^{131}Pr ε decay (1.51 min) 1996Gi08,1983ViZU

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Yu. Khazov, I. Mitropolsky, A. Rodionov	NDS 107, 2715 (2006)	17-Jul-2006

Parent: ^{131}Pr: E=0.0; J$^{\pi}$=(3/2$^+$); T$_{1/2}$=1.51 min *2*; Q(ε)=5.44×10^3 *6*; %ε+%β^+ decay=100.0

1996Gi08: ^{131}Pr ε decay [from ^{96}Mo(^{40}Ca,2p3n), E=255 MeV]. Measured x, γ, $\gamma\gamma$(t), xγ(t), cex(t), ceγ(t), T$_{1/2}$. Mass-separator, He-jet transport, magnetic electron spectrometer. Comparison with Interacting Boson-Fermion Model calculations.

1966No05: ^{131}Ce [from ^{130}Ba(α,3n), E≈40 MeV and ^{130}Ba(^{3}He,2n), E≈20 MeV]; measured x, γ, ce, β^+ spectra deduced ^{131}Ce %β^+, T$_{1/2}$. Ge(Li), NaI(Tl), Si(Li) spectrometers, chemical procedures.

1983ViZU, 1983AkZZ: ^{131}Pr ε decay [from Ta(p,X), E=1000 MeV]. Measured γ, $\gamma\gamma$, T$_{1/2}$. Mass-separation.

Others: 1973De25, 1977Gi17.

^{131}Ce Levels

The decay scheme is that of 1996Gi08, except as noted. It is built on the basis of coincidence data, energy relationships and multipolarities of the transitions. The level energies in 1996Gi08 are lower by 0.5 keV, on average, than the level energies calculated by GTOL code using Eγ of 1996Gi08. The level scheme of 1983ViZU is not as complete as of 1996Gi08 and contradicts it somewhat; evaluators have excluded 440.56, 884.1 and 947.6 keV levels from 1983ViZU level scheme so far as each of them was introduced by two transitions on the basis of energy relationship only.

E(level)[‡]	J$^{\pi}$[#]	T$_{1/2}$	Comments
0.0	(7/2$^+$)	10.3 min *3*	%ε+%β^+=100; %β^+=11 *3* (1966No05) Eβ^+(max)=2.8 MeV *4* from 1966No05. T$_{1/2}$: weighted average of 10.5 min *6* (γ(t) 1966No05), 10.2 min *3* (γ(t) 1983ViZU). Other: ≈8.5 min (1973De25).
63.11 *9*	1/2$^+$	5.4 min *5*	%ε+%β^+=?; %IT=? T$_{1/2}$: weighted average of 5.6 min *5* (1983AkZZ), 5 min *1* (1966No05). Other: ≈5 min (1973De25).
135.94 *9*	3/2$^+$		
257.08 *11*	9/2$^+$		
329.26 *10*	(5/2,3/2)$^+$		
342.67 *10*	(3/2,5/2)$^+$		
348.49 *10*	5/2$^+$		
387.52 *8*	(5/2,3/2)$^+$		
427.91 *10*	(3/2,5/2,7/2)$^+$		
470.95 *11*	(1/2$^+$,3/2$^+$,5/2$^+$)		
474.80 *15*	7/2$^+$		
543.1 *3*	11/2$^+$		
576.66 *18*	(1/2$^+$,3/2$^+$,5/2$^+$)		
609.6 *4*			
644.66[†] *18*			
648.14 *12*	(7/2,9/2)$^+$		
717.99 *20*	(3/2$^+$,5/2$^+$)		
739.77 *21*	(3/2$^+$,5/2$^+$)		
744.7 *5*	(9/2$^+$)		
753.28 *18*	(3/2,5/2)$^+$		
762.4 *3*	(3/2$^+$,5/2$^+$)		
791.70 *14*	(5/2$^+$)		
848.30 *12*	(3/2$^+$,5/2$^+$)		
928.76 *14*	(3/2,5/2)		
1009.7 *4*	(3/2,5/2)		
1117.26 *18*	(3/2,5/2)		
1236.7 *4*			

Continued on next page (footnotes at end of table)

^{131}Pr ε decay (1.51 min) 1996Gi08,1983ViZU (continued)

^{131}Ce Levels (continued)

E(level)[‡]
1276.45[†] *12*
2057.40 *17*

[†] The level was introduced by 1983ViZU.
[‡] From least-squares fit to Eγ′s.
[#] From γ-mult.

