^{137}Pr ε decay 1973Bu17

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 108,2173 (2007)	1-Oct-2006

Parent: ^{137}Pr: E=0.0; J^π=5/2$^+$; $T_{1/2}$=1.28 h *2*; Q(ε)=2701 *9*; %ε+%β^+ decay=100.0
Additional information 1.
Measured: γ, $\gamma\gamma$, ce, β^+ (1973Bu17,1967Va04,1958Da13).
Decay scheme is that proposed by 1973Bu17.

^{137}Ce Levels

E(level)	J^π†	$T_{1/2}$	E(level)	J^π†
0.0	3/2$^+$	9.0 h *3*	1569.98? *24*	
160.37 *6*	(1/2)$^+$	0.79 ns *14*	1693.34 *19*	
434.03 *7*	(3/2)$^+$		1800.55 *11*	
514.07 *8*	(3/2)$^+$		1887.72 *16*	3/2
763.34 *8*	(5/2,3/2)$^+$		1925.34 *16*	(3/2,5/2)$^+$
836.70 *9*	(5/2)$^+$		1933.54 *11*	3/2$^+$
866.74 *9*	(5/2,3/2)		1951.73 *13*	3/2
1104.93 *12*	3/2		2113.63 *13*	
1179.58 *10*	(5/2$^+$)		2133.70 *13*	3/2$^{(+)}$
1259.50 *21*			2152.9 *3*	
1271.37 *18*	3/2		2275.22 *16*	3/2$^{(+)}$
1288.7 *3*			2304.87 *23*	3/2$^{(+)}$
1435.43 *11*			2347.5 *3*	
1476.67 *17*	(5/2$^+$,3/2$^+$)		2480.0 *4*	

† From Adopted Levels.

ε,β^+ radiations

E(decay)	E(level)	Iβ^+ #	Iε‡#	Log *ft*	I($\varepsilon+\beta^+$)#	Comments
(221 9)	2480.0		0.04 *1*	6.3 *1*	0.04 *1*	εK=0.801 *3*; εL=0.1534 *21*; εM+=0.0452 *7*
(354 9)	2347.5		0.07 *2*	6.6 *1*	0.07 *2*	εK=0.8231 *9*; εL=0.1372 *7*; εM+=0.03967 *22*
(396 9)	2304.87		0.06 *1*	6.8 *1*	0.06 *1*	εK=0.8266; εL=0.1346 *5*; εM+=0.03878 *17*
(426 9)	2275.22		0.10 *2*	6.6 *1*	0.10 *2*	εK=0.8286; εL=0.1331 *5*; εM+=0.03829 *15*
(548 9)	2152.9		0.09 *2*	6.9 *1*	0.09 *2*	εK=0.8343; εL=0.12885 *25*; εM+=0.03686 *8*
(567 9)	2133.70		0.29 *5*	6.4 *1*	0.29 *5*	εK=0.8349; εL=0.12836 *23*; εM+=0.03670 *8*
(587 9)	2113.63		0.21 *4*	6.6 *1*	0.21 *4*	εK=0.8356; εL=0.12789 *21*; εM+=0.03654 *7*
(749 9)	1951.73		0.36 *6*	6.6 *1*	0.36 *6*	εK=0.8393; εL=0.1251; εM+=0.03560 *4*
(767 9)	1933.54		0.39 *6*	6.5 *1*	0.39 *6*	εK=0.8397; εL=0.1248; εM+=0.03552 *4*
(776 9)	1925.34		0.43 *7*	6.5 *1*	0.43 *7*	εK=0.8398; εL=0.1247; εM+=0.03548 *4*
(813 9)	1887.72		0.23 *4*	6.8 *1*	0.23 *4*	εK=0.8404; εL=0.1243; εM+=0.03534
(900 9)	1800.55		0.30 *5*	6.8 *8*	0.30 *5*	εK=0.8416; εL=0.1234; εM+=0.03504
(1008 9)	1693.34		0.06 *1*	7.6 *1*	0.06 *1*	εK=0.8427; εL=0.1225; εM+=0.03475
(1131 9)	1569.98?		0.04 *1*	7.9 *1*	0.04 *1*	εK=0.8438; εL=0.1217; εM+=0.03449
(1224 9)	1476.67		0.10 *2*	7.6 *1*	0.10 *2*	εK=0.8443; εL=0.1212; εM+=0.03433
(1266 9)	1435.43		0.27 *4*	7.2 *1*	0.27 *4*	εK=0.8445; εL=0.1210; εM+=0.03426
(1412 9)	1288.7	9.×10^{-5} *2*	0.05 *1*	8.0 *1*	0.05 *1*	av Eβ=187 *4*; εK=0.8439; εL=0.1203; εM+=0.03401
(1430 9)	1271.37	0.00022 *5*	0.100 *20*	7.7 *1*	0.10 *2*	av Eβ=194 *5*; εK=0.8437; εL=0.1201; εM+=0.03398
(1442 9)	1259.50	0.0001	0.06 *1*	7.9 *1*	0.06 *1*	av Eβ=199 *5*; εK=0.8435; εL=0.1201; εM+=0.03395
(1521 9)	1179.58	0.0022 *4*	0.45 *7*	7.1 *1*	0.45 *7*	av Eβ=234 *4*; εK=0.8417; εL=0.1195; εM+=0.03378
(1596 9)	1104.93	0.0014 *3*	0.16 *3*	7.6 *1*	0.16 *3*	av Eβ=267 *4*; εK=0.8390; εL=0.1189; εM+=0.03359
(1834 9)	866.74	0.0045 *9*	0.15 *3*	7.8 *1*	0.15 *3*	av Eβ=371 *4*; εK=0.8215 *10*; εL=0.11573 *16*; εM+=0.03268 *5*

