^{151}Pr β^- decay (18.90 s) 1994Sh37

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 110, 1 (2009)	20-Nov-2008

Parent: ^{151}Pr: E=0.0; J$^\pi$=(3/2$^-$); T$_{1/2}$=18.90 s *7*; Q(β^-)=4167 *14*; %β^- decay=100.0

^{151}Pr-Q(β^-): from mass of neutral ^{151}Pr=150.928303 u *14* (2006Sa56, Penning trap) and mass of neutral ^{151}Nd=150.923829 u *3* (2003Au03) 2003Au03 give 4182 *23*.

1994Sh37: measured γ, $\gamma\gamma$, ce, T$_{1/2}$. Source produced by ^{235}U(n,F) followed by on-line mass separation.

2003Ko13: measured ce, deduced K-conversion coefficients and multipolarities. Mass-separated source produced by neutron-induced fission of ^{235}U using KURISOL facility at KYOTO, Si(Li) detector used for electron detection. Data for 20 γ rays.

Additional information 1.

1996Gr20, 1997Gr09: measured total absorption γ spectra (TAGS) in singles and 4$\pi\gamma$-β coin mode. Deduced g.s. β feedings (1996Gr20) and relative β intensities (1997Gr09) as a function of excitation energy, independent of discrete γ-ray placements in level scheme.

1995Ik03: measured $\beta\gamma$ coin.

1993Gr17, 1990An31: measured $\beta\gamma$ coin with a Total Absorption Spectrometer (TAS) and a germanium detector. Source produced by ^{252}Cf(SF) followed by mass separation.

1990Gr10: measured $\beta\gamma$ coin. Source produced by ^{239}Pu(n,F) followed by mass separation.

From the following previous studies levels were known only up to 880 keV with a total of 27 γ rays.

1978PiZQ: measured γ, T$_{1/2}$. Source produced by ^{235}U(n,F) followed by mass separation. Level scheme contained 14 levels (up to 880 keV) and 27 γ rays.

1987MaZY: measured γ, $\gamma\gamma$, $\beta\gamma$ coin. Authors suggest that the 4.0 s *7* activity assigned earlier to ^{151}Pr (1972Ho08,1970WiZN,1969WiZX) on the basis of a 164.0γ belongs to ^{152}Pr rather than ^{151}Pr.

1981SeZW: T$_{1/2}$.

1990Mo15: calculation of β-strength functions and T$_{1/2}$ by quasiparticle RPA approach.

Q(β^-)=4210 *50* (1995Ik03), 4082 *40* (1993Gr17), 4170 *75* (1990Gr10). Weighted average=4102 *40*. 2003Au03 give 4182 *23*. From mass measurement of ^{151}Pr by 2006Sa56, Q(β^-)=4167 *14* which is the adopted value here.

T$_{1/2}$(^{151}Pr g.s.)=18.90 s *7* (1990An31), 18.9 s *7* (1994Sh37), 22.4 s *15* (1978PiZQ).

The level at 581 proposed earlier (1978PiZQ) has been omitted. The 523γ (from 581 level) is now placed with 599 level. a 596.1γ (Iγ=13 *3*) from 1978PiZQ is also omitted. With this large intensity it should have been seen by 1994Sh37.

^{151}Nd Levels

E(level)	J$^\pi$	E(level)	J$^\pi$	E(level)	J$^\pi$
0.0	3/2$^+$	942.57 *10*	(1/2,3/2,5/2)	2050† *50*	
22.47 *4*	(5/2)$^+$	949.14 *15*	(1/2$^-$,3/2,5/2$^+$)	2150† *50*	
57.68 *4*	(3/2)$^-$	1104.10 *20*		2250† *50*	
75.89 *6*	(7/2)$^+$	1183.8?		2312.5 *2*	(1/2$^-$,3/2,5/2)
105.75 *4*	5/2$^-$	1212.6?		2341.4 *2*	(1/2$^-$,3/2,5/2)
177.78 *10*	(7/2$^-$)	1229.84 *15*	(1/2,3/2,5/2)	2350† *50*	
189.06 *4*	(3/2)$^-$	1300† *50*		2429.8 *3*	
249.54 *6*	(5/2)$^-$	1400† *50*		2450† *50*	
495.25 *5*	(1/2)$^-$	1449.61 *19*	(1/2$^-$,3/2,5/2)	2550† *50*	
506.98 *5*	(3/2)$^-$	1512.1 *3*		2650† *50*	
532.1 *5*	(5/2$^-$,7/2$^-$)	1523.73 *17*	(1/2,3/2,5/2)	2750† *50*	
542.80 *10*	(1/2 to 7/2)$^+$	1620† *50*		2850† *50*	
581.0‡ *2*		1638.31 *20*	1/2,3/2,5/2$^+$	2950† *50*	
599.37 *11*	(5/2$^+$)	1710† *50*		3050† *50*	
626.68 *10*	(1/2 to 7/2)$^+$	1800† *50*		3150† *50*	
685.30 *6*	(3/2,5/2)$^+$	1844.28 *18*	(1/2$^-$,3/2,5/2)	3250† *50*	
846.47 *10*	1/2$^-$,3/2$^-$	1860† *50*		3350† *50*	
877.23 *9*	(1/2$^-$,3/2,5/2)	1878.09 *15*	(1/2,3/2,5/2)	3450† *50*	
880.17 *6*	(1/2,3/2)$^+$	1907.9 *2*		3550† *50*	
892.9?		1980† *50*		3650† *50*	

^{151}Pr β^- decay (18.90 s) 1994Sh37 (continued)

^{151}Nd Levels (continued)

E(level)
3750† *50*
3850† *50*

† Pseudo-level from total absorption γ spectra ($4\pi\gamma$) (1997Gr09). Uncertainty assigned by the evaluator based on 100 keV energy bin chosen by 1997Gr09 in the analysis of spectra.
‡ Level proposed on the basis of (n,γ) results and comparison of branching ratios from 599 level in ^{151}Pr β^- and (n,γ).

β^- radiations

Comparison of β feedings deduced from γ-ray intensity balance and those from total absorption γ spectra (1997Gr09) suggest that the level scheme derived from γ-ray placements is highly incomplete. For example, 10% of the feeding feeds levels 2430 that are not proposed in γ-ray study. Between 1300 and 2430, 41% feeding is predicted by total absorption (1997Gr09) whereas discrete γ-ray data gives only 14.7%. Below 900 keV, β feeding from level scheme seem to be overestimated as compared to those from 1997Gr09.

