^{133}Nd ε decay (70 s) 1995Br24,1989Li22

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Yu. Khazov and A. Rodionov, F. G. Kondev	NDS 112, 855 (2011)	31-Oct-2010

Parent: ^{133}Nd: E=0.0; J^π=(7/2$^+$); $T_{1/2}$=70 s *10*; Q(ε)=5605 *48*; %ε+%β^+ decay=100.0

1995Br24,1993BrZS: ^{133}Nd(ε) [from ^{92}Mo(^{46}Ti,4p1n)^{133}Nd, ^{92}Mo(^{46}Ti,3p2n)^{133}Pm E=246 MeV] measured γ, ce, γγ(t), ceγ(t), xγ(t), xce(t); deduced levels, $T_{1/2}$, α(exp), Q(ε), log *ft*. Tandem, mass-separator, tape transport system, Ge, Si detectors; particle plus triaxial rotor model calculation.

1989Li22: ^{133}Nd(ε) [from ^{nat}Ce(^{3}He,xp,yn) E=280 MeV] measured γ, γγ(t), ce, ceγ(t); deduced levels, α(exp), log *ft*. Synchrocyclotron, mass-separator, tape transport system, HPGe, Si(Li) detectors; interacting boson-fermion model analysis.

Other: 1988KoZX.

The decay scheme is from 1995Br24, which agrees well with that of 1989Li22.

^{133}Pr Levels

E(level)†	J^π‡	$T_{1/2}$	Comments
0.0	(3/2$^+$)		%ε+%β^+=100
61.68 *7*	(5/2$^+$)		
166.73 *7*	(5/2$^+$,7/2$^+$)		
192.06 *15*	(11/2$^-$)	1.1 s *2*	%IT=100 $T_{1/2}$: from 61.7γ(t) and 130.4γ(t) in 2001Xu04.
225.89 *8*	(7/2$^+$)		
295.63 *11*	(7/2$^-$)		
428.61 *8*	(5/2$^+$,7/2$^+$)		
475.85 *10*	(9/2$^+$)		
488.32 *10*	(5/2,7/2$^+$)		
551.38 *14*	(11/2$^-$)		
619.14 *9*	(5/2$^+$,7/2$^+$)		
679.20 *19*			
702.49 *11*	(11/2$^+$)		
753.14 *10*	(5/2,7/2$^+$)		
859.7 *4*	(5/2,7/2,9/2)		
862.98 *11*	(5/2$^+$,7/2,9/2$^+$)		
872.18 *12*	(5/2$^+$,7/2$^+$)		
898.6 *3*			
903.62 *15*	(5/2$^+$,7/2$^+$)		
910.98 *18*	(5/2,7/2,9/2)		
916.48 *24*	(7/2$^-$,9/2)		
939.3 *4*	(7/2$^-$,9/2$^+$)		
977.2 *5*	(5/2,7/2$^+$)		
984.41 *12*	(5/2$^+$,7/2,9/2$^+$)		
1001.64 *17*	(5/2$^+$,7/2,9/2$^+$)		
1027.25 *12*	(5/2$^+$,7/2,9/2)		
1055.69 *10*	(7/2$^+$,9/2$^+$)		
1058.34 *13*	(5/2,7/2,9/2)		
1129.9 *4*	(7/2$^-$,9/2)		
1167.13 *14*	(5/2,7/2,9/2$^+$)		
1188.4 *4*	(5/2$^+$,7/2,9/2)		
1231.52 *25*	(5/2,7/2,9/2$^+$)		
1255.32 *23*	(5/2,7/2,9/2)		
1284.1 *4*	(5/2$^+$,7/2,9/2)		
1295.7? *5*			
1297.3 *3*	(7/2$^+$,9/2)		
1308.5 *3*			
1312.8 *4*			
1325.54 *16*	(5/2$^+$,7/2$^+$)		

Continued on next page (footnotes at end of table)

^{133}Nd ε decay (70 s) 1995Br24,1989Li22 (continued)

^{133}Pr Levels (continued)

E(level)†	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
1366.5 *4*	1656.75 *20*	(7/2+,9/2)	1785.31 *12*	(9/2+)	2118.33 *14*	(7/2+,9/2)
1428.2 *3*	1706.03 *16*	(9/2+)	1796.57 *14*		2179.8 *5*	
1431.3 *4*	1723.06 *11*	(7/2−,9/2)	1828.4 *4*		2554.8 *8*	

† From a least squares fit to Eγ′s.
‡ From Adopted Levels.

ε,β+ radiations

There are several problems with the present decay scheme: the 61.7-keV level (Jπ=(5/2+)) is expected to be strongly fed in ε+β+ decay, but it has a negative net feeding intensity; the 702.5-keV level (Jπ=(11/2+)) should not be directly populated in ε+β+ decay, but it has I(ε+β+)=2.2 *6* net feeding intensity. Improved new measurements are needed to resolve those ambiguities and to improve uncertainties of the γ-ray emission probabilities.

E(decay)	E(level)	Iβ+ ‡	Iε‡	Log *ft*	I(ε+β+)†‡	Comments
(3.05×10^3 *5*)	2554.8	0.10 *5*	0.16 *7*	6.38 *22*	0.26 *12*	av Eβ=916 *23*; εK=0.527 *16*; εL=0.0739 *22*; εM+=0.0209 *7*
(3.43×10^3 *5*)	2179.8	0.26 *8*	0.26 *7*	6.28 *15*	0.52 *15*	av Eβ=1087 *23*; εK=0.419 *14*; εL=0.0585 *20*; εM+=0.0166 *6*
(3.49×10^3 *5*)	2118.33	2.3 *4*	2.0 *3*	5.39 *10*	4.3 *7*	av Eβ=1115 *23*; εK=0.402 *14*; εL=0.0562 *19*; εM+=0.0159 *6*
(3.81×10^3 *5*)	1796.57	2.5 *4*	1.5 *2*	5.59 *10*	4.0 *6*	av Eβ=1263 *23*; εK=0.326 *11*; εL=0.0454 *16*; εM+=0.0129 *5*
(3.82×10^3 *5*)	1785.31	4.2 *6*	2.6 *4*	5.37 *10*	6.8 *10*	av Eβ=1268 *23*; εK=0.323 *11*; εL=0.0451 *16*; εM+=0.0128 *5*
(3.88×10^3 *5*)	1723.06	5.0 *7*	2.9 *4*	5.33 *9*	7.9 *11*	av Eβ=1297 *24*; εK=0.310 *11*; εL=0.0432 *15*; εM+=0.0122 *5*
(3.90×10^3 *5*)	1706.03	3.5 *5*	2.0 *3*	5.50 *10*	5.5 *8*	av Eβ=1304 *24*; εK=0.306 *11*; εL=0.0427 *15*; εM+=0.0121 *5*
(3.95×10^3 *5*)	1656.75	0.86 *16*	0.46 *9*	6.15 *11*	1.32 *25*	av Eβ=1327 *24*; εK=0.297 *10*; εL=0.0413 *14*; εM+=0.0117 *4*
(4.17×10^3 *5*)	1431.3	0.34 *8*	0.14 *4*	6.70 *13*	0.48 *12*	av Eβ=1432 *24*; εK=0.255 *9*; εL=0.0356 *12*; εM+=0.0101 *4*
(4.18×10^3 *5*)	1428.2	0.47 *12*	0.20 *5*	6.56 *13*	0.67 *17*	av Eβ=1433 *24*; εK=0.255 *9*; εL=0.0355 *12*; εM+=0.0100 *4*
(4.24×10^3 *5*)	1366.5	0.19 *9*	0.07 *3*	7.00 *22*	0.26 *12*	av Eβ=1462 *24*; εK=0.245 *9*; εL=0.0341 *12*; εM+=0.0096 *4*
(4.28×10^3 *5*)	1325.54	1.7 *3*	0.65 *11*	6.07 *10*	2.3 *4*	av Eβ=1481 *24*; εK=0.238 *8*; εL=0.0332 *12*; εM+=0.0094 *4*
(4.29×10^3 *5*)	1312.8	0.27 *9*	0.10 *3*	6.87 *16*	0.37 *12*	av Eβ=1487 *24*; εK=0.236 *8*; εL=0.0329 *11*; εM+=0.0093 *4*
(4.30×10^3 *5*)	1308.5	0.27 *9*	0.10 *3*	6.87 *16*	0.37 *12*	av Eβ=1489 *24*; εK=0.236 *8*; εL=0.0328 *11*; εM+=0.0093 *4*
(4.31×10^3 *5*)	1297.3	0.83 *16*	0.32 *6*	6.39 *11*	1.15 *22*	av Eβ=1494 *24*; εK=0.234 *8*; εL=0.0325 *11*; εM+=0.0092 *3*
(4.32×10^3 *5*)	1284.1	0.73 *16*	0.27 *6*	6.45 *12*	1.00 *22*	av Eβ=1500 *24*; εK=0.232 *8*; εL=0.0323 *11*; εM+=0.0091 *3*
(4.35×10^3 *5*)	1255.32	0.62 *12*	0.23 *5*	6.54 *11*	0.85 *17*	av Eβ=1514 *24*; εK=0.228 *8*; εL=0.0317 *11*; εM+=0.0090 *3*
(4.37×10^3 *5*)	1231.52	1.1 *2*	0.40 *8*	6.30 *11*	1.5 *3*	av Eβ=1525 *24*; εK=0.224 *8*; εL=0.0312 *11*;