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^{137}Pr ε decay 1973Bu17 (continued)

ϵ,β^+ radiations (continued)

E(decay)	E(level)	Iβ^+ [#]	Iε[‡#]	Log *ft*	I($\varepsilon+\beta^+$)[#]	Comments
(1864 *9*)	836.70	0.041 *7*	1.2 *2*	6.9 *1*	1.2 *2*	av Eβ=384 *4*; εK=0.8181 *11*; εL=0.11519 *17*; εM+=0.03252 *5*
(1938 *9*)	763.34	0.018 *3*	0.38 *7*	7.4 *1*	0.40 *7*	av Eβ=417 *4*; εK=0.8088 *13*; εL=0.11372 *20*; εM+=0.03210 *6*
(2187 *9*)	514.07	0.08 *2*	0.7 *2*	7.2 *1*	0.8 *2*	av Eβ=526 *4*; εK=0.7646 *20*; εL=0.1071 *3*; εM+=0.03020 *9*
(2267 *9*)	434.03	0.041 *17*	0.30 *12*	7.6 *2*	0.34 *14*	av Eβ=562 *4*; εK=0.7464 *22*; εL=0.1044 *4*; εM+=0.02944 *9*
2702[†] *10*	0.0	24.8 *4*	68.7 *7*	5.42 *1*	93.5 *8*	av Eβ=755 *4*; εK=0.624 *3*; εL=0.0868 *4*; εM+=0.02446 *12*

† Eβ+=1680 *10* (1973Bu17), 1740 *50* (1967Va04), 1700 *30* (1965Gr24).
‡ εK/β^+=2.05 *30* (1958Da13), 2.5 *2* (1967Va04).
# Absolute intensity per 100 decays.

$\gamma(^{137}$Ce)

Iγ normalization: deduced by evaluators using I$\gamma\pm$=230 *30*, γ-ray intensity balance at levels populated by ε and β^+, and theoretical ε/β^+ ratios to these levels. The resulting ($\varepsilon+\beta^+$) feeding to g.s. is 93.5% 8, thus Σ I(γ+ce) to g.s. = 6.5% 8.
α(K)exp normalized so that α(K)(160.3γ)=0.293 (M1, theory).

