

$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ 1996Pe06,1999Pe19,2002Me25

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	E. A. Mccutchan	NDS 152, 331 (2018)	1-Apr-2018

Includes reactions $^{64}\text{Ni}(^{74}\text{Ge},2n\gamma)$, $^{100}\text{Mo}(^{40}\text{Ar},4n\gamma)$, $^{112}\text{Cd}(^{26}\text{Mg},2n\gamma)$, $^{120}\text{Sn}(^{20}\text{Ne},4n\gamma)$, $^{136}\text{Ce}(\alpha,4n\gamma)$ and $^{140}\text{Ce}(\alpha,8n\gamma)$.

2008Mu18: $^{100}\text{Mo}(^{40}\text{Ar},4n\gamma)$ with E=175 MeV. Measured $E\gamma$, $I\gamma$, $\gamma\gamma$ using Gammasphere array consisting of 100 Compton-suppressed HPGe detectors. Deduced $T_{1/2}$ using Doppler Shift Attenuation Method (DSAM).

2002Me25: $^{125}\text{Te}(^{16}\text{O},5n\gamma)$, with E=100 MeV. Measured $E\gamma$, $I\gamma$, $\gamma\gamma(\theta)$ using the EUROBALL array consisting of 26 Clover and 15 Cluster detectors.

1999Pe19: E=130 MeV. Measured γ , $\gamma\gamma$, $\gamma\gamma(\theta)$ (DCO) using EUROBALL III array of 239 Ge detectors.

1997Ni04, **1997FI03**: $^{112}\text{Cd}(^{26}\text{Mg},2n\gamma)$ E=94 MeV and $^{64}\text{Ni}(^{74}\text{Ge},2n\gamma)$ E=239 MeV. Measured relative population of yrast and excited SD bands.

1996Pe08, **1996Pe06**: E=130 MeV. Measured γ , $\gamma\gamma$, $\gamma\gamma(\theta)$ using GASP array with 40 Ge detectors and 80 BGO inner-ball detectors.

1995CI02: $^{100}\text{Mo}(^{40}\text{Ar},4n\gamma)$ E=176, 182 MeV. Gammasphere array (36 and 24 detectors). Measured $E\gamma$, $\gamma\gamma\gamma$ coin. Deduced multiple SD bands.

1987Bi13 (also **1987Bi14**, **1987Bi07**): $^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ E=120-125 MeV. Measured $\gamma\gamma$ -n (Ge(Li),scin); $\gamma(\theta, \text{H}, \text{t})$. Lifetimes by RDM, DSAM.

1987Be32: $^{100}\text{Mo}(^{40}\text{Ar},4n\gamma)$ E=176 MeV, 21 Compton-suppressed Ge detectors.

1986Ba63: Measured continuum γ 's and deduced moments of inertia.

1980AI23: $^{100}\text{Mo}(^{40}\text{Ar},4n\gamma)$ E=170 MeV. Measured γ -ray multiplicities versus $E\gamma$. Deduced effective moment of inertia.

1973PaZV: $^{120}\text{Sn}(^{20}\text{Ne},4n\gamma)$. Measured $E\gamma$, $\gamma\gamma$ -coincidences, and $\gamma(\theta)$. Tentative band assignments based on excitation functions and coincidence measurements.

1972Ha23: $^{140}\text{Ce}(\alpha,8n\gamma)$ and $^{136}\text{Ce}(\alpha,4n\gamma)$.

SD band data are from **1999Pe19**, **1995CI02**, **1996Pe08** and **1987Be32**. Others: **1997Ni04**, **1997FI03**.

Normal deformed levels are mainly from **1996Pe06**, **1996Pe08** and **1999Pe19**. In **2008Mu18** and **2002Me25**, a 4-qp band based on 11^- , as proposed by **1996Pe06**, was revised (bandhead spin increased to 14^- and excitation energy adjusted) based on identification of multiple weak linking transitions. In addition, a new, nearly degenerate dipole band was identified in both **2002Me25** and **2008Mu18**.

 ^{136}Nd Levels

g-factors are obtained by simultaneous fit of $14^+ \rightarrow 12^+ \rightarrow 10^+ \rightarrow 8^+$ cascade with assumption of equal g factors for 12^+ and 10^+ .

Fitting the 3686 level independently yields a slightly smaller g factor whose uncertainty overlaps the mean value (**1987Bi13**, **1987Bi14**).

E(level) [†]	J^π [‡]	$T_{1/2}$ [#]
0 ^{&}	0 ⁺	
373.68 ^{& 20}	2 ⁺	
862.4 ^{m 6}	2 ⁺	
976.4 ^{& 3}	4 ⁺	<8 ps
1230.5 ^{m 7}	3 ⁺	
1746.8 ^{& 3}	6 ⁺	<14 ps
2036.4 ^{b 7}	5 ⁻	
2046.5 ^{m 7}	5 ⁺	
2440.2 ^{b 4}	7 ⁻	21 ps 7
2484.5 ^{a 7}	6 ⁻	
2632.8 ^{& 4}	8 ⁺	<7 ps
2758.5 ^{a 7}	8 ⁻	
2941.4 ^{b 4}	9 ⁻	6 ps 2

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$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ [1996Pe06](#),[1999Pe19](#),[2002Me25](#) (continued) ^{136}Nd Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} [#]	Comments
3172.8 ^p 7	9 ^{-p}		
3244.3 ^a 7	10 ⁻		
3279.3 ^g 8	10 ⁺		
3296.7 ^e 4	10 ⁺	51 ps 6	g=+1.03 24 (1987Bi13 , 1987Bi14)
3330.9 9			
3552.7 ^{&} 8	10 ⁺		
3602.3 ^b 7	11 ⁻		
3686.8 ^e 5	12 ⁺	19 ps 3	g=+1.03 24 (1987Bi13 , 1987Bi14)
3765.4 11	11 ⁻		
3768.5 ^f 5	10 ⁺		
3781.9 ^h 9	9 ⁽⁻⁾		
3828.4 11			
3998.5 ^g 9	12 ⁺		
4001.9 ^h 11	10 ⁽⁻⁾		
4016.2 ^a 9	12 ⁻		
4028.5 ^p 8	11 ⁽⁺⁾ ^p		
4255.9 ^h 15	11 ⁽⁻⁾		
4320.6 ^f 5	12 ⁺		
4347.5 ^p 9	12 ^{-p}		
4348.2 ^e 5	14 ⁺	<4 ps	
4387.3 ^p 9	12 ^{-p}		
4426.2 ^b 8	13 ⁻		
4454.9 ^d 6	13 ⁺		
4547.6 ^p 10	12 ⁽⁺⁾ ^p		
4549.9 ^h 18	12 ⁽⁻⁾		
4838.7 ^p 12	13 ⁺ ^p		
4850.1 ^g 11	14 ⁺		
4856.0 ^c 5	14 ⁺		
4894.9 ^h 20	13 ⁽⁻⁾		
4940.7 ^p 12	13 ⁺ ^p		
5022.1 ^a 10	14 ⁻		
5022.5 ^l 9	14 ⁺		
5032.4 ^f 6	14 ⁺		
5133.1 ^d 5	15 ⁺		
5192.5 ^e 5	16 ⁺		
5305.9 ^h 23	14 ⁽⁻⁾		
5308.7 ^p 9	14 ^{-p}		
5348.6 ^{pq} 8	13 ^{-p}		
5372.6 ^p 11	14 ^{-p}		
5414.9 ^b 8	15 ⁻		
5417.5 ^{pr} 9	14 ^{-p}		
5531.6 ^{pq} 8	14 ^{-p}		
5570.6 ^c 5	16 ⁺		
5598.1 ^p 11	15 ⁽⁻⁾ ^p		
5646.8 ^{pr} 8	15 ^{-p}	0.64 ^s ps 6	
5695.4 ^l 8	16 ⁺		
5728.4 ^p 13	15 ⁺ ^p		
5730.9 ^{pq} 8	15 ^{-p}	0.88 ^s ps 4	
5759.9 ^h 25	15 ⁽⁻⁾		

