4.0[b] *9*	145.82	(4)$^-$	77.594	(2)$^-$	E2	7.92	37 *8*	B(E2)(W.u.)=1.10 *22* ce(K)/(γ+ce)=0.392 *6*; ce(L)/(γ+ce)=0.389 *6*; ce(M)/(γ+ce)=0.0866 *17*; ce(N+)/(γ+ce)=0.0209 *5* ce(N)/(γ+ce)=0.0183 *4*; ce(O)/(γ+ce)=0.00256 *6*; ce(P)/(γ+ce)=2.01×10^{-5} *4* Mult.: Only E2 is possible due to the intensity balance.
68.3[b] *1*	3.8[b] *5*	432.30	1$^-$	363.94	2$^{(-)}$	M1,E2	5.6 *24*	16 *2*	ce(K)/(γ+ce)=0.48 *17*; ce(L)/(γ+ce)=0.29 *19*; ce(M)/(γ+ce)=0.06 *6*; ce(N+)/(γ+ce)=0.016 *14* ce(N)/(γ+ce)=0.014 *12*; ce(O)/(γ+ce)=0.0019 *17*; ce(P)/(γ+ce)=3.0×10^{-5} *11* Mult.: α(K)exp=3.3 *5*;
69.7 *1*	12.8 *6*	147.24	$^-$	77.594	(2)$^-$	M1,E2	5.2 *22*	54 *3*	ce(K)/(γ+ce)=0.48 *17*; ce(L)/(γ+ce)=0.28 *18*; ce(M)/(γ+ce)=0.06 *6*; ce(N+)/(γ+ce)=0.015 *13* ce(N)/(γ+ce)=0.013 *12*; ce(O)/(γ+ce)=0.0019 *16*; ce(P)/(γ+ce)=3.0×10^{-5} *11* Mult.: α(K)exp=2.7 *4*.
77.594 *3*	462 *16*	77.594	(2)$^-$	0.0	2$^-$	M1,E2	3.6 *14*	1572 *51*	ce(K)/(γ+ce)=0.48 *15*; ce(L)/(γ+ce)=0.24 *15*; ce(M)/(γ+ce)=0.05 *5*; ce(N+)/(γ+ce)=0.013 *11* ce(N)/(γ+ce)=0.011 *9*; ce(O)/(γ+ce)=0.0016 *13*; ce(P)/(γ+ce)=3.0×10^{-5} *10* Mult.: α(K)exp=1.8 *2* (1983Ch39), 2.0 *4* (1970Mc22). E_γ: from (1979Bo26).
79.8[&]	1.8 *6*	335.02	1$^{(-)}$	255.303	1$^-$			5.8 *19*	
84.0[&]	1.5 *5*	231.3?		147.24	$^-$			4.5 *15*	
123.0 *1*	45.0 *16*	432.30	1$^-$	309.210	2$^-$	M1,E2	0.78 *18*	73 *3*	ce(K)/(γ+ce)=0.33 *4*; ce(L)/(γ+ce)=0.09 *5*; ce(M)/(γ+ce)=0.019 *11*; ce(N+)/(γ+ce)=0.005 *3* ce(N)/(γ+ce)=0.0041 *24*; ce(O)/(γ+ce)=0.0006 *4*; ce(P)/(γ+ce)=2.14×10^{-5} *24* Mult.: α(K)exp=0.65 *10*.
130.0[&]	3.0 *8*	361.44		231.3?				4.5 *12*	
147.5[&]	3.6 *6*	147.24	$^-$	0.0	2$^-$			5 *1*	

From ENSDF

γ(^{142}La) (continued)