E$_\gamma$	I$_\gamma$[†]	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.	α[‡]	Comments
160.32 *9*	4.4 *5*	160.37	(1/2)$^+$	0.0	3/2$^+$	M1	0.313	α(K)=0.267 *4*; α(L)=0.0363 *6*; α(M)=0.00759 *11*; α(N+..)=0.00198 *3* α(N)=0.001684 *24*; α(O)=0.000273 *4*; α(P)=2.06×10^{-5} *3* Mult.: K/L1=9.1 *18*, K/L2>13.3, L1/M=4.1 *8*, δ<0.33.
251.62 *20*	0.10 *3*	763.34	(5/2,3/2)$^+$	514.07	(3/2)$^+$			
273.64 *50*	0.20 *4*	434.03	(3/2)$^+$	160.37	(1/2)$^+$			
^{x}310.41 *45*	0.11 *4*							
329.04 *16*	0.80 *14*	763.34	(5/2,3/2)$^+$	434.03	(3/2)$^+$	M1	0.0452	α(K)=0.0387 *6*; α(L)=0.00515 *8*; α(M)=0.001075 *16*; α(N+..)=0.000280 *4* α(N)=0.000239 *4*; α(O)=3.87×10^{-5} *6*; α(P)=2.96×10^{-6} *5* Mult.: α(K)exp=0.047 *8*.
^{x}337.54 *20*	0.15 *5*							
353.69 *15*	2.64 *27*	514.07	(3/2)$^+$	160.37	(1/2)$^+$	M1,E2	0.033 *5*	α(K)=0.028 *5*; α(L)=0.00426 *6*; α(M)=0.000900 *17*; α(N+..)=0.000232 *4* α(N)=0.000198 *3*; α(O)=3.13×10^{-5} *9*; α(P)=2.0×10^{-6} *5* Mult.: α(K)exp=0.030 *6*.
402.36 *23*	0.29 *3*	836.70	(5/2)$^+$	434.03	(3/2)$^+$	M1,E2	0.023 *4*	α(K)=0.020 *4*; α(L)=0.00291 *14*; α(M)=0.000614 *24*; α(N+..)=0.000158 *8* α(N)=0.000135 *6*; α(O)=2.15×10^{-5} *15*; α(P)=1.4×10^{-6} *4* Mult.: α(K)exp=0.018 *5*.
416.31 *36*	0.37 *4*	1179.58	(5/2$^+$)	763.34	(5/2,3/2)$^+$			

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^{137}Pr ε decay 1973Bu17 (continued)

$\gamma(^{137}Ce)$ (continued)