E(decay)	E(level)	Iβ^- †#	Log *ft*	Comments
(3.2×10^2 *5*)	3850	0.017‡	5.0	av Eβ=91 *17*
(4.2×10^2 *5*)	3750	0.027‡	5.2	av Eβ=124 *18*
(5.2×10^2 *5*)	3650	0.046‡	5.2	av Eβ=158 *19*
(6.2×10^2 *5*)	3550	0.078‡	5.3	av Eβ=194 *20*
(7.2×10^2 *5*)	3450	0.11‡	5.4	av Eβ=231 *20*
(8.2×10^2 *5*)	3350	0.16‡	5.4	av Eβ=269 *21*
(9.2×10^2 *5*)	3250	0.23‡	5.4	av Eβ=308 *21*
(1.02×10^3 *5*)	3150	0.29‡	5.5	av Eβ=348 *21*
(1.12×10^3 *5*)	3050	0.29‡	5.6	av Eβ=389 *22*
(1.22×10^3 *5*)	2950	0.29‡	5.8	av Eβ=430 *22*
(1.32×10^3 *5*)	2850	0.71‡	5.5	av Eβ=472 *22*
(1.42×10^3 *5*)	2750	0.97‡	5.5	av Eβ=515 *23*
(1.52×10^3 *5*)	2650	2.3‡	5.2	av Eβ=558 *23*
(1.62×10^3 *5*)	2550	2.5‡	5.3	av Eβ=601 *23*
(1.72×10^3 *5*)	2450	2.0‡	5.5	av Eβ=645 *23*
(1737 *14*)	2429.8	0.38 *14*	6.2	av Eβ=653.4 *62* Iβ^-: 0.7 (1997Gr09, $4\pi\gamma$).
(1.82×10^3 *5*)	2350	0.37‡	6.3	av Eβ=689 *23*
(1826 *14*)	2341.4	0.77 *15*	6.0	av Eβ=692.3 *62* Iβ^-: 1.3 (1997Gr09, $4\pi\gamma$).
(1855 *14*)	2312.5	1.2 *2*	5.9	av Eβ=705.0 *62* Iβ^-: 2.0 (1997Gr09, $4\pi\gamma$).
(1.92×10^3 *5*)	2250	2.7‡	5.6	av Eβ=733 *23*
(2.02×10^3 *5*)	2150	3.0‡	5.6	av Eβ=777 *24*
(2.12×10^3 *5*)	2050	4.8‡	5.5	av Eβ=822 *24*
(2.19×10^3 *5*)	1980	6.0‡	5.4	av Eβ=853 *24*
(2259 *14*)	1907.9	0.52 *14*	6.6	av Eβ=885.6 *63* Iβ^-: 0.9 (1997Gr09, $4\pi\gamma$).
(2.31×10^3 *5*)	1860	4.7‡	5.6	av Eβ=907 *24*

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^{151}Pr β^- decay (18.90 s) 1994Sh37 (continued)

β^- radiations (continued)

E(decay)	E(level)	Iβ^- [†#]	Log *ft*	Comments
2.32×10^3 *17*	1878.09	1.54 *15*	6.1	av Eβ=899.1 *64*
(2323 *14*)	1844.28	0.99 *13*	6.3	av Eβ=914.3 *64* Iβ^-: 1.7 (1997Gr09, 4$\pi\gamma$).
(2.37×10^3 *5*)	1800	0.49[‡]	6.7	av Eβ=934 *24*
(2.46×10^3 *5*)	1710	3.8[‡]	5.8	av Eβ=975 *24*
2.53×10^3 *24*	1638.31	1.7 *2*	6.2	av Eβ=1007.6 *64* Iβ^-: 1.65 (1997Gr09, 4$\pi\gamma$). E(decay): from 1995Ik03.
(2.55×10^3 *5*)	1620	1.5[‡]	6.3	av Eβ=1016 *24*
(2643 *14*)	1523.73	1.08 *12*	6.5	av Eβ=1059.8 *64* Iβ^-: 0.74 (1997Gr09, 4$\pi\gamma$).
(2655 *14*)	1512.1	0.59 *9*	6.8	av Eβ=1065.1 *64* Iβ^-: 0.39 (1997Gr09, 4$\pi\gamma$).
(2717 *14*)	1449.61	0.81 *12*	6.7	av Eβ=1093.6 *64* Iβ^-: 0.29 (1997Gr09, 4$\pi\gamma$).
(2.77×10^3 *5*)	1400	0.78[‡]	6.7	av Eβ=1116 *24*
(2.87×10^3 *5*)	1300	0.73[‡]	6.8	av Eβ=1162 *24*
(2937 *14*)	1229.84	1.03 *13*	6.7	av Eβ=1194.2 *65* Iβ^-: 1.46 (1997Gr09, 4$\pi\gamma$).
(3063 *14*)	1104.10	1.03 *10*	6.8	av Eβ=1251.9 *65* Iβ^-: 1.36 (1997Gr09, 4$\pi\gamma$).
(3218 *14*)	949.14	0.80 *12*	7.0	av Eβ=1323.2 *65* Iβ^-: 0.95 (1997Gr09, 4$\pi\gamma$).
(3224 *14*)	942.57	0.30 *11*	7.4	av Eβ=1326.3 *65* Iβ^-: 0.34 (1997Gr09, 4$\pi\gamma$).
3180 *35*	880.17	9.1 *4*	6.0	av Eβ=1355.0 *65* Iβ^-: 10.55 (1997Gr09, 4$\pi\gamma$). E(decay): from 1993Gr17. Others: 3310 *110* (1995Ik03), 3380 *120* from (373γ,385γ,880γ)(3380β) (1990Gr10).
(3290 *14*)	877.23	1.35 *12*	6.8	av Eβ=1356.4 *65* Iβ^-: 1.56 (1997Gr09, 4$\pi\gamma$).
(3321 *14*)	846.47	1.10 *9*	6.9	av Eβ=1370.6 *65* Iβ^-: 1.29 (1997Gr09, 4$\pi\gamma$).
3311 *40*	685.30	6.14 *24*	6.3	av Eβ=1445.0 *65* Iβ^-: 5.93 (1997Gr09, 4$\pi\gamma$). E(decay): from 1993Gr17. Others: 3530 *180* (1995Ik03), 3485 *150* from (663γ,686γ)(3485β) (1990Gr10).
(3540 *14*)	626.68	0.90 *13*	7.1	av Eβ=1472.1 *65* Iβ^-: 0.199 (1997Gr09, 4$\pi\gamma$).
(3568 *14*)	599.37	1.03 *5*	7.1	av Eβ=1484.7 *65* Iβ^-: 0.36 (1997Gr09, 4$\pi\gamma$).
(3586[@] *14*)	581.0	<0.5	>7.4	av Eβ=1493.2 *65*
(3624 *14*)	542.80	0.92 *8*	7.2	av Eβ=1510.9 *65* Iβ^-: 0.0 (1997Gr09, 4$\pi\gamma$).
(3635[@] *14*)	532.1	0.054 *24*	8.4	av Eβ=1515.9 *65* Iβ^-: 0.0 (1997Gr09, 4$\pi\gamma$).
3577 *50*	506.98	8.9 *4*	6.2	av Eβ=1527.5 *65* Iβ^-: 9.25 (1997Gr09, 4$\pi\gamma$). E(decay): from 1993Gr17. Others: 3680 *160* (1995Ik03), 3615 *150* from (485γ)(3615β) (1990Gr10).
3642 *40*	495.25	7.0 *5*	6.3	av Eβ=1532.9 *65* Iβ^-: 7.23 (1997Gr09, 4$\pi\gamma$). E(decay): from 1993Gr17. Others: 3740 *120* (1995Ik03), 3565 *105* from (438γ,495γ) (3565β) (1990Gr10).