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$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ **1996Pe06,1999Pe19,2002Me25** (continued) ^{136}Nd Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} [#]	E(level) [†]	J ^π [‡]	T _{1/2} [#]
5844.4 ^g 13	16 ⁺		8100.5 ^d 6	21 ⁺	
5877.1 ^f 6	16 ⁺		8149.3 ^j 13	22 ⁺	
5943.0 ^d 6	17 ⁺		8223.5 ^c 6	22 ⁺	
5955.6 ^{pr} 9	16 ^{-p}	0.61 ^s ps 7	8235.4 ^{pq} 13	21 ^{-p}	
5979.1 ^{pq} 8	16 ^{-p}	0.60 ^s ps 6	8380.3 ^k 14	22 ⁽⁺⁾	
6008.2 ^j 9	16 ⁺		8402.3 ⁿ 10	21 ⁽⁻⁾	
6040.1 ^a 14	16 ⁻		8467.3 ⁱ 23	22 ⁽⁺⁾	
6192.3 ^e 6	18 ⁺		8509.4 ^{pr} 13	22 ^{-p}	
6231.9 ⁱ 11	15 ⁽⁺⁾		8556.1 ^a 22	22 ⁻	
6239.2 ^j 8	17 ⁺		8622.6 ^e 8	22 ⁺	
6261 ^h 3	16 ⁽⁻⁾		8653.3 ^j 13	23 ⁺	
6276.2 ^p 13	(16 ⁺) ^p		8755.3 ^k 16	23 ⁽⁺⁾	
6311.9 ^{pr} 9	17 ^{-p}	0.49 ^s ps 4	8777.3 ^{pq} 14	22 ^{-p}	
6323.4 ^{pq} 9	17 ^{-p}	0.42 ^s ps 5	8795.4 ^g 22	22 ⁺	
6349.1 ⁱ 13	(16 ⁺)		8948 ⁱ 3	23 ⁽⁺⁾	0.062 [@] ps 28
6360.2 ^b 8	17 ⁻		9020.3 ^{pr} 14	23 ^{-p}	
6472.2 ^c 6	18 ⁺		9048.3 ^b 14	23 ⁻	
6523.3 ^j 10	18 ⁺		9165.3 ^k 16	24 ⁽⁺⁾	
6546.3 ^l 11	18 ⁺		9172.4 ^c 7	24 ⁺	
6580.3 ⁱ 12	17 ⁽⁺⁾		9179.3 ^j 14	24 ⁺	
6587.9 ^p 13	17 ^{+p}		9197.3 ⁿ 11	(23 ⁻)	
6676.1 ^a 17	18 ⁻		9342.3 ^{pq} 17	23 ^{-p}	
6713.0 ^{pr} 9	18 ^{-p}	0.39 ^s ps 6	9492 ⁱ 3	24 ⁽⁺⁾	0.042 [@] ps 21
6756.4 ^g 16	18 ⁺		9558.1 ^a 25	24 ⁻	
6757.7 ^{pq} 10	18 ^{-p}	0.35 ^s ps 5	9569.4 ^{pr} 15	24 ^{-p}	
6771.7 ^f 7	18 ⁺		9618.3 ^k 17	25 ⁽⁺⁾	
6868.3 ^j 10	19 ⁺		9746.3 ^j 15	25 ⁺	
6885.2 ⁱ 14	18 ⁽⁺⁾		9893.9 ^b 14	25 ⁻	
6930.5 ^p 14	18 ^{+p}		10055.2 ⁿ 12	(25 ⁻)	
6931.7 ^d 6	19 ⁺		10092 ⁱ 3	25 ⁽⁺⁾	
7028.9 ⁿ 10	17 ⁽⁻⁾		10109.3 ^k 19	26 ⁽⁺⁾	
7142.2 ^b 9	19 ⁻		10190.8 ^c 7	26 ⁺	
7149.1 ^{pr} 11	19 ^{-p}	0.222 ^s ps 35	10193.3 ^{pr} 16	25 ^{-p}	
7223.0 ^{pq} 11	19 ^{-p}	0.215 ^s ps 35	10344.3 ^j 16	26 ⁺	
7256.3 ^j 11	20 ⁺		10499.8 ^a 25	26 ⁻	
7294.3 ⁱ 15	19 ⁽⁺⁾		10638.3 ^k 19	27 ⁽⁺⁾	
7330.8 ^c 6	20 ⁺		10763 ⁱ 3	26 ⁽⁺⁾	
7355.4 ^e 6	20 ⁺		10785.3 ^b 14	27 ⁻	
7534.1 ^a 20	20 ⁻		10969.3 ^j 16	27 ⁺	
7576.4 ^{pr} 11	20 ^{-p}		10973.6 ⁿ 13	27 ⁽⁻⁾	
7648.1 10	19 ⁽⁻⁾		11277.8 ^c 7	28 ⁺	
7670.3 ⁱ 18	20 ⁽⁺⁾		11491.6 ^a 25	28 ⁻	
7685.5 ⁿ 10	19 ⁽⁻⁾		11648.3 ^j 19	28 ⁺	
7686.3 ^j 12	21 ⁺		11784.4 ^b 14	29 ⁻	
7717.1 ^{pq} 12	20 ^{-p}		11957.3 ⁿ 14	29 ⁽⁻⁾	
7732.4 ^g 19	20 ⁺		12336.3 ^j 19	29 ⁺	
8021.3 ^{pr} 12	21 ^{-p}		12418.8 ^c 9	30 ⁺	
8050.3 ^b 13	21 ⁻		12556.6 ^a 25	30 ⁻	
8051.3 ⁱ 21	21 ⁽⁺⁾		12882.8 ^b 14	31 ⁻	
8064.3 13	21 ⁻		13007.4 ⁿ 14	31 ⁽⁻⁾	

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$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ **1996Pe06,1999Pe19,2002Me25** (continued) ^{136}Nd Levels (continued)

E(level) [†]	J $\pi^{\ddagger}$	Comments
13701.2 ^a 25	32 ⁻	
14069.9 ^b 14	33 ⁻	
14124.9 ⁿ 15	33 ⁽⁻⁾	
14927 ^a 3	34 ⁻	
15311.1 ⁿ 15	35 ⁽⁻⁾	
15355.6 ^b 15	35 ⁻	
16227 ^a 3	36 ⁻	
16566.0 ⁿ 16	37 ⁽⁻⁾	
16743.9 ^b 16	37 ⁻	
17594 ^a 3	38 ⁻	
17891.3 ⁿ 17	39 ⁽⁻⁾	
19290.2 ⁿ 17	41 ⁽⁻⁾	
20766.8 ⁿ 18	43 ⁽⁻⁾	
22325.9 ⁿ 19	45 ⁽⁻⁾	
23970.3 ⁿ 20	47 ⁽⁻⁾	
25702.9 ⁿ 21	49 ⁽⁻⁾	
27518.0 ⁿ 23	(51 ⁻)	
6360+x ^o	J	Additional information 1.
x+7269.10 ^o 20	J+2	
x+8269.4 ^o 3	J+4	
x+9348.8 ^o 3	J+6	
x+10500.9 ^o 4	J+8	
x+11723.3 ^o 6	J+10	
x+13007.9 ^o 8	J+12	
x+14371.9 ^o 10	J+14	
x+15812.9 ^o 11	J+16	
x+17338.0 ^o 12	J+18	

[†] From least-squares fit to E γ , by evaluator.[‡] As proposed by 1996Pe08 and 1996Pe06, except where noted.

From RDM or DSAM (1987Bi13), except where noted.

@ From DSAM (1996Pe06).

& Band(A): g.s. band.

^a Band(B): $\pi h_{11/2} \pi g_{7/2}$, $\alpha=0$. Configuration from 1987Pa17. See also detailed discussion by 1996Pe08 for problems associated with this configuration.^b Band(C): $\pi h_{11/2} \pi g_{7/2}$, $\alpha=1$. Configuration from 1987Pa17. See also detailed discussion by 1996Pe08 for problems associated with this configuration.^c Band(D): $\pi h_{11/2}^2 \nu h_{11/2}^2$. Possible triaxial shape (1996Pe08).^d Band(E): Aligned $\pi h_{11/2}^2$ or $\nu h_{11/2}^2$. Assignment from 1996Pe08.^e Band(F): Aligned $\pi h_{11/2}^2$ or $\nu h_{11/2}^2$. Assignment from 1996Pe08.^f Band(G): Band Based on 10⁺.^g Band(H): Aligned $\nu h_{11/2}^2$. Assignment from 1987Pa17.^h Band(I): 4-qp, dipole band based on 9⁻. Configuration involves $\nu h_{11/2} \nu g_{7/2} \pi h_{11/2}^2$ (1996Pe06).ⁱ Band(J): possible magnetic-rotational band based on 15⁺. Configuration involves $\nu h_{11/2} \nu f_{7/2} \pi h_{11/2}^2$ (1996Pe06).^j Band(K): 4-qp, dipole band based on 16⁺. Configuration involves $\nu h_{11/2} \nu f_{7/2} \pi h_{11/2}^2$ (1996Pe06).^k Band(L): 4-qp, dipole band based on 22⁺. Configuration involves $\pi g_{7/2}^2 \pi h_{11/2}^2$ (1996Pe06).^l Band(M): Band based on 14⁺.

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$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ **1996Pe06,1999Pe19,2002Me25 (continued)** ^{136}Nd Levels (continued)

^m Band(N): Possible $K^\pi=2^+$, γ band.

ⁿ Band(O): SD-1 band (1999Pe19,1995Cl02,1987Be32). Percent population=2.0 (1987Be32). See also 1997Ni04 for relative population of the band.

^o Band(P): SD-2 band (1999Pe19,1995Cl02). Percent population ≈ 0.4 (from an estimated 20% intensity of the yrast SD band (1995Cl02)). See also 1997Ni04 for relative population of the band. First three transitions in this band at 893, 949 and 1018 reported by 1995Cl02 are assigned to normal-deformed levels by 1999Pe19. This band was suggested (1995Cl02) to be identical (at half points of the transition energies of SD-1 band) to the yrast SD band (SD-1) in ^{136}Nd . But this conclusion is rejected by 1999Pe19, based on newer set of low-energy gamma rays. Probable particle structure is suggested (1995Cl02) as excitation of a $3/2[541]$ proton to the $5/2[532]$ orbital.

^p Level observed in 2002Me25. J^π from DCO ratios, although no details provided.

^q Band(Q): Band based on 13^- state. Band Q and R originally interpreted in 2002Me25 as chiral doublet. Lifetime measurements in 2008Mu18 yielding large differences in the transition probabilities in the two bands suggest that they are two different configurations undergoing band mixing.

^r Band(R): Band based on 14^- state. See comment on Band Q.

^s From DSAM in 2008Mu18.

 $\gamma(^{136}\text{Nd})$

R(DCO) values given in comments are from 1999Pe19. Expected values are R(DCO)=1.0 for $\Delta J=2$, quadrupole and R(DCO)=0.55 for $\Delta J=1$, dipole.