E_γ	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α [‡]	Comments
433.89 *14*	5.84 *52*	434.03	$(3/2)^+$	0.0	$3/2^+$	M1+E2	0.019 *4*	α(K)=0.016 *3*; α(L)=0.00234 *17*; α(M)=0.00049 *3*; α(N+..)=0.000127 *10* α(N)=0.000109 *8*; α(O)=1.73×10^{-5} *16*; α(P)=1.2×10^{-6} *3* Mult.: α(K)exp=0.016 *3*.
513.98 *22*	4.93 *50*	514.07	$(3/2)^+$	0.0	$3/2^+$	M1,E2	0.0123 *23*	α(K)=0.0104 *21*; α(L)=0.00146 *17*; α(M)=0.00031 *4*; α(N+..)=8.0×10^{-5} *9* α(N)=6.8×10^{-5} *8*; α(O)=1.09×10^{-5} *14*; α(P)=7.7×10^{-7} *18* Mult.: α(K)exp=0.010 *2*.
[x]573.25 *50*	0.18 *2*							
[x]584.06 *42*	0.04 *2*							
590.25 *20*	0.24 *2*	1104.93	3/2	514.07	$(3/2)^+$			
602.63 *11*	1.41 *11*	763.34	$(5/2,3/2)^+$	160.37	$(1/2)^+$			
609.89 *36*	0.12 *2*	1476.67	$(5/2^+,3/2^+)$	866.74	(5/2,3/2)			
[x]646.88 *35*	0.08 *2*							
[x]654.36 *27*	0.14 *2*							
665.16 *19*	0.53 *4*	1179.58	$(5/2^+)$	514.07	$(3/2)^+$			
671.24 *29*	0.15 *2*	1104.93	3/2	434.03	$(3/2)^+$			
676.44 *42*	0.06 *3*	836.70	$(5/2)^+$	160.37	$(1/2)^+$			
695.32 *46*	0.06 *2*	1800.55		1104.93	3/2			
699.41 *48*	0.06 *3*	2133.70	$3/2^{(+)}$	1435.43				
706.41 *18*	0.20 *3*	866.74	(5/2,3/2)	160.37	$(1/2)^+$			
713.25 *19*	0.25 *2*	1476.67	$(5/2^+,3/2^+)$	763.34	$(5/2,3/2)^+$			
734.19[#] *42*	0.04 *1*	1569.98?		836.70	$(5/2)^+$			
745.36 *15*	0.86 *4*	1179.58	$(5/2^+)$	434.03	$(3/2)^+$			
753.86 *47*	0.09 *2*	1933.54	$3/2^+$	1179.58	$(5/2^+)$			
763.18 *13*	0.86 *4*	763.34	$(5/2,3/2)^+$	0.0	$3/2^+$			
825.59 *21*	0.23 *2*	1259.50		434.03	$(3/2)^+$			
836.65 *13*	8.1	836.70	$(5/2)^+$	0.0	$3/2^+$	M1	0.00443	α(K)=0.00381 *6*; α(L)=0.000490 *7*; α(M)=0.0001021 *15*; α(N+..)=2.66×10^{-5} *4* α(N)=2.27×10^{-5} *4*; α(O)=3.69×10^{-6} *6*; α(P)=2.87×10^{-7} *4* Mult.: α(K)exp=0.0022 *4*.
856.40 *28*	0.08 *2*	1693.34		836.70	$(5/2)^+$			
866.52 *12*	1.12 *5*	866.74	(5/2,3/2)	0.0	$3/2^+$			
921.23 *13*	0.77 *5*	1435.43		514.07	$(3/2)^+$			
933.54 *18*	0.28 *3*	1800.55		866.74	(5/2,3/2)			
944.57 *57*	0.04 *2*	1104.93	3/2	160.37	$(1/2)^+$			
953.62 *27*	0.10 *1*	2133.70	$3/2^{(+)}$	1179.58	$(5/2^+)$			
963.26 *51*	<0.02	1476.67	$(5/2^+,3/2^+)$	514.07	$(3/2)^+$			
973.46 *57*	0.06 *2*	2152.9		1179.58	$(5/2^+)$			
1001.61 *13*	0.52 *4*	1435.43		434.03	$(3/2)^+$			
1019.22 *21*	0.20 *3*	1179.58	$(5/2^+)$	160.37	$(1/2)^+$			
1028.87[#] *50*	0.05 *1*	2133.70	$3/2^{(+)}$	1104.93	3/2			
1056.66 *31*	0.13 *2*	1569.98?		514.07	$(3/2)^+$			
1066.79 *32*	0.06 *2*	1933.54	$3/2^+$	866.74	(5/2,3/2)			

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^{137}Pr ε decay 1973Bu17 (continued)