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^{151}Pr β^- decay (18.90 s) 1994Sh37 (continued)

β^- radiations (continued)

E(decay)	E(level)	Iβ^- †#	Log *ft*	Comments
(3917 *14*)	249.54	3.0 *9*	6.8	av Eβ=1646.8 *65* Iβ^-: 0.80 (1997Gr09, 4$\pi\gamma$). Weak β^- feeding indicated by $\beta\gamma$ (1993Gr17).
4.12×10^3 *18*	189.06	1.5 *10*	7.1	av Eβ=1674.9 *65* Iβ^-: 0.96 (1997Gr09, 4$\pi\gamma$). Weak β^- feeding indicated from $\beta\gamma$ (1993Gr17). E(decay): (189γ)(4125β) (1990Gr10).
(3989@ *14*)	177.78	0.12 *5*	8.2	av Eβ=1680.1 *65* Iβ^-: 0.0 (1997Gr09) (from 4$\pi\gamma$).
(4061@ *14*)	105.75	<0.4	>7.7	av Eβ=1713.6 *65* Iβ^-: 0.0 (1997Gr09) (from 4$\pi\gamma$). Weak β feeding indicated by 1993Gr17.
(4091@ *14*)	75.89	6 *4*	8.2[1u]	av Eβ=1705.0 *65* Iβ^-: other: <6.6 from I($\beta\gamma$)/I(β) measured with $\beta\gamma$ coin and total absorption γ spectrometer, Iβ(g.s.+22.5+57.7+75.9)=6.6% 21 (1996Gr20).
(4109@ *14*)	57.68	<1.8	>7.1	av Eβ=1735.9 *65* Iβ^-: other: <6.6 from I($\beta\gamma$)/I(β) measured with $\beta\gamma$ coin and total absorption γ spectrometer, Iβ(g.s.+22.5+57.7+75.9)=6.6% 21 (1996Gr20); weak feeding indicated by $\beta\gamma$ (1993Gr17).
(4145@ *14*)	22.47	<6.6	>6.6	av Eβ=1752.2 *65* Iβ^-: from I($\beta\gamma$)/I(β) measured with $\beta\gamma$ coin and total absorption γ spectrometer, Iβ(g.s.+22.5+57.7+75.9)=6.6% 21 (1996Gr20). Others: Iβ(g.s.+22.5)<17% (1993Gr17), 10 *10* from γ-intensity balance.
4135@ *50*	0.0	<6.6	>6.6	av Eβ=1762.7 *65* Iβ^-: from I($\beta\gamma$)/I(β) measured with $\beta\gamma$ coin and total absorption γ spectrometer, Iβ(g.s.+22.5+57.7+75.9)=6.6% 21 (1996Gr20). Other: Iβ(g.s.+22.5)<17% (1993Gr17). E(decay): weighted average of 4200 *30* (1995Ik03), 4082 *40* (1993Gr17), 4170 *75* (1990Gr10). This value is associated with β^- branch to g.s. or 22.5 level.

† From γ-ray intensity balance unless otherwise stated. Due to incompleteness of level scheme as pointed out by 1997Gr09, the log *ft* values are given without uncertainties.
‡ From 4$\pi\gamma$ data (1997Gr09).
# Absolute intensity per 100 decays.
@ Existence of this branch is questionable.

γ(^{151}Nd)

Iγ normalization: from I(γ+ce)(γ's to g.s.)>93.4, with Iβ(g.s.)<6.6 (1997Gr09) and I$\beta\approx$36 from tags data (1997Gr09) for levels where no γ rays have been reported. Uncertainty of 25% is assigned arbitrarily by the evaluator from incompleteness of level scheme as suggested by total absorption γ-ray data (1997Gr09), and $\approx$14% missing total decay energy as indicated by the radlist code.

