^{143}Ce β^- decay 1989Ku13

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 113, 715 (2012)	31-May-2011

Parent: ^{143}Ce: E=0.0; $J^\pi=3/2^-$; $T_{1/2}$=33.039 h *6*; Q(β^-)=1461.9 *18*; %β^- decay=100.0

Measured: γ rays (1989Ku13,1982Ge03,1975Da20,1971Lu05); $\gamma\gamma$ coincidence (1975Da20,1971Lu05,1968Gr19); $\gamma\gamma(\theta)$ (1975Ch31,1974Ve07,1966Su06); $\beta\gamma$ (1977Ra18,1968Me01,1956Ma16); shape of β^- (1977Ra18,1984Ve12); ce (1967Ba23); $\beta\gamma(\theta)$ (1968Ra31,1970Ra36); $\beta\gamma(\theta$,H) (1966Zm01,1964Ko15); $\gamma\gamma(\theta$,H) (1974Ve07), $\gamma\gamma(\theta$,H,t) (1977Ne12). Others: 1966Ba17, 1966Ar14, 1965Ma43, 1964Si24, 1966Go20, 1963Ra07, 1963Gr38, 1983Ve11.

Measured: Eβ^-=540 *30*, 738 *13*, 950 *30*, 1100 *25* $\beta\gamma$ (1968Me01); 1110 *2* (statistical shape) $\beta\gamma$ (1977Ra18,1984Ve12). Others: ≈200 (6%), 500 *30* (12%), 740 *150* (5%), 1125 *20* (40%), 1400 *20* (37%) (1956Ma16); see also 1952Ko27.

β^- feeding was determined from balance of Iγ for each level and I(293γ)=42.8% *4* (1982Ge03).

^{143}Pr Levels

E(level)	J^π[†]	$T_{1/2}$	Comments
0.0	$7/2^+$	13.57 d *2*	%β^-=100
57.356 *7*	$5/2^+$	4.14 ns *5*	$T_{1/2}$: weighted average: 4.20 ns *7* (1963Bo22), 4.17 ns *9* (1963Gr38), 4.16 ns *7* (1965Na06), 4.05 ns *12* (1969MuZO). Additional information 1.
350.622 *4*	$3/2^+$	59 ps *10*	$T_{1/2}$: average: 49 ps *7* (1966Go20), 68 ps *8* (1969MuZO).
490.362 *7*	$7/2^+$		
614.22 *2*	$5/2^+$,$7/2^+$		
721.923 *1*	$5/2^+$		
740.26 *2*	$1/2^+$		
787.33 *9*			
848.42 *2*			
937.82 *1*	$3/2^+$,$5/2^+$		
1014.3 *1*			
1060.21 *2*	$5/2^+$		
1156.94 *2*	$1/2^+$,$3/2^+$		
1160.58 *2*	$(3/2)^+$		
1381.84 *3*	$5/2^+$,$3/2^+$		
1397.40 *4*	$3/2^+$,$5/2^+$		

[†] Adopted values.

β^- radiations

E(decay)	E(level)	Iβ^-[†]	Log *ft*	Comments
(64.5 *18*)	1397.40	0.017 *1*	6.6	av Eβ=16.6 *5*
(80.1 *18*)	1381.84	0.034 *2*	6.6	av Eβ=20.8 *5*
(301.3 *18*)	1160.58	0.46 *1*	7.3	av Eβ=85.8 *6*
(305.0 *18*)	1156.94	0.036 *2*	8.4	av Eβ=86.9 *6*
(401.7 *18*)	1060.21	0.16 *1*	8.1	av Eβ=118.5 *6*
(447.6 *18*)	1014.3	0.0043 *8*	9.8[1u]	av Eβ=149.7 *7*
(524.1 *18*)	937.82	1.37 *2*	7.6	av Eβ=160.7 *7*
(613.5 *18*)	848.42	0.058 *3*	9.2	av Eβ=192.8 *7*
(721.6 *18*)	740.26	0.037 *3*	9.6	av Eβ=233.1 *7*
738 *13*	721.923	13.4 *2*	7.1	av Eβ=240.0 *7*
(847.7 *18*)	614.22	0.026 *4*	10.0	av Eβ=281.6 *7*
950 *30*	490.362	0.10 *6*	10.2[1u]	av Eβ=341.8 *7*
1110 *2*	350.622	48.2 *5*	7.2	av Eβ=387.4 *8*
				E(decay): from 1977Ra18.

