^{144}La β^- decay 1982Mi01,1986WaZQ,1997Gr09

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	A. A. Sonzogni	NDS 93, 599 (2001)	1-Dec-2000

Parent: ^{144}La: E=0.0; J$^\pi$=(3$^-$); T$_{1/2}$=40.8 s *4*; Q(β^-)=5541 *56*; %β^- decay=100.0

1982Mi01: activity ^{235}U(n,F). Measured γ, $\gamma\gamma(\theta)$, θ=6 angles between 90° and 180°, Ge(Li).

1976MoZB, 1978MoZQ: measured γ, ce, $\gamma\gamma$, semi; $\beta\gamma$, scin-semi.

1977Sk02: measured γ, $\gamma\gamma$, semi.

1978St03: measured $\beta\gamma$.

1997Gr09, 1996Gr20: Total Absorption Gamma-ray Spectrometer (TAGS) system used to measure β^- decay intensities, and the g.s. β^- feeding when operated in the 4$\pi\gamma$-β^- coin. mode, NaI γ detector and Si β detector.

Fission yield: 1984Ja20, 1980KoYL.

^{144}Ce Levels

E(level)	J$^\pi$ †	T$_{1/2}$	Comments
0.0	0$^+$	284.893 d *8*	%β^-=100 T$_{1/2}$: from 1986Ol01. Others: 284.5 d *10* (1956Sc87), 284.3 d *3* (1957Ke26), 283.8 d *6* (1965Fl02), 284.8 d *10* (1968La10), 284.9 d *8* (1968Re04), 285.08 d *18* (1976WaZH), 285.8 d *1* (1980Ho17), 284.45 d *14* (1983Wa26) 286.14 d *9* (1997Ma75).
397.440 *9*	2$^+$		J$^\pi$: 397γ is E2.
938.65 *6*	4$^+$		
1242.21 *15*	3$^{(-)}$		
1346.1 *7*	(1)		
1489.0 *3*	2$^+$		
1523.67 *10*	(5$^-$)		J$^\pi$: from 1986WaZQ. 1982Mi01 gives 5$^-$,(3$^+$).
1673.67 *18*	4$^+$		
1691.53 *22*	3$^{(+)}$		
1819.0 *4*	2$^+$		
1829.01 *19*	4$^+$		
1864.5 *4*	1		
1890.92 *18*	5$^{(+)}$,3		
1991.55 *22*	3,5		
2021.1 *4*	3$^{(+)}$		
2028.7 *4*	1$^{(+)}$		
2040.7 *3*	3$^{(+)}$		
2112.10 *19*	2$^+$,(1$^+$)		
2127.0 *3*	2$^{(+)}$,3$^{(+)}$,4		
2152.8 *4*	2$^+$		
2220.8 *4*	4$^{(-)}$		
2339.8 *4*	2$^+$		
2352.6 *4*	2$^+$		
2405.2 *4*	3,2$^{(+)}$		
2447.46 *10*			
2534.3 *3*	3$^{(+)}$		
2536.6 *6*	2,3$^{(+)}$,4		
2623.2 *5*			
2642.41 *21*	4$^{(+)}$,(2$^+$)		
2692.8 *5*	4$^{(+)}$,3		
2749.9 *4*	2$^+$		
2802.5 *9*			
2881.7 *3*	3,5$^{(-)}$		
2882.0 *7*	2$^+$		
2903.6 *4*	(3$^-$,4$^+$,2)		

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^{144}La β^- decay 1982Mi01,1986WaZQ,1997Gr09 (continued)

^{144}Ce Levels (continued)

E(level)	J$^\pi$ †	E(level)	J$^\pi$ †	E(level)	E(level)	J$^\pi$ †
2937.3?		3209.3 *6*		3396.2? *11*	3628.9 *7*	1$^{(-)}$,2$^+$
2998.7 *3*	2$^+$	3238.85 *25*	4$^{(-)}$,(2)	3408.5 *4*	3635.0 *6*	1$^{(-)}$,2$^+$
3007.9 *9*	1$^{(-)}$,2$^+$	3263.0 *5*	(2$^+$,3,4$^+$)	3424.2?	3707.7 *5*	
3060.1 *5*	1$^-$	3278.6 *6*		3566.1 *5*	3790.1 *5*	
3173.0 *5*	2,3	3293.6 *6*		3597.1 *6*	3973.6 *12*	
3197.17 *24*	4$^{(+)}$,(3$^+$)	3371.9? *6*		3614.2 *20*		

† From Adopted Levels.

β^- radiations

E(decay)	E(level)	Iβ^- †‡	Log *ft*	Comments
(1.57×10^3 *6*)	3973.6	0.12 *3*	6.87 *13*	av Eβ=582 *25* Iβ=0.0% (1997Gr09).
(1.75×10^3 *6*)	3790.1	0.63 *13*	6.34 *11*	av Eβ=662 *25* Iβ=0.160% (1997Gr09).
(1.83×10^3 *6*)	3707.7	0.93 *13*	6.25 *8*	av Eβ=698 *25* Iβ=0.54% (1997Gr09).
(1.91×10^3 *6*)	3635.0	0.95 *13*	6.30 *8*	av Eβ=731 *25* Iβ=0.21% (1997Gr09).
(1.91×10^3 *6*)	3628.9	1.08 *10*	6.25 *7*	av Eβ=733 *25* Iβ=0.046% (1997Gr09).
(1.93×10^3 *6*)	3614.2	0.13 *4*	7.19 *15*	av Eβ=740 *25* Iβ=0.24% (1997Gr09).
(1.94×10^3 *6*)	3597.1	0.73 *10*	6.45 *8*	av Eβ=747 *25* Iβ=0.45% (1997Gr09).
(1.97×10^3 *6*)	3566.1	1.45 *12*	6.18 *7*	av Eβ=761 *25* Iβ=0.046% (1997Gr09).
(2.13×10^3 *6*)	3408.5	1.41 *15*	6.33 *7*	av Eβ=832 *26* Iβ=0.093% (1997Gr09).
(2.14×10^3 *6*)	3396.2?	0.25 *7*	7.09 *13*	av Eβ=837 *26* Iβ=0.66% (1997Gr09).
(2.17×10^3 *6*)	3371.9?	0.34 *8*	6.97 *12*	av Eβ=848 *26* Iβ=0% (1997Gr09).
(2.25×10^3 *6*)	3293.6	1.50 *14*	6.39 *6*	av Eβ=884 *26* Iβ=1.07% (1997Gr09).
(2.26×10^3 *6*)	3278.6	1.25 *14*	6.48 *7*	av Eβ=891 *26* Iβ=1.87% (1997Gr09).
(2.28×10^3 *6*)	3263.0	1.74 *18*	6.35 *7*	av Eβ=898 *26* Iβ=2.17% (1997Gr09).
(2.30×10^3 *6*)	3238.85	7.3 *3*	5.75 *5*	av Eβ=909 *26* Iβ=13.42% (1997Gr09).
(2.33×10^3 *6*)	3209.3	0.76 *12*	6.75 *8*	av Eβ=922 *26* Iβ=0.68% (1997Gr09).
(2.34×10^3 *6*)	3197.17	9.3 *4*	5.67 *5*	av Eβ=927 *26* Iβ=8.58% (1997Gr09).
(2.37×10^3 *6*)	3173.0	1.38 *16*	6.52 *7*	av Eβ=938 *26* Iβ=0.0% (1997Gr09).
(2.48×10^3 *6*)	3060.1	3.06 *16*	6.26 *5*	av Eβ=990 *26* Iβ=4.19% (1997Gr09).
(2.53×10^3 *6*)	3007.9	0.59 *10*	7.01 *9*	av Eβ=1014 *26* Iβ=1.47% (1997Gr09).