E_γ †	I_γ †@	E_i(level)	J^π_i	E_f	J^π_f	Mult.‡	δ	α&	Comments
22.5 1	8.3 6	22.47	(5/2)$^+$	0.0	3/2$^+$	M1+E2	0.16 3	49 13	α(L)=38 10; α(M)=8.5 23; α(N+..)=2.1 6 α(N)=1.9 5; α(O)=0.25 6; α(P)=0.00602 13 Mult.,δ: α(exp)≥28 (from $\gamma\gamma$ coin) (1994Sh37) gives M1,E2. Intensity balance at 22.5 level, possible β^- feeding≤6.6% and unplaced intensity of 41 units, all combined give α=50 13 and δ(E2/M1)=0.16 3.
29.9 1	1.0 3	105.75	5/2$^-$	75.89	(7/2)$^+$	[E1]		1.210 21	α(L)=0.956 17; α(M)=0.204 4; α(N+..)=0.0496 9 α(N)=0.0437 8; α(O)=0.00573 10; α(P)=0.000213 4
35.2 1	12.8 13	57.68	(3/2)$^-$	22.47	(5/2)$^+$	[E1]		0.764 13	α(L)=0.604 10; α(M)=0.1283 21; α(N+..)=0.0315 5 α(N)=0.0277 5; α(O)=0.00370 6; α(P)=0.0001454 23
53.5 1	6.6 13	75.89	(7/2)$^+$	22.47	(5/2)$^+$	M1(+E2)		16 8	α(K)=6.0 13; α(L)=8 7; α(M)=1.7 16; α(N+..)=0.4 4 α(N)=0.4 4; α(O)=0.05 4; α(P)=0.00035 13 α: for M1. α(exp)≥6.1 (from $\gamma\gamma$ coin) gives M1,E2. γ-ray intensity balance and allowance for Iβ(76 level)<6.6% is consistent with M1 or M1 with some E2 admixture, but not pure E2 (α=23.4).
57.70 5	67 6	57.68	(3/2)$^-$	0.0	3/2$^+$	E1		1.143	α(K)=0.954 14; α(L)=0.1493 22; α(M)=0.0316 5; α(N+..)=0.00790 12 α(N)=0.00690 10; α(O)=0.000963 14; α(P)=4.40$\times10^{-5}$ 7 α(K)exp=0.87 9 (from Xγ coin).
60.5 1	2.8 9	249.54	(5/2)$^-$	189.06	(3/2)$^-$	[M1,E2]		10 4	α(K)=4.6 6; α(L)=4 4; α(M)=1.0 9; α(N+..)=0.24 20 α(N)=0.21 18; α(O)=0.027 22; α(P)=0.00026 8
75.9 1	0.9 1	75.89	(7/2)$^+$	0.0	3/2$^+$	[E2]		5.99	α(K)=2.51; α(L)=2.71; α(M)=0.62; α(N+..)=0.15 α(N)=0.13; α(O)=0.017; α(P)=0.00011
83.30 5	19.4 17	105.75	5/2$^-$	22.47	(5/2)$^+$	E1		0.427	α(K)=0.360 5; α(L)=0.0527 8; α(M)=0.01114 16; α(N+..)=0.00281 4 α(N)=0.00245 4; α(O)=0.000349 5; α(P)=1.748$\times10^{-5}$ 25 I_γ: intensity of the 83.3 doublet split on the basis of $\gamma\gamma$. α(K)exp≤0.79 (from Xγ coin).
83.3 3	2 1	189.06	(3/2)$^-$	105.75	5/2$^-$				E_γ: uncertainty assigned by the evaluator. I_γ: from $\gamma\gamma$.
105.75 5	32.7 18	105.75	5/2$^-$	0.0	3/2$^+$	E1		0.222	α(K)=0.189 3; α(L)=0.0268 4; α(M)=0.00566 8; α(N+..)=0.001437 21 α(N)=0.001248 18; α(O)=0.000180 3; α(P)=9.47$\times10^{-6}$ 14 α(K)exp≤0.35.
131.4 1	7.9 7	189.06	(3/2)$^-$	57.68	(3/2)$^-$	M1,E2		0.74 9	α(K)=0.546 12; α(L)=0.15 8; α(M)=0.034 18; α(N+..)=0.008 5 α(N)=0.007 4; α(O)=0.0010 5; α(P)=3.0$\times10^{-5}$ 6 α(K)exp=0.36 4 (2003Ko13), 0.32 16 (1994Sh37), α(exp)=0.69 16 (from $\gamma\gamma$ coin).

γ(^{151}Nd) (continued)