Continued on next page (footnotes at end of table)

^{143}Ce β^- decay 1989Ku13 (continued)

β^- radiations (continued)

E(decay)	E(level)	Iβ^-[†]	Log *ft*	Comments
1400 *20*	57.356	35 *3*	7.7	av Eβ=510.5 *8*
1461.4 *18*	0.0	≤0.2	≥10.8[1u]	av Eβ=538.11 *75*

[†] Absolute intensity per 100 decays.

$\gamma(^{143}Pr)$

Iγ normalization: I(293γ)=42.8% *4* (1982Ge03).

E_γ	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[#]	α[†]	Comments
57.356 *7*	27.4 *8*	57.356	5/2$^+$	0.0	7/2$^+$	M1+E2	+0.039 *8*	6.47	α(K)=5.48 *8*; α(L)=0.777 *13*; α(M)=0.164 *3*; α(N+..)=0.0429 *7* α(N)=0.0366 *6*; α(O)=0.00587 *9*; α(P)=0.000422 *6* Additional information 2. Mult.: α(K)exp=5.64 *34*; L1:L2:L3=1000:91.0 *17*:27.2 *7* (1968Ge02). δ: from L1:L2:L3 (1968Ge02), sign from γγ(θ) (1975Ch31). Iγ: 12.3% *3* (1982Ge03).
122.4 *1*	0.020 *7*	1060.21	5/2$^+$	937.82	3/2$^+$,5/2$^+$	E2		1.033	α(K)=0.663 *10*; α(L)=0.289 *5*; α(M)=0.0648 *10*; α(N+..)=0.01607 *24* α(N)=0.01405 *21*; α(O)=0.00198 *3*; α(P)=3.61×10^{-5} *6* Mult.: K/L=2.14 *10* (1967Ba23,1971Ba40).
139.742 *17*	0.18 *1*	490.362	7/2$^+$	350.622	3/2$^+$	E2		0.649	α(K)=0.441 *7*; α(L)=0.1634 *23*; α(M)=0.0365 *6*; α(N+..)=0.00907 *13* α(N)=0.00791 *11*; α(O)=0.001128 *16*; α(P)=2.47×10^{-5} *4* Mult.: K/L=2.45 *12* (1967Ba23), K/L=2.7 (theory,E2).
197.6 *2*	0.006 *3*	937.82	3/2$^+$,5/2$^+$	740.26	1/2$^+$				
231.550 *2*	4.8 *1*	721.923	5/2$^+$	490.362	7/2$^+$	E2(+M1)		0.121 *5*	α(K)=0.098 *9*; α(L)=0.018 *4*; α(M)=0.0038 *8*; α(N+..)=0.00098 *19* α(N)=0.00085 *17*; α(O)=0.000130 *20*; α(P)=6.9×10^{-6} *13* Mult.: α(K)exp=0.085 *13*, α(K)=0.1083 (M1), α(K)=0.0900 (E2).
272.9 *2*	≤0.02	1060.21	5/2$^+$	787.33					
293.266 *2*	100.0 *3*	350.622	3/2$^+$	57.356	5/2$^+$	M1+E2	+0.77 *10*	0.0620 *12*	α(K)=0.0518 *12*; α(L)=0.00806 *14*; α(M)=0.00172 *3*; α(N+..)=0.000445 *8* α(N)=0.000382 *7*; α(O)=5.98×10^{-5} *9*; α(P)=3.76×10^{-6} *11* Additional information 3. Iγ: 42.8% *4* (1982Ge03). Others: 42.6% (1957Ma16), 41.3% (1971Lu05). Mult.: K/L=6.04 *13*, L1:L2:L3=1000:177 *10*:14 *6* (1968Ge02), α(K)exp=0.053 *4* (1989Ku13). δ: from L1:L2:L3 (1968Ge02), sign from γγ(θ) (1975Ch31). Others: 1974Ve07, 1966Su06.
338.3 *2*	0.002 *1*	1060.21	5/2$^+$	721.923	5/2$^+$				
350.619 *3*	7.55 *6*	350.622	3/2$^+$	0.0	7/2$^+$	E2		0.0312	α(K)=0.0253 *4*; α(L)=0.00467 *7*; α(M)=0.001008 *15*;