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^{144}La β^- decay 1982Mi01,1986WaZQ,1997Gr09 (continued)

β^- radiations (continued)

E(decay)	E(level)	Iβ^- †‡	Log *ft*	Comments
(2.54×10^3 *6*)	2998.7	1.67 *18*	6.56 *7*	av Eβ=1018 *26* Iβ=4.29% (1997Gr09).
(2.60×10^3 *6*)	2937.3?	0		Iβ=1.76% (1997Gr09).
(2.64×10^3 *6*)	2903.6	1.13 *19*	6.80 *9*	av Eβ=1061 *26* Iβ=3.28% (1997Gr09).
(2.66×10^3 *6*)	2882.0	0.33 *16*	7.35 *22*	av Eβ=1071 *26* Iβ=4.30%, sum of 2881.7 + 2882.0 levels (1997Gr09).
(2.66×10^3 *6*)	2881.7	2.20 *21*	6.52 *6*	av Eβ=1071 *26* Iβ=4.30%, sum of 2881.7 + 2882.0 levels (1997Gr09).
(2.74×10^3 *6*)	2802.5	0.28 *11*	7.47 *18*	av Eβ=1108 *26* Iβ=0.35% (1997Gr09).
(2.79×10^3 *6*)	2749.9	0.46 *20*	7.29 *20*	av Eβ=1132 *26* Iβ=0% (1997Gr09).
(2.85×10^3 *6*)	2692.8	0.89 *11*	7.04 *7*	av Eβ=1158 *26* Iβ=0% (1997Gr09).
(2.90×10^3 *6*)	2642.41	7.6 *5*	6.14 *5*	av Eβ=1181 *26* Iβ=7.35% (1997Gr09).
(3.00×10^3 *6*)	2536.6	2.7 *4*	6.65 *8*	av Eβ=1230 *26* Iβ=0% (1997Gr09).
(3.01×10^3 *6*)	2534.3	6.53 *25*	6.27 *4*	av Eβ=1231 *26* Iβ=6.63% (1997Gr09).
(3.09×10^3 *6*)	2447.46	0.76 *14*	7.26 *9*	av Eβ=1271 *26* Iβ=0.32% (1997Gr09).
(3.14×10^3 # *6*)	2405.2	<0.34	>7.6	av Eβ=1290 *26* Iβ=0.112% (1997Gr09).
(3.19×10^3 *6*)	2352.6	0.45 *21*	7.54 *21*	av Eβ=1315 *26* Iβ=0.33% (1997Gr09).
(3.20×10^3 *6*)	2339.8	2.00 *19*	6.90 *6*	av Eβ=1321 *26* Iβ=0.45% (1997Gr09).
(3.32×10^3 *6*)	2220.8	1.97 *16*	6.97 *5*	av Eβ=1376 *26* Iβ= 0.83% (1997Gr09).
(3.39×10^3 *6*)	2152.8	0		Iβ=0.188% (1997Gr09).
(3.41×10^3 *6*)	2127.0	0.4 *3*	7.7 *4*	av Eβ=1419 *26* Iβ=0.148% (1997Gr09).
(3.43×10^3 *6*)	2112.10	0.44 *24*	7.68 *24*	av Eβ=1426 *26* Iβ=0.234% (1997Gr09).
(3.50×10^3 *6*)	2040.7	1.01 *24*	7.36 *11*	av Eβ=1459 *26* Iβ=0.164% (1997Gr09).
(3.51×10^3 *6*)	2028.7	0.34 *16*	7.84 *21*	av Eβ=1465 *26* Iβ= 0.092% (1997Gr09).
(3.52×10^3 # *6*)	2021.1	<0.32	>7.9	av Eβ=1468 *26* Iβ=0.25% (1997Gr09).
(3.55×10^3 *6*)	1991.55	1.60 *20*	7.19 *7*	av Eβ=1482 *26* Iβ=0.0% (1997Gr09).
(3.65×10^3 *6*)	1890.92	0		Iβ=0.043% (1997Gr09).
(3.68×10^3 # *6*)	1864.5	<0.34	>7.9	av Eβ=1541 *26* Iβ=0.080% (1997Gr09).
(3.71×10^3 *6*)	1829.01	1.2 *3*	7.39 *12*	av Eβ=1558 *26* Iβ=0.23% (1997Gr09).
(3.72×10^3 *6*)	1819.0	0.90 *19*	7.52 *10*	av Eβ=1562 *26* Iβ=0.111% (1997Gr09).
(3.85×10^3 *6*)	1691.53	1.1 *6*	7.50 *24*	av Eβ=1622 *26* Iβ=0.69% (1997Gr09).
(3.87×10^3 *6*)	1673.67	2.5 *5*	7.15 *10*	av Eβ=1630 *26* Iβ=0.0% (1997Gr09).

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^{144}La β^- decay 1982Mi01,1986WaZQ,1997Gr09 (continued)

β^- radiations (continued)

E(decay)	E(level)	Iβ^- †‡	Log *ft*	Comments
(4.02×10^3 *6*)	1523.67	2.5 *4*	7.22 *8*	av Eβ=1700 *27* Iβ=0.20% (1997Gr09).
(4.05×10^3 *6*)	1489.0	1.13 *21*	7.58 *9*	av Eβ=1716 *27* Iβ=0.0% (1997Gr09).
(4.19×10^3 *6*)	1346.1	0		Iβ=0.25% (1997Gr09).
(4.30×10^3 *6*)	1242.21	3.1 *11*	7.25 *16*	av Eβ=1831 *27* Iβ=0.64% (1997Gr09).
(4.60×10^3 *6*)	938.65	9.6 *10*	6.89 *5*	av Eβ=1973 *27* Iβ= 0.0% (1997Gr09).
(5.14×10^3 *6*)	397.440	10.2 *21*	7.07 *10*	av Eβ=2226 *27* Iβ=0.0% (1997Gr09).