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. ^a	Comments
373.68	2 ⁺	373.7 2	100 8	0	0 ⁺	Q	R(DCO)=1.01 3.
862.4	2 ⁺	489		373.68	2 ⁺		
		862		0	0 ⁺		
976.4	4 ⁺	602.7 2	100 9	373.68	2 ⁺	Q	R(DCO)=1.02 4.
1230.5	3 ⁺	368		862.4	2 ⁺		
		857		373.68	2 ⁺		
1746.8	6 ⁺	770.4 2	100 10	976.4	4 ⁺	Q	R(DCO)=1.02 5.
2036.4	5 ⁻	1060		976.4	4 ⁺		
2046.5	5 ⁺	816		1230.5	3 ⁺		
		1070		976.4	4 ⁺		
2440.2	7 ⁻	404		2036.4	5 ⁻		
		693.5 2	23 4	1746.8	6 ⁺	D	R(DCO)=0.59 4.
2484.5	6 ⁻	438		2046.5	5 ⁺		
		448		2036.4	5 ⁻		
		738		1746.8	6 ⁺		
2632.8	8 ⁺	886.0 2	76 8	1746.8	6 ⁺	Q	R(DCO)=1.04 5.
2758.5	8 ⁻	274		2484.5	6 ⁻		
		318		2440.2	7 ⁻		
2941.4	9 ⁻	501.2 2	20 4	2440.2	7 ⁻	Q	R(DCO)=0.96 5.
3172.8	9 ⁻	414 @		2758.5	8 ⁻		
		732 @		2440.2	7 ⁻		
3244.3	10 ⁻	303		2941.4	9 ⁻		
		486		2758.5	8 ⁻		
3279.3	10 ⁺	646		2632.8	8 ⁺		
3296.7	10 ⁺	123 @		3172.8	9 ⁻		
		355.4 2	24 5	2941.4	9 ⁻	D	R(DCO)=0.66 4.
		663.7 3	68 9	2632.8	8 ⁺		
3330.9		698		2632.8	8 ⁺		
3552.7	10 ⁺	920		2632.8	8 ⁺		
3602.3	11 ⁻	358		3244.3	10 ⁻		

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$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ **1996Pe06,1999Pe19,2002Me25** (continued) $\gamma(^{136}\text{Nd})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. ^a	Comments
3602.3	11 ⁻	661		2941.4	9 ⁻		
3686.8	12 ⁺	390.1 2	88 8	3296.7	10 ⁺	Q	R(DCO)=1.03 4.
3765.4	11 ⁻	824 ^b		2941.4	9 ⁻		
3768.5	10 ⁺	1135.7 3	6 3	2632.8	8 ⁺	Q	R(DCO)=0.95 5.
3781.9	9 ⁽⁻⁾	1149		2632.8	8 ⁺		
3828.4		887		2941.4	9 ⁻		
3998.5	12 ⁺	719		3279.3	10 ⁺		
4001.9	10 ⁽⁻⁾	220		3781.9	9 ⁽⁻⁾		
		671 ^b		3330.9			
4016.2	12 ⁻	772		3244.3	10 ⁻		
4028.5	11 ⁽⁺⁾	749 [@]		3279.3	10 ⁺		
4255.9	11 ⁽⁻⁾	254		4001.9	10 ⁽⁻⁾		
4320.6	12 ⁺	292 [@]		4028.5	11 ⁽⁺⁾		
		552.1 2	6 2	3768.5	10 ⁺	Q	R(DCO)=1.10 5.
		768		3552.7	10 ⁺		
4347.5	12 ⁻	745 [@]		3602.3	11 ⁻		
4348.2	14 ⁺	661.3 3	70 9	3686.8	12 ⁺		
4387.3	12 ⁻	785 [@]		3602.3	11 ⁻		
4426.2	13 ⁻	410 ^b		4016.2	12 ⁻		
		824 ^b		3602.3	11 ⁻		
4454.9	13 ⁺	768.7 6	13 8	3686.8	12 ⁺		
4547.6	12 ⁽⁺⁾	519 [@]		4028.5	11 ⁽⁺⁾		
4549.9	12 ⁽⁻⁾	294		4255.9	11 ⁽⁻⁾		
4838.7	13 ⁺	840 [@]		3998.5	12 ⁺		
4850.1	14 ⁺	852		3998.5	12 ⁺		
4856.0	14 ⁺	1169.2 3	9 3	3686.8	12 ⁺	Q	R(DCO)=1.05 8.
4894.9	13 ⁽⁻⁾	345 ^b		4549.9	12 ⁽⁻⁾		
4940.7	13 ⁺	942 [@]		3998.5	12 ⁺		
5022.1	14 ⁻	1006		4016.2	12 ⁻		
5022.5	14 ⁺	702		4320.6	12 ⁺		
5032.4	14 ⁺	711.8 3	6 2	4320.6	12 ⁺		
5133.1	15 ⁺	678.4 4	15 4	4454.9	13 ⁺		
		784.9 2	11 4	4348.2	14 ⁺	D	R(DCO)=0.36 7.
5192.5	16 ⁺	844.3 3	5 2	4348.2	14 ⁺		
5305.9	14 ⁽⁻⁾	411		4894.9	13 ⁽⁻⁾		
5308.7	14 ⁻	882 [@]		4426.2	13 ⁻		
		922 [@]		4387.3	12 ⁻		
		961 [@]		4347.5	12 ⁻		
5348.6	13 ⁻	801 [@]		4547.6	12 ⁽⁺⁾		
		1028 [@]		4320.6	12 ⁺		
		1350 [@]		3998.5	12 ⁺		
5372.6	14 ⁻	985 [@]		4387.3	12 ⁻		
5414.9	15 ⁻	393		5022.1	14 ⁻		
		989		4426.2	13 ⁻		
		1066		4348.2	14 ⁺		
5417.5	14 ⁻	1030 [@]		4387.3	12 ⁻		
		1070 [@]		4347.5	12 ⁻		
5531.6	14 ⁻	183 [@]		5348.6	13 ⁻		
		1184		4348.2	14 ⁺		
5570.6	16 ⁺	714.5 2	11 3	4856.0	14 ⁺	Q	R(DCO)=0.98 4.

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$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ **1996Pe06,1999Pe19,2002Me25** (continued) $\gamma(^{136}\text{Nd})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. ^a	Comments
5570.6	16 ⁺	1222.6 4	11 4	4348.2	14 ⁺	Q	R(DCO)=1.10 7.
5598.1	15 ⁽⁻⁾	748 @		4850.1	14 ⁺		
5646.8	15 ⁻	229.3 &	60 & 3	5417.5	14 ⁻		
		274.0 &	14 & 2	5372.6	14 ⁻		
		338.0 &	26 & 3	5308.7	14 ⁻		
		1221 @		4426.2	13 ⁻		
5695.4	16 ⁺	663		5032.4	14 ⁺		
		673		5022.5	14 ⁺		
5728.4	15 ⁺	878 @		4850.1	14 ⁺		
5730.9	15 ⁻	199.6 &	93 & 5	5531.6	14 ⁻		
		382.0 &	7 & 1	5348.6	13 ⁻		
5759.9	15 ⁽⁻⁾	454		5305.9	14 ⁽⁻⁾		
5844.4	16 ⁺	995		4850.1	14 ⁺		
5877.1	16 ⁺	844.7 2	45 7	5032.4	14 ⁺	Q	R(DCO)=1.01 4.
5943.0	17 ⁺	750.4 2	6 2	5192.5	16 ⁺	D	R(DCO)=0.30 6.
		809.9 3	7 3	5133.1	15 ⁺		
5955.6	16 ⁻	224.7 &	5 & 1	5730.9	15 ⁻		
		308.7 &	82 & 4	5646.8	15 ⁻		
		538.0 &	13 & 1	5417.5	14 ⁻		
5979.1	16 ⁻	248.1 &	90 & 3	5730.9	15 ⁻		
		381 @		5598.1	15 ⁽⁻⁾		
		447.7 &	10 & 1	5531.6	14 ⁻		
6008.2	16 ⁺	875		5133.1	15 ⁺		
6040.1	16 ⁻	1018		5022.1	14 ⁻		
6192.3	18 ⁺	999.7 2	20 4	5192.5	16 ⁺	Q	R(DCO)=0.91 6.
6231.9	15 ⁽⁺⁾	1291 @		4940.7	13 ⁺		
		1382		4850.1	14 ⁺		
		1393 @		4838.7	13 ⁺		
6239.2	17 ⁺	231 <i>b</i>		6008.2	16 ⁺		
		544 <i>b</i>		5695.4	16 ⁺		
		1106		5133.1	15 ⁺		
6261	16 ⁽⁻⁾	501		5759.9	15 ⁽⁻⁾		
6276.2	(16 ⁺)	1426 @		4850.1	14 ⁺		
6311.9	17 ⁻	332.8 &	29 & 3	5979.1	16 ⁻		
		356.2 &	62 & 3	5955.6	16 ⁻		
		664.9 &	9 & 1	5646.8	15 ⁻		
6323.4	17 ⁻	344.4 &	66 & 4	5979.1	16 ⁻		
		367.8 &	10 & 1	5955.6	16 ⁻		
		592.5 &	24 & 2	5730.9	15 ⁻		
6349.1	(16 ⁺)	117		6231.9	15 ⁽⁺⁾		
6360.2	17 ⁻	945		5414.9	15 ⁻		
		1168		5192.5	16 ⁺		
6472.2	18 ⁺	901.6 2	9 3	5570.6	16 ⁺	Q	R(DCO)=1.01 7.
		1279.7 9	5 3	5192.5	16 ⁺	Q	R(DCO)=0.92 4.
6523.3	18 ⁺	284		6239.2	17 ⁺		
		828		5695.4	16 ⁺		
6546.3	18 ⁺	851		5695.4	16 ⁺		
6580.3	17 ⁽⁺⁾	231 <i>b</i>		6349.1 (16 ⁺)			
		304 @		6276.2 (16 ⁺)			