$\gamma(^{137}Ce)$ (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α[‡]	Comments
1088.64 *14*	1.90 *10*	1925.34	(3/2,5/2)$^+$	836.70	(5/2)$^+$	M1,E2	0.0020 *4*	α(K)=0.0018 *3*; α(L)=0.00023 *4*; α(M)=4.7×10^{-5} *8*; α(N+..)=1.23×10^{-5} *20* α(N)=1.05×10^{-5} *17*; α(O)=1.7×10^{-6} *3*; α(P)=1.30×10^{-7} *25* Mult.: α(K)exp=0.0020 *7*.
1096.89 *13*	0.92 *6*	1933.54	3/2$^+$	836.70	(5/2)$^+$	M1	0.00235	α(K)=0.00202 *3*; α(L)=0.000258 *4*; α(M)=5.37×10^{-5} *8*; α(N+..)=1.402×10^{-5} *20* α(N)=1.192×10^{-5} *17*; α(O)=1.94×10^{-6} *3*; α(P)=1.517×10^{-7} *22* Mult.: α(K)exp=0.0030 *10*.
1105.21 *17*	0.41 *4*	1104.93	3/2	0.0	3/2$^+$			
1110.92 *19*	0.39 *4*	1271.37	3/2	160.37	(1/2)$^+$			
1125.04 *56*	0.27 *5*	1887.72	3/2	763.34	(5/2,3/2)$^+$			
1128.56 *32*	0.19 *4*	1288.7		160.37	(1/2)$^+$			
1170.65 *20*	0.27 *3*	1933.54	3/2$^+$	763.34	(5/2,3/2)$^+$			
1180.00 *20*	0.37 *5*	1179.58	(5/2$^+$)	0.0	3/2$^+$			
1200.02 *47*	0.06 *2*	2304.87	3/2$^{(+)}$	1104.93	3/2			
1246.54 *29*	0.12 *2*	2113.63		866.74	(5/2,3/2)			
1258.85 *48*	0.05 *2*	1259.50		0.0	3/2$^+$			
1260.06 *49*	0.04 *2*	1693.34		434.03	(3/2)$^+$			
1271.58 *34*	0.08 *2*	1271.37	3/2	0.0	3/2$^+$			
1276.75 *17*	0.27 *3*	2113.63		836.70	(5/2)$^+$			
^{x}1282.06 *35*	0.06 *2*							
1286.46 *20*	0.21 *2*	1800.55		514.07	(3/2)$^+$			
1288.20 *52*	0.06 *2*	1288.7		0.0	3/2$^+$			
1300.42 *56*	0.02 *1*	2480.0		1179.58	(5/2$^+$)			
1350.22 *60*	0.07 *2*	2113.63		763.34	(5/2,3/2)$^+$			
1366.21 *46*	0.06 *2*	1800.55		434.03	(3/2)$^+$			
1372.75 *56*	0.06 *2*	1887.72	3/2	514.07	(3/2)$^+$			
1418.88 *18*	0.34 *2*	1933.54	3/2$^+$	514.07	(3/2)$^+$			
1435.2[#] *5*	<0.09	1435.43		0.0	3/2$^+$			
1437.31 *16*	1.12 *8*	1951.73	3/2	514.07	(3/2)$^+$			
1453.17 *31*	0.23 *3*	1887.72	3/2	434.03	(3/2)$^+$			
1467.59 *42*	0.02 *2*	2304.87	3/2$^{(+)}$	836.70	(5/2)$^+$			
1476.66 *52*	0.06 *1*	1476.67	(5/2$^+$,3/2$^+$)	0.0	3/2$^+$			
^{x}1499.50 *20*	0.37 *4*							
^{x}1505.66 *52*	0.10 *3*							
1511.85 *31*	0.18 *4*	2275.22	3/2$^{(+)}$	763.34	(5/2,3/2)$^+$			
1517.54 *23*	0.28 *4*	1951.73	3/2	434.03	(3/2)$^+$			
1532.95 *44*	0.03 *1*	1693.34		160.37	(1/2)$^+$			
^{x}1541.73 *64*	0.04 *2*							
^{x}1560.27 *62*	0.03 *2*							
1568.95 *36*	0.04 *1*	1569.98?		0.0	3/2$^+$			
1612.94 *95*	0.06 *2*	2480.0		866.74	(5/2,3/2)			
1619.28 *24*	0.33 *5*	2133.70	3/2$^{(+)}$	514.07	(3/2)$^+$			
1638.98 *61*	0.17 *2*	2152.9		514.07	(3/2)$^+$			
1679.82 *24*	0.23 *3*	2113.63		434.03	(3/2)$^+$			
1693.30 *35*	0.13 *2*	1693.34		0.0	3/2$^+$			
1699.76 *18*	0.58 *6*	2133.70	3/2$^{(+)}$	434.03	(3/2)$^+$			
1718.37 *65*	0.04 *2*	2152.9		434.03	(3/2)$^+$			