E_γ	I_γ[@a]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	δ[#]	α[†]	$I_{(\gamma+ce)}$[a]	Comments
153.1 *1*	4.2 *10*	300.37		147.24	$^-$				5.6 *13*	
154.6 *1*	23.6 *14*	300.37		145.82	(4)$^-$				31 *2*	
162.3 *1*	5.5 *4*	309.210	2$^-$	147.24	$^-$				7.1 *5*	
172.6 *3*	1.8 *7*	604.46	1,2	432.30	1$^-$				2.2 *9*	
177.0 *1*	84 *2*	432.30	1$^-$	255.303	1$^-$				103 *3*	
215.7 *2*	5 *2*	361.44		145.82	(4)$^-$				5.9 *2*	
216.6 *1*	10 *2*	363.94	2$^{(-)}$	147.24	$^-$				11 *2*	
220.2 *2*	3.2 *6*	1204.35	(1)$^+$	984.39					3.3 *6*	
222.8 *1*	15.7 *5*	300.37		77.594	(2)$^-$				17.6 *6*	
231.611 *10*	591 *12*	309.210	2$^-$	77.594	(2)$^-$	M1+E2	−0.16 *4*	0.1052	656 *13*	ce(K)/(γ+ce)=0.0813 *11*; ce(L)/(γ+ce)=0.01098 *18*; ce(M)/(γ+ce)=0.00228 *4*; ce(N+)/(γ+ce)=0.000589 *10* ce(N)/(γ+ce)=0.000501 *8*; ce(O)/(γ+ce)=8.14×10^{-5} *13*; ce(P)/(γ+ce)=6.27×10^{-6} *9* E_γ: from 1979Bo26. I_γ: Iγ=10.8% *18* if Iγ=541 (1984So18). Mult.: α(K)exp=0.09 *2*; δ may also be +0.33 *3* (if J(77.59)=1).
242.9 *2*	9 *2*	604.46	1,2	361.44					10 *2*	
253.7 *1*	26 *2*	1457.90	(1)$^+$	1204.35	(1)$^+$				29 *3*	
255.300 *12*	1000 *23*	255.303	1$^-$	0.0	2$^-$	M1+E2	−0.26 *16*	0.0808	1084 *25*	ce(K)/(γ+ce)=0.0638 *10*; ce(L)/(γ+ce)=0.0087 *3*; ce(M)/(γ+ce)=0.00182 *7*; ce(N+)/(γ+ce)=0.000468 *17* ce(N)/(γ+ce)=0.000399 *15*; ce(O)/(γ+ce)=6.45×10^{-5} *20*; ce(P)/(γ+ce)=4.89×10^{-6} *13* E_γ: from 1979Bo26. Mult.: α(K)exp=0.11 *2*; δ may also be −0.03 *5* (if J(432.3)=0). I_γ: I(255γ)/β^-=0.211 *6* (1983Ch39), 0.20 *2* (1984So18).
257.5 *1*	6.8 *16*	335.02	1$^{(-)}$	77.594	(2)$^-$				7.3 *18*	
269.5 *1*	45 *4*	604.46	1,2	335.02	1$^{(-)}$	(M1+E2)		0.0682 *22*	48 *5*	ce(K)/(γ+ce)=0.053 *4*; ce(L)/(γ+ce)=0.0086 *12*; ce(M)/(γ+ce)=0.0018 *3*; ce(N+)/(γ+ce)=0.00046 *7* ce(N)/(γ+ce)=0.00040 *6*; ce(O)/(γ+ce)=6.2×10^{-5} *7*; ce(P)/(γ+ce)=3.8×10^{-6} *6* δ: +0.22 *6* (if J=1); −0.14 *7* (if J=2).
283.5 *2*	14 *4*	361.44		77.594	(2)$^-$				15 *4*	
286.3 *1*	54 *4*	363.94	2$^{(-)}$	77.594	(2)$^-$	(M1+E2)	0.00 *6*	0.0598	57 *4*	ce(K)/(γ+ce)=0.0483 *7*; ce(L)/(γ+ce)=0.00639 *9*; ce(M)/(γ+ce)=0.001326 *19*; ce(N+)/(γ+ce)=0.000343 *5*

$\gamma(^{142}La)$ (continued)