Continued on next page (footnotes at end of table)

$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ **1996Pe06,1999Pe19,2002Me25** (continued) $\gamma(^{136}\text{Nd})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. ^a	Comments
6580.3	17 ⁽⁺⁾	736		5844.4	16 ⁺		
		852@		5728.4	15 ⁺		
6587.9	17 ⁺	744		5844.4	16 ⁺		
		859		5728.4	15 ⁺		
6676.1	18 ⁻	636		6040.1	16 ⁻		
6713.0	18 ⁻	389.6&	19& 2	6323.4	17 ⁻		
		401.2&	57& 6	6311.9	17 ⁻		
		734@		5979.1	16 ⁻		
		757.4&	24& 2	5955.6	16 ⁻		
6756.4	18 ⁺	912		5844.4	16 ⁺		
6757.7	18 ⁻	434.2&	73& 7	6323.4	17 ⁻		
		445.8&	19& 2	6311.9	17 ⁻		
		778.6	8 1	5979.1	16 ⁻		
6771.7	18 ⁺	894.6 4	4 2	5877.1	16 ⁺		
6868.3	19 ⁺	322		6546.3	18 ⁺		
		345 ^b		6523.3	18 ⁺		
		629		6239.2	17 ⁺		
6885.2	18 ⁽⁺⁾	297		6587.9	17 ⁺		
		305		6580.3	17 ⁽⁺⁾		
6930.5	18 ⁺	343@		6587.9	17 ⁺		
		350		6580.3	17 ⁽⁺⁾		
6931.7	19 ⁺	988.7 2		5943.0	17 ⁺		
7142.2	19 ⁻	782		6360.2	17 ⁻		
		950		6192.3	18 ⁺		
7149.1	19 ⁻	435.8&	83& 8	6713.0	18 ⁻		
		837.0&	17& 2	6311.9	17 ⁻		
7223.0	19 ⁻	465.5&	88& 9	6757.7	18 ⁻		
		899.7&	12& 2	6323.4	17 ⁻		
7256.3	20 ⁺	388		6868.3	19 ⁺		
		733		6523.3	18 ⁺		
7294.3	19 ⁽⁺⁾	364		6930.5	18 ⁺		
		409		6885.2	18 ⁽⁺⁾		
7330.8	20 ⁺	858.7 2		6472.2	18 ⁺		
		1138		6192.3	18 ⁺		
7355.4	20 ⁺	1163.1 2		6192.3	18 ⁺		
7534.1	20 ⁻	858		6676.1	18 ⁻		
7576.4	20 ⁻	427@		7149.1	19 ⁻		
		864@		6713.0	18 ⁻		
7648.1	19 ⁽⁻⁾	1456 1	0.11 4	6192.3	18 ⁺	D	R(DCO)=0.49 9.
7670.3	20 ⁽⁺⁾	376		7294.3	19 ⁽⁺⁾		
7685.5	19 ⁽⁻⁾	656.6 3	0.14 4	7028.9	17 ⁽⁻⁾	Q	R(DCO)=1.17 12.
		1493 1	0.06 3	6192.3	18 ⁺		
7686.3	21 ⁺	430		7256.3	20 ⁺		
		818		6868.3	19 ⁺		
7717.1	20 ⁻	494@		7223.0	19 ⁻		
		959@		6757.7	18 ⁻		
7732.4	20 ⁺	976		6756.4	18 ⁺		
8021.3	21 ⁻	445@		7576.4	20 ⁻		
		872@		7149.1	19 ⁻		
8050.3	21 ⁻	908		7142.2	19 ⁻		

Continued on next page (footnotes at end of table)

$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ **1996Pe06,1999Pe19,2002Me25** (continued) $\gamma(^{136}\text{Nd})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. ^a	Comments
8051.3	21 ⁽⁺⁾	381		7670.3	20 ⁽⁺⁾		
8064.3	21 ⁻	922		7142.2	19 ⁻		
8100.5	21 ⁺	1168.8 2		6931.7	19 ⁺		
8149.3	22 ⁺	463		7686.3	21 ⁺		
		893		7256.3	20 ⁺		
8223.5	22 ⁺	892.7 2		7330.8	20 ⁺		
8235.4	21 ⁻	518 @		7717.1	20 ⁻		
		1013 @		7223.0	19 ⁻		
8380.3	22 ⁽⁺⁾	316		8064.3	21 ⁻		
		330		8050.3	21 ⁻		
8402.3	21 ⁽⁻⁾	716.7 7	0.52 15	7685.5	19 ⁽⁻⁾	Q	R(DCO)=1.28 19.
		754.2 3	0.15 4	7648.1	19 ⁽⁻⁾		
8467.3	22 ⁽⁺⁾	416		8051.3	21 ⁽⁺⁾		
8509.4	22 ⁻	488 @		8021.3	21 ⁻		
		933 @		7576.4	20 ⁻		
8556.1	22 ⁻	1022		7534.1	20 ⁻		
8622.6	22 ⁺	1267.2 5		7355.4	20 ⁺		
8653.3	23 ⁺	504		8149.3	22 ⁺		
		967		7686.3	21 ⁺		
8755.3	23 ⁽⁺⁾	375		8380.3	22 ⁽⁺⁾		
8777.3	22 ⁻	542 @		8235.4	21 ⁻		
		1060 @		7717.1	20 ⁻		
8795.4	22 ⁺	1063		7732.4	20 ⁺		
8948	23 ⁽⁺⁾	481		8467.3	22 ⁽⁺⁾		
9020.3	23 ⁻	511 @		8509.4	22 ⁻		
		999 @		8021.3	21 ⁻		
9048.3	23 ⁻	984		8064.3	21 ⁻		
		998		8050.3	21 ⁻		
9165.3	24 ⁽⁺⁾	410 ^b		8755.3	23 ⁽⁺⁾		
		785		8380.3	22 ⁽⁺⁾		
9172.4	24 ⁺	948.9 2		8223.5	22 ⁺		
9179.3	24 ⁺	526		8653.3	23 ⁺		
		1030		8149.3	22 ⁺		
9197.3	(23 ⁻)	795.0 5	0.95 14	8402.3	21 ⁽⁻⁾	Q	R(DCO)=1.00 8.
9342.3	23 ⁻	565 @		8777.3	22 ⁻		
9492	24 ⁽⁺⁾	544 ^b		8948	23 ⁽⁺⁾		
9558.1	24 ⁻	1002		8556.1	22 ⁻		
9569.4	24 ⁻	549 @		9020.3	23 ⁻		
		1060 @		8509.4	22 ⁻		
9618.3	25 ⁽⁺⁾	453		9165.3	24 ⁽⁺⁾		
		863		8755.3	23 ⁽⁺⁾		
9746.3	25 ⁺	567		9179.3	24 ⁺		
		1093		8653.3	23 ⁺		
9893.9	25 ⁻	845.6 2		9048.3	23 ⁻		
10055.2	(25 ⁻)	857.9 5	1.00 13	9197.3	(23 ⁻)		
10092	25 ⁽⁺⁾	600		9492	24 ⁽⁺⁾		
10109.3	26 ⁽⁺⁾	491		9618.3	25 ⁽⁺⁾		
10190.8	26 ⁺	1018.4 2		9172.4	24 ⁺		
10193.3	25 ⁻	624 @		9569.4	24 ⁻		
		1173 @		9020.3	23 ⁻		
10344.3	26 ⁺	598		9746.3	25 ⁺		

Continued on next page (footnotes at end of table)