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^{137}Pr ε decay 1973Bu17 (continued)

$\gamma(^{137}$Ce) (continued)

E_γ	I_γ †	E_i(level)	J^π_i	E_f	J^π_f
1727.57 *24*	0.15 *3*	1887.72	3/2	160.37	$(1/2)^+$
x1742.32 *68*	0.05 *2*				
1764.81 *69*	0.06 *2*	1925.34	$(3/2,5/2)^+$	160.37	$(1/2)^+$
1774.29# *79*	0.03 *2*	1933.54	$3/2^+$	160.37	$(1/2)^+$
1792.63 *36*	0.11 *3*	1951.73	3/2	160.37	$(1/2)^+$
1800.92 *18*	0.74 *6*	1800.55		0.0	$3/2^+$
x1819.29 *41*	0.10 *4*				
1833.60 *48*	0.06 *3*	2347.5		514.07	$(3/2)^+$
1841.09 *19*	0.06 *3*	2275.22	$3/2^{(+)}$	434.03	$(3/2)^+$
x1852.77 *47*	0.07 *2*				
x1864.09 *86*	0.03 *2*				
1871.13 *39*	0.09 *2*	2304.87	$3/2^{(+)}$	434.03	$(3/2)^+$
1887.88 *29*	0.35 *7*	1887.72	3/2	0.0	$3/2^+$
x1893.81 *35*	0.10 *3*				
1912.87 *64*	0.12 *4*	2347.5		434.03	$(3/2)^+$
1934.54 *50*	0.09 *2*	1933.54	$3/2^+$	0.0	$3/2^+$
1952.62 *38*	0.13 *4*	1951.73	3/2	0.0	$3/2^+$
1966.68 *84*	0.06 *2*	2480.0		514.07	$(3/2)^+$
1974.22# *56*	0.03 *1*	2133.70	$3/2^{(+)}$	160.37	$(1/2)^+$
1992.22 *72*	0.02 *1*	2152.9		160.37	$(1/2)^+$
2114.42 *37*	0.28 *5*	2113.63		0.0	$3/2^+$
2115.35 *51*	0.13 *4*	2275.22	$3/2^{(+)}$	160.37	$(1/2)^+$
x2127.91 *52*	0.08 *2*				
2134.52 *42*	0.23 *5*	2133.70	$3/2^{(+)}$	0.0	$3/2^+$
2145.36 *69*	0.04 *2*	2304.87	$3/2^{(+)}$	160.37	$(1/2)^+$
2152.95 *53*	0.11 *3*	2152.9		0.0	$3/2^+$
2186.89 *86*	0.03 *1*	2347.5		160.37	$(1/2)^+$
2275.48 *75*	0.07 *2*	2275.22	$3/2^{(+)}$	0.0	$3/2^+$
2304.39 *70*	0.05 *2*	2304.87	$3/2^{(+)}$	0.0	$3/2^+$
2320.32 *77*	0.03 *1*	2480.0		160.37	$(1/2)^+$
2347.62 *56*	0.09 *3*	2347.5		0.0	$3/2^+$
2479.21 *58*	0.03 *1*	2480.0		0.0	$3/2^+$
x2517.98 *59*	0.03 *1*				