E_γ †	I_γ †@	E_i(level)	J^π_i	E_f	J^π_f	Mult.‡	α&	Comments
143.5 *3*	0.3 *2*	249.54	(5/2)$^-$	105.75	5/2$^-$	[M1,E2]	0.56 *6*	α(K)=0.421 *14*; α(L)=0.11 *5*; α(M)=0.024 *12*; α(N+..)=0.006 *3* α(N)=0.0053 *25*; α(O)=0.0007 *3*; α(P)=2.4×10^{-5} *5*
155.3 *1*	5.9 *5*	177.78	(7/2$^-$)	22.47	(5/2)$^+$	[E1]	0.0778	α(K)=0.0662 *10*; α(L)=0.00912 *13*; α(M)=0.00192 *3*; α(N+..)=0.000492 *7* α(N)=0.000426 *6*; α(O)=6.25×10^{-5} *9*; α(P)=3.50×10^{-6} *5*
166.60 *5*	25.7 *16*	189.06	(3/2)$^-$	22.47	(5/2)$^+$	E1	0.0642	α(K)=0.0547 *8*; α(L)=0.00751 *11*; α(M)=0.001584 *23*; α(N+..)=0.000405 *6* α(N)=0.000351 *5*; α(O)=5.16×10^{-5} *8*; α(P)=2.91×10^{-6} *4* α(K)exp=0.039 *6* (2003Ko13), 0.044 *39* (1994Sh37).
173.7 *1*	3.8 *3*	249.54	(5/2)$^-$	75.89	(7/2)$^+$	[E1]	0.0574	α(K)=0.0489 *7*; α(L)=0.00669 *10*; α(M)=0.001411 *20*; α(N+..)=0.000361 *5* α(N)=0.000313 *5*; α(O)=4.60×10^{-5} *7*; α(P)=2.62×10^{-6} *4* I_γ: a small fraction (<0.35) may belong with 846 level as in (n,γ) data.
189.05 *5*	75 *4*	189.06	(3/2)$^-$	0.0	3/2$^+$	E1	0.0456	α(K)=0.0389 *6*; α(L)=0.00530 *8*; α(M)=0.001118 *16*; α(N+..)=0.000286 *4* α(N)=0.000248 *4*; α(O)=3.66×10^{-5} *6*; α(P)=2.10×10^{-6} *3* α(K)exp=0.043 *3* (2003Ko13), 0.038 *5* (1994Sh37).
191.9 *2*	2.5 *4*	249.54	(5/2)$^-$	57.68	(3/2)$^-$	[M1,E2]	0.226	α(K)=0.179 *15*; α(L)=0.037 *11*; α(M)=0.0081 *25*; α(N+..)=0.0020 *6* α(N)=0.0018 *6*; α(O)=0.00025 *6*; α(P)=1.04×10^{-5} *21*
227.0 *1*	5.6 *11*	249.54	(5/2)$^-$	22.47	(5/2)$^+$	[E1]	0.0280	α(K)=0.0239 *4*; α(L)=0.00322 *5*; α(M)=0.000680 *10*; α(N+..)=0.0001746 *25* α(N)=0.0001509 *22*; α(O)=2.24×10^{-5} *4*; α(P)=1.315×10^{-6} *19*
249.6 *1*	9.8 *7*	249.54	(5/2)$^-$	0.0	3/2$^+$	E1	0.0218	α(K)=0.0186 *3*; α(L)=0.00250 *4*; α(M)=0.000527 *8*; α(N+..)=0.0001356 *19* α(N)=0.0001172 *17*; α(O)=1.742×10^{-5} *25*; α(P)=1.034×10^{-6} *15* α(K)exp=0.0166 *21* (2003Ko13).
253.7 *3*	2.4 *5*	880.17	(1/2,3/2)$^+$	626.68	(1/2 to 7/2)$^+$			
257.6 *2*	3.6 *3*	506.98	(3/2)$^-$	249.54	(5/2)$^-$	M1,E2	0.094 *9*	α(K)=0.077 *11*; α(L)=0.0135 *16*; α(M)=0.0029 *4*; α(N+..)=0.00074 *9* α(N)=0.00064 *8*; α(O)=9.3×10^{-5} *8*; α(P)=4.6×10^{-6} *11* α(K)exp=0.068 *6* (2003Ko13).
306.2 *1*	10.4 *16*	495.25	(1/2)$^-$	189.06	(3/2)$^-$	M1,E2	0.057 *8*	α(K)=0.047 *9*; α(L)=0.0077 *3*; α(M)=0.00167 *8*; α(N+..)=0.000427 *15* α(N)=0.000370 *15*; α(O)=5.41×10^{-5} *8*; α(P)=2.8×10^{-6} *7* α(K)exp=0.052 *4* (2003Ko13).
317.9 *1*	9.3 *12*	506.98	(3/2)$^-$	189.06	(3/2)$^-$	M1,E2	0.051 *8*	α(K)=0.042 *8*; α(L)=0.00688 *14*; α(M)=0.00148 *5*; α(N+..)=0.000380 *8* α(N)=0.000329 *9*; α(O)=4.82×10^{-5} *11*; α(P)=2.6×10^{-6} *7* α(K)exp=0.055 *5* (2003Ko13). I_γ: other: 16 *3* (1978PiZQ).
343.0 *5*	0.9 *4*	532.1	(5/2$^-$,7/2$^-$)	189.06	(3/2)$^-$			I_γ: from $\gamma\gamma$.
373.3 *1*	16.6 *15*	880.17	(1/2,3/2)$^+$	506.98	(3/2)$^-$	E1	0.00785	α(K)=0.00673 *10*; α(L)=0.000888 *13*; α(M)=0.000187 *3*; α(N+..)=4.83×10^{-5} *7* α(N)=4.16×10^{-5} *6*; α(O)=6.24×10^{-6} *9*; α(P)=3.85×10^{-7} *6* α(K)exp=0.0084 *9* (2003Ko13).
385.0 *1*	33.6 *21*	880.17	(1/2,3/2)$^+$	495.25	(1/2)$^-$	E1	0.00729	α(K)=0.00625 *9*; α(L)=0.000822 *12*; α(M)=0.0001732 *25*;

From ENSDF

$\gamma(^{151}$Nd) (continued)