E_γ	I_γ [@a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[#]	α[†]	$I_{(\gamma+ce)}$ [a]	Comments
										ce(N)/(γ+ce)=0.000292 *5*; ce(O)/(γ+ce)=4.75×10^{-5} *7*; ce(P)/(γ+ce)=3.73×10^{-6} *6* δ: weighted average of possible δ=−0.05 *8* and +0.09 *10*.
309.2 *1*	126 *4*	309.210	2$^-$	0.0	2$^-$	(M1+E2)	−0.74 *15*	0.0467 *9*	132 *5*	ce(K)/(γ+ce)=0.0375 *9*; ce(L)/(γ+ce)=0.00557 *11*; ce(M)/(γ+ce)=0.00117 *3*; ce(N+)/(γ+ce)=0.000298 *6* ce(N)/(γ+ce)=0.000255 *6*; ce(O)/(γ+ce)=4.06×10^{-5} *7*; ce(P)/(γ+ce)=2.78×10^{-6} *10*
335.0 *1*	71.5 *6*	335.02	1$^{(-)}$	0.0	2$^-$				74.4 *6*	
337.7 *2*	15.1 *11*	1204.35	(1)$^+$	866.91					15.2 *11*	
340.5 *7*	1.2 *10*	417.80		77.594	(2)$^-$					
346.8 *2*	6.5 *6*	425.00	1$^{(-)}$	77.594	(2)$^-$					
354.7[&]	2.4 *8*	432.30	1$^-$	77.594	(2)$^-$				2.4 *8*	
356.8[&]	4.0 *12*	666.14		309.210	2$^-$					
363.96 *3*	230 *7*	363.94	2$^{(-)}$	0.0	2$^-$	(M1+E2)	−0.77 *12*	0.0297 *7*	238 *7*	ce(K)/(γ+ce)=0.0244 *6*; ce(L)/(γ+ce)=0.00351 *5*; ce(M)/(γ+ce)=0.000734 *11*; ce(N+)/(γ+ce)=0.000188 *3* ce(N)/(γ+ce)=0.0001605 *23*; ce(O)/(γ+ce)=2.57×10^{-5} *4*; ce(P)/(γ+ce)=1.81×10^{-6} *6* E_γ: from 1979Bo26. δ: weighted average of possible δ=−0.74 *15* and −0.83 *21*.
379.4 *1*	28.1 *6*	1457.90	(1)$^+$	1078.71	(1$^+$)				28.9 *6*	
380.0[&]	3.2 *11*	984.39		604.46	1,2				3.3 *11*	
412.7[&]	2.7 *13*	1078.71	(1$^+$)	666.14						
417.8 *2*	18 *2*	417.80		0.0	2$^-$					
425.04 *3*	279 *5*	425.00	1$^{(-)}$	0.0	2$^-$	(M1+E2)	+0.31 *24*	0.0211 *9*	285 *5*	ce(K)/(γ+ce)=0.0177 *8*; ce(L)/(γ+ce)=0.00234 *5*; ce(M)/(γ+ce)=0.000486 *9*; ce(N+)/(γ+ce)=0.0001255 *25* ce(N)/(γ+ce)=0.0001068 *21*; ce(O)/(γ+ce)=1.74×10^{-5} *4*; ce(P)/(γ+ce)=1.35×10^{-6} *7* E_γ: from 1979Bo26.
432.3 *1*	50 *4*	432.30	1$^-$	0.0	2$^-$				51 *4*	
434.4 *1*	22 *3*	866.91		432.30	1$^-$					
448.3 *1*	12.1 *7*	1457.90	(1)$^+$	1009.68						
457.1 *1*	18.2 *7*	604.46	1,2	147.24	$^-$	(M1+E2)		0.0156 *24*	18.5 *7*	ce(K)/(γ+ce)=0.0130 *22*; ce(L)/(γ+ce)=0.00184 *13*; ce(M)/(γ+ce)=0.000385 *25*; ce(N+)/(γ+ce)=9.9×10^{-5} *8* ce(N)/(γ+ce)=8.4×10^{-5} *6*; ce(O)/(γ+ce)=1.35×10^{-5} *12*; ce(P)/(γ+ce)=9.6×10^{-7} *20* δ: for possible values of δ see 1983Ch39.
473.4 *1*	20.3 *7*	1457.90	(1)$^+$	984.39						
488.3 *2*	4.5 *7*	1457.90	(1)$^+$	969.57						

^{142}Ba β^- decay 1983Ch39 (continued)

γ(^{142}La) (continued)