$\gamma(^{131}Ce)$

Iγ normalization: Not given as the level scheme is incomplete.
I($\gamma^{\pm}$)≈850.

E$_\gamma$[†]	I$_\gamma$[#]	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.[&]	α[a]	Comments
58.6 *2*	14 *3*	387.52	(5/2,3/2)$^+$	329.26	(5/2,3/2)$^+$			
72.84 *5*	210 *20*	135.94	3/2$^+$	63.11	1/2$^+$	M1	2.99	α(K)=2.55 *8*; α(L)=0.349 *11*; α(M)=0.0728 *22*; α(N+..)=0.0199 *6* α(K)exp=2.88 *29*; K/L=6.16 *44* (1996Gi08)
79.39 *9*	25 *4*	427.91	(3/2,5/2,7/2)$^+$	348.49	5/2$^+$			
^{x}103.3[@]	≈2.6[@]							
^{x}114.2[@]	≈2.2[@]							
^{x}117.3[@]	≈2.2[@]							
122.5 *4*	≈4	470.95	(1/2$^+$,3/2$^+$,5/2$^+$)	348.49	5/2$^+$			
126.1 *2*	9 *3*	474.80	7/2$^+$	348.49	5/2$^+$			
128.20 *17*	12 *3*	470.95	(1/2$^+$,3/2$^+$,5/2$^+$)	342.67	(3/2,5/2)$^+$			
^{x}152.3[@] *3*	2.2[@] *9*							
176.5 *4*	12 *3*	648.14	(7/2,9/2)$^+$	470.95	(1/2$^+$,3/2$^+$,5/2$^+$)			
188.8 *2*	5 *1*	576.66	(1/2$^+$,3/2$^+$,5/2$^+$)	387.52	(5/2,3/2)$^+$			
193.37 *6*	24 *3*	329.26	(5/2,3/2)$^+$	135.94	3/2$^+$	M1,E2	0.198 *9*	α(K)=0.159 *3*; α(L)=0.031 *10*; α(M)=0.0066 *21*; α(N+..)=0.0018 *6* α(K)exp=0.27 *6* (1996Gi08)
206.73 *6*	70 *15*	342.67	(3/2,5/2)$^+$	135.94	3/2$^+$			
212.56 *7*	100	348.49	5/2$^+$	135.94	3/2$^+$	M1	0.147	α(K)=0.125 *4*; α(L)=0.0168 *5*; α(M)=0.00350 *11*; α(N+..)=0.00096 *3* α(K)exp=0.125 *20*; K/L>5.5 (1996Gi08)
^{x}214.7[@] *3*	5.3[@] *22*							
^{x}224.00[@] *15*	7.5[@] *30*							
^{x}244.1[@] *2*	13.6[@] *13*							
248.0 *5*	4 *1*	576.66	(1/2$^+$,3/2$^+$,5/2$^+$)	329.26	(5/2,3/2)$^+$			
251.49 *7*	90 *10*	387.52	(5/2,3/2)$^+$	135.94	3/2$^+$	M1	0.093	α(K)=0.0796 *24*; α(L)=0.0107 *4*; α(M)=0.00221 *7*; α(N+..)=0.00060 *2* α(K)exp=0.098 *23* (1996Gi08) ce: contaminated line or doublet in ce-spectrum.
257.07 *11*	35 *7*	257.08	9/2$^+$	0.0	(7/2$^+$)			
266.14 *7*	190 *20*	329.26	(5/2,3/2)$^+$	63.11	1/2$^+$	E2,M1	0.076 *5*	α(K)=0.063 *6*; α(L)=0.0104 *13*; α(M)=0.0022 *3*; α(N+..)=0.00059 *8* α(K)exp=0.060 *6* (1996Gi08)
^{x}273.9[@] *3*	5.7[@] *26*							
278.48 *15*	10 *1*	753.28	(3/2,5/2)$^+$	474.80	7/2$^+$			
279.55 *7*	100 *15*	342.67	(3/2,5/2)$^+$	63.11	1/2$^+$	E2,M1	0.066 *5*	α(K)=0.054 *6*; α(L)=0.0089 *9*; α(M)=0.00188 *22*;