$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ **1996Pe06,1999Pe19,2002Me25** (continued) $\gamma(^{136}\text{Nd})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. ^a	Comments
10344.3	26 ⁺	1165		9179.3	24 ⁺		
10499.8	26 ⁻	941.7 2		9558.1	24 ⁻		
10638.3	27 ⁽⁺⁾	529		10109.3	26 ⁽⁺⁾		
		1020		9618.3	25 ⁽⁺⁾		
10763	26 ⁽⁺⁾	671 ^b		10092	25 ⁽⁺⁾		
10785.3	27 ⁻	891.4 2		9893.9	25 ⁻		
10969.3	27 ⁺	625		10344.3	26 ⁺		
		1223		9746.3	25 ⁺		
10973.6	27 ⁽⁻⁾	918.4 6	0.99 14	10055.2	(25 ⁻)		
11277.8	28 ⁺	1086.9 2		10190.8	26 ⁺		
11491.6	28 ⁻	991.8 2		10499.8	26 ⁻		
11648.3	28 ⁺	1304		10344.3	26 ⁺		
11784.4	29 ⁻	999.1 2		10785.3	27 ⁻		
11957.3	29 ⁽⁻⁾	983.7 3	1.01 13	10973.6	27 ⁽⁻⁾		
12336.3	29 ⁺	1367 ^b		10969.3	27 ⁺		
12418.8	30 ⁺	1141.0 5		11277.8	28 ⁺		
12556.6	30 ⁻	1065.0 2		11491.6	28 ⁻		
12882.8	31 ⁻	1098.4 2		11784.4	29 ⁻		
13007.4	31 ⁽⁻⁾	1050.1 4	1.03 13	11957.3	29 ⁽⁻⁾	Q	R(DCO)=1.03 7.
13701.2	32 ⁻	1144.6 2		12556.6	30 ⁻		
14069.9	33 ⁻	1187.1 2		12882.8	31 ⁻		
14124.9	33 ⁽⁻⁾	1117.5 4	0.95 12	13007.4	31 ⁽⁻⁾	Q	R(DCO)=1.19 9.
14927	34 ⁻	1225.6 5		13701.2	32 ⁻		
15311.1	35 ⁽⁻⁾	1186.2 4	0.54 9	14124.9	33 ⁽⁻⁾		
15355.6	35 ⁻	1285.7 5		14069.9	33 ⁻		
16227	36 ⁻	1300.4 5		14927	34 ⁻		
16566.0	37 ⁽⁻⁾	1254.9 4	0.39 7	15311.1	35 ⁽⁻⁾	Q	R(DCO)=0.97 8.
16743.9	37 ⁻	1388.3 5		15355.6	35 ⁻		
17594	38 ⁻	1367 ^{bc}		16227	36 ⁻		
17891.3	39 ⁽⁻⁾	1325.3 5	0.23 4	16566.0	37 ⁽⁻⁾	Q	R(DCO)=0.82 10.
19290.2	41 ⁽⁻⁾	1398.9 4	0.20 4	17891.3	39 ⁽⁻⁾	Q	R(DCO)=1.09 10.
20766.8	43 ⁽⁻⁾	1476.6 5	0.12 3	19290.2	41 ⁽⁻⁾		
22325.9	45 ⁽⁻⁾	1559.1 5	0.06 2	20766.8	43 ⁽⁻⁾		
23970.3	47 ⁽⁻⁾	1644.4 7	0.03 2	22325.9	45 ⁽⁻⁾		
25702.9	49 ⁽⁻⁾	1732.6 7		23970.3	47 ⁽⁻⁾		E_γ : from 1995Cl02.
27518.0?	(51 ⁻)	1815 ^c 1		25702.9	49 ⁽⁻⁾		E_γ : from 1995Cl02.
x+7269.10	J+2	909.1 2		6360+x	J		
x+8269.4	J+4	1000.3 2		x+7269.10	J+2		
x+9348.8	J+6	1079.4 2		x+8269.4	J+4		
x+10500.9	J+8	1152.1 2		x+9348.8	J+6		
x+11723.3	J+10	1222.4 5		x+10500.9	J+8		
x+13007.9	J+12	1284.6 5		x+11723.3	J+10		
x+14371.9	J+14	1364.0 5		x+13007.9	J+12		
x+15812.9	J+16	1441.0 5		x+14371.9	J+14		
x+17338.0	J+18	1525.0 ^c 5		x+15812.9	J+16		

[†] From 1999Pe19 and 1996Pe08, when uncertainties are given, others are from 1996Pe06 and 1996Pe08, except where noted.

Values for SD-1 and SD-2 bands are also reported by 1995Cl02, and for SD-1 by 1987Be32.

[‡] From 1999Pe19, except where noted. Values for SD-1 band are relative to 1.0 for 857.9 γ .# From 1999Pe19. The γ ray is involved in the decay of SD-1 band, but exact placement is not yet established.

@ From 2002Me25.

$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ **1996Pe06,1999Pe19,2002Me25 (continued)**

$\gamma(^{136}\text{Nd})$ (continued)

& From [2008Mu18](#).

^a From R(DCO) in [1999Pe19](#).

^b Multiply placed.

^c Placement of transition in the level scheme is uncertain.

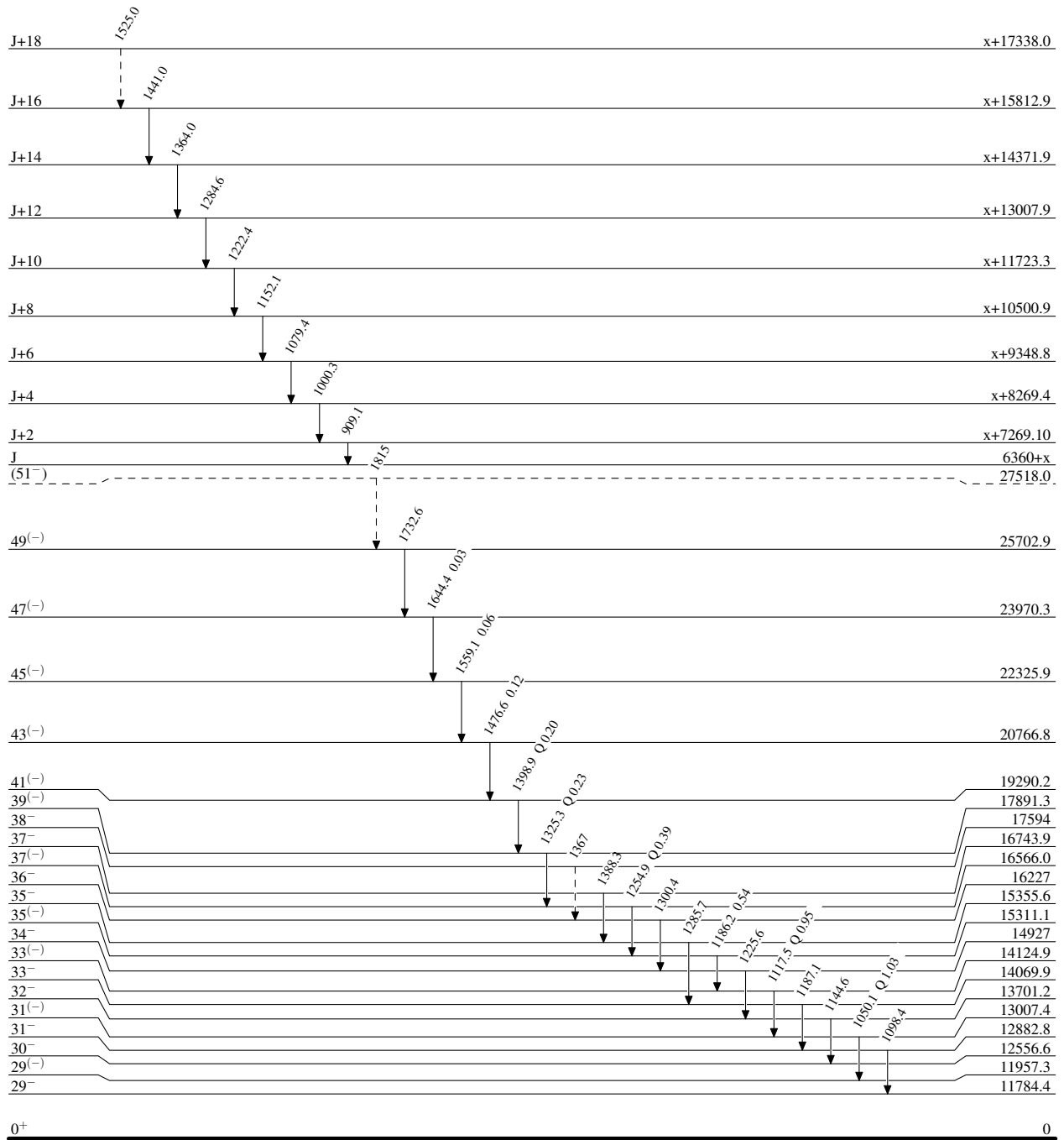
^x γ ray not placed in level scheme.

$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ 1996Pe06,1999Pe19,2002Me25

Legend

Level Scheme

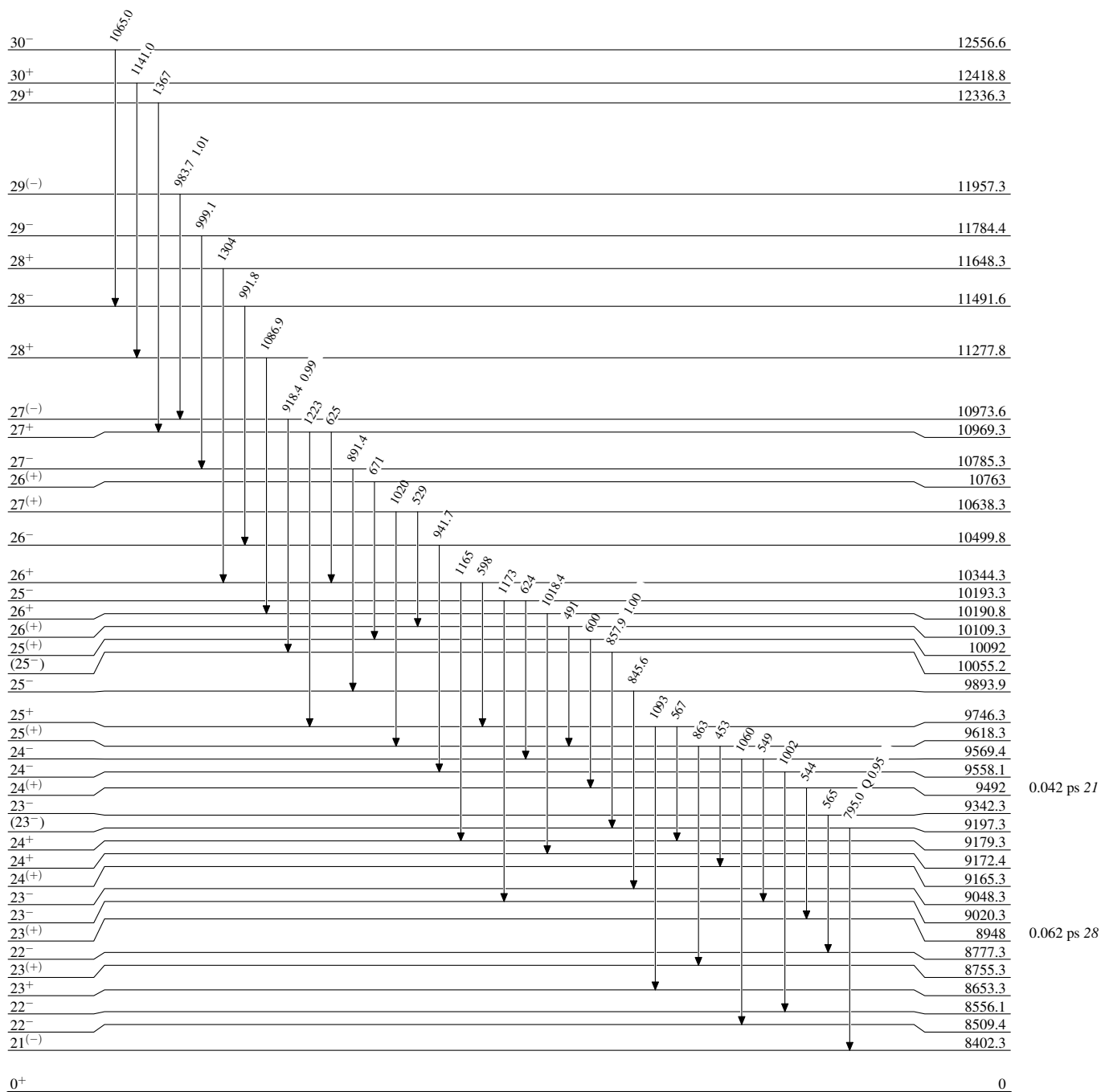
Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)