E_γ[†]	I_γ[†@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	α[&]	Comments
								α(N+..)=4.47×10^{-5} *7* α(N)=3.86×10^{-5} *6*; α(O)=5.79×10^{-6} *9*; α(P)=3.58×10^{-7} *5* α(K)exp=0.0055 *4* (2003Ko13). I_γ: other: 12 *2* (1978PiZQ). Mult.: absence of ce data for this transition may indicate E1.
389.5 *1*	2.2 *2*	495.25	(1/2)$^-$	105.75	5/2$^-$	[E2]	0.0237	α(K)=0.0193 *3*; α(L)=0.00349 *5*; α(M)=0.000758 *11*; α(N+..)=0.000192 *3* α(N)=0.0001673 *24*; α(O)=2.40×10^{-5} *4*; α(P)=1.102×10^{-6} *16*
401.3 *1*	13.6 *15*	506.98	(3/2)$^-$	105.75	5/2$^-$	M1,E2	0.027 *6*	α(K)=0.023 *5*; α(L)=0.0034 *3*; α(M)=0.00073 *5*; α(N+..)=0.000189 *15* α(N)=0.000163 *12*; α(O)=2.42×10^{-5} *24*; α(P)=1.4×10^{-6} *4* α(K)exp=0.0246 *23* (2003Ko13).
421.5 *3*	4.3 *6*	599.37	(5/2$^+$)	177.78	(7/2$^-$)			
437.6 *1*	45 *3*	495.25	(1/2)$^-$	57.68	(3/2)$^-$	M1,E2	0.021 *5*	α(K)=0.018 *4*; α(L)=0.0027 *3*; α(M)=0.00057 *6*; α(N+..)=0.000147 *15* α(N)=0.000127 *13*; α(O)=1.89×10^{-5} *24*; α(P)=1.1×10^{-6} *3* α(K)exp=0.0191 *15* (2003Ko13), 0.014 *6* (1994Sh37).
449.3 *1*	12.8 *13*	506.98	(3/2)$^-$	57.68	(3/2)$^-$	M1,E2	0.020 *5*	α(K)=0.017 *4*; α(L)=0.0025 *3*; α(M)=0.00053 *6*; α(N+..)=0.000137 *15* α(N)=0.000118 *13*; α(O)=1.76×10^{-5} *23*; α(P)=1.0×10^{-6} *3* α(K)exp=0.0153 *18* (2003Ko13).
484.5 *1*	100 *5*	506.98	(3/2)$^-$	22.47	(5/2)$^+$	E1	0.00423	α(K)=0.00363 *5*; α(L)=0.000474 *7*; α(M)=9.97×10^{-5} *14*; α(N+..)=2.58×10^{-5} *4* α(N)=2.22×10^{-5} *4*; α(O)=3.35×10^{-6} *5*; α(P)=2.11×10^{-7} *3* α(K)exp=0.0034 *3* (2003Ko13),≤0.004 (1994Sh37).
493.6 *3*	4.0 *6*	599.37	(5/2$^+$)	105.75	5/2$^-$			
495.3 *1*	91 *6*	495.25	(1/2)$^-$	0.0	3/2$^+$	E1	0.00402	α(K)=0.00345 *5*; α(L)=0.000450 *7*; α(M)=9.47×10^{-5} *14*; α(N+..)=2.45×10^{-5} *4* α(N)=2.11×10^{-5} *3*; α(O)=3.18×10^{-6} *5*; α(P)=2.01×10^{-7} *3* α(K)exp=0.0039 *5* (2003Ko13),≤0.004 (1994Sh37). α(K)exp≤0.004.
496.1 *5*	2.1 *6*	685.30	(3/2,5/2)$^+$	189.06	(3/2)$^-$			I_γ: from $\gamma\gamma$.
507.0 *1*	23.6 *12*	506.98	(3/2)$^-$	0.0	3/2$^+$			
523.5[a] *1*	≈8.8[a]	581.0		57.68	(3/2)$^-$			I_γ: total Iγ=17.6 *16*. This γ is shown to deexcite a 599 level only by 1994Sh37. The (n,γ) results and comparison of branching ratios from 599 level indicate placement with 581 level also.
523.5[a] *1*	≈8.8[a]	599.37	(5/2$^+$)	75.89	(7/2)$^+$			α(K)exp=0.0037 *7* (2003Ko13) for doublet suggests E1 but ΔJ^π requires M1+E2.
542.8 *1*	15.2 *13*	542.80	(1/2 to 7/2)$^+$	0.0	3/2$^+$	M1,E2	0.012 *3*	α(K)=0.0103 *25*; α(L)=0.00148 *23*; α(M)=0.00031 *5*; α(N+..)=8.1×10^{-5} *13* α(N)=7.0×10^{-5} *11*; α(O)=1.05×10^{-5} *18*; α(P)=6.4×10^{-7} *18* α(K)exp=0.0126 *19* (2003Ko13).
579.7 *1*	13.5 *22*	685.30	(3/2,5/2)$^+$	105.75	5/2$^-$			I_γ: other: 5 *1* (1978PiZQ).
626.7 *1*	17.2 *21*	626.68	(1/2 to 7/2)$^+$	0.0	3/2$^+$	M1,E2	0.0085 *20*	α(K)=0.0072 *18*; α(L)=0.00101 *18*; α(M)=0.00021 *4*; α(N+..)=5.6×10^{-5}

γ(^{151}Nd) (continued)

E_γ †	I_γ †@	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	α&	Comments
								10
								α(N)=4.8×10^{-5} *9*; α(O)=7.2×10^{-6} *14*; α(P)=4.5×10^{-7} *12*
								α(K)exp=0.0137 *25* (2003Ko13).
627.5 *3*	5.6 *8*	685.30	(3/2,5/2)$^+$	57.68	(3/2)$^-$			
641.1#b *2*	3.6 *14*	1183.8?		542.80	(1/2 to 7/2)$^+$			
641.3#b *2*	2.1 *10*	892.9?		249.54	(5/2)$^-$			
657.4 *1*	11.6 *7*	846.47	1/2$^-$,3/2$^-$	189.06	(3/2)$^-$			
662.8 *1*	60 *3*	685.30	(3/2,5/2)$^+$	22.47	(5/2)$^+$	M1,E2	0.0074 *17*	α(K)=0.0063 *15*; α(L)=0.00087 *16*; α(M)=0.00019 *4*; α(N+..)=4.8×10^{-5} *9* α(N)=4.1×10^{-5} *8*; α(O)=6.3×10^{-6} *12*; α(P)=3.9×10^{-7} *11* α(K)exp=0.0079 *7* (2003Ko13).
685.2 *1*	20.6 *10*	685.30	(3/2,5/2)$^+$	0.0	3/2$^+$	M1,E2	0.0068 *16*	α(K)=0.0058 *14*; α(L)=0.00080 *15*; α(M)=0.00017 *3*; α(N+..)=4.4×10^{-5} *8* α(N)=3.8×10^{-5} *7*; α(O)=5.7×10^{-6} *11*; α(P)=3.6×10^{-7} *10* α(K)exp=0.0083 *9* (2003Ko13).
688.2 *1*	2.9 *4*	877.23	(1/2$^-$,3/2,5/2)	189.06	(3/2)$^-$			
753.5 *1*	3.0 *16*	942.57	(1/2,3/2,5/2)	189.06	(3/2)$^-$			
760.0 *2*	5.8 *14*	949.14	(1/2$^-$,3/2,5/2$^+$)	189.06	(3/2)$^-$			
771.5 *3*	1.8 *14*	877.23	(1/2$^-$,3/2,5/2)	105.75	5/2$^-$			
819.1 *3*	3.3 *7*	877.23	(1/2$^-$,3/2,5/2)	57.68	(3/2)$^-$			
822.2 *3*	3.2 *9*	880.17	(1/2,3/2)$^+$	57.68	(3/2)$^-$			
843.2 *3*	4.7 *9*	949.14	(1/2$^-$,3/2,5/2$^+$)	105.75	5/2$^-$			
846.5 *3*	6.8 *13*	846.47	1/2$^-$,3/2$^-$	0.0	3/2$^+$			
857.5 *3*	4.0 *12*	880.17	(1/2,3/2)$^+$	22.47	(5/2)$^+$			
877.3 *2*	14.5 *10*	877.23	(1/2$^-$,3/2,5/2)	0.0	3/2$^+$			
880.0 *1*	91 *6*	880.17	(1/2,3/2)$^+$	0.0	3/2$^+$	M1,E2	0.0038 *9*	α(K)=0.0032 *8*; α(L)=0.00043 *9*; α(M)=9.2×10^{-5} *17*; α(N+..)=2.4×10^{-5} *5* α(N)=2.1×10^{-5} *4*; α(O)=3.1×10^{-6} *6*; α(P)=2.0×10^{-7} *5* α(K)exp=0.0045 *4* (2003Ko13).
891.8 *3*	2.8 *9*	949.14	(1/2$^-$,3/2,5/2$^+$)	57.68	(3/2)$^-$			
x900.7 *4*	1.3 *6*							I_γ: from $\gamma\gamma$.
942.6 *3*	2.0 *9*	942.57	(1/2,3/2,5/2)	0.0	3/2$^+$			
x962.7 *2*	11.9 *23*							
1040.6 *2*	9.7 *16*	1229.84	(1/2,3/2,5/2)	189.06	(3/2)$^-$			
1104.1 *2*	17.2 *16*	1104.10		0.0	3/2$^+$			
1154.9#b *3*	4.7 *6*	1212.6?		57.68	(3/2)$^-$			
1172.6 *3*	5.4 *6*	1229.84	(1/2,3/2,5/2)	57.68	(3/2)$^-$			
1229.8 *3*	2.1 *13*	1229.84	(1/2,3/2,5/2)	0.0	3/2$^+$			
x1259.3 *3*	6.6 *12*							
1343.9 *3*	6.1 *16*	1449.61	(1/2$^-$,3/2,5/2)	105.75	5/2$^-$			
x1362.8 *4*	4.8 *15*							
1391.5 *4*	1.7 *5*	1449.61	(1/2$^-$,3/2,5/2)	57.68	(3/2)$^-$			
1449.8 *3*	5.7 *9*	1449.61	(1/2$^-$,3/2,5/2)	0.0	3/2$^+$			