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^{143}Ce β^- decay 1989Ku13 (continued)

$\gamma(^{143}Pr)$ (continued)

E_γ	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[†]	Comments
								α(N+..)=0.000258 *4* α(N)=0.000222 *4*; α(O)=3.38×10^{-5} *5*; α(P)=1.691×10^{-6} *24* Additional information 4. Mult.: α(K)exp=0.025 *2* (1989Ku13).
357.8 *2*	0.0014 *5*	848.42		490.362	7/2$^+$			
371.29 *3*	0.058 *6*	721.923	5/2$^+$	350.622	3/2$^+$	M1	0.0360	α(K)=0.0308 *5*; α(L)=0.00411 *6*; α(M)=0.000865 *13*; α(N+..)=0.000227 *4* α(N)=0.000193 *3*; α(O)=3.12×10^{-5} *5*; α(P)=2.33×10^{-6} *4* Mult.: α(K)exp=0.041 *6*.
389.64 *2*	0.085 *4*	740.26	1/2$^+$	350.622	3/2$^+$	M1	0.0318	α(K)=0.0272 *4*; α(L)=0.00363 *5*; α(M)=0.000762 *11*; α(N+..)=0.000200 *3* α(N)=0.0001705 *24*; α(O)=2.75×10^{-5} *4*; α(P)=2.06×10^{-6} *3* Mult.: α(K)exp≥0.008 *2*.
416.57 *10*	0.016 *3*	1156.94	1/2$^+$,3/2$^+$	740.26	1/2$^+$			
432.999 *6*	0.371 *7*	490.362	7/2$^+$	57.356	5/2$^+$	M1	0.0243	α(K)=0.0208 *3*; α(L)=0.00276 *4*; α(M)=0.000580 *9*; α(N+..)=0.0001523 *22* α(N)=0.0001298 *19*; α(O)=2.10×10^{-5} *3*; α(P)=1.569×10^{-6} *22* α(K)=0.02105 Mult.: α(K)exp=0.022 *4*.
438.43 *8*	0.010 *2*	1160.58	(3/2)$^+$	721.923	5/2$^+$			
446.02 *9*	0.035 *7*	1060.21	5/2$^+$	614.22	5/2$^+$,7/2$^+$	M1,E2	0.019 *4*	α(K)=0.016 *4*; α(L)=0.00234 *22*; α(M)=0.00050 *5*; α(N+..)=0.000129 *12* α(N)=0.000110 *10*; α(O)=1.75×10^{-5} *20*; α(P)=1.2×10^{-6} *3* Mult.: α(K)exp=0.017 *5* (for 446.02γ+447.45γ).
447.45 *2*	0.140 *6*	937.82	3/2$^+$,5/2$^+$	490.362	7/2$^+$	[E2]	0.01532	α(K)=0.01264 *18*; α(L)=0.00211 *3*; α(M)=0.000451 *7*; α(N+..)=0.0001160 *17* α(N)=9.98×10^{-5} *14*; α(O)=1.541×10^{-5} *22*; α(P)=8.70×10^{-7} *13* Mult.: M1,E2 from α(K)exp=0.017 *5* (for 446.02γ+447.45γ). E2 from ΔJ^π.
490.368 *5*	5.05 *5*	490.362	7/2$^+$	0.0	7/2$^+$	M1	0.01771	α(K)=0.01517 *22*; α(L)=0.00201 *3*; α(M)=0.000422 *6*; α(N+..)=0.0001107 *16* α(N)=9.43×10^{-5} *14*; α(O)=1.524×10^{-5} *22*; α(P)=1.144×10^{-6} *16* α(K)=0.01538 Mult.: α(K)exp=0.015 *2*.
497.81 *2*	0.104 *6*	848.42		350.622	3/2$^+$			
523.0 *5*	0.004 *1*	1014.3		490.362	7/2$^+$			
556.87 *1*	0.074 *4*	614.22	5/2$^+$,7/2$^+$	57.356	5/2$^+$	E2+(M1)	0.0107 *23*	α(K)=0.0091 *20*; α(L)=0.00128 *19*; α(M)=0.00027 *4*; α(N+..)=7.0×10^{-5} *10* α(N)=6.0×10^{-5} *9*; α(O)=9.6×10^{-6} *15*; α(P)=6.6×10^{-7} *17* Mult.: α(K)exp=0.007 *4*, α(K)=0.01122 (M1), α(K)=0.00708 (E2).
569.91 *9*	0.012 *4*	1060.21	5/2$^+$	490.362	7/2$^+$			
587.20 *2*	0.623 *6*	937.82	3/2$^+$,5/2$^+$	350.622	3/2$^+$	M1	0.01130	α(K)=0.00969 *14*; α(L)=0.001275 *18*; α(M)=0.000268 *4*;