$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ 1996Pe06,1999Pe19,2002Mc25

Level Scheme (continued)

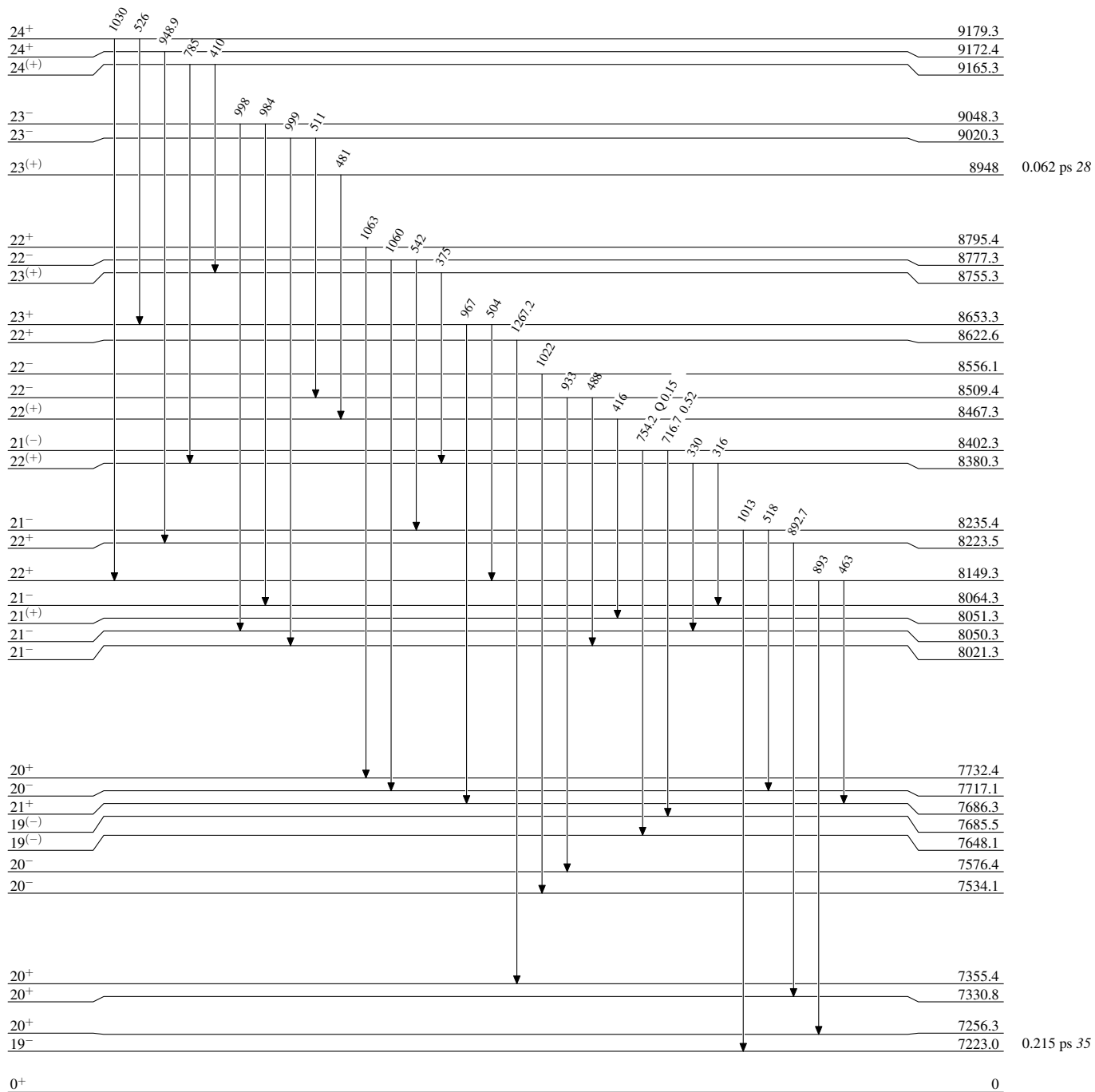
Intensities: Relative photon branching from each level



$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ 1996Pe06,1999Pe19,2002Me25

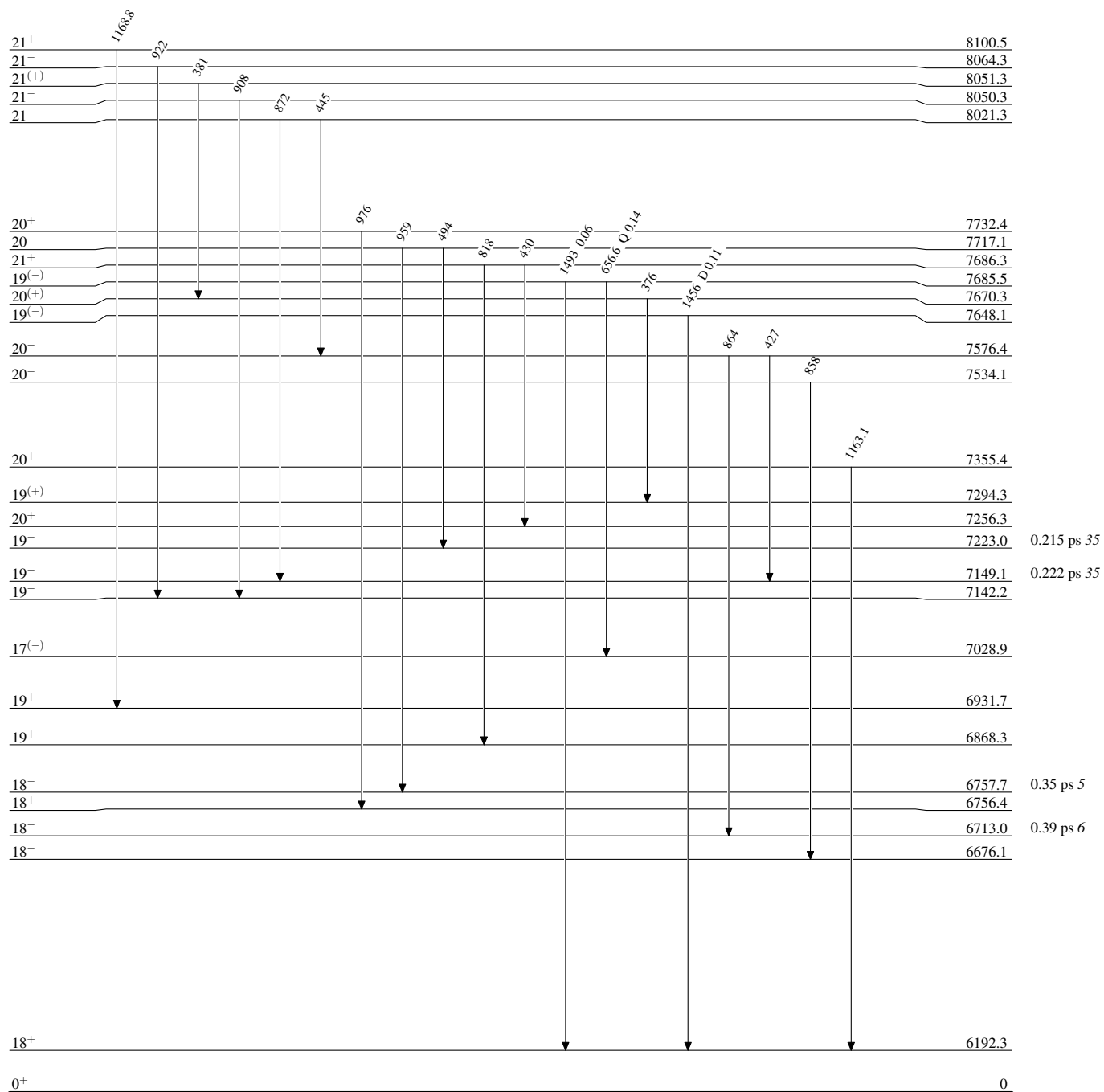
Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{136}_{60}\text{Nd}_{76}$