Continued on next page (footnotes at end of table)

^{133}Nd ε decay (70 s) 1995Br24,1989Li22 (continued)

ε,$β^+$ radiations (continued)

E(decay)	E(level)	I$β^+$ ‡	Iε‡	Log ft	I(ε+$β^+$)†‡	Comments
						εM+=0.0088 3
(4.42×10^3 5)	1188.4	0.37 12	0.13 4	6.80 16	0.50 16	av Eβ=1545 24; εK=0.218 8; εL=0.0303 10; εM+=0.0086 3
(4.44×10^3 5)	1167.13	0.4 2	0.1 1	6.8 3	0.5 3	av Eβ=1555 24; εK=0.215 7; εL=0.0299 10; εM+=0.0085 3
(4.48×10^3 5)	1129.9	0.39 13	0.13 4	6.81 16	0.52 17	av Eβ=1572 24; εK=0.210 7; εL=0.0292 10; εM+=0.0083 3
(4.55×10^3 5)	1058.34	1.2 4	0.38 12	6.36 16	1.6 5	av Eβ=1605 24; εK=0.200 7; εL=0.0279 10; εM+=0.0079 3
(4.55×10^3 5)	1055.69	1.9 5	0.59 17	6.16 14	2.5 7	av Eβ=1607 24; εK=0.200 7; εL=0.0278 10; εM+=0.0079 3
(4.58×10^3 5)	1027.25	1.0 3	0.30 9	6.46 15	1.3 4	av Eβ=1620 24; εK=0.196 7; εL=0.0273 9; εM+=0.0077 3
(4.60×10^3 5)	1001.64	1.9 4	0.55 12	6.21 12	2.4 5	av Eβ=1632 24; εK=0.193 7; εL=0.0269 9; εM+=0.00760 25
(4.62×10^3 5)	984.41	3.4 9	1.0 3	5.95 14	4.4 12	av Eβ=1640 24; εK=0.191 7; εL=0.0266 9; εM+=0.00752 25
(4.63×10^3 5)	977.2	0.32 9	0.09 3	6.99 15	0.41 12	av Eβ=1643 24; εK=0.190 7; εL=0.0264 9; εM+=0.00748 25
(4.67×10^3 5)	939.3	0.95 20	0.27 6	6.53 11	1.22 25	av Eβ=1661 24; εK=0.186 6; εL=0.0258 9; εM+=0.00730 24
(4.69×10^3 5)	916.48	0.34 9	0.09 3	6.99 14	0.43 12	av Eβ=1672 24; εK=0.183 6; εL=0.0254 9; εM+=0.00720 24
(4.69×10^3 5)	910.98	1.7 3	0.47 9	6.29 11	2.2 4	av Eβ=1674 24; εK=0.182 6; εL=0.0253 9; εM+=0.00717 24
(4.70×10^3 5)	903.62	2.4 4	0.64 11	6.16 10	3.0 5	av Eβ=1678 24; εK=0.182 6; εL=0.0252 9; εM+=0.00714 23
(4.71×10^3 5)	898.6	0.17 9	0.05 3	7.29 25	0.22 12	av Eβ=1680 24; εK=0.181 6; εL=0.0252 9; εM+=0.00712 23
(4.73×10^3 5)	872.18	3.0 7	0.80 19	6.07 13	3.8 9	av Eβ=1693 24; εK=0.178 6; εL=0.0247 8; εM+=0.00700 23
(4.74×10^3 5)	862.98	3.7 6	0.98 17	5.98 10	4.7 8	av Eβ=1697 24; εK=0.177 6; εL=0.0246 8; εM+=0.00696 23
(4.75×10^3 5)	859.7	0.70 16	0.19 4	6.70 12	0.89 20	av Eβ=1698 24; εK=0.177 6; εL=0.0245 8; εM+=0.00694 23
(4.85×10^3 5)	753.14	3.5 6	0.84 16	6.07 11	4.3 8	av Eβ=1748 24; εK=0.165 6; εL=0.0230 8; εM+=0.00649 21
(4.93×10^3 5)	679.20	0.9 3	0.20 7	6.69 18	1.1 4	av Eβ=1783 24; εK=0.158 5; εL=0.0219 7; εM+=0.00620 20
(4.99×10^3 5)	619.14	3.7 7	0.81 16	6.11 11	4.5 9	av Eβ=1811 24; εK=0.152 5; εL=0.0211 7; εM+=0.00598 19
(5.12×10^3 5)	488.32	3.6 9	0.71 18	6.18 13	4.3 11	av Eβ=1873 24; εK=0.141 5; εL=0.0195 6; εM+=0.00552 17
(5.13×10^3 5)	475.85	2.3 16	0.4 3	6.4 4	2.7 19	av Eβ=1879 24; εK=0.140 5; εL=0.0194 6; εM+=0.00548 17
(5.18×10^3 5)	428.61	4.9 18	0.9 3	6.08 17	5.8 21	av Eβ=1901 24; εK=0.136 4; εL=0.0188 6; εM+=0.00533 17
(5.31×10^3 5)	295.63	2.8 13	0.49 22	6.38 21	3.3 15	av Eβ=1964 24; εK=0.126 4; εL=0.0174 6; εM+=0.00493 15
(5.38×10^3 5)	225.89	10.0 19	1.6 3	5.86 11	11.6 22	av Eβ=1997 24; εK=0.121 4; εL=0.0167 5; εM+=0.00473 14
(5.41×10^3 5)	192.06	7 4	2.8 14	7.69[1u] 23	10 5	av Eβ=1993 23; εK=0.236 7; εL=0.0332 9; εM+=0.0094 3
(5.44×10^3 5)	166.73	≤7	≤1	≥6.0	≤8	av Eβ=2025 24; εK=0.117 4; εL=0.0162 5; εM+=0.00457 14

Continued on next page (footnotes at end of table)

^{133}Nd ε decay (70 s) 1995Br24,1989Li22 (continued)

ε,β^{+} radiations (continued)

† From intensity balances.
‡ Absolute intensity per 100 decays.

γ(^{133}Pr)

Iγ normalization: From Σ(I(γ+ce))=100 to g.s., assuming that there is no direct ε+$β^+$ decay feeding to the (3/2$^+$) g.s. of ^{133}Pr.