† From 1982Mi01, in their unpublished work 1986WaZQ, have suggested many more levels above 2.0 MeV. Level feedings as given here, therefore, are likely to be incorrect. TAGS branchings to the discrete levels are given in comments. Differences between these sets of Iβ values may be due to the validity of the approximations used to deduced them, and to differences between γ detectors. No direct feeding to 0^+ g.s. is expected because of ΔJ=(3); however, TAGS experiment gives a value of 1.2% 10. Moreover, TAGS analysis gives the following levels and associated Iβ in addition to the discrete levels listed, which heavily relies on 1986WaZQ: E(level)=1647.1 keV, Iβ=0.0%; E(level)=2038.7 keV, Iβ=0.07%; E(level)=2142.7 keV, Iβ=0.067%; E(level)=2150.9 keV, Iβ=0.012%; E(level)=2191.6 keV, Iβ=0.0%; E(level)=2203.7 keV, Iβ=0.0%; E(level)=2242.1 keV, Iβ=0.28%; E(level)=2329.2 keV, Iβ=0.168%; E(level)=2331.7 keV, Iβ=0.096%; E(level)=2373.3 keV, Iβ=0.035%; E(level)=2377.9 keV, Iβ=0.143%; E(level)=2390.6 keV, Iβ=0.39%; E(level)=2473.3 keV, Iβ=0.082%; E(level)=2549.6 keV, Iβ=0.50%; E(level)=2620.1 keV, Iβ=0.092%; E(level)=2710 keV, Iβ=2.99%; E(level)=2736.7 keV, Iβ=0.0%; E(level)=2823.2 keV, Iβ=0.113%; E(level)=2828.3 keV, Iβ=0.057%; E(level)=2839.9 keV, Iβ=0.27%; E(level)=2843.7 keV, Iβ=0.100%; E(level)=2895.6 keV, Iβ=0.35%; E(level)=2942.9 keV, Iβ=0.105%; E(level)=2962.2 keV, Iβ=0.121%; E(level)=3016.8 keV, Iβ=3.59%; E(level)=3035.9 keV, Iβ=0.034%; E(level)=3096.3 keV, Iβ=0.44%; E(level)=3100.8 keV, Iβ=0.158%; E(level)=3203.1 keV, Iβ=0.033%; E(level)=3264.1 keV, Iβ=2.17%; E(level)=3296.7 keV, Iβ=0.090%; E(level)=3318.9 keV, Iβ=0.038%; E(level)=3378.9 keV, Iβ=0.21%; E(level)=3383.7 keV, Iβ=0.195%; E(level)=3402.7 keV, Iβ=0.046%; E(level)=3410.6 keV, Iβ=0.29%; E(level)=3420.5 keV, Iβ=0.30%; E(level)=3427.3 keV, Iβ=0.25%; E(level)=3436.4 keV, Iβ=0.31%; E(level)=3447.4 keV, Iβ=0.055%; E(level)=3450.9 keV, Iβ=0.084%; E(level)=3465.4 keV, Iβ=0.066%; E(level)=3480.3 keV, Iβ=0.028%; E(level)=3487.9 keV, Iβ=0.047%; E(level)=3500 keV, Iβ=1.09%; E(level)=3532.0 keV, Iβ=0.32%; E(level)=3536.8 keV, Iβ=0.055%; E(level)=3538.8 keV, Iβ=0.20%; E(level)=3551.0 keV, Iβ=0.44%; E(level)=3567.3 keV, Iβ=0.62%; E(level)=3572.1 keV, Iβ=0.046%; E(level)=3600 keV, Iβ=2.01%; E(level)=3642.2 keV, Iβ=0.074%; E(level)=3653.4 keV, Iβ=0.176%; E(level)=3700 keV, Iβ=0.148%; E(level)=3765.8 keV, Iβ=0.028%; E(level)=3800 keV, Iβ=0.50%; E(level)=3821.7 keV, Iβ=0.130%; E(level)=3868.3 keV, Iβ=0.019%; E(level)=3878.0 keV, Iβ=0.32%; E(level)=3900 keV, Iβ=0.89%; E(level)=3928.9 keV, Iβ=0.047%; E(level)=3987.8 keV, Iβ=0.075%; E(level)=4000 keV, Iβ=1.17%; E(level)=4001.4 keV, Iβ=0.132%; E(level)=4032.1 keV, Iβ=0.166%; E(level)=4039.6 keV, Iβ=0.065%; E(level)=4054.4 keV, Iβ=0.027%; E(level)=4062.3 keV, Iβ=0.27%; E(level)=4072.6 keV, Iβ=0.028%; E(level)=4080 keV, Iβ=0.065%; E(level)=4098.6 keV, Iβ=0.028%; E(level)=4100 keV, Iβ=1.30%; E(level)=4123.4 keV, Iβ=0.120%; E(level)=4136.2 keV, Iβ=0.046%; E(level)=4175.2 keV, Iβ=0.028%; E(level)=4179.1 keV, Iβ=0.038%; E(level)=4200 keV, Iβ=1.11%; E(level)=4252.9 keV, Iβ=0.027%; E(level)=4259.6 keV, Iβ=0.23%; E(level)=4300 keV, Iβ=1.97%; E(level)=4308.3 keV, Iβ=0.085%; E(level)=4312.1 keV, Iβ=0.075%; E(level)=4340.7 keV, Iβ=0.120%; E(level)=4348.9 keV, Iβ=0.046%; E(level)=4358.5 keV, Iβ=0.084%; E(level)=4346.8 keV, Iβ=0.139%; E(level)=4371.1 keV, Iβ=0.130%; E(level)=4396.6 keV, Iβ=0.066%; E(level)=4400 keV, Iβ=1.29%; E(level)=4400.3 keV, Iβ=0.122%; E(level)=4404.8 keV, Iβ=0.066%; E(level)=4443.9 keV, Iβ=0.037%; E(level)=4467.6 keV, Iβ=0.028%; E(level)=4500 keV, Iβ=0.37%; E(level)=4529.9 keV, Iβ=0.019%; E(level)=4595.2 keV, Iβ=0.028%; E(level)=4600 keV, Iβ=0.22%; E(level)=4700 keV, Iβ=0.28%; E(level)=4800 keV, Iβ=0.138%; E(level)=4893.6 keV, Iβ=0.09%;

‡ Absolute intensity per 100 decays.

\# Existence of this branch is questionable.

γ(^{144}Ce)

Iγ normalization: from Σ I(γ+ce) to g.s.=100.

Decay scheme, Eγ, Iγ are mostly as given by 1982Mi01. In a more detailed, but as yet unpublished, work 1986WaZQ have observed many more levels above 2.0 MeV. Below 2.0 MeV 1986WaZQ do not support the placement of a 0$^+$ level at 1481.6, so the level has been removed from the decay scheme. Also, 1986WaZQ have suggested two additional levels at 1346 (1$^-$) and 1647 (6$^+$). Up to at least 1864 level, 1986WaZQ support J$^\pi$ assignments of 1982Mi01. Level energies have been calculated by the evaluator from a least-squares fit to the γ-ray energies.

E$_\gamma$	I$_\gamma$[@]	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.[†]	δ[†]	α[&]	Comments
303.6 3	1.56 9	1242.21	3$^{(-)}$	938.65	4$^+$	(E1+M2)	+0.007 8	0.0121 1	α(K)=0.01039 4; α(L)=0.00136; α(M)=0.00028
340.2 3	0.50 8	2692.8	4$^{(+)}$,3	2352.6	2$^+$				
357.3 4	0.29 7	3238.85	4$^{(-)}$,(2)	2881.7	3,5$^{(-)}$				
367.3 3	1.55 11	1890.92	5$^{(+)}$,3	1523.67	(5$^-$)				δ: 0.25 17 if J(1890)=5, 0.16 14 or −1.86 +74 −50 if J(1890)=3.
397.440[‡] 9	100.0 17	397.440	2$^+$	0.0	0$^+$	E2		0.02071	α(K)=0.01703; α(L)=0.00291; α(M)=0.00062; α(N+..)=0.00016 Mult.: α(K)exp=0.019 2 (1976MoZB).
431.4[#] 3	3.85[#] 16	1673.67	4$^+$	1242.21	3$^{(-)}$	(E1+M2)	+0.03 6	0.0051 6	α(K)= 0.0044 5; α(L)=0.00057 7; α(M)=0.00012
449.5[#] 4	0.80[#] 11	1691.53	3$^{(+)}$	1242.21	3$^{(-)}$				
453.4[#] 4	2.00[#] 22	2127.0	2$^{(+)}$,3$^{(+)}$,4	1673.67	4$^+$	(E2+M1)			δ: −0.45 10 or 4.2 +20−12 if J(2127)=3, −0.02 +3−16 if J(2127)=4.
467.7 4	0.55 9	1991.55	3,5	1523.67	(5$^-$)				
541.20[‡] 6	41.6 8	938.65	4$^+$	397.440	2$^+$	E2		0.00843	α(K)=0.00731; α(L)=0.00112 Mult.: α(K)exp=0.0056 20 (1976MoZB).
585.02[‡] 9	8.45 25	1523.67	(5$^-$)	938.65	4$^+$	D+Q			δ: 0.020 18 if J(1523.5)=5, −0.097 15 if J(1523.5)=3.
587.0[#] 3	1.00[#] 11	1829.01	4$^+$	1242.21	3$^{(-)}$				
597.2 4	0.54 9	2749.9	2$^+$	2152.8	2$^+$				
621.8 5	0.30 8	3371.9?		2749.9	2$^+$				
643.0 4	1.58 11	2534.3	3$^{(+)}$	1890.92	5$^{(+)}$,3				
662.5 4	1.17 10	3566.1		2903.6	(3$^-$,4$^+$,2)				
705.4 4	4.43 16	2534.3	3$^{(+)}$	1829.01	4$^+$	(M1+E2)	−0.63 9	0.0061 2	α(K)=0.00522 12; α(L)=0.00069
735.2 3	7.52 20	1673.67	4$^+$	938.65	4$^+$	(M1+E2)	+0.52 4	0.0057 1	α(K)=0.00486 5; α(L)=0.00064
746.9 4	0.78 9	3628.9	1$^{(-)}$,2$^+$	2882.0	2$^+$				
751.7 3	1.62 11	2642.41	4$^{(+)}$,(2$^+$)	1890.92	5$^{(+)}$,3	(M1+E2)			δ: 0.06 6 or 9.9 +114−35.
763.4[a] 4	0.40 9	3566.1		2802.5					
798.5 5	0.53 8	2040.7	3$^{(+)}$	1242.21	3$^{(-)}$				
813.2 4	0.52 8	2642.41	4$^{(+)}$,(2$^+$)	1829.01	4$^+$				
833.6 4	0.93 9	3238.85	4$^{(-)}$,(2)	2405.2	3,2$^{(+)}$				
844.8 4	23.6 9	1242.21	3$^{(-)}$	397.440	2$^+$	(E1+M2)	−0.126 5	0.0013	α(K)=0.00115; α(L)=0.00015
853.2 5	1.11 10	2881.7	3,5$^{(-)}$	2028.7	1$^{(+)}$				