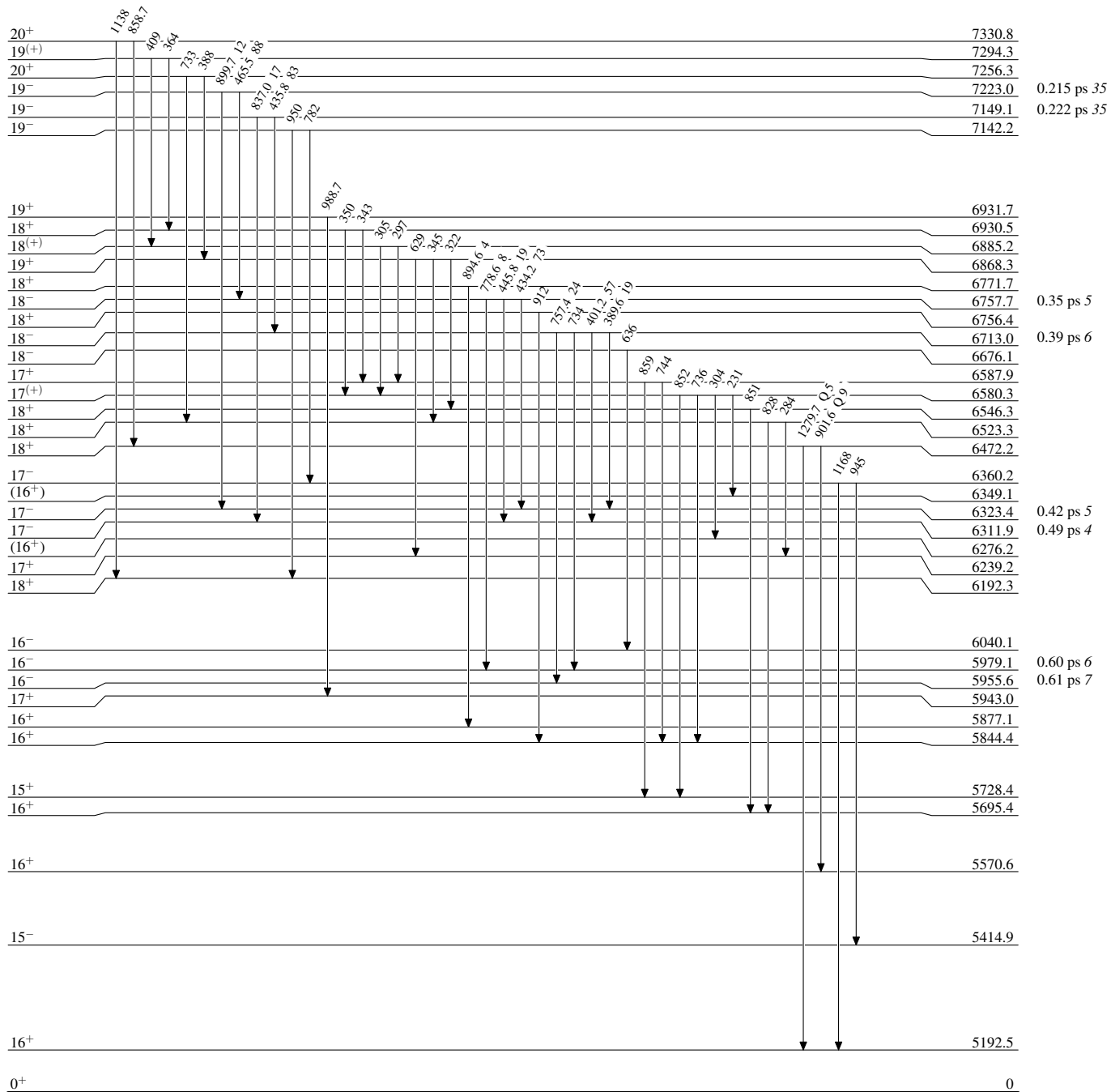
Intensities: Relative photon branching from each level

 $^{136}_{60}\text{Nd}_{76}$

$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ 1996Pe06,1999Pe19,2002Me25

Level Scheme (continued)

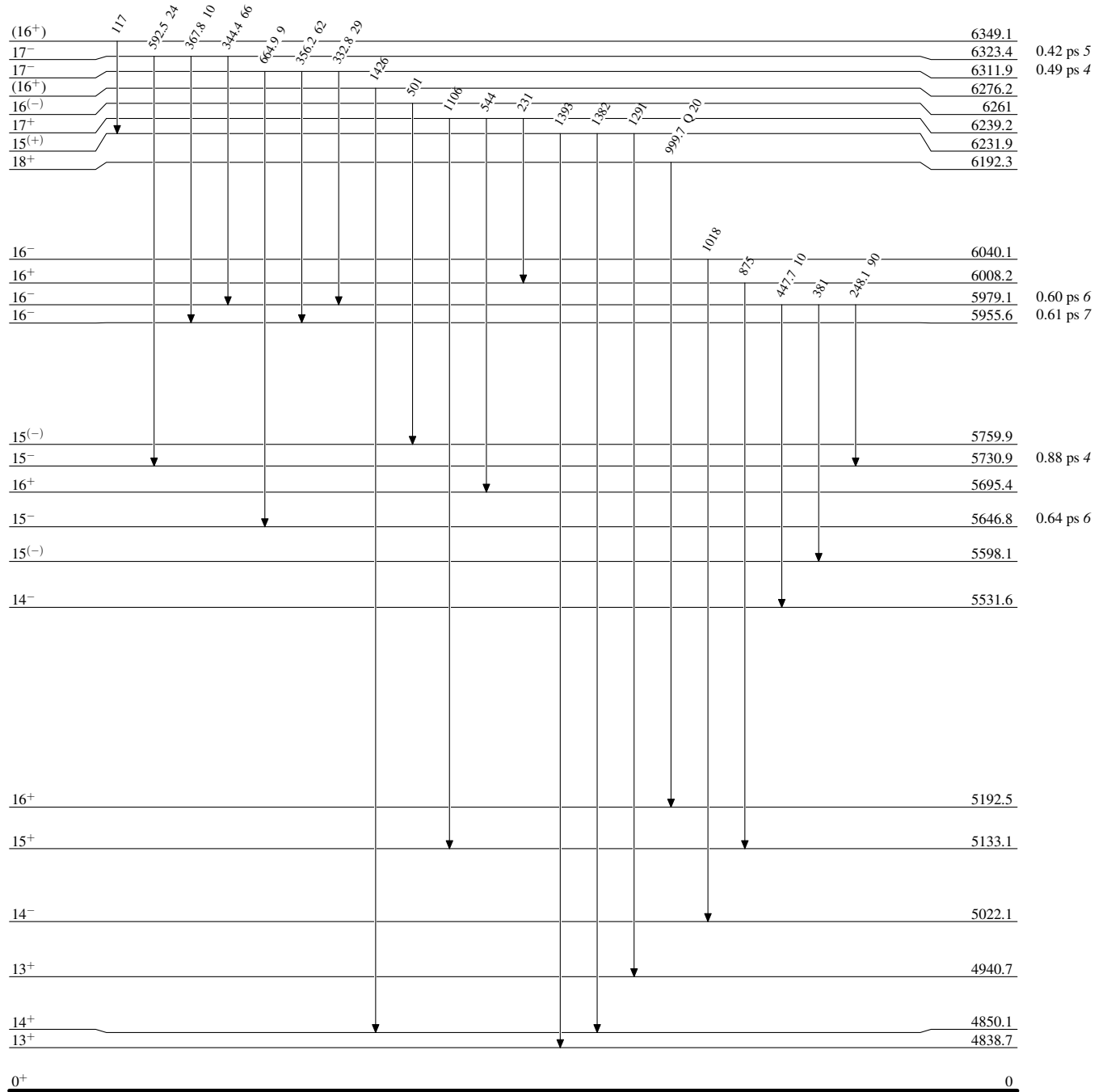
Intensities: Relative photon branching from each level



$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ 1996Pe06,1999Pe19,2002Me25

Level Scheme (continued)

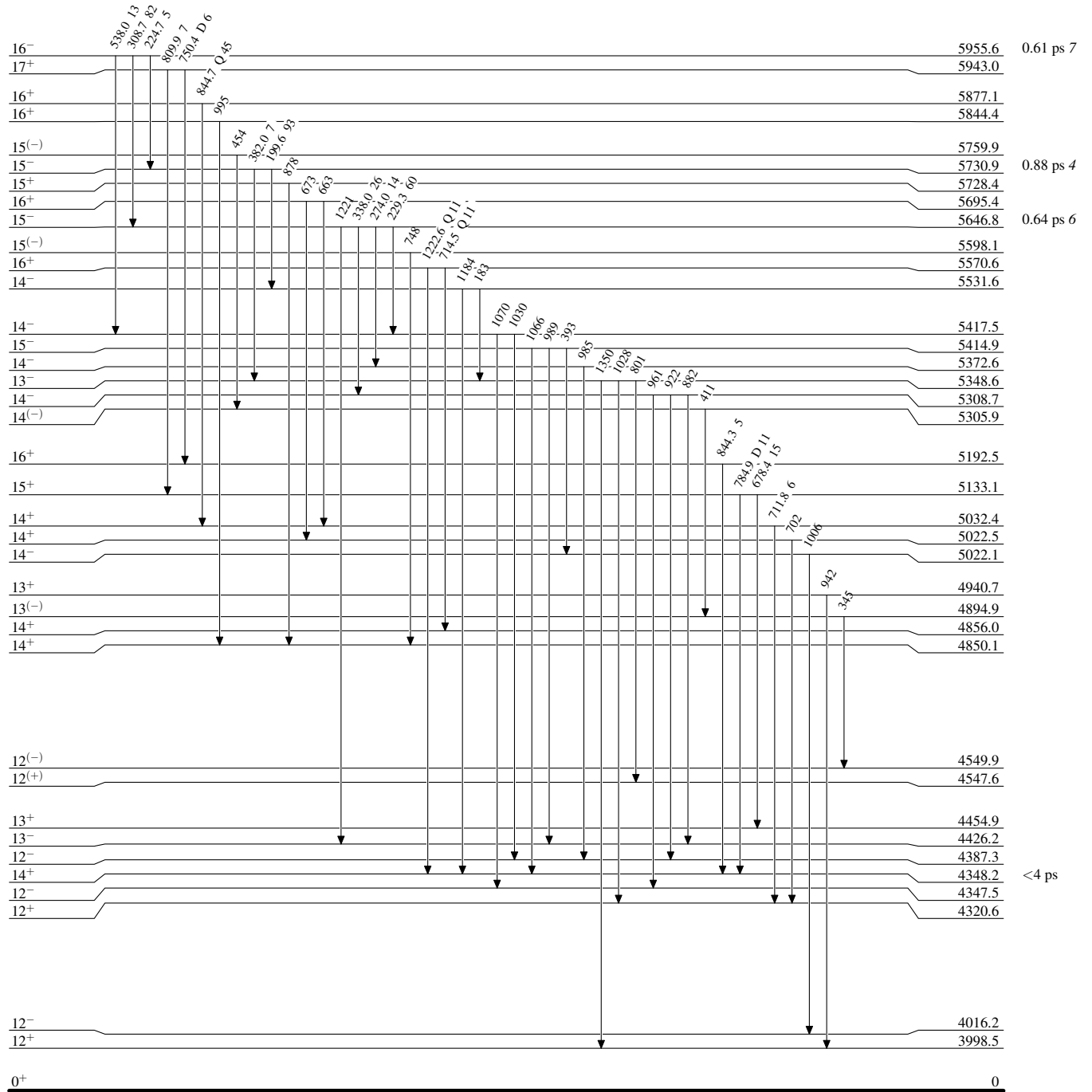
Intensities: Relative photon branching from each level

