^{146}Nd(n,γ) E=th 1976Ro03,1975Ro16

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	N. Nica and B. Singh	NDS 181, 1 (2022)	9-Mar-2022

1975Ro16: measured Eγ<904 curved cryst, otherwise semi; $\gamma\gamma$-coin (semi).
1976Ro03: measured ce for Eγ<127 (s) via ^{146}Nd(n,ce) E=th.

^{147}Nd Levels

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0.0	5/2$^-$	11.03 d *3*	$T_{1/2}$: adopted value.
49.9268 *10*	7/2$^-$		J$^\pi$: 7/2$^-$ from L=3 (d,t) (1977St22), J=L+1/2 (pol d,t) (1977St23).
127.9190 *10*	5/2$^-$		J$^\pi$: 5/2$^-$ from L=3 (d,t) (1977St22), J=L−1/2 (pol d,t) (1977St23).
190.291? *6*	(9/2$^-$)		J$^\pi$: (9/2$^-$) is consistent with L=5 (^{3}He,α) 1976LoZP and N=87 syst.
214.5949 *12*	1/2$^-$		J$^\pi$: consistent with E2 γ-decay to 5/2$^-$ state, and L=1 (d,t) (1977St22) and J=L−1/2 (pol d,t) (1977St23).
314.6794 *23*	3/2$^-$		J$^\pi$: 3/2$^-$ from primary γ-feeding, γ-decays to J=1/2$^-$,5/2$^-$,7/2$^-$ states. Consistent with L=1 (d,t) (1977St22), J=L+1/2 (pol d,t).
463.616 *3*	3/2$^-$		J$^\pi$: 3/2$^-$ from primary γ-feeding, γ-decays to J=1/2$^-$,5/2$^-$,7/2$^-$ states. Consistent with L=1 (d,t) (1977St22), J=L+1/2 (pol d,t) (1977St23).
516.671 *5*			J$^\pi$: 3/2$^-$ assignment (1975Ro16) based on tentative primary γ-feeding is not compatible with L=3 (d,t) (1977St22).
604.514 *4*	1/2$^-$,3/2$^-$[#]		
631.479 *4*	1/2$^-$,3/2$^-$[#]		
769.313 *21*	1/2,3/2		J$^\pi$: 1/2 is ruled out by log *ft*=6.3 in ^{147}Pr decay.
792.561 *23*	1/2,3/2		J$^\pi$: 1/2 is ruled out by log *ft*=6.2 for ^{147}Pr decay.
942.07 *10*			
957.26 *10*			
1041.48 *4*			
1111.90 *10*			
1310.76 *22*			Probable (794γ)(467γ,517γ)-coin relation supports E(level).
1398.16 *13*	1/2,3/2		
1445.14 *11*	1/2,3/2		
1523.49 *8*	1/2$^-$,3/2$^-$[#]		
1544.92 *10*	1/2,3/2		
1550.09 *9*	3/2$^-$		
1841.05 *7*	1/2$^-$,3/2$^-$[#]		
1979.49 *10*	1/2$^-$,3/2$^-$[#]		
(5292.20 *9*)	1/2$^+$		Additional information 1. E(level): level energy held fixed in least-squares adjustment. E(level): from 2021Wa16; others: 5292.19 *15* (1975Ro16). J$^\pi$: from s-wave capture.

† Level scheme based on Ritz combination principle for levels up to 800 keV. Levels above 800 keV are derived from coincidence relationships and confirmed by presence of primary transitions. Level energies have been least-squares adjusted to best fit the transition energies. Normalized χ^2=4.7 greater than critical χ^2=1.5.
‡ Primary feeding of levels above 700-keV limits J to values of 1/2,3/2.
# π=− determined from primary γ-radiation strengths (1975Ro16).