$E_γ$[‡]	$I_γ$[‡@]	E_i(level)	$J^π_i$	E_f	$J^π_f$	Mult.[#]	δ	α[†]	Comments
59.1 *3*	1.7 *4*	225.89	(7/2$^+$)	166.73	(5/2$^+$,7/2$^+$)	[M1]		5.91 *12*	α(K)=5.03 *11*; α(L)=0.699 *15*; α(M)=0.147 *3*; α(N+..)=0.0387 *8* α(N)=0.0330 *7*; α(O)=0.00530 *11*; α(P)=0.000387 *8*
61.7 *1*	60 *8*	61.68	(5/2$^+$)	0.0	(3/2$^+$)	M1		5.22	α(K)=4.44 *7*; α(L)=0.617 *10*; α(M)=0.1300 *20*; α(N+..)=0.0341 *5* α(N)=0.0291 *5*; α(O)=0.00467 *7*; α(P)=0.000342 *5* Mult.: α(L)exp=0.67 *15*, α(M)exp=0.30 *13*, and M/L=0.27 *8*; α(L)exp=0.67 *13* (1989Li22).
103.6 *2*	10 *2*	295.63	(7/2$^-$)	192.06	(11/2$^-$)	E2		1.87	α(L)exp=0.75 *20*; α(M)exp=0.23 *8*; L/K=0.70 *20*; M/L=0.30 *9*; M/K=0.19 *6* α(K)=1.093 *17*; α(L)=0.604 *10*; α(M)=0.1361 *23*; α(N+..)=0.0336 *6* α(N)=0.0294 *5*; α(O)=0.00412 *7*; α(P)=5.75×10^{-5} *9*
105.1 *2*	38 *6*	166.73	(5/2$^+$,7/2$^+$)	61.68	(5/2$^+$)	M1+E2	0.5 *3*	1.25 *13*	α(K)exp<1.7; α(L)exp=0.23 *7*; L/K=0.19 *6*; M/L=0.28 *9*; M/K=0.066 *20* α(K)=0.975 *23*; α(L)=0.22 *9*; α(M)=0.048 *19*; α(N+..)=0.012 *5* α(N)=0.010 *4*; α(O)=0.0016 *6*; α(P)=7.0×10^{-5} *4* δ: calculated by evaluators with BrIccmixing program.
130.4 *2*	11 *2*	192.06	(11/2$^-$)	61.68	(5/2$^+$)	E3		7.60 *12*	α(L)exp=4.1 *6*; α(M)exp=1.3 *2*; L/K=1.7 *3*; M/K=0.54 *12*; M/L=0.30 *8*; ce(K)=26 *4*; ce(L)=45 *9* ce(M)=14 *3* α(K)=2.40 *4*; α(L)=4.02 *7*; α(M)=0.943 *16*; α(N+..)=0.232 *4* α(N)=0.204 *4*; α(O)=0.0279 *5*; α(P)=0.0001277 *19* B(E3)(W.u.)=0.19 *4* α(exp): theoretical value 2.4 for α(K)exp is used for normalization of Iγ to Ice.
143.2 *4*	1.2 *3*	619.14	(5/2$^+$,7/2$^+$)	475.85	(9/2$^+$)				
164.21 *10*	100	225.89	(7/2$^+$)	61.68	(5/2$^+$)	M1(+E2)	0.2 *4*	0.322 *13*	α(K)=0.273 *5*; α(L)=0.039 *11*; α(M)=0.0083 *24*; α(N+..)=0.0022 *6* α(N)=0.0018 *5*; α(O)=0.00029 *7*; α(P)=2.07×10^{-5} *13* Mult.: α(K)exp=0.49 *16*, α(L)exp=0.075 *23*, α(M)exp=0.092 *30*, L/K=0.13 *4*, M/K=0.035 *10* and M/L=0.30 *10*; α(K)exp=0.32 *7*, α(L)exp=0.041 *9* and α(M)exp=0.014 *7* (1989Li22). δ: calculated by evaluators with BrIccmixing program.
166.7 *1*	4.2 *8*	166.73	(5/2$^+$,7/2$^+$)	0.0	(3/2$^+$)	[M1,E2]		0.330 *24*	α(K)=0.258 *6*; α(L)=0.057 *21*; α(M)=0.012 *5*; α(N+..)=0.0031 *12* α(N)=0.0027 *11*; α(O)=0.00041 *14*; α(P)=1.7×10^{-5} *3*

γ(^{133}Pr) (continued)

E_γ ‡	I_γ ‡@	E_i(level)	J_i^π	E_f	J_f^π	Mult. #	α †	Comments
190.5 *2*	2.2 *5*	619.14	(5/2+,7/2+)	428.61	(5/2+,7/2+)	[M1]	0.213	α(K)=0.181 *3*; α(L)=0.0247 *4*; α(M)=0.00521 *8*; α(N+..)=0.001367 *20* α(N)=0.001165 *17*; α(O)=0.000188 *3*; α(P)=1.388×10^{-5} *20*
202.7 *1*	3.4 *6*	428.61	(5/2+,7/2+)	225.89	(7/2+)	[M1]	0.180	α(K)=0.1531 *22*; α(L)=0.0208 *3*; α(M)=0.00439 *7*; α(N+..)=0.001152 *17* α(N)=0.000982 *14*; α(O)=0.0001582 *23*; α(P)=1.171×10^{-5} *17*
225.9 *3*	19 *4*	225.89	(7/2+)	0.0	(3/2+)	[E2]	0.1264	α(K)=0.0969 *15*; α(L)=0.0231 *4*; α(M)=0.00507 *8*; α(N+..)=0.001280 *19* α(N)=0.001110 *17*; α(O)=0.0001637 *25*; α(P)=6.01×10^{-6} *9*
226.6 *3*	3.9 *8*	702.49	(11/2+)	475.85	(9/2+)	[M1]	0.1327	α(K)=0.1132 *17*; α(L)=0.01537 *23*; α(M)=0.00324 *5*; α(N+..)=0.000849 *13* α(N)=0.000724 *11*; α(O)=0.0001166 *17*; α(P)=8.64×10^{-6} *13*
231.7 *2*	1.4 *4*	910.98	(5/2,7/2,9/2)	679.20				
233.9 *1*	10 *2*	295.63	(7/2−)	61.68	(5/2+)	E1	0.0249	α(K)exp<0.05 (1989Li22) α(K)=0.0213 *3*; α(L)=0.00283 *4*; α(M)=0.000594 *9*; α(N+..)=0.0001539 *22* α(N)=0.0001317 *19*; α(O)=2.08×10^{-5} *3*; α(P)=1.396×10^{-6} *20*
250.0 *2*	20 *3*	475.85	(9/2+)	225.89	(7/2+)	M1(+E2)	0.096 *6*	α(K)=0.079 *9*; α(L)=0.0137 *20*; α(M)=0.0030 *5*; α(N+..)=0.00076 *11* α(N)=0.00065 *10*; α(O)=0.000101 *12*; α(P)=5.5×10^{-6} *11* Mult.: α(K)exp=0.12 *3*; α(K)exp=0.12 *6* (1989Li22).
255.7 *2*	4.1 *6*	551.38	(11/2−)	295.63	(7/2−)	[E2]	0.0842	α(K)=0.0658 *10*; α(L)=0.01445 *21*; α(M)=0.00315 *5*; α(N+..)=0.000798 *12* α(N)=0.000691 *10*; α(O)=0.0001029 *15*; α(P)=4.18×10^{-6} *6*
261.9 *2*	7.8 *16*	428.61	(5/2+,7/2+)	166.73	(5/2+,7/2+)	[M1]	0.0900	α(K)=0.0768 *11*; α(L)=0.01038 *15*; α(M)=0.00218 *3*; α(N+..)=0.000573 *9* α(N)=0.000489 *7*; α(O)=7.88×10^{-5} *12*; α(P)=5.85×10^{-6} *9*
262.5 *2*	7.8 *16*	488.32	(5/2,7/2+)	225.89	(7/2+)			
264.8 *2*	2.2 *4*	753.14	(5/2,7/2+)	488.32	(5/2,7/2+)			
321.2 *3*	1.9 *4*	488.32	(5/2,7/2+)	166.73	(5/2+,7/2+)			
353.3 *2*	1.4 *3*	1055.69	(7/2+,9/2+)	702.49	(11/2+)			
359.1 *4*	14 *2*	551.38	(11/2−)	192.06	(11/2−)	[M1]	0.0392	α(K)=0.0335 *5*; α(L)=0.00449 *7*; α(M)=0.000944 *14*; α(N+..)=0.000248 *4* α(N)=0.000211 *3*; α(O)=3.41×10^{-5} *5*; α(P)=2.54×10^{-6} *4*
359.4 *4*	5.1 *10*	910.98	(5/2,7/2,9/2)	551.38	(11/2−)			
365.1 *2*	2.0 *5*	916.48	(7/2−,9/2)	551.38	(11/2−)			
367.0 *1*	49 *7*	428.61	(5/2+,7/2+)	61.68	(5/2+)	M1(+E2)	0.032 *5*	α(K)exp=0.043 *9* α(K)=0.027 *5*; α(L)=0.00412 *14*; α(M)=0.000877 *19*; α(N+..)=0.000227 *8* α(N)=0.000195 *6*; α(O)=3.06×10^{-5} *17*; α(P)=1.9×10^{-6} *5*
374.4 *3*	1.7 *4*	862.98	(5/2+,7/2,9/2+)	488.32	(5/2,7/2+)			
383.5 *2*	6.6 *13*	679.20		295.63	(7/2−)			
383.9 *4*	3.2 *6*	872.18	(5/2+,7/2+)	488.32	(5/2,7/2+)			
387.4 *2*	2.0 *4*	862.98	(5/2+,7/2,9/2+)	475.85	(9/2+)			
393.3 *2*	9.5 *19*	619.14	(5/2+,7/2+)	225.89	(7/2+)	M1(+E2)	0.027 *5*	α(K)exp=0.047 *12*