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^{143}Ce β^- decay 1989Ku13 (continued)

$\gamma(^{143}Pr)$ (continued)

E_γ	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[†]	Comments
								α(N+..)=7.03×10^{-5} *10* α(N)=5.99×10^{-5} *9*; α(O)=9.67×10^{-6} *14*; α(P)=7.28×10^{-7} *11* Mult.: α(K)exp=0.010 *1*.
594.5 *4*	≤0.005	1381.84	5/2$^+$,3/2$^+$	787.33				
614.22 *3*	0.028 *3*	614.22	5/2$^+$,7/2$^+$	0.0	7/2$^+$			
664.571 *15*	13.3 *1*	721.923	5/2$^+$	57.356	5/2$^+$	M1+(E2)	0.0069 *15*	α=0.0069 *15*; α(K)=0.0059 *13*; α(L)=0.00080 *14*; α(M)=0.00017 *3*; α(N+..)=4.4×10^{-5} *8* α(N)=3.8×10^{-5} *7*; α(O)=6.0×10^{-6} *11*; α(P)=4.3×10^{-7} *11* Mult.: α(K)exp=0.0065 *10*, α(K)=0.00726 (M1), α(K)=0.00456 (E2).
670.12 *7*	0.019 *4*	1160.58	(3/2)$^+$	490.362	7/2$^+$			
675.5 *5*	0.002 *1*	1397.40	3/2$^+$,5/2$^+$	721.923	5/2$^+$			
682.82 *9*	0.020 *4*	740.26	1/2$^+$	57.356	5/2$^+$			
709.59 *5*	0.020 *3*	1060.21	5/2$^+$	350.622	3/2$^+$			
721.929 *13*	12.6 *1*	721.923	5/2$^+$	0.0	7/2$^+$	M1	0.00682 *10*	α=0.00682 *10*; α(K)=0.00585 *9*; α(L)=0.000765 *11*; α(M)=0.0001604 *23*; α(N+..)=4.21×10^{-5} *6* α(N)=3.59×10^{-5} *5*; α(O)=5.80×10^{-6} *9*; α(P)=4.38×10^{-7} *7* Mult.: α(K)exp=0.0071 *7*.
729.87 *8*	0.007 *1*	787.33		57.356	5/2$^+$			
767.70 *6*	0.0074 *8*	1381.84	5/2$^+$,3/2$^+$	614.22	5/2$^+$,7/2$^+$			
787.40 *9*	0.006 *1*	787.33		0.0	7/2$^+$			
791.07 *2*	0.031 *1*	848.42		57.356	5/2$^+$			
806.34 *2*	0.067 *2*	1156.94	1/2$^+$,3/2$^+$	350.622	3/2$^+$	M1+E2	0.0043 *9*	α=0.0043 *9*; α(K)=0.0037 *8*; α(L)=0.00050 *9*; α(M)=0.000104 *18*; α(N+..)=2.7×10^{-5} *5* α(N)=2.3×10^{-5} *4*; α(O)=3.7×10^{-6} *7*; α(P)=2.7×10^{-7} *7* Mult.: α(K)exp=0.0044 *6*.
809.98 *2*	0.073 *2*	1160.58	(3/2)$^+$	350.622	3/2$^+$			
880.46 *1*	2.41 *2*	937.82	3/2$^+$,5/2$^+$	57.356	5/2$^+$	M1	0.00424 *6*	α=0.00424 *6*; α(K)=0.00364 *5*; α(L)=0.000473 *7*; α(M)=9.90×10^{-5} *14*; α(N+..)=2.60×10^{-5} *4* α(N)=2.22×10^{-5} *4*; α(O)=3.59×10^{-6} *5*; α(P)=2.72×10^{-7} *4* Mult.: α(K)exp=0.0047 *4*.
891.47 *7*	0.019 *2*	1381.84	5/2$^+$,3/2$^+$	490.362	7/2$^+$			
907.1 *1*	0.003 *1*	1397.40	3/2$^+$,5/2$^+$	490.362	7/2$^+$			
937.82 *1*	0.061 *3*	937.82	3/2$^+$,5/2$^+$	0.0	7/2$^+$	E2	0.00244 *4*	α=0.00244 *4*; α(K)=0.00208 *3*; α(L)=0.000286 *4*; α(M)=6.01×10^{-5} *9*; α(N+..)=1.569×10^{-5} *22* α(N)=1.340×10^{-5} *19*; α(O)=2.14×10^{-6} *3*; α(P)=1.494×10^{-7} *21* Mult.: α(K)exp=0.0022 *8*.
956.9 *1*	0.003 *1*	1014.3		57.356	5/2$^+$			
1002.85 *1*	0.176 *4*	1060.21	5/2$^+$	57.356	5/2$^+$	M1	0.00312 *5*	α=0.00312 *5*; α(K)=0.00268 *4*; α(L)=0.000347 *5*; α(M)=7.26×10^{-5} *11*; α(N+..)=1.91×10^{-5} *3* α(N)=1.624×10^{-5} *23*; α(O)=2.63×10^{-6} *4*; α(P)=2.00×10^{-7} *3* Mult.: α(K)exp=0.0028 *6*.
1014.3 *3*	0.003 *1*	1014.3		0.0	7/2$^+$			