γ(^{147}Nd)

Eγ[†]	Iγ[‡e]	Ei(level)	J^π_i	Ef	J^π_f	Mult.[a]	δ	α[f]	Comments
49.927 *1*	4.5 *7*	49.9268	7/2⁻	0.0	5/2⁻	M1+E2	0.12 *1*	10.83	α(K)=8.88 *13*; α(L)=1.53 *5*; α(M)=0.330 *12*; α(N+..)=0.084 *3* α(N)=0.0732 *25*; α(O)=0.0107 *4*; α(P)=0.000580 *9* Mult.: from α(L1)exp=1.35 *21*. δ: from L1/L2/L3=100 *5*/20 *4*/14.7 *22* (1976Ro03).
77.9921 *3*	9.8 *10*	127.9190	5/2⁻	49.9268	7/2⁻	M1+E2	0.28 *4*	3.08 *7*	α(K)=2.45 *4*; α(L)=0.49 *5*; α(M)=0.107 *10*; α(N+..)=0.0273 *24* α(N)=0.0237 *21*; α(O)=0.0034 *3*; α(P)=0.0001552 *25* Mult.: from α(K)exp=2.5 *3*. δ: 0.28 *4* from L1/L2/L3=100 *8*/30 *6*/30 *6*, and 0.26 *7* from K/L=5.2 *6* (1976Ro03).
86.6759 *6*	4.3 *4*	214.5949	1/2⁻	127.9190	5/2⁻	E2		3.68	α(K)=1.79 *3*; α(L)=1.468 *21*; α(M)=0.335 *5*; α(N+..)=0.0817 *12* α(N)=0.0724 *11*; α(O)=0.00926 *13*; α(P)=7.67×10⁻⁵ *11* Mult.: from α(L3)exp=0.78 *8* based on I(ce(L3))=3.4 *1* and from K/L1/L2/L3=100 *3*/6.2 *12*/35 *1*/42 *1* (1976Ro03).
100.078 *3*	0.42 *3*	314.6794	3/2⁻	214.5949	1/2⁻				
114.781[d] *6*	0.3 *1*	631.479	1/2⁻,3/2⁻	516.671					
127.919 *6*	5.3 *5*	127.9190	5/2⁻	0.0	5/2⁻	M1(+E2)		0.81 *11*	α(K)=0.590 *12*; α(L)=0.17 *9*; α(M)=0.038 *21*; α(N+..)=0.009 *5* α(N)=0.008 *5*; α(O)=0.0011 *6*; α(P)=3.3×10⁻⁵ *6* Mult.: from K/L(exp)=8.0 *9* and the nonobservation of L(2), L(3) lines (1976Ro03).
[x]135.15 *10*	0.10 *1*								
140.364[g] *6*	0.38 *3*	190.291?	(9/2⁻)	49.9268	7/2⁻				
140.898 *1*	2.2 *2*	604.514	1/2⁻,3/2⁻	463.616	3/2⁻				
[x]148.12 *3*	0.15 *1*								
[x]165.02 *3*	0.21 *2*								
167.870 *3*	0.85 *7*	631.479	1/2⁻,3/2⁻	463.616	3/2⁻				
186.752 *6*	0.48 *4*	314.6794	3/2⁻	127.9190	5/2⁻				
[x]199.14 *8*	0.11 *1*								
201.926[d] *7*	0.44[#] *3*	516.671		314.6794	3/2⁻				
214.594 *6*	0.65 *5*	214.5949	1/2⁻	0.0	5/2⁻				
[x]229.67 *4*	0.3 *1*								
[x]238.91 *15*	0.10 *1*								
249.029 *4*	1.83 *15*	463.616	3/2⁻	214.5949	1/2⁻				
[x]255.76 *12*	0.2 *1*								
264.70 *4*	0.24 *2*	314.6794	3/2⁻	49.9268	7/2⁻				
[x]269.80 *4*	0.23 *2*								
305.75 *20*	0.26 *2*	769.313	1/2,3/2	463.616	3/2⁻				
[x]310.34 *15*	0.3[#] *1*								
314.675 *4*	11.9 *10*	314.6794	3/2⁻	0.0	5/2⁻				
316.82 *4*	0.68 *5*	631.479	1/2⁻,3/2⁻	314.6794	3/2⁻				
328.84 *5*	0.69 *6*	792.561	1/2,3/2	463.616	3/2⁻				
335.700 *5*	7.2 *6*	463.616	3/2⁻	127.9190	5/2⁻				
[x]346.29 *20*	0.07 *1*								

γ(^{147}Nd) (continued)