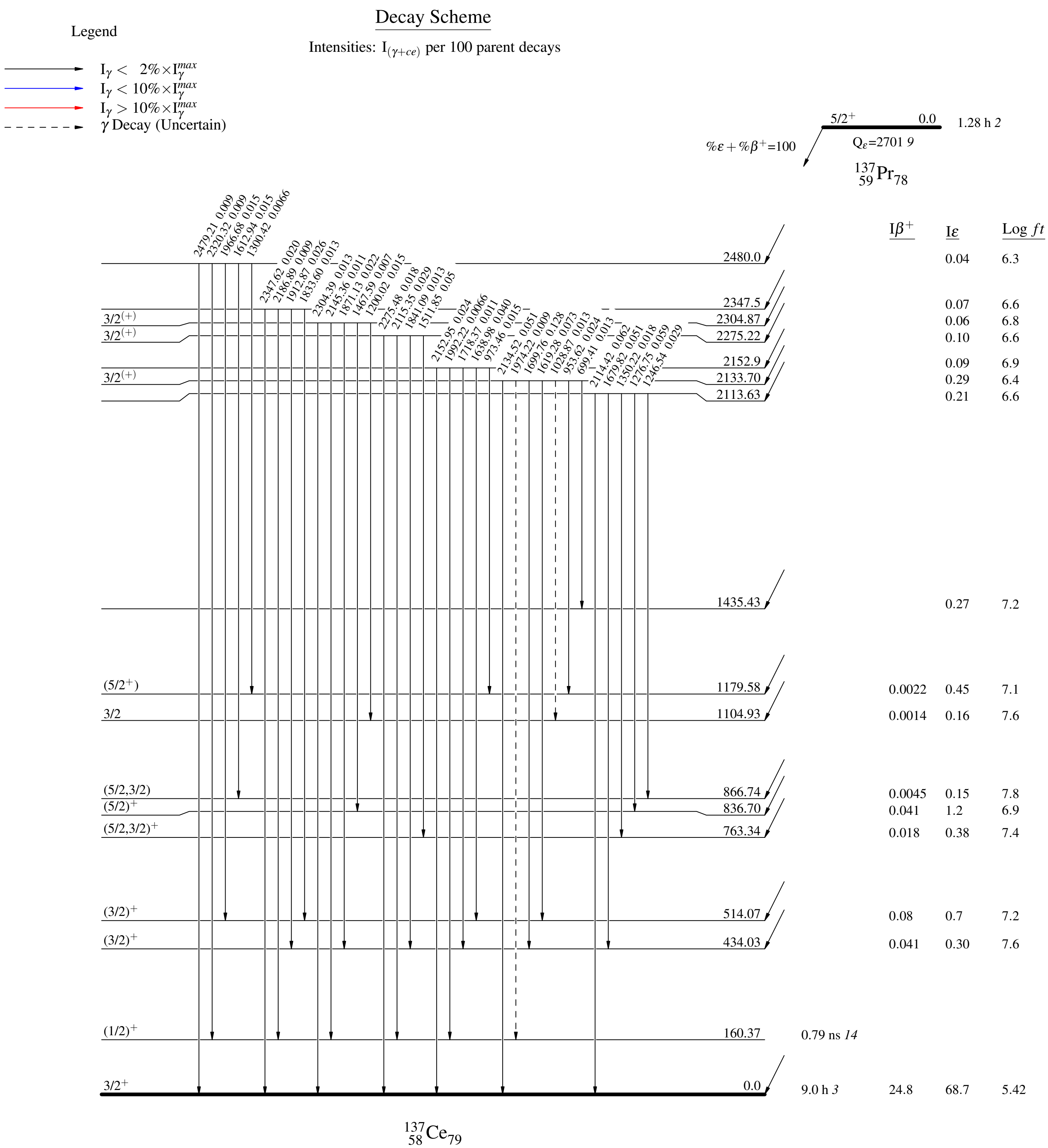
† For absolute intensity per 100 decays, multiply by 0.22 *3*.

‡ 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.

Placement of transition in the level scheme is uncertain.

x γ ray not placed in level scheme.