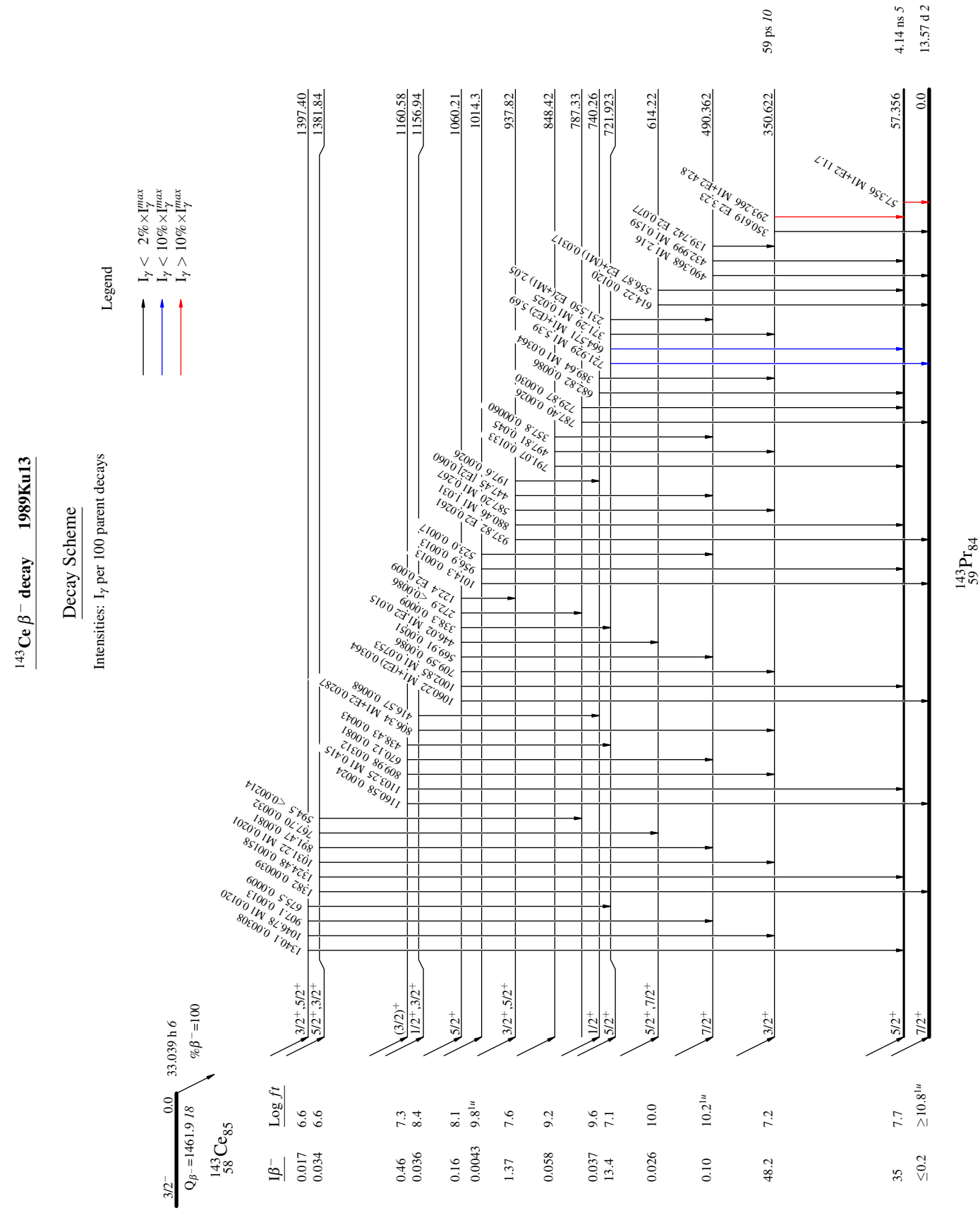
^{143}Ce β^- decay 1989Ku13 (continued)

$\gamma(^{143}Pr)$ (continued)

E_γ	I_γ [@]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	α [†]	Comments
1031.22 *3*	0.047 *2*	1381.84	$5/2^+,3/2^+$	350.622	$3/2^+$	M1	0.00292 *4*	α=0.00292 *4*; α(K)=0.00251 *4*; α(L)=0.000324 *5*; α(M)=6.79×10^{-5} *10*; α(N+..)=1.785×10^{-5} *25* α(N)=1.520×10^{-5} *22*; α(O)=2.46×10^{-6} *4*; α(P)=1.87×10^{-7} *3* Mult.: α(K)exp=0.0037 *12*.
1046.78 *4*	0.028 *2*	1397.40	$3/2^+,5/2^+$	350.622	$3/2^+$	M1	0.00282 *4*	α=0.00282 *4*; α(K)=0.00243 *4*; α(L)=0.000313 *5*; α(M)=6.56×10^{-5} *10*; α(N+..)=1.723×10^{-5} *25* α(N)=1.468×10^{-5} *21*; α(O)=2.38×10^{-6} *4*; α(P)=1.81×10^{-7} *3* Mult.: α(K)exp=0.0040 *15*.
1060.22 *2*	0.085 *3*	1060.21	$5/2^+$	0.0	$7/2^+$	M1+(E2)	0.0023 *5*	α=0.0023 *5*; α(K)=0.0020 *4*; α(L)=0.00026 *5*; α(M)=5.5×10^{-5} *10*; α(N+..)=1.43×10^{-5} *25* α(N)=1.22×10^{-5} *21*; α(O)=2.0×10^{-6} *4*; α(P)=1.5×10^{-7} *3* Mult.: α(K)exp=0.0022 *6*.
1103.25 *2*	0.97 *1*	1160.58	$(3/2)^+$	57.356	$5/2^+$	M1	0.00250 *4*	α=0.00250 *4*; α(K)=0.00215 *3*; α(L)=0.000277 *4*; α(M)=5.79×10^{-5} *9*; α(N+..)=1.563×10^{-5} *22* α(N)=1.297×10^{-5} *19*; α(O)=2.10×10^{-6} *3*; α(P)=1.598×10^{-7} *23*; α(IPF)=4.02×10^{-7} *6* Mult.: α(K)exp=0.0023 *4*.
1160.58 *6*	0.0056 *7*	1160.58	$(3/2)^+$	0.0	$7/2^+$			
1324.48 *3*	0.0037 *1*	1381.84	$5/2^+,3/2^+$	57.356	$5/2^+$			
1340.1 *1*	0.0072 *3*	1397.40	$3/2^+,5/2^+$	57.356	$5/2^+$			
1382 *1*	0.0009 *3*	1381.84	$5/2^+,3/2^+$	0.0	$7/2^+$			