$^{144}_{58}$Ce$_{86}$-5

γ(^{144}Ce) (continued)

E_γ	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[†]	δ[†]	α[&]	Comments
857.8[#] *5*	0.14[#] *13*	3263.0	(2$^+$,3,4$^+$)	2405.2	3,2$^{(+)}$				
860.8[#] *5*	0.59[#] *9*	2534.3	3$^{(+)}$	1673.67	4$^+$				
871.9[#] *5*	0.54[#] *10*	2998.7	2$^+$	2127.0	2$^{(+)}$,3$^{(+)}$,4				
890.4 *4*	1.34 *11*	1829.01	4$^+$	938.65	4$^+$	(M1+E2)	+0.68 *14*	0.0035 *2*	α(K)=0.00298 *10*; α(L)=0.00039
907.3 *5*	0.63 *9*	3060.1	1$^-$	2152.8	2$^+$				
948.6		1346.1	(1)	397.440	2$^+$				E_γ: part of a triplet resolved in high resolution detector (1986WaZQ).
950.9[#] *3*	2.0[#] *4*	2642.41	4$^{(+)}$,(2$^+$)	1691.53	3$^{(+)}$				
952.2[#] *3*	3.1[#] *4*	1890.92	5$^{(+)}$,3	938.65	4$^+$	D+Q			δ: −0.43 +*11*−*9* or −3.0 +*10*−*7* if J(1890)=5, 0.25 *7* if J(1890)=3.
957.9 *4*	0.38 *9*	3707.7		2749.9	2$^+$				
968.8 *5*	3.51 *14*	2642.41	4$^{(+)}$,(2$^+$)	1673.67	4$^+$	(E2,M1+E2)			δ: 0.5 *10* or −0.86 *1* if J(2642)=4.
974.2[#] *5*	0.55[#] *9*	3597.1		2623.2					
978.5 *5*	2.01 *12*	2220.8	4$^{(-)}$	1242.21	3$^{(-)}$	(M1+E2)	−0.32 *9*	0.0030 *1*	α(K)=0.00259 *5*; α(L)=0.00033
1006.2 *5*	0.17 *5*	2998.7	2$^+$	1991.55	3,5				
1010.8[#] *5*	0.46[#] *10*	3635.0	1$^{(-)}$,2$^+$	2623.2					
1017.8[#] *5*	0.28[#] *6*	3238.85	4$^{(-)}$,(2)	2220.8	4$^{(-)}$				
1044.5 *5*	0.20 *8*	3197.17	4$^{(+)}$,(3$^+$)	2152.8	2$^+$				
1052.7 *3*	2.14 *12*	1991.55	3,5	938.65	4$^+$	D+Q			δ: −0.24 *7* if J(1991)=5, 0.11 *5* if J(1991)=3.
1062.9 *6*	0.38 *9*	2881.7	3,5$^{(-)}$	1819.0	2$^+$				
1070.2 *5*	1.05 *11*	3197.17	4$^{(+)}$,(3$^+$)	2127.0	2$^{(+)}$,3$^{(+)}$,4				
1082.7[#] *6*	0.58[#] *10*	2021.1	3$^{(+)}$	938.65	4$^+$	(E2+M1)	−5.6 *36*	0.0017 *2*	α(K)=0.00148 *11*; α(L)=0.00020
1084.3 *6*	0.80 *15*	3197.17	4$^{(+)}$,(3$^+$)	2112.10	2$^+$,(1$^+$)	(E2)		0.00165	E_γ: placement by 1986WaZQ based upon coin with 1714γ, 2112γ.
1092.1 *5*	1.07 *11*	1489.0	2$^+$	397.440	2$^+$	(E2+M1)	5 +*12*−*3*	0.0017 *2*	α(K)=0.00146 *11*; α(L)=0.00019
1102.1 *5*	1.33 *11*	2040.7	3$^{(+)}$	938.65	4$^+$	(M1+E2)	−0.63 +*32*−*16*	0.0021 *2*	α(K)=0.00185 *13*; α(L)=0.00024
1153.0 *5*	0.46 *9*	2642.41	4$^{(+)}$,(2$^+$)	1489.0	2$^+$				
1170.2 *5*	0.49 *10*	2998.7	2$^+$	1829.01	4$^+$				
1176.2[#] *5*	0.52[#] *13*	3197.17	4$^{(+)}$,(3$^+$)	2021.1	3$^{(+)}$				
1190.4 *6*	0.50 *9*	2881.7	3,5$^{(-)}$	1691.53	3$^{(+)}$				
1212.0 *8*	<0.52	2903.6	(3$^-$,4$^+$,2)	1691.53	3$^{(+)}$				I_γ: Iγ(1212.0γ+1214.5γ)=0.43 *9*.
1214.5[a] *8*	<0.52	2152.8	2$^+$	938.65	4$^+$				I_γ: Iγ(1212.0γ+1214.5γ)=0.43 *9*.
1217.8 *6*	0.42 *9*	3209.3		1991.55	3,5				
1237.8 *6*	0.63 *10*	3278.6		2040.7	3$^{(+)}$				
1247.4 *6*	0.40 *10*	3238.85	4$^{(-)}$,(2)	1991.55	3,5				
1276.3 *5*	1.71 *12*	1673.67	4$^+$	397.440	2$^+$	(E2)		0.00118	α(K)=0.00105; α(L)=0.00014
1282.1[#] *6*	0.35[#] *9*	2220.8	4$^{(-)}$	938.65	4$^+$				
1294.2[#] *5*	4.0[#] *4*	1691.53	3$^{(+)}$	397.440	2$^+$	(M1+E2)			δ: −0.66≥δ≥−2.25.
1294.4[#] *5*	2.9[#] *4*	2536.6	2,3$^{(+)}$,4	1242.21	3$^{(-)}$	D+Q			δ: −0.31 *19* if J(2536)=2; 0.21 *31* if J(2536)=3; 0.06≤δ≤5.71 if J(2536)=4.

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γ(^{144}Ce) (continued)

E_γ	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	δ[†]	α[&]	Comments
1307.4[#] *6*	0.20[#] *5*	2998.7	2$^+$	1691.53	3$^{(+)}$				
1308.4[#] *6*	0.50[#] *10*	3173.0	2,3	1864.5	1				
1346.1		1346.1	(1)	0.0	0$^+$				E_γ: placement from 1986WaZQ.
1347.8 *6*	1.59 *11*	3238.85	4$^{(-)}$,(2)	1890.92	5$^{(+)}$,3	(E1+M2)	−0.09 *22*		α(K)=0.00045 *20*
1357.8 *5*	0.30 *10*	2881.7	3,5$^{(-)}$	1523.67	(5$^-$)	(E2+M1)			δ: 0.72≤δ≤4.60 if J(2882)=5.
1367.6 *5*	0.46 *10*	3408.5		2040.7	3$^{(+)}$				
1380.1 *6*	0.79 *11*	2903.6	(3$^-$,4$^+$,2)	1523.67	(5$^-$)				
1387.5[#] *6*	0.68[#] *10*	3408.5		2021.1	3$^{(+)}$				
1401.1 *6*	0.76 *10*	2339.8	2$^+$	938.65	4$^+$				
1413.9 *6*	0.58 *10*	2352.6	2$^+$	938.65	4$^+$				
1421.8 *6*	1.20 *11*	1819.0	2$^+$	397.440	2$^+$	(E2+M1)	−3.5 +*14*−*49*	0.0010 *1*	α(K)=0.00087 *4*; α(L)=0.00011
1431.4 *4*	4.43 *17*	1829.01	4$^+$	397.440	2$^+$	E2			α(K)=0.00083; α(L)=0.00011
1437.8 *6*	0.14 *8*	3790.1		2352.6	2$^+$				
1450.2 *6*	0.41 *10*	3790.1		2339.8	2$^+$				
1467.1 *6*	0.64 *10*	1864.5	1	397.440	2$^+$	D(+Q)	−0.4 *4*		α(K)= 0.0006 *5*
1489.6 *6*	1.50 *12*	1489.0	2$^+$	0.0	0$^+$				
1499.3 *7*	0.74 *11*	3173.0	2,3	1673.67	4$^+$				
1505.7 *7*	0.41 *10*	3197.17	4$^{(+)}$,(3$^+$)	1691.53	3$^{(+)}$				
1523.5 *7*	3.69 *16*	3197.17	4$^{(+)}$,(3$^+$)	1673.67	4$^+$	(M1+E2)			δ: −0.99≤δ≤0.02 if J(3197)=4; −0.51 *8* if J(3197)=3.
1623.8 *7*	0.74 *10*	2021.1	3$^{(+)}$	397.440	2$^+$	(M1+E2)	+0.13 +*24*−*19*		
1631.8 *7*	1.10 *11*	2028.7	1$^{(+)}$	397.440	2$^+$	(M1+E2)	+0.53 +*14*−*11*		
1639.8[#] *9*	0.80[#] *12*	2882.0	2$^+$	1242.21	3$^{(-)}$				
1641.9[#] *9*	0.30[#] *16*	2040.7	3$^{(+)}$	397.440	2$^+$				
1661.4 *7*	0.70 *10*	2903.6	(3$^-$,4$^+$,2)	1242.21	3$^{(-)}$				
1673.7 *6*	1.47 *12*	3197.17	4$^{(+)}$,(3$^+$)	1523.67	(5$^-$)	D+Q			δ: −0.056 *61* if J(3197)=4.
1683.1 *7*	0.73 *10*	2623.2		938.65	4$^+$				
1714.6[#] *8*	1.04[#] *18*	2112.10	2$^+$,(1$^+$)	397.440	2$^+$	(M1+E2)			δ: −0.14≥δ≥−1.60 if J(2112)=2; −0.58≥δ≥−1.22 if J(2112)=1.
1715.6[#] *8*	0.93[#] *12*	3238.85	4$^{(-)}$,(2)	1523.67	(5$^-$)	D+Q			
1754.7[#] *9*	0.44[#] *8*	2692.8	4$^{(+)}$,3	938.65	4$^+$	D+Q			
1755.5[#] *8*	1.12[#] *17*	2152.8	2$^+$	397.440	2$^+$	(M1+E2)			δ: −0.14≥δ≥−1.61.
1756.8[#] *8*	0.37[#] *9*	2998.7	2$^+$	1242.21	3$^{(-)}$				
1765.7 *8*	0.63 *10*	3007.9	1$^{(-)}$,2$^+$	1242.21	3$^{(-)}$				
1804.4 *8*	0.71 *9*	3293.6		1489.0	2$^+$				
1818.0[#] *9*	0.41[#] *8*	3060.1	1$^-$	1242.21	3$^{(-)}$				
1819.1[#] *9*	0.13[#] *13*	1819.0	2$^+$	0.0	0$^+$				
1842.9 *10*	0.28 *8*	3707.7		1864.5	1				
1863.8 *9*	0.30 *11*	2802.5		938.65	4$^+$				
1864.2 *9*	0.30 *11*	1864.5	1	0.0	0$^+$				

γ(^{144}Ce) (continued)

E_γ	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[†]	δ[†]	Comments
1930.9 *8*	0.22 *7*	3173.0	2,3	1242.21	$3^{(-)}$			
1942.2 *9*	1.48 *13*	2339.8	2^+	397.440	2^+	(M1+E2)	+0.07 *17*	
1942.7 *9*	0.33 *7*	2881.7	$3,5^{(-)}$	938.65	4^+	(E1+M2)		δ: −0.17 *19* if J(1942)=3; 0.11 *26* if J(1942)=5.
1955.1[#] *9*	0.54[#] *16*	2352.6	2^+	397.440	2^+			
1955.2[#] *9*	0.98[#] *13*	3197.17	$4^{(+)},(3^+)$	1242.21	$3^{(-)}$			
1965.0[#] *9*	0.36[#] *8*	2903.6	$(3^-,4^+,2)$	938.65	4^+			
1966.8[#] *9*	0.39[#] *8*	3209.3		1242.21	$3^{(-)}$			
1996.4 *7*	3.00 *14*	3238.85	$4^{(-)},(2)$	1242.21	$3^{(-)}$	D+Q		δ: −0.42 *+10−8* if J(3238)=4; 0.20 *6* if J(3238)=2.
2007.8 *9*	1.24 *10*	2405.2	$3,2^{(+)}$	397.440	2^+	D+Q		δ: 0.59 *+30−18* if J(2405)=2; −0.11 *+14−8* or $-14.2\le\delta\le5.18$ if J(2405)=3.
2028.7 *9*	0.37 *6*	2028.7	$1^{(+)}$	0.0	0^+			
2036.5 *9*	0.46 *9*	3278.6		1242.21	$3^{(-)}$			
2050.0[#] *10*	0.81[#] *14*	2447.46		397.440	2^+			
2051.4[#] *10*	0.56[#] *9*	3293.6		1242.21	$3^{(-)}$			
2112.0[#] *2*	0.23[#] *8*	2112.10	$2^+,(1^+)$	0.0	0^+			
2131.0[#] *16*	0.06[#] *3*	3371.9?		1242.21	$3^{(-)}$			
2137.4[#] *9*	0.30[#] *8*	2534.3	$3^{(+)}$	397.440	2^+			
2150.8[#] *9*	0.20[#] *8*	3635.0	$1^{(-)},2^+$	1489.0	2^+			
2152.8 *9*	0.30 *14*	2152.8	2^+	0.0	0^+			
2154.0[#] *10*	0.27[#] *7*	3396.2?		1242.21	$3^{(-)}$			
2166.5[#] *9*	0.36[#] *7*	3408.5		1242.21	$3^{(-)}$			
2182.1[#a] *9*	0.12[#] *4*	3424.2?		1242.21	$3^{(-)}$			
2184.2[#] *9*	0.18[#] *5*	3707.7		1523.67	(5^-)			
2258.7 *9*	0.69 *8*	3197.17	$4^{(+)},(3^+)$	938.65	4^+			
2300.0 *10*	0.35 *7*	3238.85	$4^{(-)},(2)$	938.65	4^+			
2323.7[#] *9*	0.37[#] *7*	3566.1		1242.21	$3^{(-)}$			
2324.4[#] *9*	0.60[#] *9*	3263.0	$(2^+,3,4^+)$	938.65	4^+			
2339.5	0.29	2339.8	2^+	0.0	0^+			E_γ,I_γ: given in authors′ decay scheme but not in their table.
2340.0[#] *15*	0.24[#] *6*	3278.6		938.65	4^+			
2352.4[#a] *10*	0.27[#] *10*	2352.6	2^+	0.0	0^+			
2352.9[#] *10*	0.50[#] *14*	2749.9	2^+	397.440	2^+	(M1+E2)		δ: $0.42\ge\delta\ge-41.11$.
2353.6[#] *10*	0.22[#] *5*	3597.1		1242.21	$3^{(-)}$			
2372.0[#] *20*	0.14[#] *4*	3614.2		1242.21	$3^{(-)}$			
2386.8[#] *20*	<0.25[#]	3628.9	$1^{(-)},2^+$	1242.21	$3^{(-)}$			I_γ: Iγ(2386γ+2390γ)=0.20 *5*.
2390.3[#] *20*	<0.25[#]	3635.0	$1^{(-)},2^+$	1242.21	$3^{(-)}$			I_γ: Iγ(2386γ+2390)=0.20 *5*.
2464.2[#] *10*	0.15[#] *4*	3707.7		1242.21	$3^{(-)}$			
2540.0[a] *11*	0.39 *6*	2937.3?		397.440	2^+			

$\gamma(^{144}Ce)$ (continued)

E_γ	I_γ [@]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [†]	δ [†]
2547.6[#] *11*	0.12[#] *4*	3790.1		1242.21	$3^{(-)}$		
2662.7 *10*	2.08 *10*	3060.1	1^-	397.440	2^+	(E1+M2)	−0.09 *8*
2731.4[#] *12*	0.13[#] *3*	3973.6		1242.21	$3^{(-)}$		
2749.9 *12*	0.13 *3*	2749.9	2^+	0.0	0^+		
2865.2 *12*	1.10 *9*	3263.0	$(2^+,3,4^+)$	397.440	2^+		
2881.9 *12*	0.33 *6*	2882.0	2^+	0.0	0^+		
2896.2 *12*	0.32 *6*	3293.6		397.440	2^+		
2998.9[a] *15*	0.22 *5*	2998.7	2^+	0.0	0^+		
3007.4[a] *15*	0.20 *5*	3007.9	$1^{(-)},2^+$	0.0	0^+		
3027.4[a] *15*	0.26 *5*	3424.2?		397.440	2^+		
3060.0 *15*	0.13 *3*	3060.1	1^-	0.0	0^+		
3628.9 *15*	0.12 *3*	3628.9	$1^{(-)},2^+$	0.0	0^+		
3632.4 *15*	0.10 *3*	3635.0	$1^{(-)},2^+$	0.0	0^+		

† Unless indicated otherwise, multipolarities and mixing ratios are deduced from $\gamma\gamma(\theta)$. The character of most transitions, whether M1 or E1, for example, is inferred from the deduced mixing ratio. 1982Mi01 assumed that the transitions with Q admixtures>10% are E2′s and predominantly D transitions are E1′s.

‡ From 1979Bo26 cryst.

From coincidence spectra (1982Mi01).

@ For absolute intensity per 100 decays, multiply by 0.943 *16*.

& 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.

a Placement of transition in the level scheme is uncertain.

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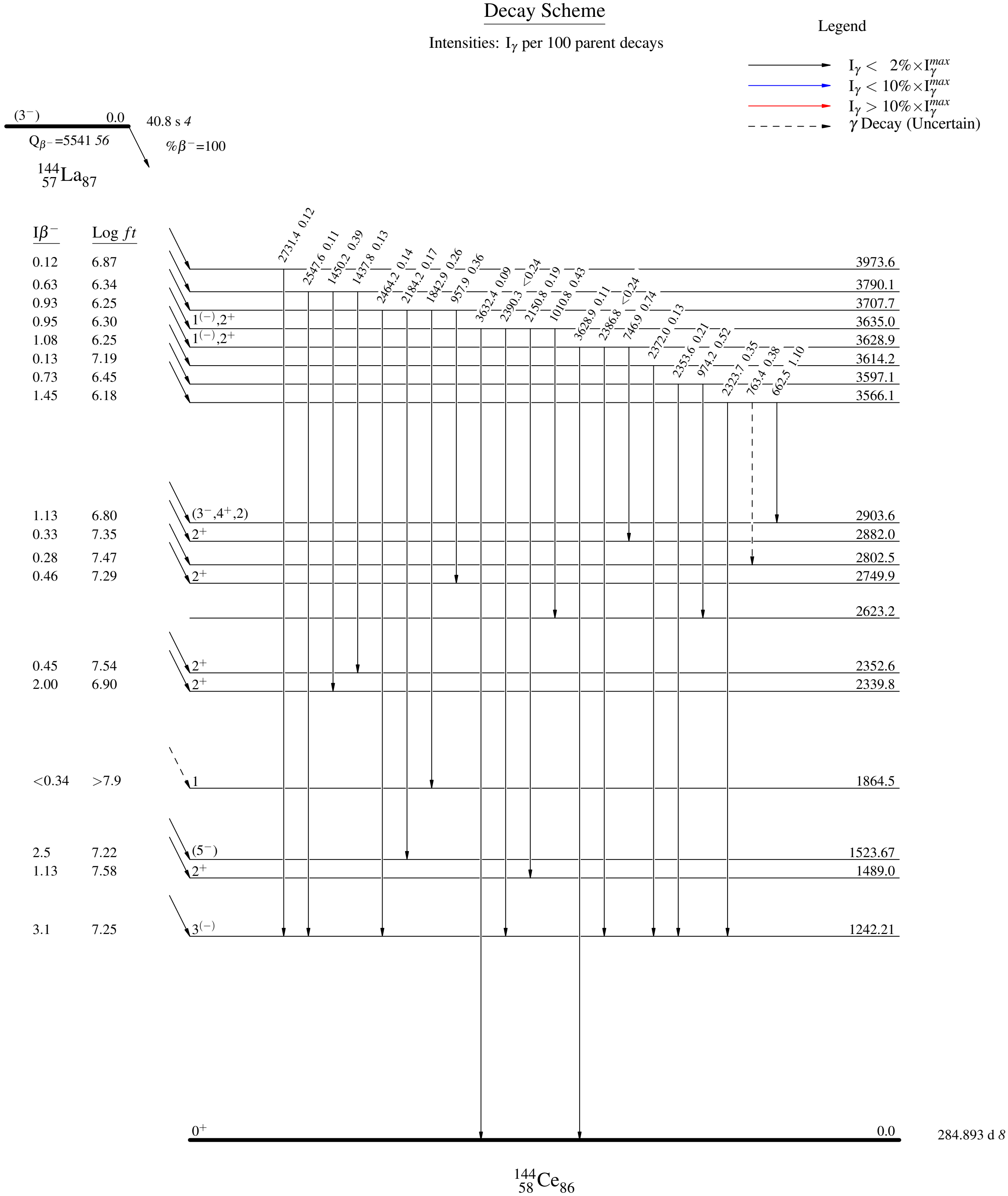
^{144}La β^- decay 1982Mi01,1986WaZQ,1997Gr09