E_γ[†]	I_γ[‡e]	E_i(level)	J^π_i	E_f	J^π_f
^{x}366.99 5	0.55 4				
^{x}378.96 21	0.06 1				
^{x}384.87 14	0.11 1				
388.815[d] 12	1.65 13	516.671		127.9190	5/2$^-$
389.94 6	0.4 1	604.514	1/2$^-$,3/2$^-$	214.5949	1/2$^-$
410.03 9	0.25 2	1041.48		631.479	1/2$^-$,3/2$^-$
413.680 15	1.6 1	463.616	3/2$^-$	49.9268	7/2$^-$
416.88 4	0.2 1	631.479	1/2$^-$,3/2$^-$	214.5949	1/2$^-$
436.91 6	0.41 3	1041.48		604.514	1/2$^-$,3/2$^-$
^{x}447.48 7	0.3 1				
^{x}459.98 19	0.12 1				
463.53 13	0.23 2	463.616	3/2$^-$	0.0	5/2$^-$
466.750 12	1.5 1	516.671		49.9268	7/2$^-$
478.03 5	0.3 1	792.561	1/2,3/2	314.6794	3/2$^-$
493.48 15	0.4 1	957.26		463.616	3/2$^-$
503.56 3	1.8 2	631.479	1/2$^-$,3/2$^-$	127.9190	5/2$^-$
516.78 5	1.33 10	516.671		0.0	5/2$^-$
^{x}525.35 10	0.4 1				
^{x}527.97 13	0.2 1				
^{x}534.74 16	0.15 2				
554.77 4	1.05 8	769.313	1/2,3/2	214.5949	1/2$^-$
577.95 3	1.80 14	792.561	1/2,3/2	214.5949	1/2$^-$
595.20 20	<0.1	1111.90		516.671	
604.57 3	5.5 4	604.514	1/2$^-$,3/2$^-$	0.0	5/2$^-$
^{x}614.2 3	0.12 1				
^{x}621.68 13	0.5 1				
627.44 15	0.29 2	942.07		314.6794	3/2$^-$
631.480 13	3.2 2	631.479	1/2$^-$,3/2$^-$	0.0	5/2$^-$
641.380 25	2.5 2	769.313	1/2,3/2	127.9190	5/2$^-$
642.69 20	0.2 1	957.26		314.6794	3/2$^-$
^{x}666.8 3	0.11 1				
^{x}668.18 21	0.16 2				
^{x}682.23 20	0.13 1				
^{x}699.58 6	1.15 9				
^{x}701.93 20	0.47 5				
726.84 6	0.54 4	1041.48		314.6794	3/2$^-$
^{x}728.4 3	0.11 1				
730.9 3	0.11 1	1523.49	1/2$^-$,3/2$^-$	792.561	1/2,3/2
^{x}747.61 16	0.23 2				
754.36 19	0.18 2	1523.49	1/2$^-$,3/2$^-$	769.313	1/2,3/2
^{x}760.6 5	0.060 6				
^{x}768.90 15	0.22 2				
797.23 11	0.89 7	1111.90		314.6794	3/2$^-$
^{x}810.28 22	0.14 1				
^{x}819.19 25	0.12 1				
840.62 11	0.55 4	1445.14	1/2,3/2	604.514	1/2$^-$,3/2$^-$
^{x}854.09 23	0.23 2				
^{x}860.44 17	0.22 2				
897.57[g] 11	1.31 10	1111.90		214.5949	1/2$^-$
^{x}899.05 19	0.28 3				
^{x}903.87 8	1.24 10				
^{x}906.94 13	0.37 3				
^{x}921.1 3	0.13 1				
942.03 12	0.66 5	942.07		0.0	5/2$^-$
^{x}944.07 11	1.53 12				
957.34 14	0.35 3	957.26		0.0	5/2$^-$
^{x}962.03 10	1.04 8				
^{x}977.08 12	0.65 5				
996.08 22	0.20 2	1310.76		314.6794	3/2$^-$
^{x}998.25 17	0.27 2				
1033.18 14	0.29 2	1550.09	3/2$^-$	516.671	
^{x}1040.56 22	0.19 2				
^{x}1065.02 16	0.33 2				
1083.43 14	0.41 3	1398.16	1/2,3/2	314.6794	3/2$^-$
^{x}1090.66 18	0.28 2				
^{x}1107.42 12	0.81 6				
^{x}1119.25 13	0.54 4				
^{x}1122.6 5	0.11 1				
1130.57[g] 18	0.30 2	1445.14	1/2,3/2	314.6794	3/2$^-$
^{x}1150.45 16	0.39 3				
^{x}1153.73 21	0.25 2				
^{x}1158.98 18	0.32 2				
^{x}1164.40 15	0.44[#] 3				
^{x}1183.49 17	0.46 4				
^{x}1185.7 3	0.49 4				
1186.89 15	1.25 10	1979.49	1/2$^-$,3/2$^-$	792.561	1/2,3/2
1208.79 12	0.62 5	1523.49	1/2$^-$,3/2$^-$	314.6794	3/2$^-$
^{x}1219.51 24	0.20 2				
1230.30 12	0.68 6	1544.92	1/2,3/2	314.6794	3/2$^-$
1235.47 14	0.46 4	1550.09	3/2$^-$	314.6794	3/2$^-$
^{x}1242.24 20	0.29 2				
^{x}1249.4 3	0.16 1				
1375.5 4	0.40 3	1979.49	1/2$^-$,3/2$^-$	604.514	1/2$^-$,3/2$^-$
1377.79 17	0.83 7	1841.05	1/2$^-$,3/2$^-$	463.616	3/2$^-$
^{x}1465.06 19	0.38 3				
^{x}1519.59 22	0.33 2				