γ(^{131}Ce) (continued)

E_γ[†]	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	α[a]	Comments
								α(N+..)=0.00050 *5* α(K)exp=0.044 *10* (1996Gi08) ce: contaminated line or doublet in ce-spectrum.
280.42[‡@] *16*	22[@] *7*	928.76	(3/2,5/2)	648.14	(7/2,9/2)$^+$			
284.2[‡@] *2*	8.8[@] *4*	928.76	(3/2,5/2)	644.66				
285.39 *7*	90 *10*	348.49	5/2$^+$	63.11	1/2$^+$			
286.0 *4*	7 *2*	543.1	11/2$^+$	257.08	9/2$^+$			
291.2 *4*	40 *8*	762.4	(3/2$^+$,5/2$^+$)	470.95	(1/2$^+$,3/2$^+$,5/2$^+$)			
292.04 *7*	80 *15*	427.91	(3/2,5/2,7/2)$^+$	135.94	3/2$^+$	M1	0.0626	α(K)=0.0535 *16*; α(L)=0.00714 *22*; α(M)=0.00148 *5*; α(N+..)=0.00040 *1* α(K)exp=0.080 *19* (1996Gi08) ce: contaminated line or doublet in ce-spectrum.
299.55 *21*	8 *2*	648.14	(7/2,9/2)$^+$	348.49	5/2$^+$			
305.42 *10*	25 *4*	648.14	(7/2,9/2)$^+$	342.67	(3/2,5/2)$^+$	M1,E2	0.051 *5*	α(K)=0.042 *6*; α(L)=0.0067 *4*; α(M)=0.00142 *11*; α(N+..)=0.00038 *2* α(K)exp=0.046 *6* (1996Gi08)
[x]307.6[@] *2*	6.6[@] *26*							
315.5[@] *2*	19.8[@] *22*	644.66		329.26	(5/2,3/2)$^+$			Coincides with 266.15 γ.
316.7 *4*	14 *4*	791.70	(5/2$^+$)	474.80	7/2$^+$			
319.00 *20*	21 *4*	648.14	(7/2,9/2)$^+$	329.26	(5/2,3/2)$^+$			E_γ: unplaced in level scheme of 1983ViZU.
[x]322.1[@] *3*	19[@] *7*							
324.36 *8*	100 *20*	387.52	(5/2,3/2)$^+$	63.11	1/2$^+$			
334.96 *9*	140 *20*	470.95	(1/2$^+$,3/2$^+$,5/2$^+$)	135.94	3/2$^+$	E2,M1	0.039 *5*	α(K)=0.033 *5*; α(L)=0.00506 *9*; α(M)=0.00106 *4*; α(N+..)=0.00029 *1* α(K)exp=0.031 *8* (1996Gi08)
339.05 *21*	55 *6*	474.80	7/2$^+$	135.94	3/2$^+$			
364.7[@] *2*	48[@] *13*	427.91	(3/2,5/2,7/2)$^+$	63.11	1/2$^+$			
376.5 *4*	3 *1*	717.99	(3/2$^+$,5/2$^+$)	342.67	(3/2,5/2)$^+$			E_γ: poor fit: the energy value between levels is equal to 375.32 *18*.
377.25[‡@] *17*	8.4[@] *22*	848.30	(3/2$^+$,5/2$^+$)	470.95	(1/2$^+$,3/2$^+$,5/2$^+$)			
387.54 *8*	90 *10*	387.52	(5/2,3/2)$^+$	0.0	(7/2$^+$)	M1,E2	0.026 *4*	α(K)=0.022 *4*; α(L)=0.00327 *13*; α(M)=0.00069 *2*; α(N+..)=0.00018 *1* α(K)exp=0.021 *3*; K/L>6.3 (1996Gi08) I_γ: 167 *12* in 1983ViZU.
391.3 *5*	4 *2*	739.77	(3/2$^+$,5/2$^+$)	348.49	5/2$^+$			
396.2[b] *4*	7[b] *3*	739.77	(3/2$^+$,5/2$^+$)	342.67	(3/2,5/2)$^+$			E_γ: poor fit: the energy value between levels is equal to 397.10 *19*.
396.2[b] *4*	7[b] *3*	744.7	(9/2$^+$)	348.49	5/2$^+$			
[x]398.00[@] *15*	11.4[@] *22*							
410.76[b] *28*	3[b] *1*	739.77	(3/2$^+$,5/2$^+$)	329.26	(5/2,3/2)$^+$			
410.76[b] *28*	3[b] *1*	753.28	(3/2,5/2)$^+$	342.67	(3/2,5/2)$^+$			