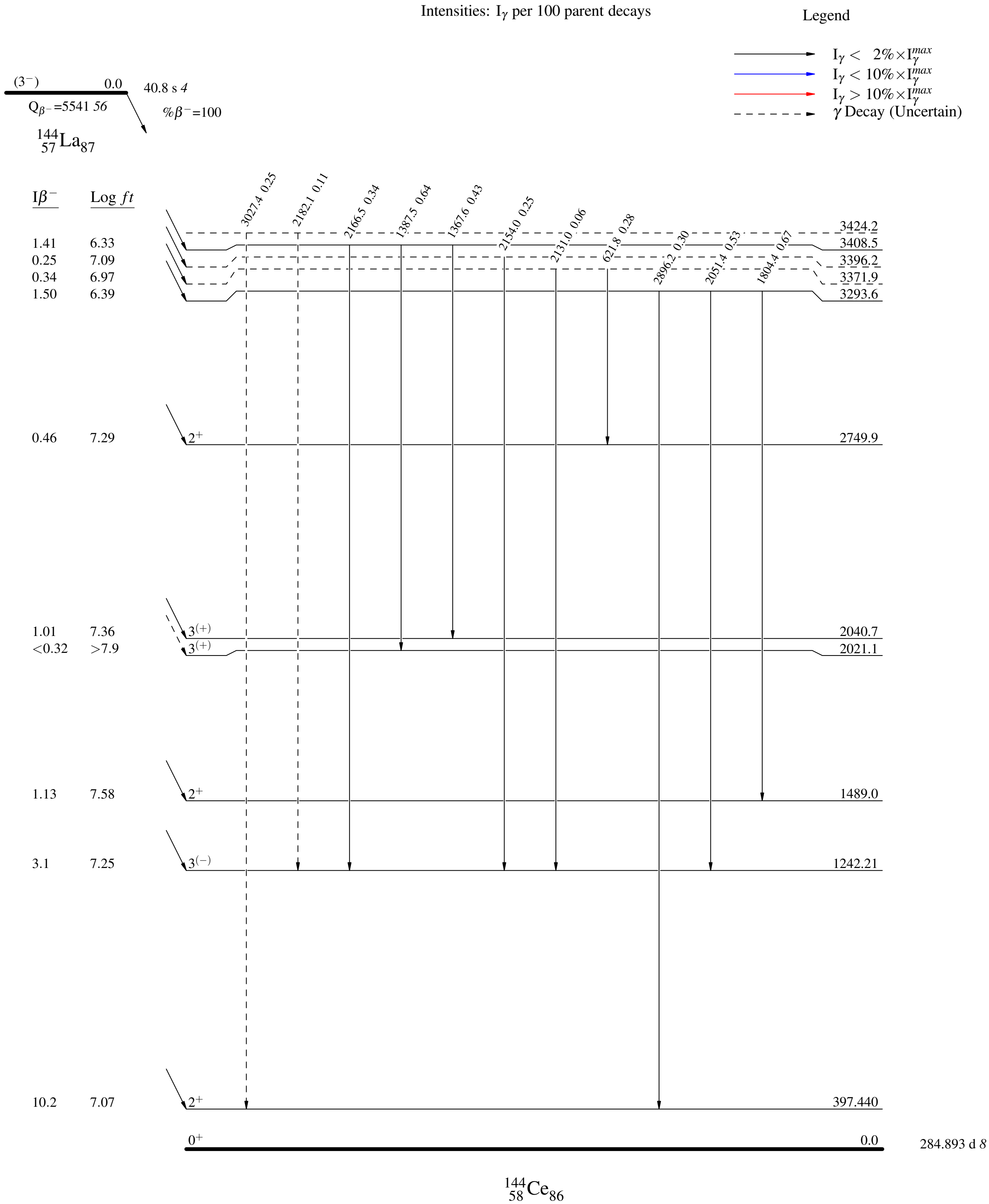
Decay Scheme

Intensities: I_γ per 100 parent decays



^{144}La β^- decay 1982Mi01,1986WaZQ,1997Gr09

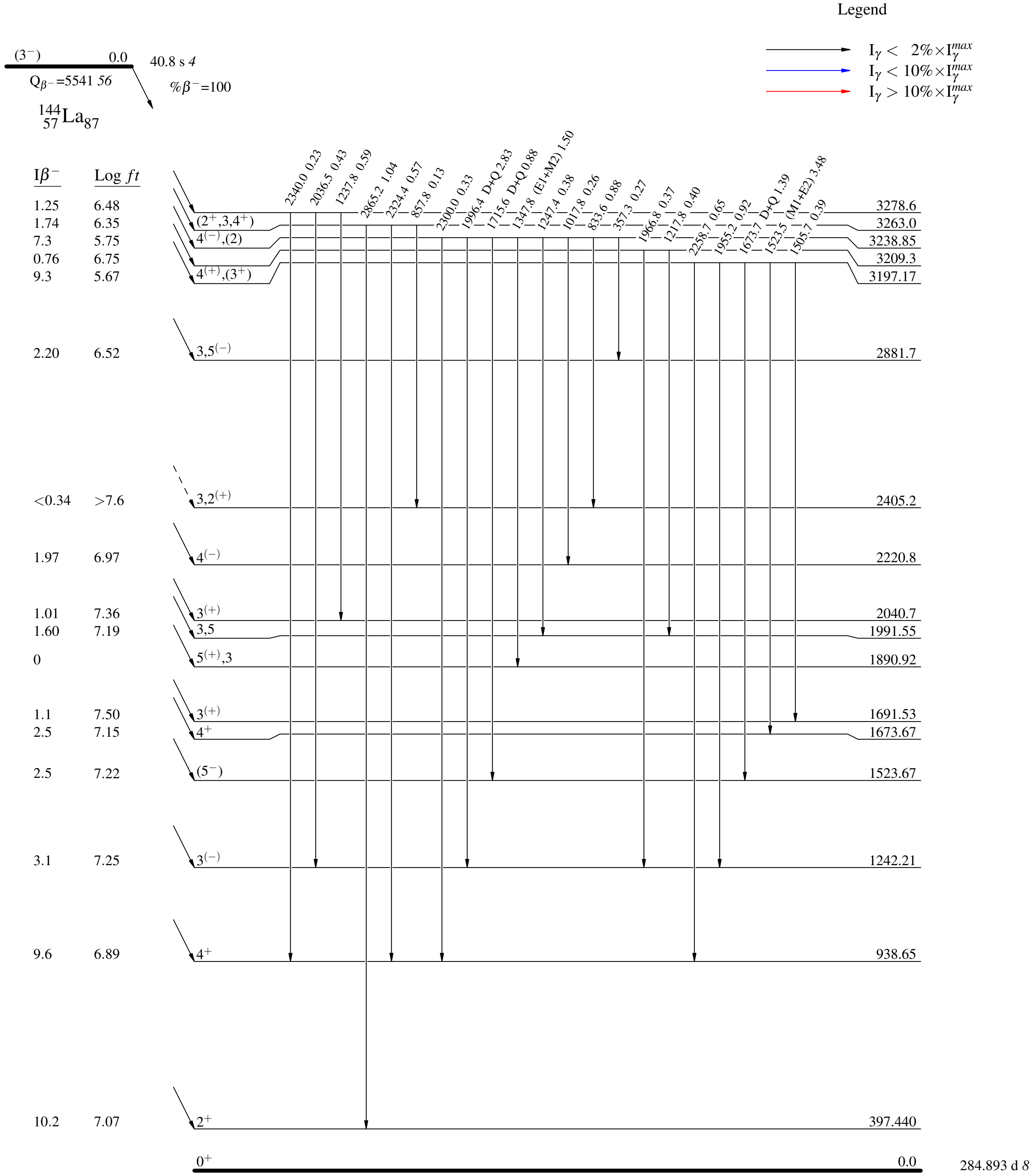
Decay Scheme (continued)



^{144}La β^- decay 1982Mi01,1986WaZQ,1997Gr09

Decay Scheme (continued)

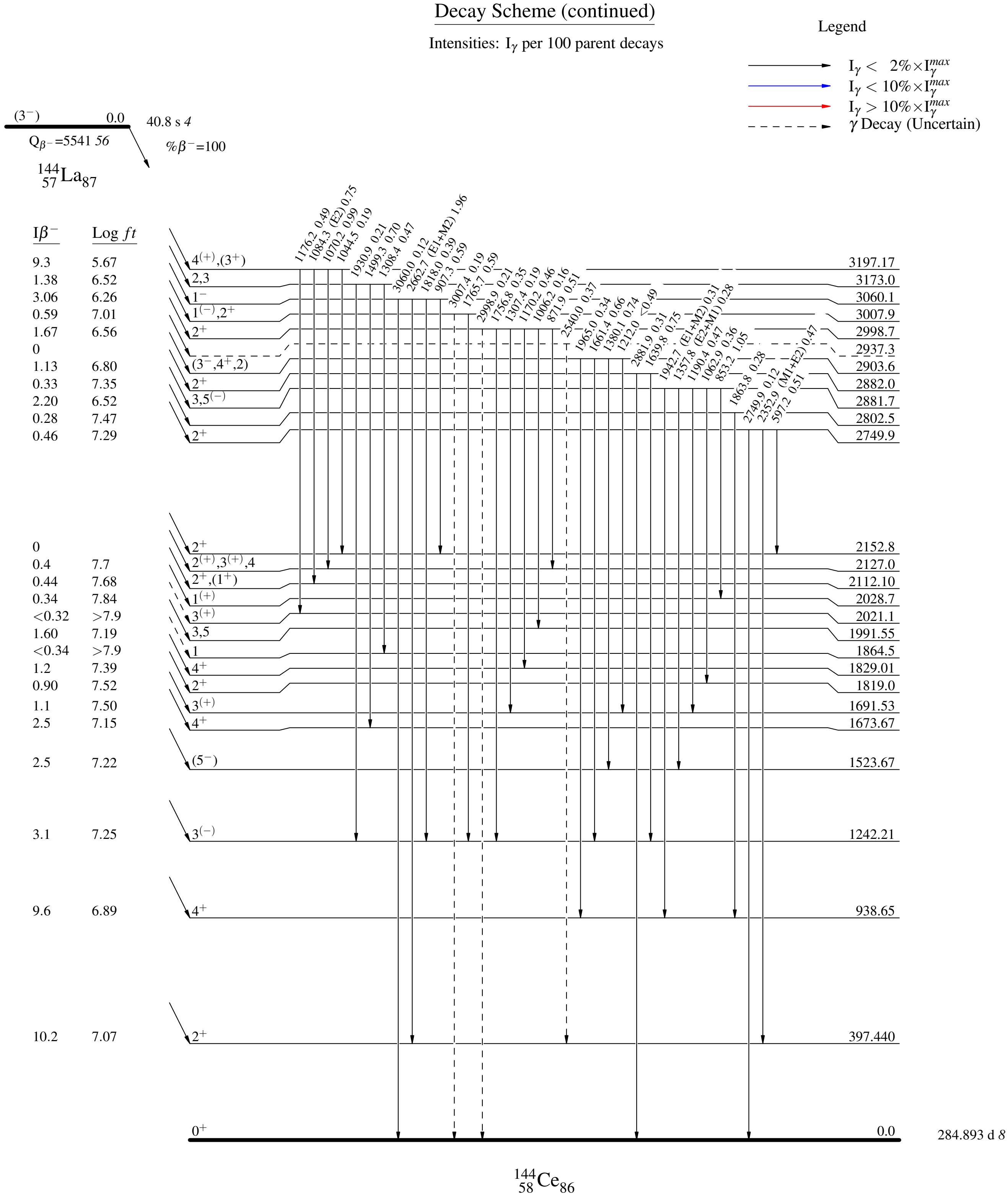
Intensities: I_γ per 100 parent decays



^{144}La β^- decay 1982Mi01,1986WaZQ,1997Gr09

Decay Scheme (continued)

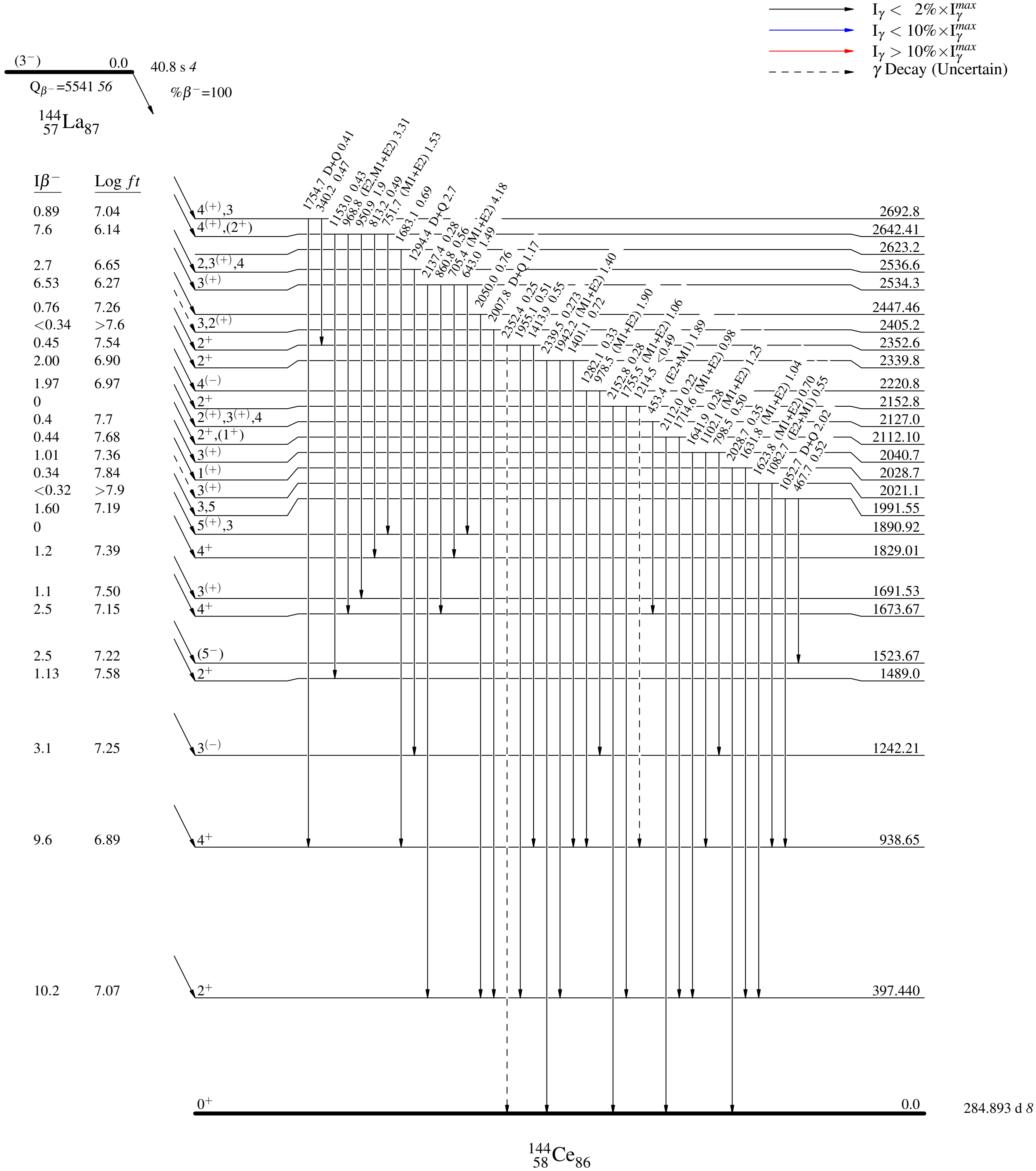
Intensities: I_γ per 100 parent decays



^{144}La β^- decay 1982Mi01,1986WaZQ,1997Gr09

Decay Scheme (continued)

Intensities: I_γ per 100 parent decays



^{144}La β^- decay 1982Mi01,1986WaZQ,1997Gr09

Decay Scheme (continued)

Intensities: I_γ per 100 parent decays