E_γ	I_γ [@a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[†]	Comments
537.2 *2*	3.4 *6*	969.57		432.30	1^-			
557.7 *1*	12.0 *5*	866.91		309.210	2^-			
577.7 *2*	3.3 *5*	1009.68		432.30	1^-			
588.4 *2*	4.4 *7*	666.14		77.594	$(2)^-$			E_γ: authors′ value of 558.4 *2* in their table 1 seems to be a misprint.
590.7 *1*	15.1 *7*	1457.90	$(1)^+$	866.91				
599.8 *1*	89.8 *10*	1204.35	$(1)^+$	604.46	1,2			
604.3 *2*	20.4 *10*	604.46	1,2	0.0	2^-	(M1+E2)	0.0076 *14*	α=0.0076 *14*; α(K)=0.0065 *13*; α(L)=0.00088 *12*; α(M)=0.000183 *23*; α(N+..)=4.7×10^{-5} *7* α(N)=4.0×10^{-5} *6*; α(O)=6.5×10^{-6} *9*; α(P)=4.8×10^{-7} *11* δ: −0.30 *34* (if J=1); +0.44 *10* (if J=2).
620.3 *3*	2.4 *6*	984.39		363.94	$2^{(-)}$			
622.8 *2*	3.2 *6*	984.39		361.44				
649.3 *2*	3.4 *6*	984.39		335.02	$1^{(-)}$			
654.6 *2*	4.3 *6*	1078.71	(1^+)	425.00	$1^{(-)}$			
660.9 *1*	11.0 *6*	1078.71	(1^+)	417.80				
674.4 *6*	3.2 *13*	984.39		309.210	2^-			
674.7 *7*	3.4 *13*	1009.68		335.02	$1^{(-)}$			
714.4 *4*	2.0 *7*	969.57		255.303	1^-			
769.4 *1*	36.7 *9*	1078.71	(1^+)	309.210	2^-			
771.9 *2*	4.6 *7*	1204.35	$(1)^+$	432.30	1^-			
786.6 *2*	9.2 *7*	1204.35	$(1)^+$	417.80				
791.6 *2*	4.1 *7*	1457.90	$(1)^+$	666.14				
823.4 *3*	14 *5*	1078.71	(1^+)	255.303	1^-			
840.4 *1*	176 *6*	1204.35	$(1)^+$	363.94	$2^{(-)}$			
853[&]	1.5 *8*	1457.90	$(1)^+$	604.46	1,2			
895.2 *1*	676 *19*	1204.35	$(1)^+$	309.210	2^-			I_γ: Iγ=12.2% *9* if Iγ=609 (1984So18).
907.2 *4*	2.0 *7*	984.39		77.594	$(2)^-$			
931.6 *4*	4 *3*	1078.71	(1^+)	147.24	$^-$			
932.6 *9*	4 *3*	1009.68		77.594	$(2)^-$			
934[&]	1.5 *8*	1539.26	(1)	604.46	1,2			
949.1 *1*	517 *13*	1204.35	$(1)^+$	255.303	1^-			I_γ: Iγ=9.2% *10* if Iγ=459 (1984So18).
984.5 *3*	3.6 *7*	984.39		0.0	2^-			
1001.2 *1*	474 *12*	1078.71	(1^+)	77.594	$(2)^-$			
1033.0 *1*	16.7 *7*	1457.90	$(1)^+$	425.00	$1^{(-)}$			
1040[&]	3.8 *13*	1457.90	$(1)^+$	417.80				
1078.7 *1*	559 *16*	1078.71	(1^+)	0.0	2^-			I_γ: Iγ=11.0% *10* if Iγ=551 (1984So18).
1094.1 *1*	137 *6*	1457.90	$(1)^+$	363.94	$2^{(-)}$			
1114.4 *4*	5 *2*	1539.26	(1)	425.00	$1^{(-)}$			
1122.9 *1*	19.1 *8*	1457.90	$(1)^+$	335.02	$1^{(-)}$			
1126.8 *1*	73 *6*	1204.35	$(1)^+$	77.594	$(2)^-$			
1148.7 *1*	24.3 *9*	1457.90	$(1)^+$	309.210	2^-			
1202.4 *1*	270 *10*	1457.90	$(1)^+$	255.303	1^-			

γ(^{142}La) (continued)

E_γ	I_γ [@a]	E_i(level)	J^π_i	E_f	J^π_f
1204.3 *1*	694 *11*	1204.35	$(1)^+$	0.0	2^-
1230.2 *2*	4.1 *4*	1539.26	(1)	309.210	2^-
1283.6 *3*	3.2 *6*	1539.26	(1)	255.303	1^-
1380.2 *1*	166 *8*	1457.90	$(1)^+$	77.594	$(2)^-$

† Additional information 1.

‡ α(K)exp were derived from K x ray and Iγ (coin spectra).