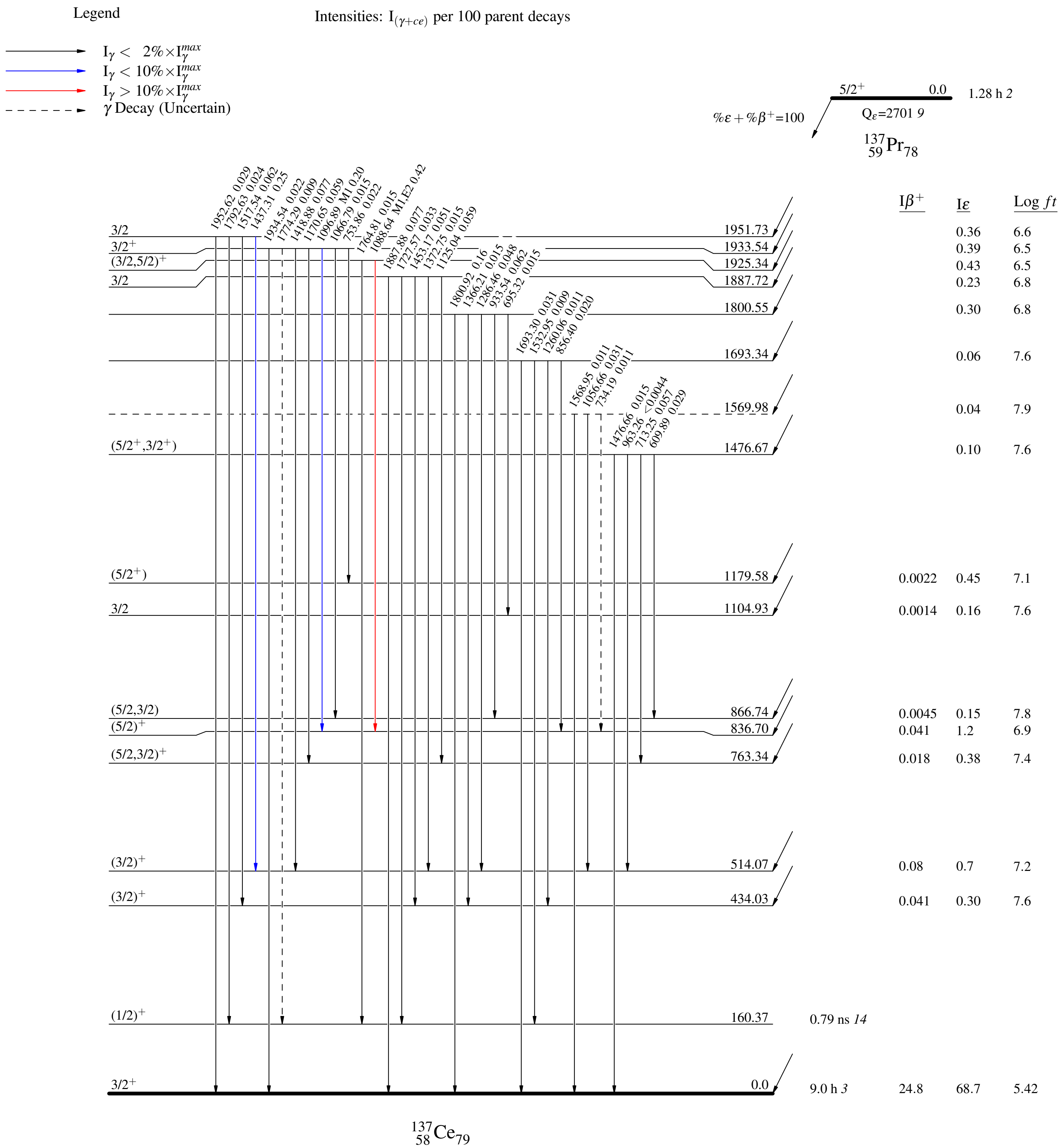
^{137}Pr ε decay 1973Bu17



^{137}Pr ε decay 1973Bu17

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



^{137}Pr ε decay 1973Bu17

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays