^{155}Nd β^- decay 1993GrZP,1997Gr09

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 160, 1 (2019)	21-Oct-2019

Parent: ^{155}Nd: E=0.0; $T_{1/2}$=8.9 s *2*; Q(β^-)=4656 *10*; %β^- decay=100.0
^{155}Nd-$T_{1/2}$,Q(β^-): From adopted values.
Additional information 1.
Production: produced in the neutron-induced fission of ^{235}U (1986Ok08,1990Ok04) and in the spontaneous fission of ^{252}Cf (1993GrZP,1990An31). All of these studies utilized on-line isotope separation in the preparation of the source material.
The decay scheme is that proposed by 1993GrZP and is based on measurements of Eγ, Iγ, γγ and (K x ray)γ using a variety of Ge and Ge(Li) detectors.
1996Gr20 use total-absorption γ spectroscopy to deduce the β feeding intensity to the g.s. and the first two excited states. They report 9.6±3.2% for this intensity.
From analysis of total-absorption γ ray spectra, 1997Gr09 deduce β feeding intensities to the excited states of ^{155}Pm.
In the ^{235}U-based work, γ rays having Eγ=67.5, 180.7, 418.9 and 955.1 are reported. The Iγ values reported for these γ′s are in reasonably good agreement with those of 1993GrZP.
Others: 1986Ok09, 1986Ok08, 1987Gr12, 1988GrZY.
Level scheme is incomplete.

^{155}Pm Levels

E(level)[†]	J$^\pi$[#]	E(level)[†]	E(level)[†]	E(level)[†]
0.0	5/2$^-$	999.84 *21*	1876.0 *3*	2673.6 *5*
67.435 *14*	(7/2)$^-$	1034.16 *13*	1950?[‡]	2750?[‡]
154.594 *24*	(9/2)$^-$	1063.6? *3*	2050?[‡]	2770.6 *5*
180.565 *18*	(5/2)$^+$	1068.96 *16*	2150?[‡]	2850?[‡]
253.09 *3*	(7/2$^+$)	1114.07 *12*	2244.4 *5*	2950?[‡]
345.73 *8*	(9/2$^+$)	1129.30 *12*	2250?[‡]	3050?[‡]
418.99 *4*		1170.24 *13*	2311.3 *5*	3150?[‡]
471.88 *9*		1177.9? *3*	2353.2 *5*	3250?[‡]
495.89 *17*		1346.4 *3*	2358.7 *5*	3350?[‡]
544.59 *15*		1390.99 *10*	2389.3 *4*	3450?[‡]
714.60 *17*		1432.43 *18*	2468.8 *4*	3550?[‡]
774.69 *16*		1550?[‡]	2471.6 *5*	
955.10 *6*		1650?[‡]	2479.1 *5*	
959.37 *13*		1750?[‡]	2589.4 *4*	

† Listed values were calculated from a least-squares fit of the γ-ray energies.
‡ "Pseudo-level" introduced to account for β^- feeding to this region of excitation, where no individual levels are reported. Since these levels do not correspond to any specific actual level, their existence is questioned and they are not included in the Adopted Levels.
# From adopted values.

β^- radiations

E(decay)	E(level)	Iβ^-[†#]
(1106 *10*)	3550?	0.079
(1206 *10*)	3450?	0.157
(1306 *10*)	3350?	0.31
(1406 *10*)	3250?	0.46
(1506 *10*)	3150?	0.46

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^{155}Nd β^- decay 1993GrZP,1997Gr09 (continued)

β^- radiations (continued)

E(decay)	E(level)	$I\beta^-$ [†#]	Log *ft*	Comments
(1606 *10*)	3050?	1.03		
(1706 *10*)	2950?	0.93		
(1806 *10*)	2850?	1.09		
(1885 *10*)	2770.6	0.45	6.0	av Eβ=717.3 *45*
(1906 *10*)	2750?	1.08		
(1982 *10*)	2673.6	1.49	5.6	av Eβ=760.3 *45*
(2067 *10*)	2589.4	3.64	5.3	av Eβ=797.7 *45*
(2177 *10*)	2479.1	1.00	5.9	av Eβ=847.0 *45*
(2184 *10*)	2471.6	2.03	5.6	av Eβ=850.4 *45*
(2187 *10*)	2468.8	2.12	5.6	av Eβ=851.6 *45*
(2267 *10*)	2389.3	3.52	5.4	av Eβ=887.3 *45*
(2297 *10*)	2358.7	1.47	5.8	av Eβ=901.1 *45*
(2303 *10*)	2353.2	1.16	5.9	av Eβ=903.6 *45*
(2345 *10*)	2311.3	0.56	6.0	av Eβ=922.4 *46*
(2406 *10*)	2250?	2.25		
(2412 *10*)	2244.4	0.55	6.3	av Eβ=952.6 *46*
(2506 *10*)	2150?	4.04		
(2606 *10*)	2050?	3.68		
(2706 *10*)	1950?	1.12		
(2780 *10*)	1876.0	3.95	5.7	av Eβ=1120.0 *46*
(2906 *10*)	1750?	2.59		
(3006 *10*)	1650?	0.94		
(3106 *10*)	1550?	1.18		
(3224 *10*)	1432.43	3.32	6.1	av Eβ=1323.2 *46*
(3265 *10*)	1390.99	11.2	5.6	av Eβ=1342.3 *46*
(3310 *10*)	1346.4	1.53	6.5	av Eβ=1362.8 *46*
(3478 *10*)	1177.9?	0.77	6.9	av Eβ=1440.4 *47*
(3486 *10*)	1170.24	0.68	6.9	av Eβ=1444.0 *47*
(3527 *10*)	1129.30	0.35	7.2	av Eβ=1462.9 *47*
(3542 *10*)	1114.07	0.47	7.1	av Eβ=1469.9 *47*
(3587 *10*)	1068.96	2.50	6.4	av Eβ=1490.7 *47*
(3592 *10*)	1063.6?	0.70	7.0	av Eβ=1493.2 *47*
(3622 *10*)	1034.16	2.64	6.4	av Eβ=1506.8 *47*
(3656 *10*)	999.84	2.00	6.5	av Eβ=1522.6 *47*
(3697 *10*)	959.37	3.14	6.4	av Eβ=1541.3 *47*
(3701 *10*)	955.10	15.6	5.7	av Eβ=1543.3 *47*
(3881 *10*)	774.69	1.04	6.9	av Eβ=1626.8 *47*
(3941 *10*)	714.60	0.65	7.2	av Eβ=1654.6 *47*
(4501 *10*)	154.594	[‡]		av Eβ=1914.2 *47*
(4589 *10*)	67.435	[‡]		av Eβ=1954.7 *47*
(4656 *10*)	0.0	9.6[‡] *32*		av Eβ=1986.0 *47*

† The $I\beta^-$ values are from the total-absorption γ spectroscopy data of 1997Gr09. These differ from the values deduced from intensity balances within the decay scheme, since these latter values are most likely systematically skewed by the nonobservation of a number of γ transitions.

‡ Iβ=9.6±3.2% for the summed intensity to the three lowest states in ^{155}Pm.

\# Absolute intensity per 100 decays.

^{155}Nd β^- decay 1993GrZP,1997Gr09 (continued)

γ(^{155}Pm)

Iγ normalization: Computed by requiring that the sum of the I(γ+ce) values for the γ's feeding the g.s. and the first two excited states be 90.4±3.2%. This is the difference between 100% and the 9.6±3.2% reported by 1996Gr20 for the β feeding to these three levels.

1986Ok09 report I(Pm Kα x ray)=229 *34* and I(Pm Kβ x ray)=41 *7*, relative to Iγ(180.5γ)=100. 1993GrZP report I(Pm K x ray)=220 *22*, also relative to Iγ(180.5γ)=100.

E$_\gamma$	I$_\gamma$[#]	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.[†]	α[‡]	Comments
53.0 *2*	2.5 *10*	471.88		418.99		M1	9.69 *18*	%Iγ=0.31 *13* α(K)=8.21 *15*; α(L)=1.169 *21*; α(M)=0.250 *5* α(N)=0.0563 *10*; α(O)=0.00847 *16*; α(P)=0.000532 *10* α(K)exp=10 *3*.
67.432 *15*	38 *4*	67.435	(7/2)$^-$	0.0	5/2$^-$	M1	4.82	%Iγ=4.7 *4* α(K)=4.09 *6*; α(L)=0.578 *8*; α(M)=0.1234 *18* α(N)=0.0278 *4*; α(O)=0.00419 *6*; α(P)=0.000264 *4* α(K)exp=4.7 *4*.
72.8 *2*	2.5 *12*	544.59		471.88				%Iγ=0.31 *15*
76.8 *2*	0.5 *2*	495.89		418.99				%Iγ=0.062 *25*
87.155 *20*	21.6 *22*	154.594	(9/2)$^-$	67.435	(7/2)$^-$	M1(+E2)	3.0 *8*	%Iγ=2.70 *27* α(K)=1.84 *11*; α(L)=0.91 *64*; α(M)=0.21 *15* α(N)=0.045 *33*; α(O)=0.0059 *40*; α(P)=1.00×10^{-4} *26* α(K)exp=2.2 *4*.
98.35 *15*	3.8 *10*	253.09	(7/2$^+$)	154.594	(9/2)$^-$			%Iγ=0.47 *13*
113.08 *4*	10.8 *11*	180.565	(5/2)$^+$	67.435	(7/2)$^-$			%Iγ=1.35 *15*
154.7 *3*	2.6 *8*	154.594	(9/2)$^-$	0.0	5/2$^-$			%Iγ=0.32 *10*
180.574 *20*	100 *10*	180.565	(5/2)$^+$	0.0	5/2$^-$	E1	0.0536	%Iγ=12.5 *12* α(K)=0.0456 *7*; α(L)=0.00629 *9*; α(M)=0.001336 *19* α(N)=0.000298 *5*; α(O)=4.35×10^{-5} *6*; α(P)=2.42×10^{-6} *4* α(K)exp=0.07 *3*.
185.70 *4*	19.9 *20*	253.09	(7/2$^+$)	67.435	(7/2)$^-$			%Iγ=2.49 *27*
190.9 *2*	4.8 *12*	345.73	(9/2$^+$)	154.594	(9/2)$^-$			%Iγ=0.60 *15*
219.2 *3*	1.5 *8*	471.88		253.09	(7/2$^+$)			%Iγ=0.19 *10*
220.67 *15*	10.2 *15*	1390.99		1170.24				%Iγ=1.27 *20*
238.54 *15*	2.5 *8*	418.99		180.565	(5/2)$^+$			%Iγ=0.31 *10*
253.07 *4*	26.0 *26*	253.09	(7/2$^+$)	0.0	5/2$^-$			%Iγ=3.25 *35*
261.75 *20*	14.8 *22*	1390.99		1129.30				%Iγ=1.85 *29*
262.3 *3*	3.2 *13*	1432.43		1170.24				%Iγ=0.40 *16*
276.95 *10*	12.5 *19*	1390.99		1114.07				%Iγ=1.56 *25*
278.29 *10*	14.0 *21*	345.73	(9/2$^+$)	67.435	(7/2)$^-$			%Iγ=1.75 *27*
291.2 *2*	3.2 *8*	471.88		180.565	(5/2)$^+$			%Iγ=0.40 *10*
291.3 *4*	1.3 *7*	544.59		253.09	(7/2$^+$)			%Iγ=0.16 *9*
294.3 *4*	2.0 *10*	1068.96		774.69				%Iγ=0.25 *13*
303.2 *3*	6.8 *20*	1432.43		1129.30				%Iγ=0.85 *25*
364.0 *3*	2.5 *12*	544.59		180.565	(5/2)$^+$			%Iγ=0.31 *15*
389.9 *4*	2.8 *14*	544.59		154.594	(9/2)$^-$			%Iγ=0.35 *18*
391.3 *4*	2.9 *15*	1390.99		999.84				%Iγ=0.36 *19*
404.39 *15*	7.8 *12*	471.88		67.435	(7/2)$^-$			%Iγ=0.97 *15*
418.99 *4*	75 *8*	418.99		0.0	5/2$^-$			%Iγ=9.4 *10*

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^{155}Nd β^- decay 1993GrZP,1997Gr09 (continued)

γ(^{155}Pm) (continued)

E_γ	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Comments
471.9 *3*	2.7 *11*	471.88		0.0	5/2⁻	%Iγ=0.34 *14*
496.1 *3*	5.5 *17*	495.89		0.0	5/2⁻	%Iγ=0.69 *21*
521.8 *2*	5.7 *23*	774.69		253.09	(7/2⁺)	%Iγ=0.71 *29*
534.0 *2*	8.5 *17*	714.60		180.565	(5/2)⁺	%Iγ=1.06 *22*
593.7 *3*	2.0 *8*	774.69		180.565	(5/2)⁺	%Iγ=0.25 *10*
609.23 *15*	16.2 *24*	955.10		345.73	(9/2⁺)	%Iγ=2.02 *31*
626.0[@] *4*	2.6 *10*	1170.24		544.59		%Iγ=0.32 *13*
642.2 *3*	8 *3*	1114.07		471.88		%Iγ=1.0 *4*
676.3 *3*	4.9 *20*	1390.99		714.60		%Iγ=0.61 *25*
695.3 *3*	3.0 *12*	1114.07		418.99		%Iγ=0.37 *15*
702.0 *5*	4.1 *20*	955.10		253.09	(7/2⁺)	%Iγ=0.51 *25*
706.0 *4*	4.6 *14*	959.37		253.09	(7/2⁺)	%Iγ=0.57 *18*
710.4 *2*	15 *3*	1129.30		418.99		%Iγ=1.9 *4*
781.0 *5*	4.3 *17*	1034.16		253.09	(7/2⁺)	%Iγ=0.54 *21*
800.55 *15*	28 *4*	955.10		154.594	(9/2)⁻	%Iγ=3.5 *5*
804.7 *3*	3.4 *10*	959.37		154.594	(9/2)⁻	%Iγ=0.42 *13*
850.1[@] *5*	4.2 *21*	1346.4		495.89		%Iγ=0.52 *26*
853.53 *15*	11.1 *22*	1034.16		180.565	(5/2)⁺	%Iγ=1.39 *28*
861.2[@] *5*	3.7 *18*	1114.07		253.09	(7/2⁺)	%Iγ=0.46 *23*
876.0[@] *5*	3.6 *18*	1129.30		253.09	(7/2⁺)	%Iγ=0.45 *23*
883.3[@] *5*	1.9 *10*	1063.6?		180.565	(5/2)⁺	%Iγ=0.24 *13*
887.72 *10*	32 *5*	955.10		67.435	(7/2)⁻	%Iγ=4.0 *6*
891.9 *2*	5.1 *15*	959.37		67.435	(7/2)⁻	%Iγ=0.64 *19*
908.8[@] *3*	4.0 *20*	1063.6?		154.594	(9/2)⁻	%Iγ=0.50 *25*
914.5 *2*	7.0 *21*	1068.96		154.594	(9/2)⁻	%Iγ=0.87 *26*
932.6 *4*	5.6 *17*	999.84		67.435	(7/2)⁻	%Iγ=0.70 *21*
933.6 *4*	2.3 *12*	1114.07		180.565	(5/2)⁺	%Iγ=0.29 *15*
948.6 *3*	4.8 *19*	1129.30		180.565	(5/2)⁺	%Iγ=0.60 *24*
955.08 *10*	50 *8*	955.10		0.0	5/2⁻	%Iγ=6.2 *10*
959.5 *2*	13.3 *27*	959.37		0.0	5/2⁻	%Iγ=1.66 *34*
967.0 *3*	6.8 *20*	1034.16		67.435	(7/2)⁻	%Iγ=0.85 *25*
972.0 *2*	5.9 *18*	1390.99		418.99		%Iγ=0.74 *23*
989.9[@] *5*	2.7 *13*	1170.24		180.565	(5/2)⁺	%Iγ=0.34 *16*
999.8 *3*	14 *3*	999.84		0.0	5/2⁻	%Iγ=1.7 *4*
1001.2 *3*	12 *3*	1068.96		67.435	(7/2)⁻	%Iγ=1.5 *4*
1023.3[@] *3*	6.5 *20*	1177.9?		154.594	(9/2)⁻	%Iγ=0.81 *25*
1102.8 *3*	6.3 *19*	1170.24		67.435	(7/2)⁻	%Iγ=0.79 *24*
1129.4 *3*	2.5 *12*	1129.30		0.0	5/2⁻	%Iγ=0.31 *15*
1165.8 *3*	5.6 *17*	1346.4		180.565	(5/2)⁺	%Iγ=0.70 *21*
1170.0 *3*	9.6 *24*	1170.24		0.0	5/2⁻	%Iγ=1.20 *30*
1179.2 *4*	5.8 *23*	1432.43		253.09	(7/2⁺)	%Iγ=0.72 *29*
1210.4 *2*	16 *3*	1390.99		180.565	(5/2)⁺	%Iγ=2.0 *4*
[x]1235 *1*	4.0 *20*					%Iγ=0.50 *25*
1364.8 *4*	5.3 *21*	1432.43		67.435	(7/2)⁻	%Iγ=0.66 *26*
[x]1391.1 *5*	5.5 *22*					%Iγ=0.69 *28*
1695.4 *3*	10.1 *25*	1876.0		180.565	(5/2)⁺	%Iγ=1.26 *32*
1825.4 *5*	3.0 *12*	2244.4		418.99		%Iγ=0.37 *15*
2130.7[@] *5*	3.1 *12*	2311.3		180.565	(5/2)⁺	%Iγ=0.39 *15*
2172.6 *5*	3.3 *12*	2353.2		180.565	(5/2)⁺	%Iγ=0.41 *15*
2178.1 *5*	4.2 *17*	2358.7		180.565	(5/2)⁺	%Iγ=0.52 *21*
2208.7 *4*	10 *3*	2389.3		180.565	(5/2)⁺	%Iγ=1.2 *4*
2288.2 *4*	5.5 *22*	2468.8		180.565	(5/2)⁺	%Iγ=0.69 *28*
2291.0 *5*	5.3 *21*	2471.6		180.565	(5/2)⁺	%Iγ=0.66 *26*
2298.5 *5*	2.6 *13*	2479.1		180.565	(5/2)⁺	%Iγ=0.32 *16*

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^{155}Nd β^- decay 1993GrZP,1997Gr09 (continued)

$\gamma(^{155}Pm)$ (continued)

E_γ	I_γ #	E_i(level)	J^π_i	E_f	J^π_f	Comments
2408.8 *4*	7.8 *23*	2589.4		180.565	$(5/2)^+$	%Iγ=0.97 *29*
2493.0 *5*	2.8 *14*	2673.6		180.565	$(5/2)^+$	%Iγ=0.35 *18*
2590.0 *5*	2.5 *12*	2770.6		180.565	$(5/2)^+$	%Iγ=0.31 *15*

† From α(K)exp, as determined from the ratios of I(K x ray) and Iγ in the γγ coincidence spectra.
‡ Additional information 2.
# For absolute intensity per 100 decays, multiply by 0.125 *6*.
@ Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

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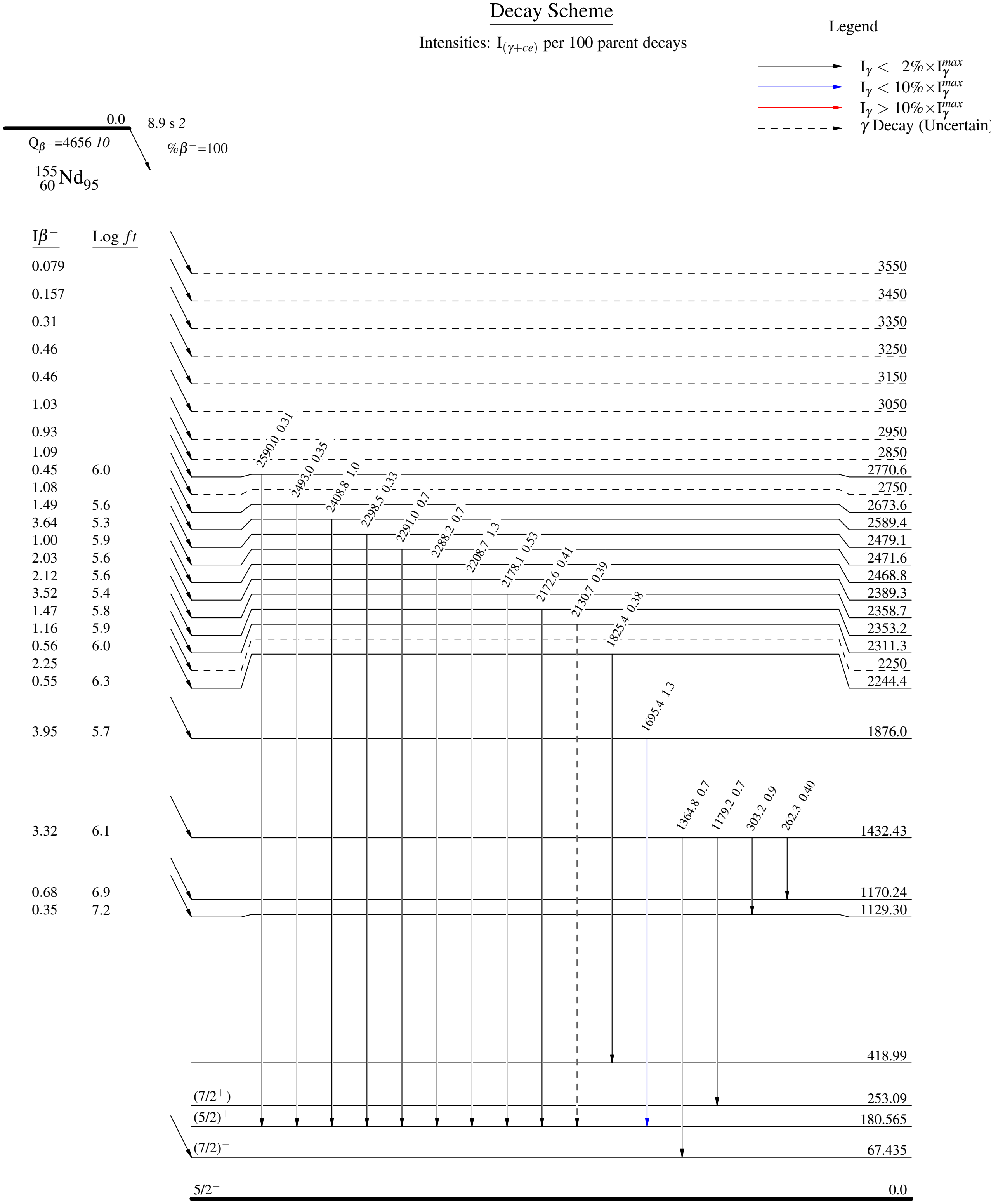
Decay Scheme

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



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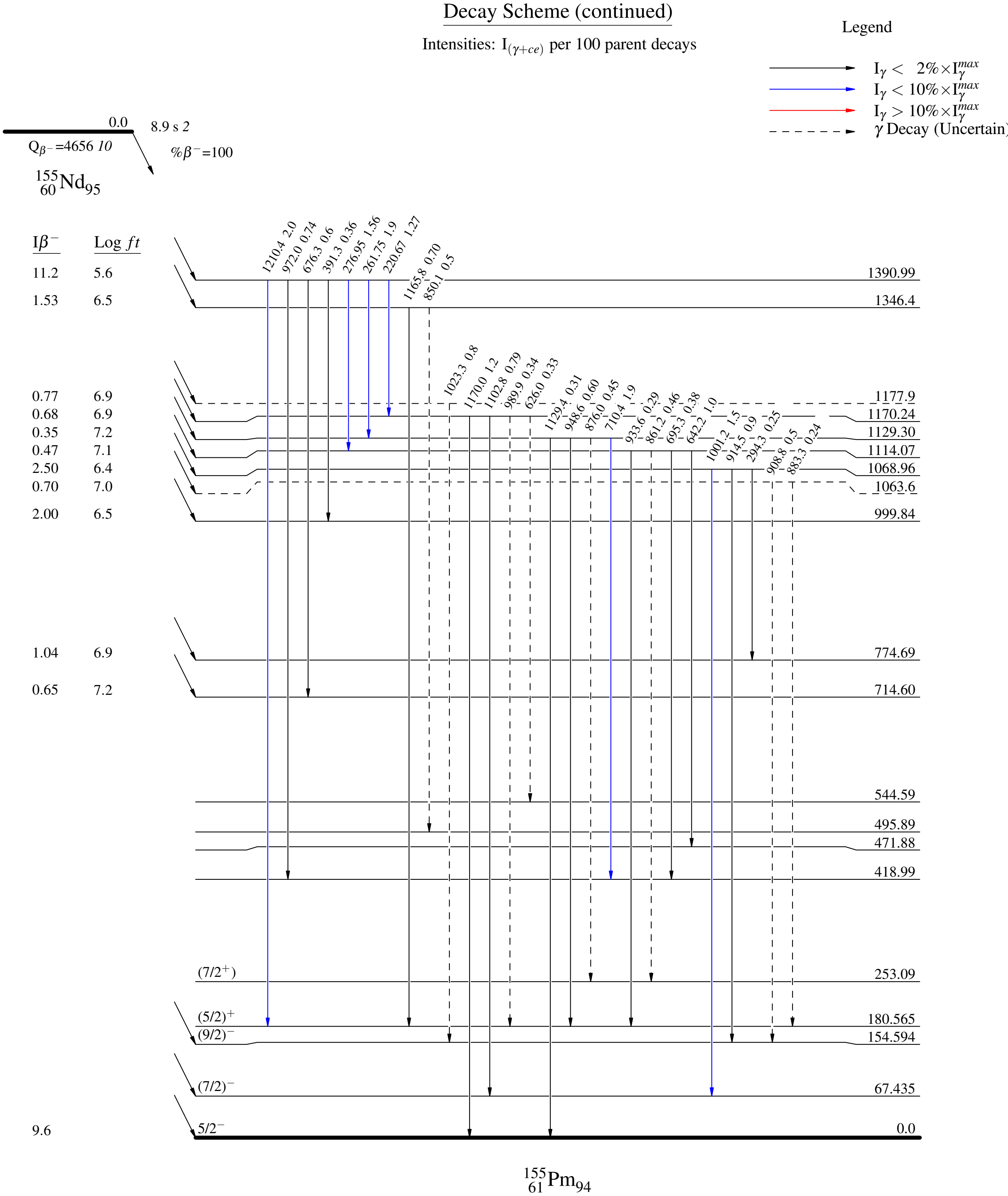
Decay Scheme (continued)