\# A_2 and A_4 from $\gamma\gamma(\theta)$ are given in 1983Ch39. As in odd-odd nuclei the M1 component in M1+E2 γ's is usually dominant, we present only the lowest of 2 possible values of δ; for details see 1983Ch39.

@ Absolute Iγ from 1984So18 were renormalized to I(641γ ^{142}La β decay)=47.4% *5* (1981Ge04).

& From $\gamma\gamma$; ΔE>0.4.

a For absolute intensity per 100 decays, multiply by 0.0206 *6*.

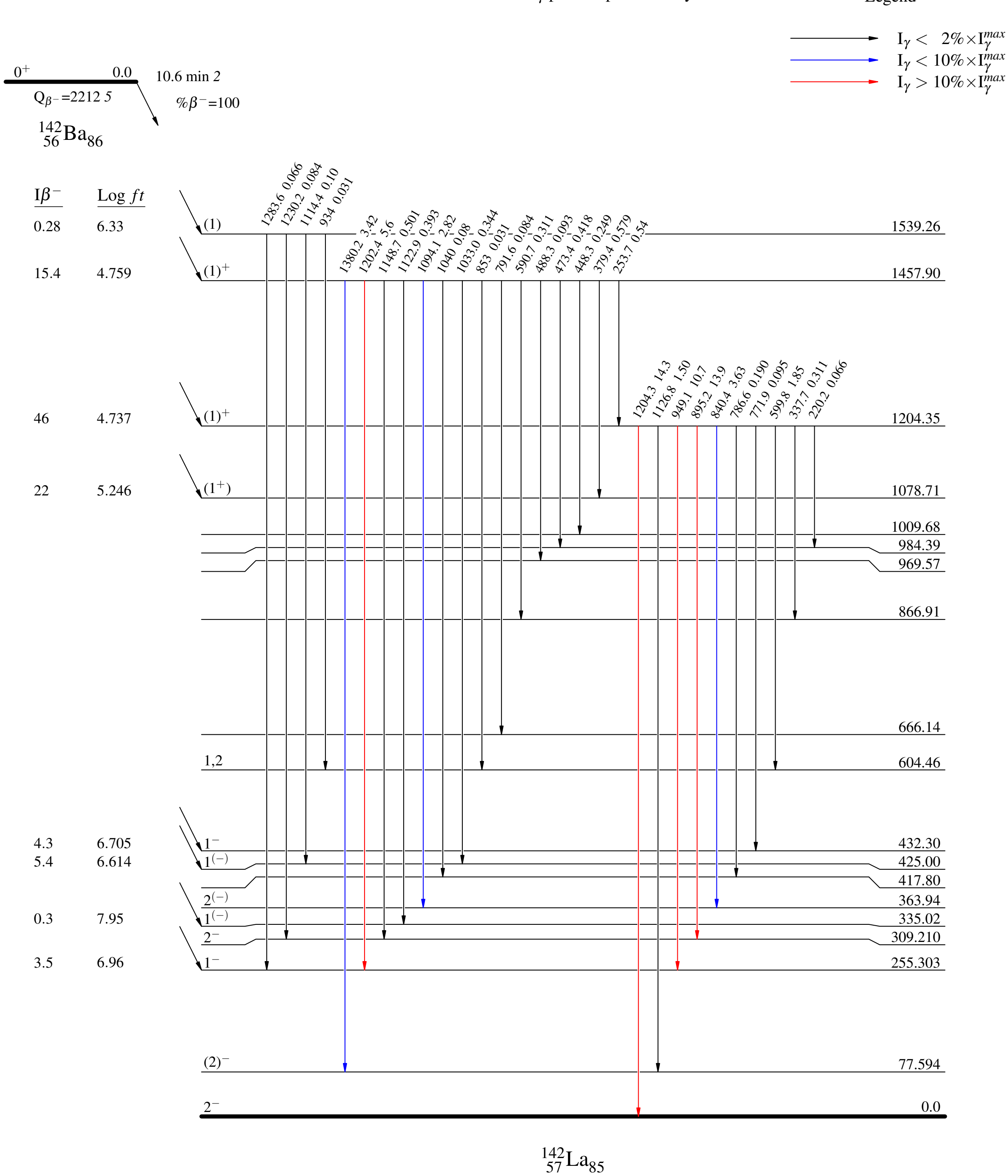
b Multiply placed with intensity suitably divided.