† Additional information 5.
‡ α(K)exp were normalized to α(K)(293γ)=0.0524 (M1+E2 δ=0.77 *10*) with ce from 1971Ba40 and Iγ from 1989Ku13; see also 1967Ba23.
# Additional information 6.
@ For absolute intensity per 100 decays, multiply by 0.428 *4*.

$^{143}_{59}Pr_{84}$-6


143Ce β− decay 1989Ku13
Decay Scheme
Intensities: Iγ per 100 parent decays
Legend
Iγ < 2%×Iγmax
Iγ < 10%×Iγmax
Iγ > 10%×Iγmax
3/2−
0.0
33.039 h 6
Qβ−=1461.9 18
%β−=100
143 58Ce85
143 59Pr84
Iβ− Log ft
0.017 6.6
0.034 6.6
0.46 7.3
0.036 8.4
0.16 8.1
0.0043 9.8lu
1.37 7.6
0.058 9.2
0.037 9.6
13.4 7.1
0.026 10.0
0.10 10.2lu
48.2 7.2
35 7.7
≤0.2 ≥10.8lu
1397.40
1381.84
1160.58
1156.94
1060.21
1014.3
937.82
848.42
787.33
740.26
721.923
614.22
490.362
350.622
57.356
0.0
59 ps 10
4.14 ns 5
13.57 d 2
3/2+,5/2+
5/2+,3/2+
(3/2)+
1/2+,3/2+
5/2+
3/2+,5/2+
1/2+
5/2+
5/2+,7/2+
7/2+
3/2+
5/2+
7/2+
1340.1 0.0308
1046.78 M1 0.0120
907.1 0.0013
675.5 0.0009
1382 0.0039
1324.48 0.00158
1031.22 M1 0.0201
891.47 0.0081
767.70 0.0032
594.5 <0.00214
1160.58 0.0024
1103.25 M1 0.415
809.98 0.0312
670.12 0.0081
438.43 0.0043
806.34 M1+E2 0.0287
416.57 0.0068
1060.22 M1+(E2) 0.0364
1002.85 M1 0.0753
709.59 0.0086
569.91 0.0051
446.02 M1,E2 0.015
338.3 0.0009
272.9 <0.0086
122.4 E2 0.009
1014.3 0.0013
956.9 0.0013
523.0 0.0017
937.82 E2 0.0261
880.46 M1 1.031
587.20 M1 0.257
447.45 [E2] 0.1060
197.6 0.0026
791.07 0.0133
497.81 0.045
357.8 0.00060
787.40 0.0026
729.87 0.0030
682.82 0.0086
389.64 M1 0.0364
721.929 M1 5.39
664.571 M1+(E2) 5.69
371.29 M1 0.025
231.550 E2+(M1) 2.05
614.22 0.0120
556.87 E2+(M1) 0.0317
490.368 M1 2.16
432.999 M1 0.159
139.742 E2 0.077
350.619 E2 3.23
293.266 M1+E2 42.8
57.356 M1+E2 11.7