From ENSDF

γ(^{133}Pr) (continued)

E_γ [‡]	I_γ [‡@]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [#]	α [†]	Comments
								α(K)=0.022 *5*; α(L)=0.00336 *19*; α(M)=0.00071 *4*; α(N+..)=0.000185 *11* α(N)=0.000159 *8*; α(O)=2.50×10^{-5} *19*; α(P)=1.6×10^{-6} *4*
396.3 *2*	6.0 *12*	872.18	(5/2$^+$,7/2$^+$)	475.85	(9/2$^+$)			
414.3 *2*	44 *6*	475.85	(9/2$^+$)	61.68	(5/2$^+$)	[E2]	0.0191	α(K)=0.01566 *22*; α(L)=0.00269 *4*; α(M)=0.000577 *9*; α(N+..)=0.0001481 *21* α(N)=0.0001274 *18*; α(O)=1.96×10^{-5} *3*; α(P)=1.069×10^{-6} *15*
426.6 *4*	20 *3*	488.32	(5/2,7/2$^+$)	61.68	(5/2$^+$)			
428.1 *5*	3.1 *7*	903.62	(5/2$^+$,7/2$^+$)	475.85	(9/2$^+$)			
428.6 *4*	22 *4*	428.61	(5/2$^+$,7/2$^+$)	0.0	(3/2$^+$)	[M1,E2]	0.021 *4*	α(K)=0.018 *4*; α(L)=0.00262 *22*; α(M)=0.00056 *4*; α(N+..)=0.000145 *12* α(N)=0.000124 *10*; α(O)=1.96×10^{-5} *20*; α(P)=1.3×10^{-6} *4*
436.4 *2*	5.1 *8*	1055.69	(7/2$^+$,9/2$^+$)	619.14	(5/2$^+$,7/2$^+$)			
439.0 *2*	2.6 *4*	1058.34	(5/2,7/2,9/2)	619.14	(5/2$^+$,7/2$^+$)			
443.9 *4*	1.5 *3*	872.18	(5/2$^+$,7/2$^+$)	428.61	(5/2$^+$,7/2$^+$)			
450.3 *2*	6.1 *12*	1001.64	(5/2$^+$,7/2,9/2$^+$)	551.38	(11/2$^-$)			
452.4 *1*	15 *2*	619.14	(5/2$^+$,7/2$^+$)	166.73	(5/2$^+$,7/2$^+$)	E2(+M1)	0.018 *4*	α(K)exp=0.012 *3* α(K)=0.015 *4*; α(L)=0.00225 *22*; α(M)=0.00048 *5*; α(N+..)=0.000124 *12* α(N)=0.000106 *10*; α(O)=1.68×10^{-5} *20*; α(P)=1.1×10^{-6} *3*
475.0 *2*	2.0 *5*	903.62	(5/2$^+$,7/2$^+$)	428.61	(5/2$^+$,7/2$^+$)			
476.6 *1*	15 *2*	702.49	(11/2$^+$)	225.89	(7/2$^+$)	E2	0.01285	α(K)exp=0.012 *3* α(K)=0.01065 *15*; α(L)=0.001733 *25*; α(M)=0.000371 *6*; α(N+..)=9.55×10^{-5} *14* α(N)=8.20×10^{-5} *12*; α(O)=1.272×10^{-5} *18*; α(P)=7.38×10^{-7} *11*
488.3 *2*	9.4 *19*	488.32	(5/2,7/2$^+$)	0.0	(3/2$^+$)			
496.3 *4*	3.9 *8*	984.41	(5/2$^+$,7/2,9/2$^+$)	488.32	(5/2,7/2$^+$)			
502.1 *3*	2.0 *4*	1255.32	(5/2,7/2,9/2)	753.14	(5/2,7/2$^+$)			
508.6 *4*	11 *4*	984.41	(5/2$^+$,7/2,9/2$^+$)	475.85	(9/2$^+$)			
525.7 *3*	3.1 *7*	1001.64	(5/2$^+$,7/2,9/2$^+$)	475.85	(9/2$^+$)			
527.2 *2*	7.8 *16*	753.14	(5/2,7/2$^+$)	225.89	(7/2$^+$)			
544.2 *3*	3.1 *6*	1297.3	(7/2$^+$,9/2)	753.14	(5/2,7/2$^+$)			
551.2 *2*	3.4 *7*	1027.25	(5/2$^+$,7/2,9/2)	475.85	(9/2$^+$)			
555.7 *2*	3.0 *6*	984.41	(5/2$^+$,7/2,9/2$^+$)	428.61	(5/2$^+$,7/2$^+$)			
557.4 *3*	5.3 *8*	619.14	(5/2$^+$,7/2$^+$)	61.68	(5/2$^+$)			
564.1 *3*	4.1 *8*	859.7	(5/2,7/2,9/2)	295.63	(7/2$^-$)			
569.3 *4*	0.9 *3*	1188.4	(5/2$^+$,7/2,9/2)	619.14	(5/2$^+$,7/2$^+$)			
569.9 *4*	5.4 *11*	1058.34	(5/2,7/2,9/2)	488.32	(5/2,7/2$^+$)			
572.3 *2*	1.7 *4*	1325.54	(5/2$^+$,7/2$^+$)	753.14	(5/2,7/2$^+$)			
572.9 *4*	2.9 *6*	1001.64	(5/2$^+$,7/2,9/2$^+$)	428.61	(5/2$^+$,7/2$^+$)			
578.4 *4*	1.0 *5*	1129.9	(7/2$^-$,9/2)	551.38	(11/2$^-$)			
580.0 *4*	3.6 *6*	1055.69	(7/2$^+$,9/2$^+$)	475.85	(9/2$^+$)			
586.3 *3*	1.9 *4*	753.14	(5/2,7/2$^+$)	166.73	(5/2$^+$,7/2$^+$)			

γ(^{133}Pr) (continued)