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γ(^{147}Nd) (continued)

E_γ [†]	I_γ [‡e]	E_i(level)	J_i^π	E_f	J_f^π
1526.46 22	0.41 3	1841.05	1/2$^-$,3/2$^-$	314.6794	3/2$^-$
[x]1774.00 14	0.75 6				
[x]1782.50 19	0.49 4				
[x]1788.2 3	0.24 2				
1840.86 10	0.83 7	1841.05	1/2$^-$,3/2$^-$	0.0	5/2$^-$
[x]1847.6 3	0.38 3				
[x]1851.1 4	0.26 2				
[x]1856.05 16	0.50 4				
[x]1942.52 8	1.09 8				
[x]1987.84 22	0.42 3				
[x]1995.6 6	0.13 1				
[x]2001.21 24	0.32 2				
[x]2007.3 3	0.22 2				
[x]2030.8 3	0.30 2				
[x]2041.0 3	0.27 2				
[x]2096.13 24	0.59 5				
[x]2122.5 3	0.28 2				
[x]2135.22 17	0.70 6				
[x]2158.4 3	0.30 2				
[x]2209.49 24	0.51 4				
[x]2315.4 3	0.37 3				
[x]2371.41 24	0.64 5				
[x]2374.69 17	0.94 7				
[x]2392.5 3	0.29 2				
[x]2404.8 3	0.26 2				
[x]2436.9 5	0.23 2				
[x]2496.49 24	0.34 3				
[x]2518.2 6	0.18 1				
[x]2522.1 5	0.25 2				
[x]2534.1 3	0.26 2				
[x]2554.5 4	0.24 2				
[x]2601.5 3	0.19 2				
[x]2608.87 23	0.29 2				
[x]2630.4 3	0.21 2				
[x]2653.7 3	0.50 4				
[x]2664.8 3	0.29 2				
[x]2696.30 19	0.53 4				
[x]2701.21 16	0.68 6				
[x]2760.2 4	0.18 1				
[x]2774.6 3	0.21 2				
[x]2796.19 11	1.88 15				
[x]2806.51 25	0.30 2				
[x]2837.3 5	0.22 2				
[x]2868.13 24	0.41 3				
[x]2874.98 20	0.42 3				
[x]2881.7 4	0.18 1				
[x]2911.78 22	0.44 3				
[x]2914.3 3	0.32 2				
[x]2993.8 3	0.15 1				
[x]3003.4 5	0.13 1				
[x]3014.86 21	0.34 2				
[x]3040.43 21	0.33 2				
[x]3075.5[g] 3	0.22[@] 2				
[x]3081.83 21	0.30 2				
[x]3108.17 13	0.75 6				
[x]3153.5 3	0.17 1				
[x]3208.71 24	0.18 1				
[x]3222.8 3	0.14 1				
[x]3258.19[g] 12	0.88[@] 7				
[x]3262.8 4	0.22 2				
[x]3268.7[g] 4	0.19[@] 2				
[x]3283.89 18	0.31 2				
3312.70 13	0.66 5	(5292.20)	1/2$^+$	1979.49	1/2$^-$,3/2$^-$
[x]3356.4 4	0.14 1				
[x]3377.5 3	0.20 2				
[x]3394.8 3	0.24 2				
[x]3430.00 20	0.25 2				
3451.08 11	1.20 10	(5292.20)	1/2$^+$	1841.05	1/2$^-$,3/2$^-$
[x]3509.41 14	0.43 3				
[x]3540.2 4	0.10 1				
[x]3604.4 3	0.13 1				
[x]3659.2 3	0.14 1				
[x]3671.09 23	0.17 1				
[x]3702.58 21	0.18 1				
[x]3721.5 4	0.09 1				
3741.69 20	0.19 2	(5292.20)	1/2$^+$	1550.09	3/2$^-$
3747.32 15	0.31 2	(5292.20)	1/2$^+$	1544.92	1/2,3/2
[x]3754.9 3	0.12 1				
3768.72 12	0.67 5	(5292.20)	1/2$^+$	1523.49	1/2$^-$,3/2$^-$
3847.0 4	0.36[#] 3	(5292.20)	1/2$^+$	1445.14	1/2,3/2
3893.8 3	0.28[#] 2	(5292.20)	1/2$^+$	1398.16	1/2,3/2
[x]3950.8 5	0.07 1				
[x]4023.13 15	0.30 2				
[x]4031.06 21	0.16 1				
[x]4054.29 18	0.23 2				
[x]4069.31 17	0.24 2				
[x]4237.81 25	0.13 1				
[x]4331.8 3	0.11 1				