$^{131}_{58}$Ce$_{73}$-4

γ(^{131}Ce) (continued)

E_γ[†]	I_γ[#]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	α[a]	Comments
414.1 *3*	15 *2*	762.4	(3/2+,5/2+)	348.49	5/2+			
≈419	10 *3*	762.4	(3/2+,5/2+)	342.67	(3/2,5/2)+			
420.45[@] *15*	39[@] *7*	848.30	(3/2+,5/2+)	427.91	(3/2,5/2,7/2)+			
423.7 *4*	4 *2*	753.28	(3/2,5/2)+	329.26	(5/2,3/2)+			
428.15[@] *8*	52[@] *7*	1276.45		848.30	(3/2+,5/2+)			
[x]440.60[@] *12*	67[@] *7*							
441.3 *3*	80 *8*	576.66	(1/2+,3/2+,5/2+)	135.94	3/2+	M1	0.0215	α(K)=0.0184 *6*; α(L)=0.00243 *8*; α(M)=0.00050 *2*; α(N+..)=0.00014 *1* α(K)exp=0.022 *3* (1996Gi08)
443.4 *4*	10 *3*	791.70	(5/2+)	348.49	5/2+			
[x]460.7[@] *3*	≈6.6[@]							
[x]465.0[@] *3*	8.6[@] *22*							
[x]471.0[@] *3*	17[@] *4*							
473.7 *4*	25 *2*	609.6		135.94	3/2+			
474.3 *3*	40 *4*	1236.7		762.4	(3/2+,5/2+)			
[x]499.5[@] *2*	8.4[@] *18*							
505.0 *4*	5 *2*	848.30	(3/2+,5/2+)	342.67	(3/2,5/2)+			
543.2 *4*	7 *2*	543.1	11/2+	0.0	(7/2+)			
[x]547.3[@]	≈6.6[@]							
581.79 *19*	5 *2*	717.99	(3/2+,5/2+)	135.94	3/2+			E_γ: in 1983ViZU is placed from 644.72 level.
586.18 *13*	8 *4*	928.76	(3/2,5/2)	342.67	(3/2,5/2)+			
599.7 *7*	18 *4*	928.76	(3/2,5/2)	329.26	(5/2,3/2)+			
604.2 *4*	15 *4*	739.77	(3/2+,5/2+)	135.94	3/2+			
[x]609.4[@] *2*	24[@] *7*							
626 *1*	4 *2*	762.4	(3/2+,5/2+)	135.94	3/2+			
646.5[@]	≈2.6[@]	1117.26	(3/2,5/2)	470.95	(1/2+,3/2+,5/2+)			
[x]652.36[@] *10*	7.9[@] *22*							
655.76 *12*	13 *3*	791.70	(5/2+)	135.94	3/2+			
661 *1*	4 *2*	1009.7	(3/2,5/2)	348.49	5/2+			
667.2 *6*	8 *3*	1009.7	(3/2,5/2)	342.67	(3/2,5/2)+			
[x]677.58[@] *12*	33[@] *4*							
[x]679.9[@] *3*	7.5[@] *18*							
[x]690.6[@]	≈3[@]							
711.9 *6*	35 *15*	848.30	(3/2+,5/2+)	135.94	3/2+			E_γ: unweighted ave.
729 *1*	12 *3*	791.70	(5/2+)	63.11	1/2+			
769.18 *20*	11 *3*	1117.26	(3/2,5/2)	348.49	5/2+			E_γ: poor fit: the energy value between levels is equal to 768.77 *16*.
774.3 *8*	10 *3*	1117.26	(3/2,5/2)	342.67	(3/2,5/2)+			E_γ: unweighted ave.
[x]778.4[@] *2*	4.8[@] *9*							
785.39 *19*	5 *2*	848.30	(3/2+,5/2+)	63.11	1/2+			