Eγ[‡]	Iγ[‡@]	Ei(level)	J^π_i	Ef	J^π_f
594.8 *5*	2.2 *5*	1297.3	(7/2+,9/2)	702.49	(11/2+)
598.7 *1*	5.4 *8*	1027.25	(5/2+,7/2,9/2)	428.61	(5/2+,7/2+)
615.2 *6*	4.4 *9*	910.98	(5/2,7/2,9/2)	295.63	(7/2−)
617.8 *4*	2.4 *5*	1785.31	(9/2+)	1167.13	(5/2,7/2,9/2+)
627.1 *1*	10 *1*	1055.69	(7/2+,9/2+)	428.61	(5/2+,7/2+)
629.4 *2*	3.4 *7*	1796.57		1167.13	(5/2,7/2,9/2+)
637.1 *1*	8.5 *17*	862.98	(5/2+,7/2,9/2+)	225.89	(7/2+)
646.3 *3*	6.0 *12*	872.18	(5/2+,7/2+)	225.89	(7/2+)
647.7 *3*	3.4 *8*	1706.03	(9/2+)	1058.34	(5/2,7/2,9/2)
664.7 *2*	3.6 *2*	1723.06	(7/2−,9/2)	1058.34	(5/2,7/2,9/2)
667.4 *2*	10 *2*	1723.06	(7/2−,9/2)	1055.69	(7/2+,9/2+)
677.8 *4*	3.2 *5*	903.62	(5/2+,7/2+)	225.89	(7/2+)
691.4 *2*	4.4 *8*	753.14	(5/2,7/2+)	61.68	(5/2+)
696.1 *3*	4.8 *9*	862.98	(5/2+,7/2,9/2+)	166.73	(5/2+,7/2+)
712.5 *8*	1.4 *6*	1188.4	(5/2+,7/2,9/2)	475.85	(9/2+)
721.3 *4*	2.9 *6*	1706.03	(9/2+)	984.41	(5/2+,7/2,9/2+)
724.6[a] *4*	1.4 *7*	916.48	(7/2−,9/2)	192.06	(11/2−)
736.7 *3*	2.5 *6*	903.62	(5/2+,7/2+)	166.73	(5/2+,7/2+)
738.7 *2*	6.3 *9*	1723.06	(7/2−,9/2)	984.41	(5/2+,7/2,9/2+)
740.8 *2*	3.4 *8*	1796.57		1055.69	(7/2+,9/2+)
753.1 *2*	12 *2*	753.14	(5/2,7/2+)	0.0	(3/2+)
758.3 *4*	2.0 *6*	984.41	(5/2+,7/2,9/2+)	225.89	(7/2+)
758.3 *4*	2.6 *8*	1785.31	(9/2+)	1027.25	(5/2+,7/2,9/2)
772.5 *4*	2.2 *6*	939.3	(7/2−,9/2+)	166.73	(5/2+,7/2+)
783.4 *5*	4.4 *8*	1785.31	(9/2+)	1001.64	(5/2+,7/2,9/2+)
793.7 *6*	1.7 *5*	1656.75	(7/2+,9/2)	862.98	(5/2+,7/2,9/2+)
801.0 *3*	6.5 *12*	862.98	(5/2+,7/2,9/2+)	61.68	(5/2+)
801.3 *3*	1.7 *6*	1785.31	(9/2+)	984.41	(5/2+,7/2,9/2+)
802.8 *4*	2.9 *7*	1231.52	(5/2,7/2,9/2+)	428.61	(5/2+,7/2+)
808.3 *5*	2.9 *7*	1284.1	(5/2+,7/2,9/2)	475.85	(9/2+)
810.5[&] *5*	5.1[&] *8*	872.18	(5/2+,7/2+)	61.68	(5/2+)
810.5[&] *5*	1.9[&] *5*	977.2	(5/2,7/2+)	166.73	(5/2+,7/2+)
818.1 *3*	4.2 *8*	984.41	(5/2+,7/2,9/2+)	166.73	(5/2+,7/2+)
819.9[a] *4*	2.7 *6*	1295.7?		475.85	(9/2+)
826.8 *3*	1.9 *5*	1255.32	(5/2,7/2,9/2)	428.61	(5/2+,7/2+)
826.8[a] *4*	4.2 *8*	1828.4		1001.64	(5/2+,7/2,9/2+)
829.7 *3*	1.5 *5*	1055.69	(7/2+,9/2+)	225.89	(7/2+)
832.5 *5*	2.7 *6*	1058.34	(5/2,7/2,9/2)	225.89	(7/2+)
833.8 *5*	8.2 *17*	1706.03	(9/2+)	872.18	(5/2+,7/2+)
836.9[&] *3*	1.0[&] *5*	898.6		61.68	(5/2+)
836.9[&] *3*	1.7[&] *5*	1312.8		475.85	(9/2+)
837.2 *3*	2.9 *7*	1325.54	(5/2+,7/2+)	488.32	(5/2,7/2+)

From ENSDF

$\gamma(^{133}$Pr) (continued)

E_γ[‡]	I_γ[‡@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[†]	Comments
841.9 *4*	1.7 *5*	903.62	(5/2+,7/2+)	61.68	(5/2+)			
850.1 *6*	3.2 *6*	1325.54	(5/2+,7/2+)	475.85	(9/2+)			
855.5 *4*	1.7 *5*	1284.1	(5/2+,7/2,9/2)	428.61	(5/2+,7/2+)			
872.2 *2*	8.3 *17*	872.18	(5/2+,7/2+)	0.0	(3/2+)			
877.6 *5*	3.4 *7*	939.3	(7/2−,9/2+)	61.68	(5/2+)			
888.9 *2*	4.9 *10*	1055.69	(7/2+,9/2+)	166.73	(5/2+,7/2+)			
891.8 *2*	6.0 *11*	1058.34	(5/2,7/2,9/2)	166.73	(5/2+,7/2+)			
903.7 *4*	1.4 *5*	903.62	(5/2+,7/2+)	0.0	(3/2+)			
922.8 *2*	7.3 *14*	984.41	(5/2+,7/2,9/2+)	61.68	(5/2+)			
924.6 *3*	4.2 *8*	1796.57		872.18	(5/2+,7/2+)			
937.9 *4*	1.2 *5*	1366.5		428.61	(5/2+,7/2+)			
939.9 *4*	3.2 *6*	1001.64	(5/2+,7/2,9/2+)	61.68	(5/2+)			
954.5 *9*	0.5 *3*	1656.75	(7/2+,9/2)	702.49	(11/2+)			
963.4 *5*	1.4 *5*	1129.9	(7/2−,9/2)	166.73	(5/2+,7/2+)			
969.8 *3*	1.9 *5*	1723.06	(7/2−,9/2)	753.14	(5/2,7/2+)			
977.3[a] *3*	4.4 *9*	977.2	(5/2,7/2+)	0.0	(3/2+)			
993.5 *6*	2.7 *6*	1055.69	(7/2+,9/2+)	61.68	(5/2+)			
1000.3 *2*	3.7 *7*	1167.13	(5/2,7/2,9/2+)	166.73	(5/2+,7/2+)			
1002.7 *4*	2.2 *5*	1431.3		428.61	(5/2+,7/2+)			
1004.1 *7*	1.2 *4*	1706.03	(9/2+)	702.49	(11/2+)	[M1]	0.00311 *5*	α=0.00311 *5*; α(K)=0.00267 *4*; α(L)=0.000346 *5*; α(M)=7.24×10^{-5} *11*; α(N+..)=1.90×10^{-5} *3* α(N)=1.619×10^{-5} *23*; α(O)=2.62×10^{-6} *4*; α(P)=1.99×10^{-7} *3*
1062.6 *4*	4.3 *8*	2118.33	(7/2+,9/2)	1055.69	(7/2+,9/2+)			
1082.6 *3*	1.7 *5*	1308.5		225.89	(7/2+)			
1082.6 *2*	2.9 *6*	1785.31	(9/2+)	702.49	(11/2+)	[M1]	0.00261 *4*	α=0.00261 *4*; α(K)=0.00224 *4*; α(L)=0.000289 *4*; α(M)=6.06×10^{-5} *9*; α(N+..)=1.592×10^{-5} *23* α(N)=1.356×10^{-5} *19*; α(O)=2.19×10^{-6} *3*; α(P)=1.670×10^{-7} *24*
1105.4[&] *2*	4.3[&] *8*	1167.13	(5/2,7/2,9/2+)	61.68	(5/2+)			
1105.4[&] *2*	1.7[&] *5*	1656.75	(7/2+,9/2)	551.38	(11/2−)			
1121.5 *4*	2.4 *6*	2179.8		1058.34	(5/2,7/2,9/2)			
1166.5 *2*	4.9 *10*	1785.31	(9/2+)	619.14	(5/2+,7/2+)			
1169.9 *3*	3.9 *8*	1231.52	(5/2,7/2,9/2+)	61.68	(5/2+)			
1171.6 *2*	2.0 *5*	1723.06	(7/2−,9/2)	551.38	(11/2−)			
1202.3 *3*	3.1 *7*	1428.2		225.89	(7/2+)			
1207.2 *2*	0.9 *4*	2118.33	(7/2+,9/2)	910.98	(5/2,7/2,9/2)			
1228.0 *4*	2.2 *5*	1656.75	(7/2+,9/2)	428.61	(5/2+,7/2+)			
1233.8 *9*	0.9 *4*	1785.31	(9/2+)	551.38	(11/2−)	[E1]	0.000649 *9*	α=0.000649 *9*; α(K)=0.000523 *8*; α(L)=6.52×10^{-5} *10*; α(M)=1.358×10^{-5} *20*; α(N+..)=4.74×10^{-5} *8* α(N)=3.03×10^{-6} *5*; α(O)=4.90×10^{-7} *7*; α(P)=3.69×10^{-8} *6*; α(IPF)=4.39×10^{-5} *8*
1277.4 *9*	2.0 *5*	1706.03	(9/2+)	428.61	(5/2+,7/2+)			
1294.5 *2*	8.9 *19*	1723.06	(7/2−,9/2)	428.61	(5/2+,7/2+)			