$^{151}_{60}$Nd$_{91}$-8

γ(^{151}Nd) (continued)

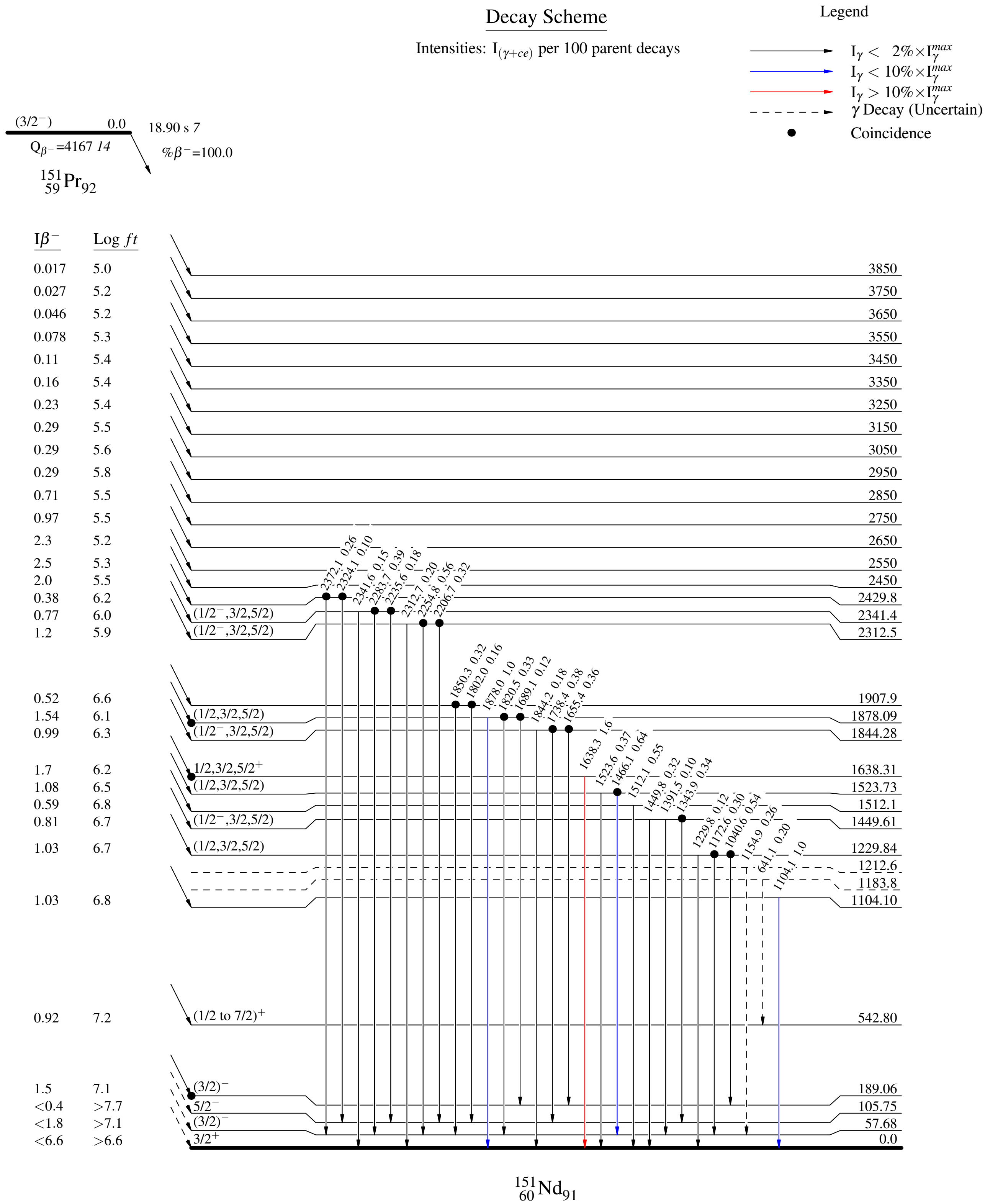
E_γ[†]	I_γ[†@]	E_i(level)	J^π_i	E_f	J^π_f	E_γ[†]	I_γ[†@]	E_i(level)	J^π_i	E_f	J^π_f
1466.1 *2*	11.4 *18*	1523.73	(1/2,3/2,5/2)	57.68	(3/2)$^-$	1850.3 *3*	5.7 *18*	1907.9		57.68	(3/2)$^-$
1512.1 *3*	9.9 *14*	1512.1		0.0	3/2$^+$	1878.0 *2*	17.6 *22*	1878.09	(1/2,3/2,5/2)	0.0	3/2$^+$
1523.6 *3*	6.6 *9*	1523.73	(1/2,3/2,5/2)	0.0	3/2$^+$	[x]1991.5 *3*	1.4 *7*				
[x]1554.0 *3*	4.6 *16*					2206.7 *3*	5.8 *16*	2312.5	(1/2$^-$,3/2,5/2)	105.75	5/2$^-$
1638.3 *2*	28 *3*	1638.31	1/2,3/2,5/2$^+$	0.0	3/2$^+$	2235.6 *3*	3.3 *7*	2341.4	(1/2$^-$,3/2,5/2)	105.75	5/2$^-$
1655.4 *3*	6.4 *14*	1844.28	(1/2$^-$,3/2,5/2)	189.06	(3/2)$^-$	2254.8 *3*	10 *3*	2312.5	(1/2$^-$,3/2,5/2)	57.68	(3/2)$^-$
1689.1 *3*	2.2 *6*	1878.09	(1/2,3/2,5/2)	189.06	(3/2)$^-$	2283.7 *3*	7.0 *18*	2341.4	(1/2$^-$,3/2,5/2)	57.68	(3/2)$^-$
1738.4 *3*	6.8 *15*	1844.28	(1/2$^-$,3/2,5/2)	105.75	5/2$^-$	2312.7 *4*	3.5 *18*	2312.5	(1/2$^-$,3/2,5/2)	0.0	3/2$^+$
1802.0 *3*	2.9 *15*	1907.9		105.75	5/2$^-$	2324.1 *4*	1.8 *15*	2429.8		105.75	5/2$^-$
1820.5 *3*	5.9 *10*	1878.09	(1/2,3/2,5/2)	57.68	(3/2)$^-$	2341.6 *4*	2.6 *16*	2341.4	(1/2$^-$,3/2,5/2)	0.0	3/2$^+$
1844.2 *3*	3.3 *7*	1844.28	(1/2$^-$,3/2,5/2)	0.0	3/2$^+$	2372.1 *3*	4.6 *16*	2429.8		57.68	(3/2)$^-$

[†] From 1994Sh37.
[‡] From ce data (1994Sh37).
[#] This γ was not placed by 1994Sh37. Placement here proposed by the evaluator based on (n,γ) data and ‘adopted gammas’.
[@] For absolute intensity per 100 decays, multiply by 0.056 *14*.
[&] 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] Multiply placed with intensity suitably divided.
[b] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

^{151}Pr β^- decay (18.90 s) 1994Sh37

Decay Scheme

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

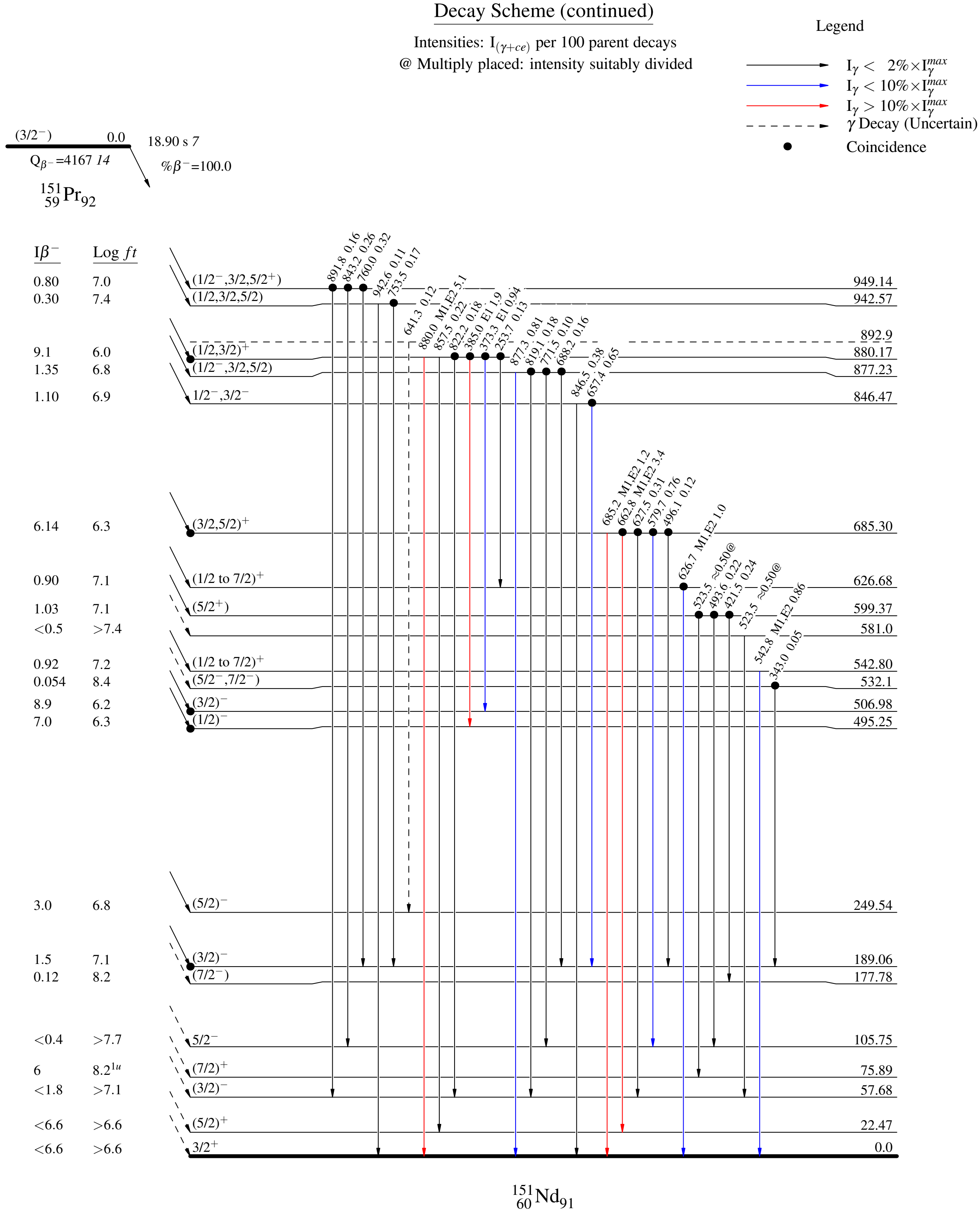


^{151}Pr β^- decay (18.90 s) 1994Sh37

Decay Scheme (continued)

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

@ Multiply placed: intensity suitably divided



^{151}Pr β^- decay (18.90 s) 1994Sh37

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
@ Multiply placed: intensity suitably divided