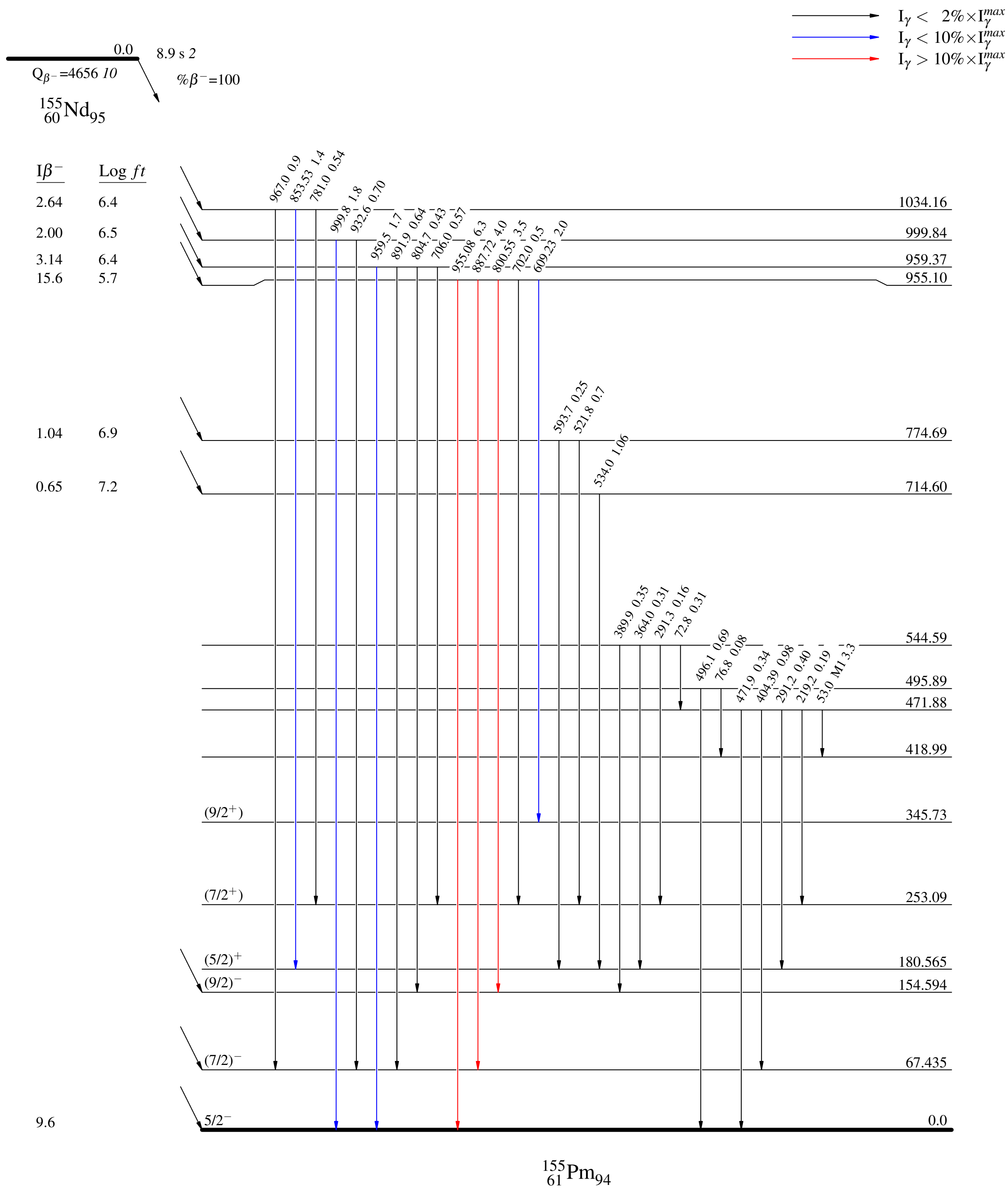
Intensities: $I_{(\gamma+ce)}$ per 100 parent decays



^{155}Nd β^- decay 1993GrZP,1997Gr09

Decay Scheme (continued)

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



^{155}Nd β^- decay 1993GrZP,1997Gr09

Decay Scheme (continued)

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