$^{133}_{59}$Pr$_{74}$-9

$\gamma(^{133}$Pr) (continued)

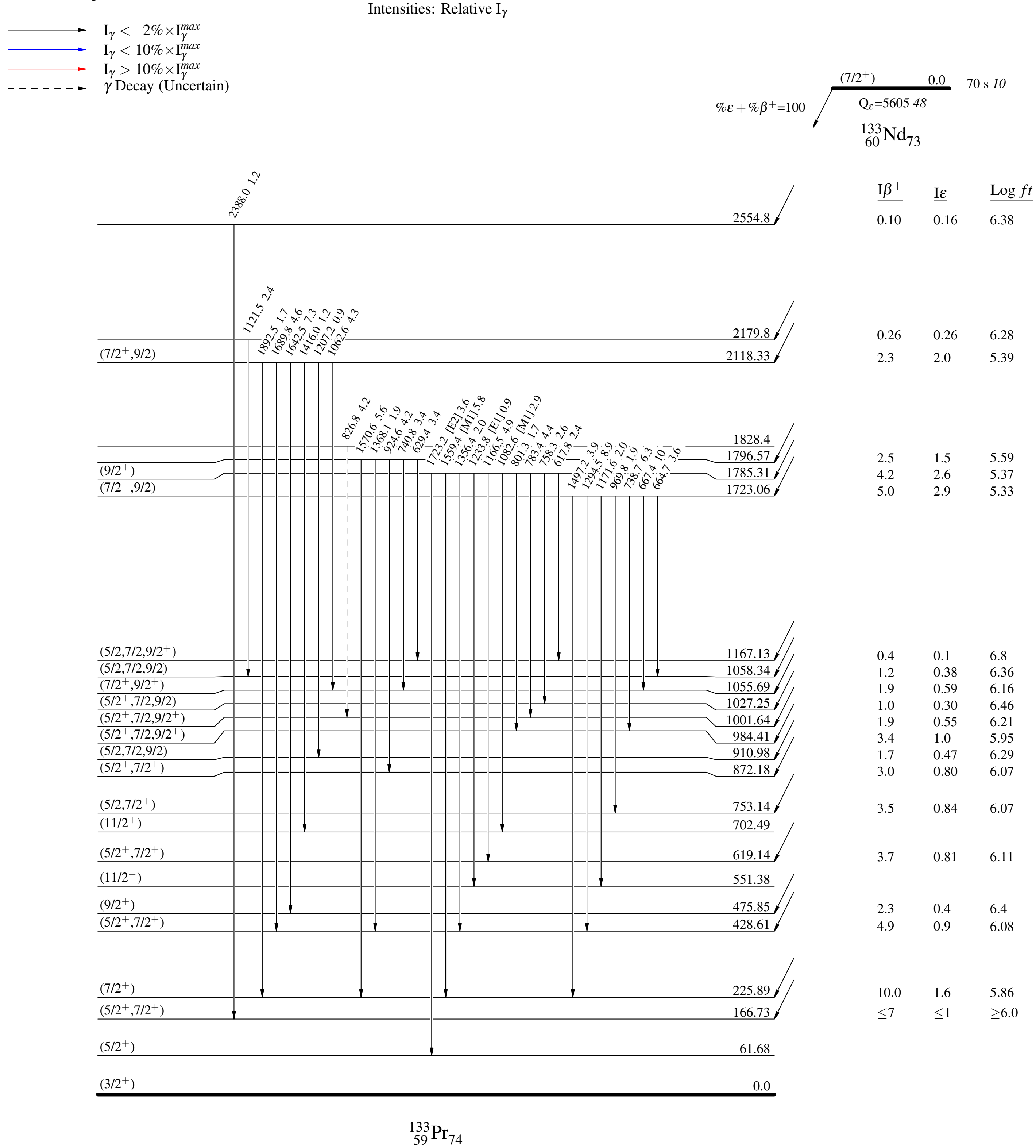
E_γ [‡]	I_γ [‡@]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [#]	α [†]	Comments
1325.7 *3*	2.9 *6*	1325.54	(5/2$^+$,7/2$^+$)	0.0	(3/2$^+$)			
1356.4 *3*	2.0 *5*	1785.31	(9/2$^+$)	428.61	(5/2$^+$,7/2$^+$)			
1368.1 *4*	1.9 *5*	1796.57		428.61	(5/2$^+$,7/2$^+$)			
1410.4 *2*	4.2 *8*	1706.03	(9/2$^+$)	295.63	(7/2$^-$)	[E1]	0.000628 *9*	α=0.000628 *9*; α(K)=0.000414 *6*; α(L)=5.14×10^{-5} *8*; α(M)=1.071×10^{-5} *15*; α(N+..)=0.0001516 *2* α(N)=2.39×10^{-6} *4*; α(O)=3.86×10^{-7} *6*; α(P)=2.92×10^{-8} *4*; α(IPF)=0.0001488 *21*
1416.0 *5*	1.2 *5*	2118.33	(7/2$^+$,9/2)	702.49	(11/2$^+$)			
1497.2 *4*	3.9 *8*	1723.06	(7/2$^-$,9/2)	225.89	(7/2$^+$)			
1514.1 *4*	3.4 *8*	1706.03	(9/2$^+$)	192.06	(11/2$^-$)	[E1]	0.000649 *9*	α=0.000649 *9*; α(K)=0.000367 *6*; α(L)=4.55×10^{-5} *7*; α(M)=9.47×10^{-6} *14*; α(N+..)=0.000227 *4* α(N)=2.12×10^{-6} *3*; α(O)=3.42×10^{-7} *5*; α(P)=2.59×10^{-8} *4*; α(IPF)=0.000224 *4*
1559.4 *2*	5.8 *12*	1785.31	(9/2$^+$)	225.89	(7/2$^+$)	[M1]	0.001239 *18*	α=0.001239 *18*; α(K)=0.000979 *14*; α(L)=0.0001249 *18*; α(M)=2.61×10^{-5} *4*; α(N+..)=0.000109 α(N)=5.84×10^{-6} *9*; α(O)=9.47×10^{-7} *14*; α(P)=7.24×10^{-8} *11*; α(IPF)=0.0001023 *15*
1570.6 *4*	5.6 *12*	1796.57		225.89	(7/2$^+$)			
1642.5 *2*	7.3 *14*	2118.33	(7/2$^+$,9/2)	475.85	(9/2$^+$)			
1689.8 *2*	4.6 *9*	2118.33	(7/2$^+$,9/2)	428.61	(5/2$^+$,7/2$^+$)			
1723.2 *5*	3.6 *8*	1785.31	(9/2$^+$)	61.68	(5/2$^+$)	[E2]	0.000883 *13*	α=0.000883 *13*; α(K)=0.000618 *9*; α(L)=7.92×10^{-5} *11*; α(M)=1.655×10^{-5} *24*; α(N+..)=0.0001690 α(N)=3.70×10^{-6} *6*; α(O)=5.96×10^{-7} *9*; α(P)=4.46×10^{-8} *7*; α(IPF)=0.0001647 *24*
1892.5 *7*	1.7 *6*	2118.33	(7/2$^+$,9/2)	225.89	(7/2$^+$)			
2388.0 *8*	1.2 *5*	2554.8		166.73	(5/2$^+$,7/2$^+$)			

[†] Additional information 1.
[‡] From 1995Br24, except as noted.
[#] From conversion electron measurements in 1995Br24, unless otherwise specified. The data of 1995Br24 are normalized to α(K)=2.40 for the 130.4γ, E3 theory value.
[@] For absolute intensity per 100 decays, multiply by 0.217 *24*.
[&] Multiply placed with intensity suitably divided.
[a] Placement of transition in the level scheme is uncertain.