$^{131}_{58}$Ce$_{73}$-5

γ(^{131}Ce) (continued)

E_γ [†]	I_γ [#]	E_i(level)	J^π_i	E_f	J^π_f	Comments
787.4 *3*	10 *3*	1117.26	(3/2,5/2)	329.26	$(5/2,3/2)^+$	E_γ: poor fit: the energy value between levels is equal to 788.00 *16*.
^{x}824.0[@]	≈3.5[@]					
848.7[‡@] *2*	8.8[@] *18*	1276.45		427.91	$(3/2,5/2,7/2)^+$	
873.7 *6*	20 *5*	1009.7	(3/2,5/2)	135.94	$3/2^+$	
^{x}930.0[@] *3*	10[@] *3*					
940.2[‡@]	≈3.1[@]	2057.40		1117.26	(3/2,5/2)	
^{x}944.4[@] *3*	4.4[@] *22*					
^{x}963[@]	≈3.1[@]					
980.2 *6*	25 *5*	1117.26	(3/2,5/2)	135.94	$3/2^+$	E_γ: poor fit: the energy value between levels is equal to 981.32 *16*.
^{x}1007.4[@]	≈4[@]					
^{x}1031.3[@] *2*	17.6[@] *22*					
^{x}1046.4[@] *4*	3.5[@] *13*					
1117.0[‡@]	6.6[@] *26*	1117.26	(3/2,5/2)	0.0	$(7/2^+)$	E_γ: from 1983ViZU, placed by evaluators.
^{x}1155.8[@] *3*	8.4[@] *35*					
^{x}1183.6[@]	4.4[@] *18*					
^{x}1189.0[@] *4*	5.7[@] *26*					
1276.3[‡@] *2*	11.9[@] *18*	1276.45		0.0	$(7/2^+)$	E_γ: from 1983ViZU, placed by evaluators.
^{x}1429.1[@] *3*	6.6[@] *13*					
^{x}1542.7[@] *3*	7.5[@] *13*					
^{x}1585.0[@] *5*	7.0[@] *18*					
1669.7[‡@] *2*	9.7[@] *13*	2057.40		387.52	$(5/2,3/2)^+$	
^{x}1781.8[@]	≈4[@]					
1921.8[‡@] *3*	13.6[@] *22*	2057.40		135.94	$3/2^+$	
^{x}1927.7[@] *6*	≈4[@]					
^{x}1968.8[@] *3*	8.4[@] *26*					
1994.3[‡@] *3*	9.4[@] *22*	2057.40		63.11	$1/2^+$	

[†] Weighted average from 1996Gi08 and 1983ViZU, except as noted.
[‡] The transition were introduced into level scheme using energy relationship only.
[#] From 1996Gi08, except as noted.
[@] From 1983ViZU. Iγ was multiplied by 4.4 to adjust to scale of 1996Gi08.
[&] From α(exp).
[a] 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.

γ(^{131}Ce) (continued)

[b] Multiply placed with intensity suitably divided.
[x] γ ray not placed in level scheme.

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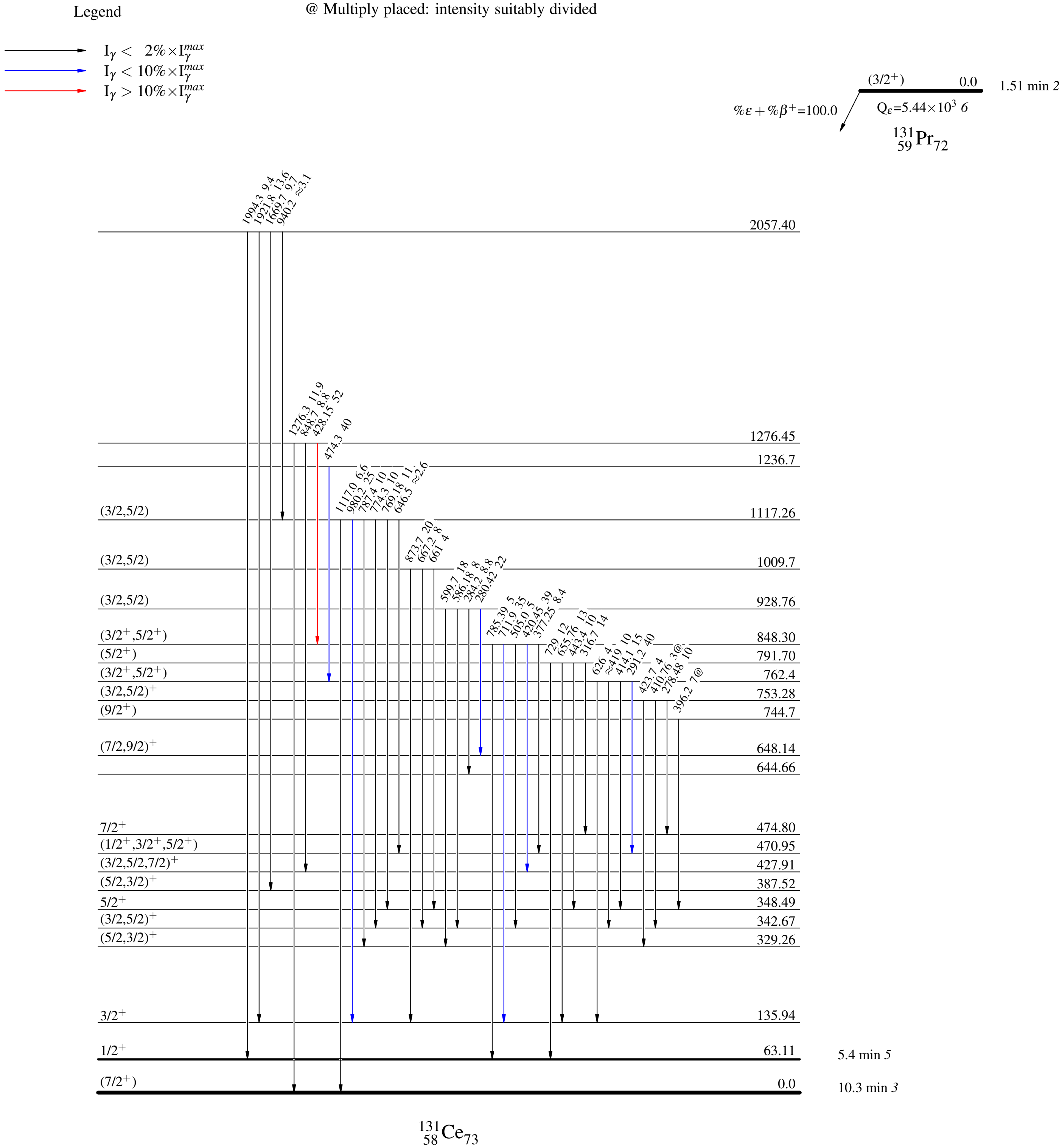
Decay Scheme

Intensities: Relative I_γ

@ Multiply placed: intensity suitably divided



^{131}Pr ε decay (1.51 min) 1996Gi08,1983ViZU

Decay Scheme (continued)

Intensities: Relative I_γ

@ Multiply placed: intensity suitably divided