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γ(^{147}Nd) (continued)

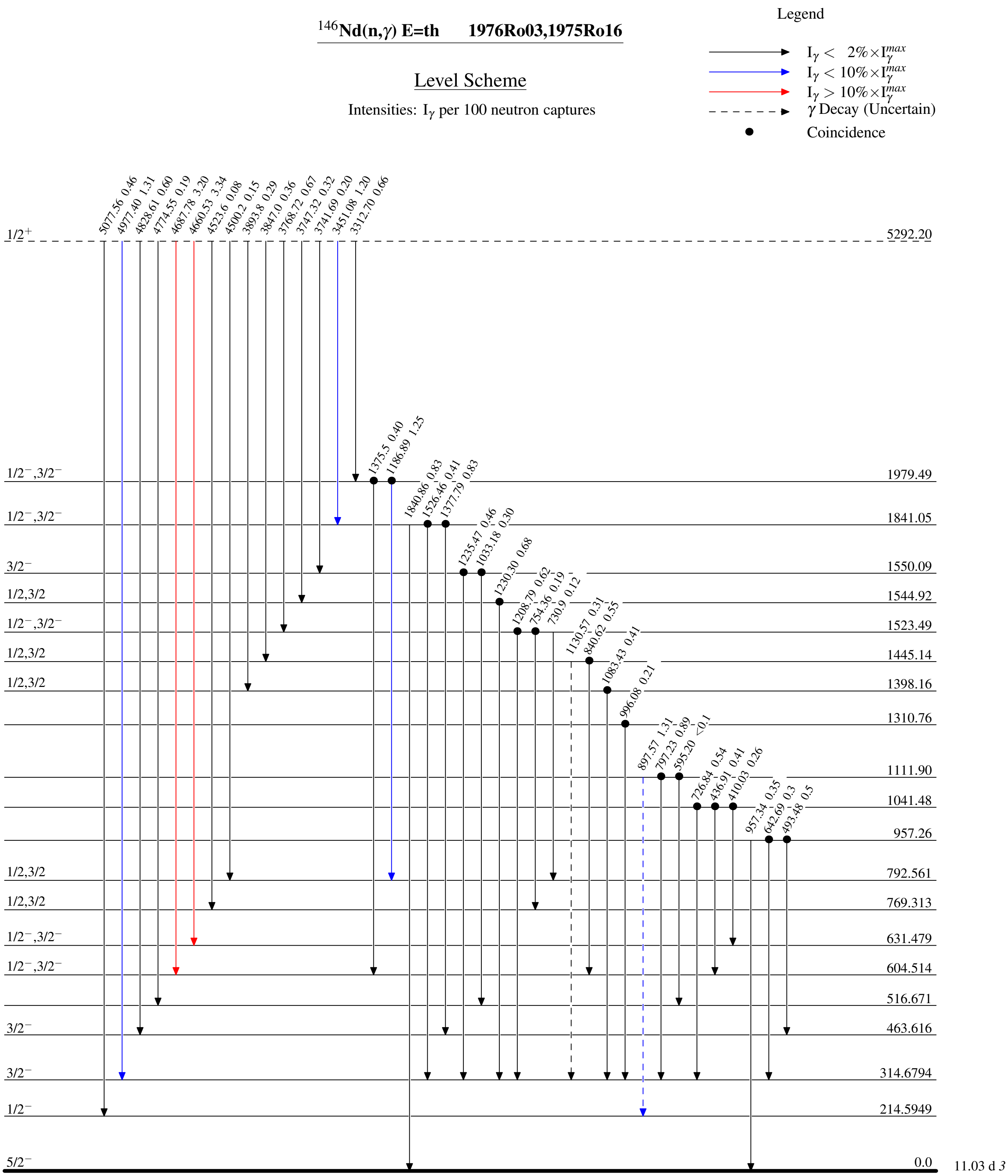
E_γ[†]	I_γ[‡e]	E_i(level)	J^π_i	E_f	J^π_f
[x]4339.8 *6*	0.05 *1*				
[x]4396.9 *4*	0.09 *1*				
[x]4484.23 *21*	0.13 *1*				
4500.2 *4*	0.14 *1*	(5292.20)	1/2$^+$	792.561	1/2,3/2
4523.6 *3*	0.07 *1*	(5292.20)	1/2$^+$	769.313	1/2,3/2
[x]4582.4 *5*	0.05 *1*				
[x]4618.7 *7*	0.12 *1*				
4660.53 *11*	3.34 *25*	(5292.20)	1/2$^+$	631.479	1/2$^-$,3/2$^-$
4687.78 *20*	3.20 *25*	(5292.20)	1/2$^+$	604.514	1/2$^-$,3/2$^-$
[x]4695.3[g] *6*	0.08[&] *1*				
[x]4769.83 *21*	0.21 *2*				
4774.55[d] *21*	0.18[#] *2*	(5292.20)	1/2$^+$	516.671	
4828.61 *12*	0.60 *5*	(5292.20)	1/2$^+$	463.616	3/2$^-$
[x]4848.5 *4*	0.05 *1*				
[x]4962.1[g] *4*	0.05[&] *1*				
4977.40 *11*	1.31 *10*	(5292.20)	1/2$^+$	314.6794	3/2$^-$
[x]4997.13[cg] *22*	0.13 *2*				
[x]5005.7[g] *3*	0.10[&] *1*				
[x]5031.1[g] *5*	0.04[&] *1*				
[x]5039.3[g] *4*	0.06[&] *1*				
5077.56[b] *12*	0.46 *4*	(5292.20)	1/2$^+$	214.5949	1/2$^-$
[x]5130.1[g] *4*	0.10[&] *1*				
[x]5150.7[g] *4*	0.05[&] *1*				
[x]5162.2[g] *5*	0.03[&] *1*				
[x]5176.55[g] *18*	0.14[&] *1*				
[x]5184.5[g] *3*	0.06[&] *1*				
[x]5212.7[g] *6*	0.04[&] *1*				
[x]5253.5[g] *4*	0.06[&] *1*				

† From 1975Ro16.
‡ Absolute I(γ) for both primary and secondary spectra given as percent/capture are normalized to Iγ(91γ,^{147}Pm) via ^{147}Nd decay.
# Partially due to another isotope.
@ Possibly a background line.
& May be a transition in another Nd isotope.
a The absolute internal conversion coefficients are from 1976Ro03 based on relative I(ce) and Iγ data normalized so that α(L12)exp(91γ in ^{147}Nd β^- decay)=0.246 (1967Ba21).
b Authors indicate this primary transition to the 215 level may be a transition in another Nd isotope, but since they use it as part of their J^π assignment to this level, the evaluator assumes their footnote on this level is an error.
c Possible transition in Sm.
d Differs by 3σ or more from ΔE(level).
e Intensity per 100 neutron captures.
f 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.
g Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

^{146}Nd(n,γ) E=th 1976Ro03,1975Ro16

Level Scheme

Intensities: I_γ per 100 neutron captures



$^{147}_{60}Nd_{87}$

^{146}Nd(n,γ) E=th 1976Ro03,1975Ro16

Level Scheme (continued)

Intensities: I_γ per 100 neutron captures