^{133}Nd ε decay (70 s) 1995Br24,1989Li22

Decay Scheme

Intensities: Relative I_γ

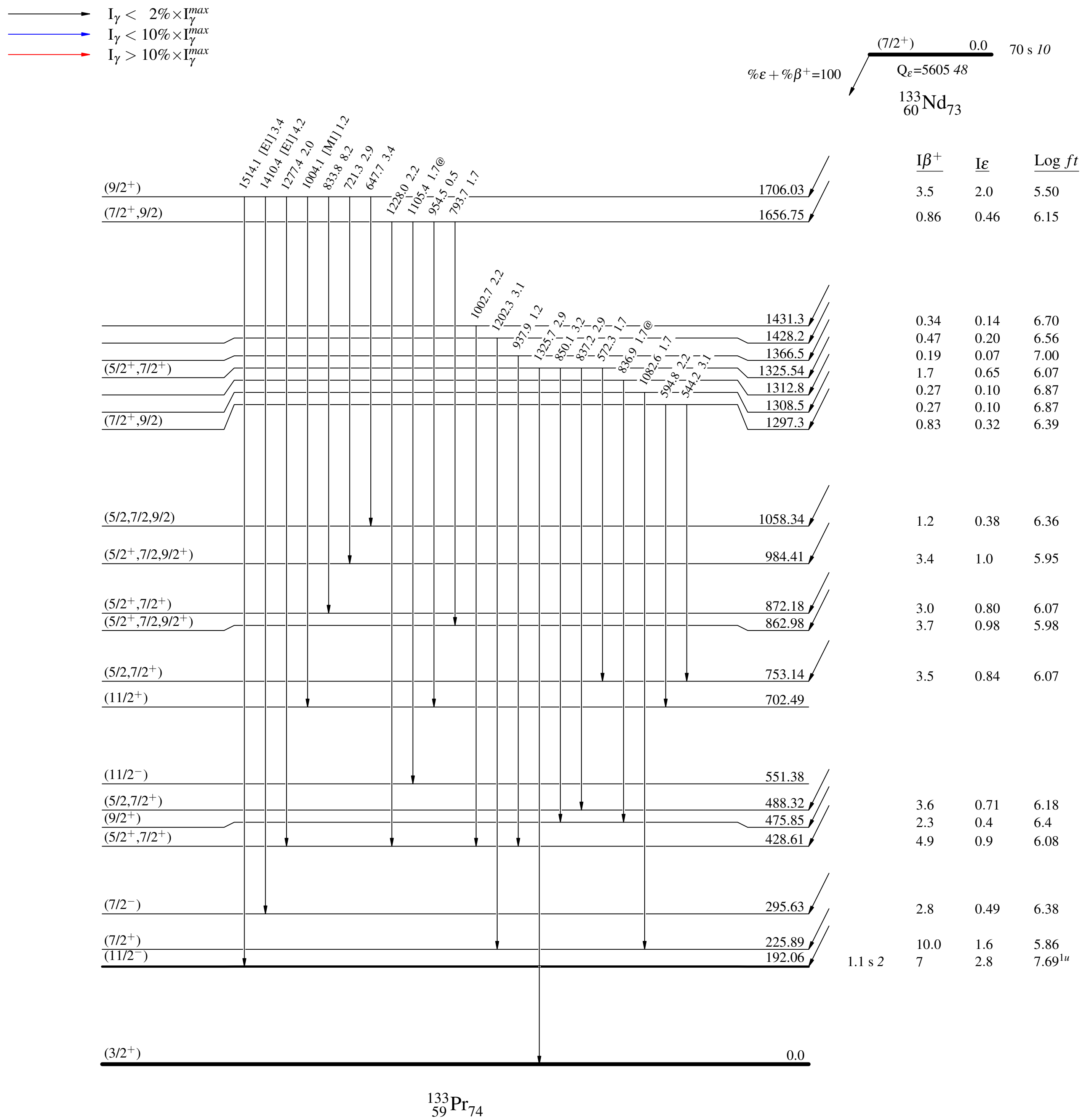


^{133}Nd ε decay (70 s) 1995Br24,1989Li22

Decay Scheme (continued)

Intensities: Relative I_γ

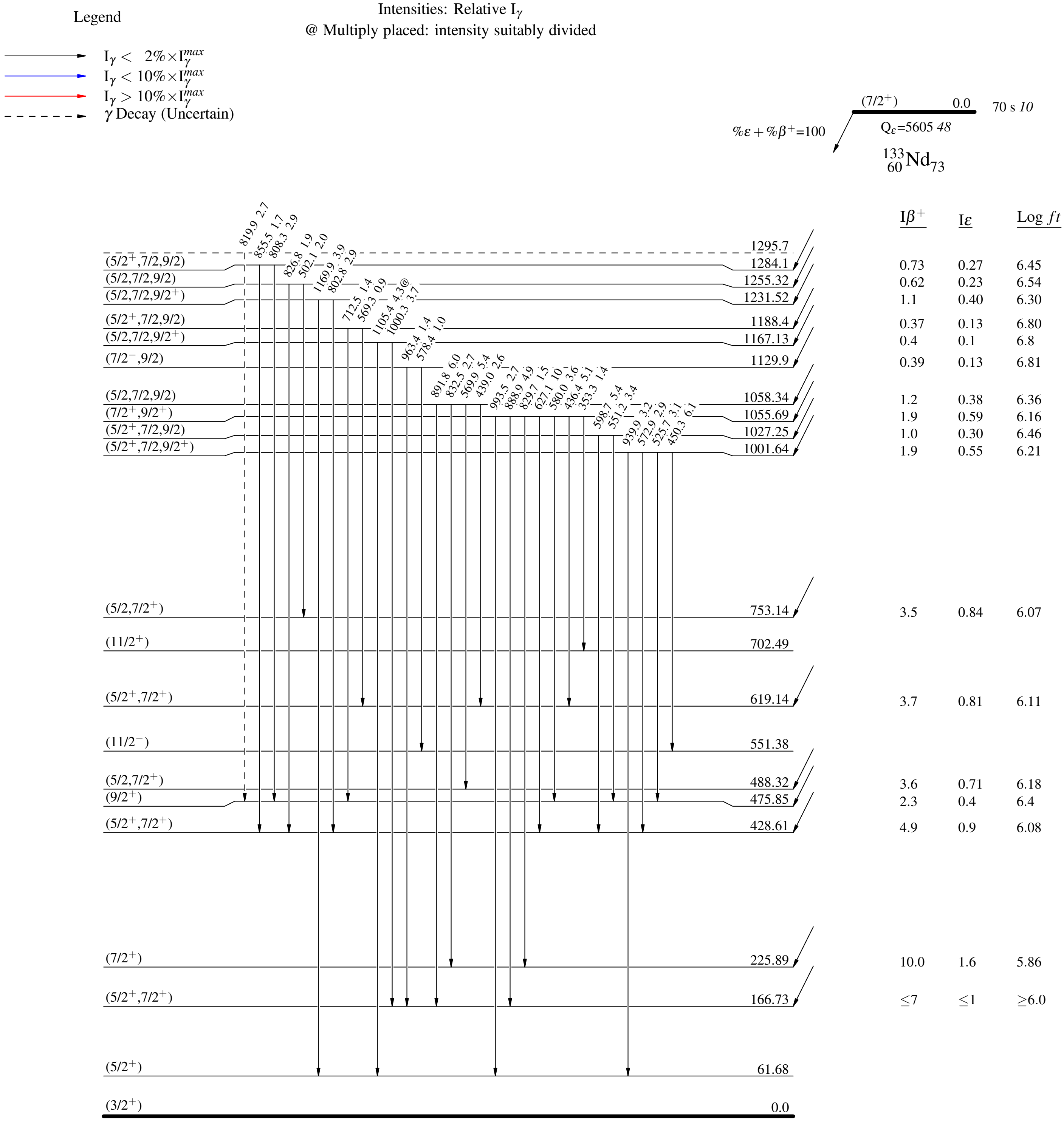
@ Multiply placed: intensity suitably divided



^{133}Nd ε decay (70 s) 1995Br24,1989Li22

Decay Scheme (continued)