$^{142}_{57}La_{85}$-6

^{142}Ba β^- decay 1983Ch39

Decay Scheme

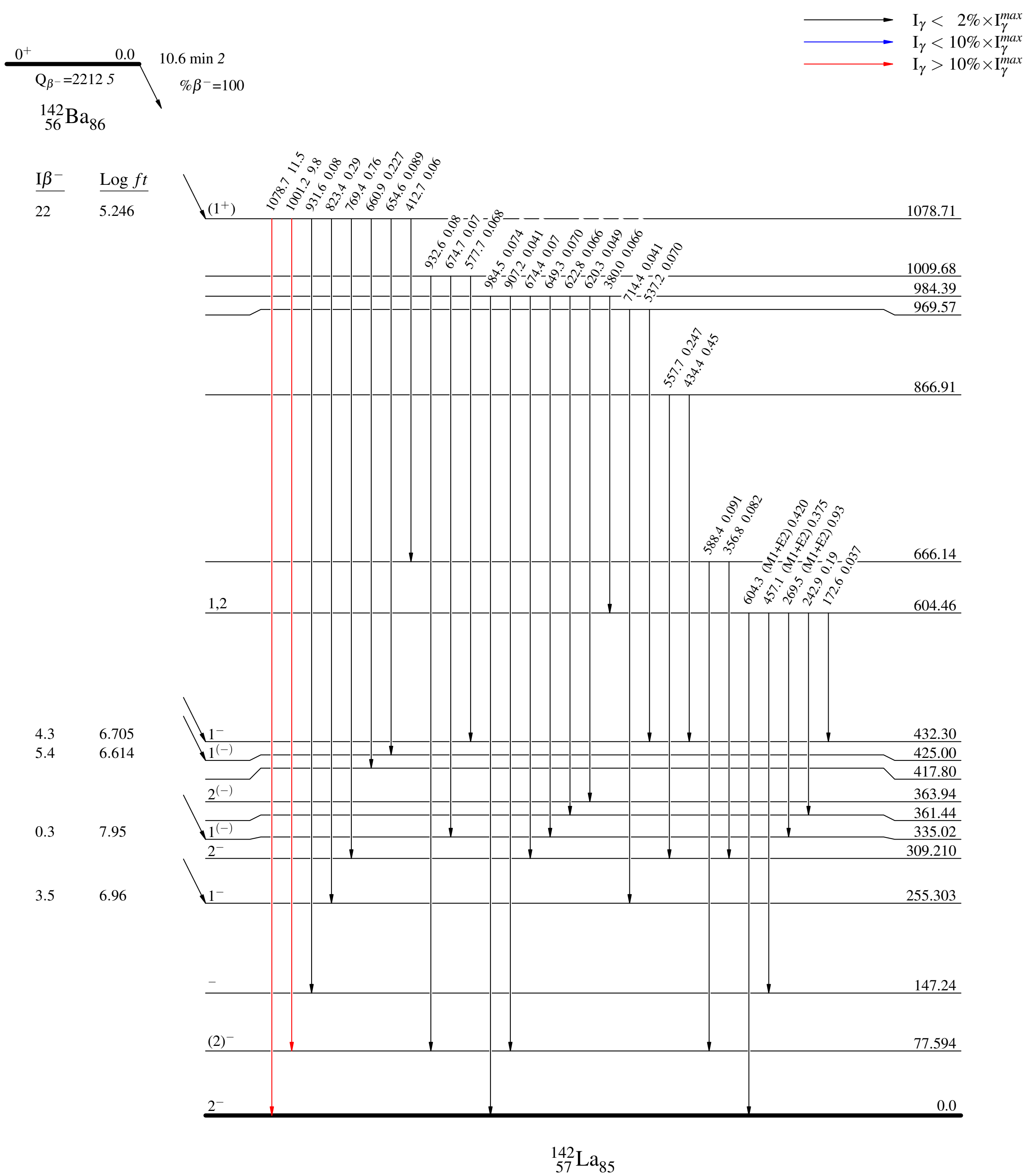
Intensities: I_γ per 100 parent decays



^{142}Ba β^- decay 1983Ch39

Decay Scheme (continued)

Intensities: I_γ per 100 parent decays



$^{142}Ba\ \beta^-$ decay 1983Ch39

Decay Scheme (continued)

Intensities: I_γ per 100 parent decays
@ Multiply placed: intensity suitably divided