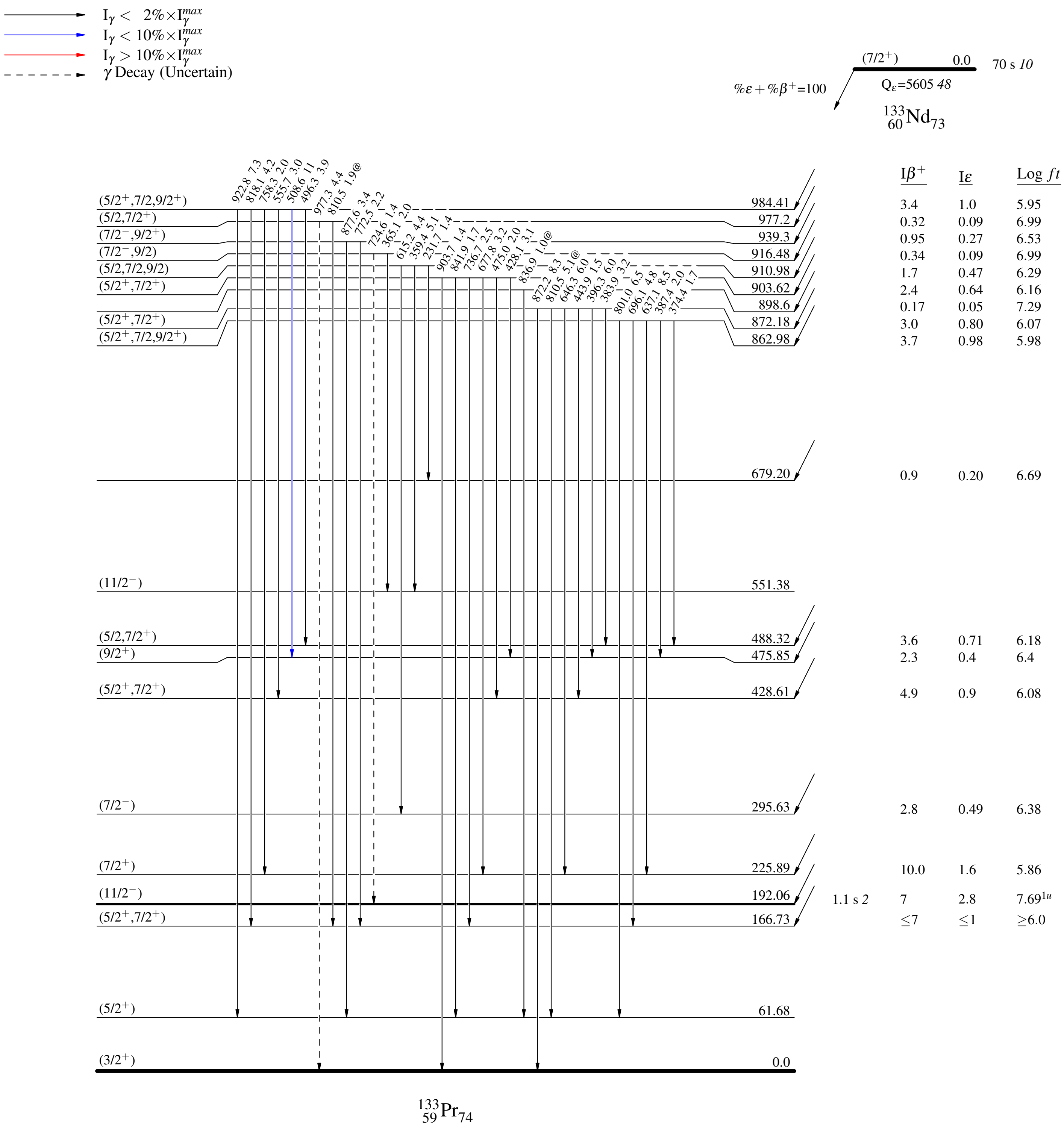
Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided



^{133}Nd ε decay (70 s) 1995Br24,1989Li22

Decay Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

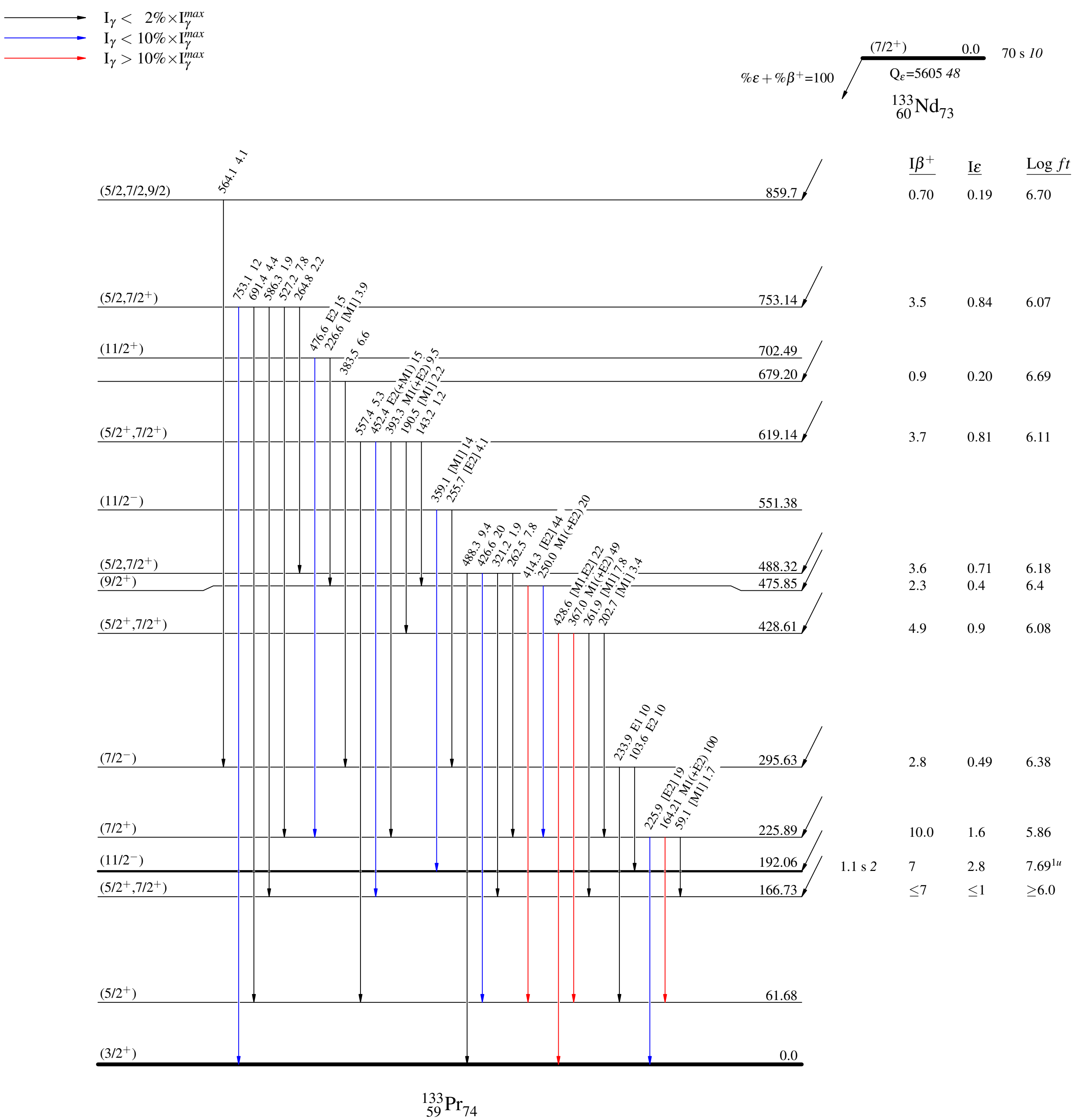


^{133}Nd ε decay (70 s) 1995Br24,1989Li22

Decay Scheme (continued)

Intensities: Relative I_γ

@ Multiply placed: intensity suitably divided



^{133}Nd ε decay (70 s) 1995Br24,1989Li22

Decay Scheme (continued)

Intensities: Relative I_γ

@ Multiply placed: intensity suitably divided