 $^{136}_{60}\text{Nd}_{76}$

$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ 1996Pe06,1999Pe19,2002Me25

Level Scheme (continued)

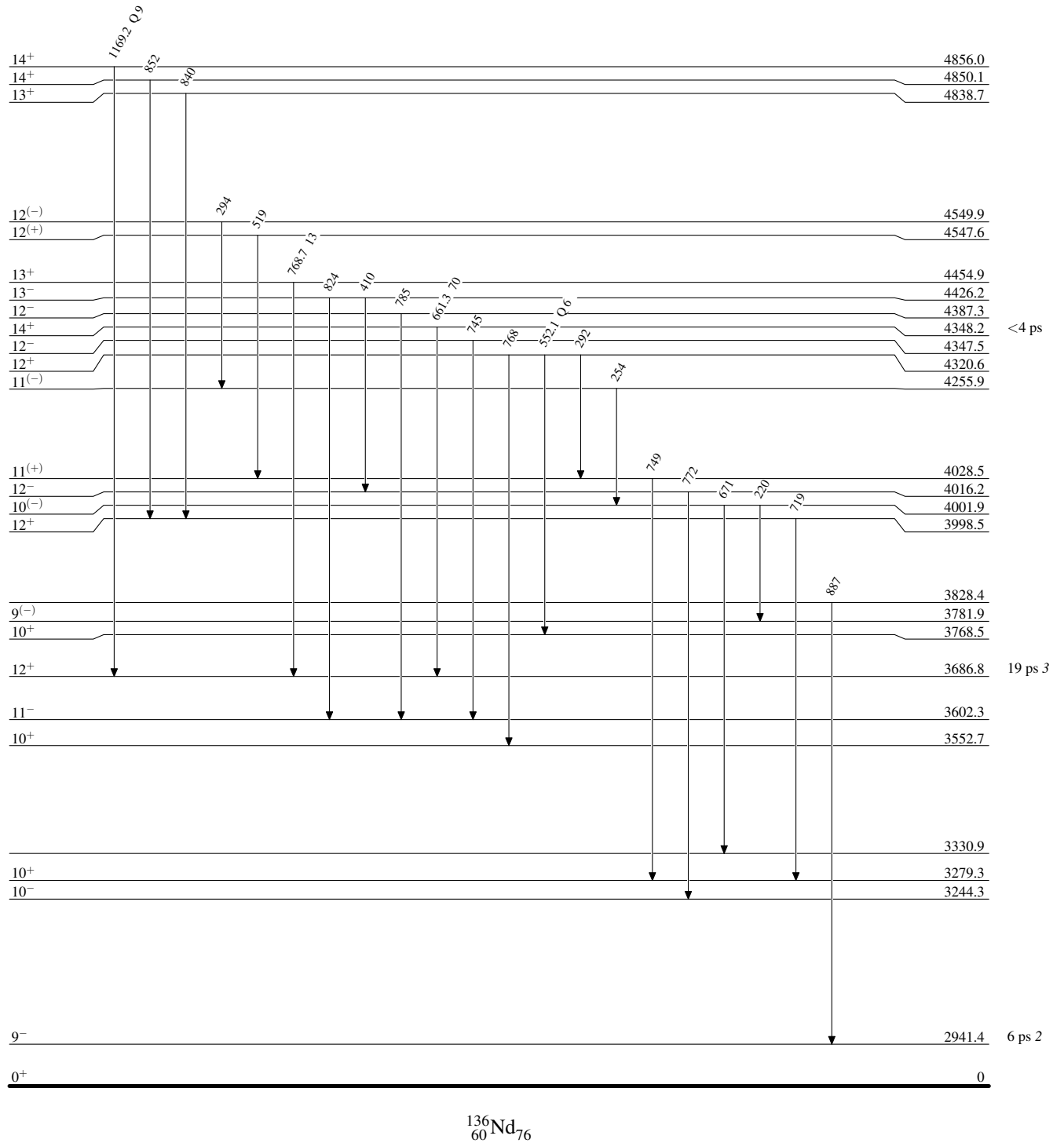
Intensities: Relative photon branching from each level



$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ 1996Pe06,1999Pe19,2002Me25

Level Scheme (continued)

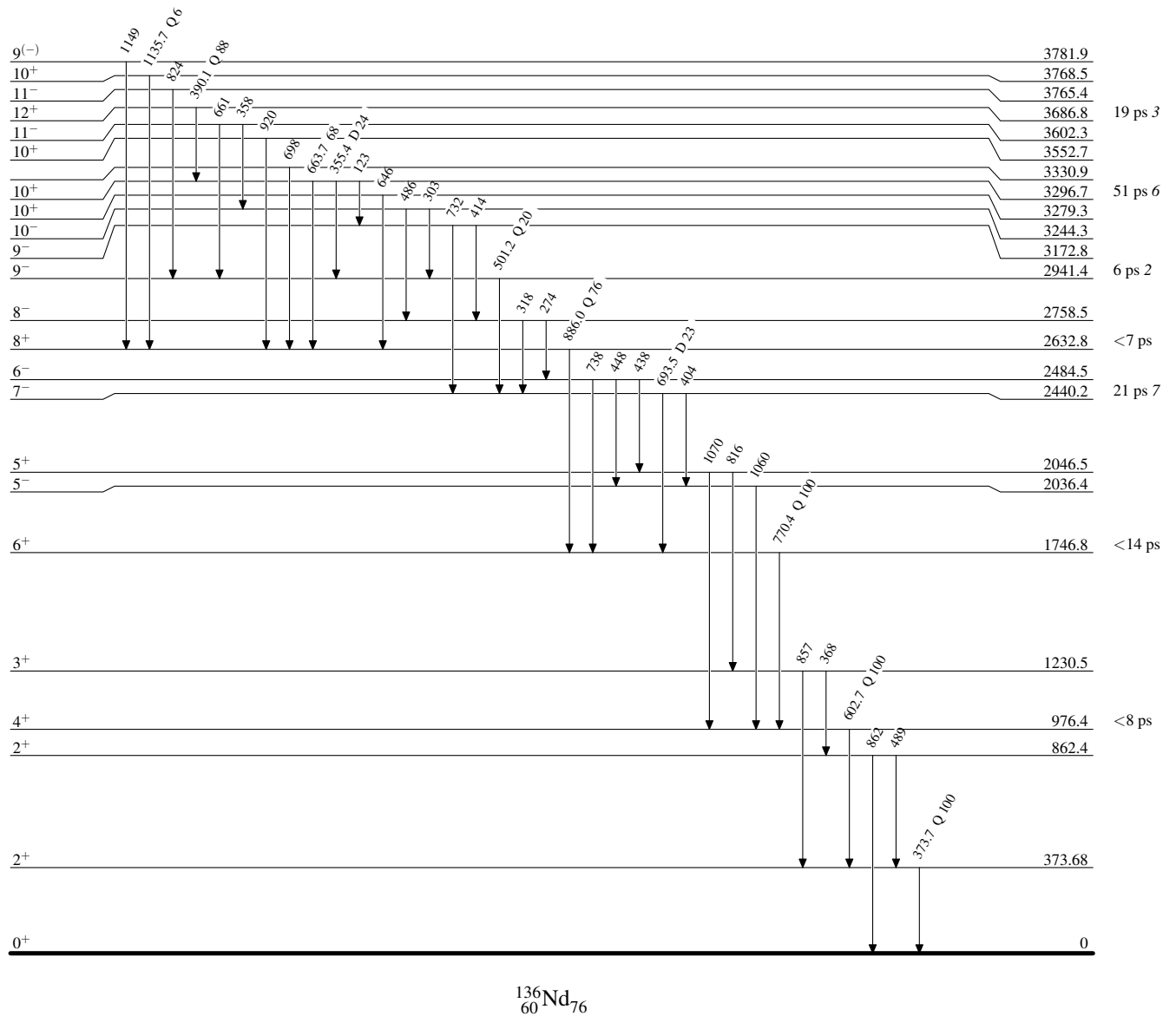
Intensities: Relative photon branching from each level

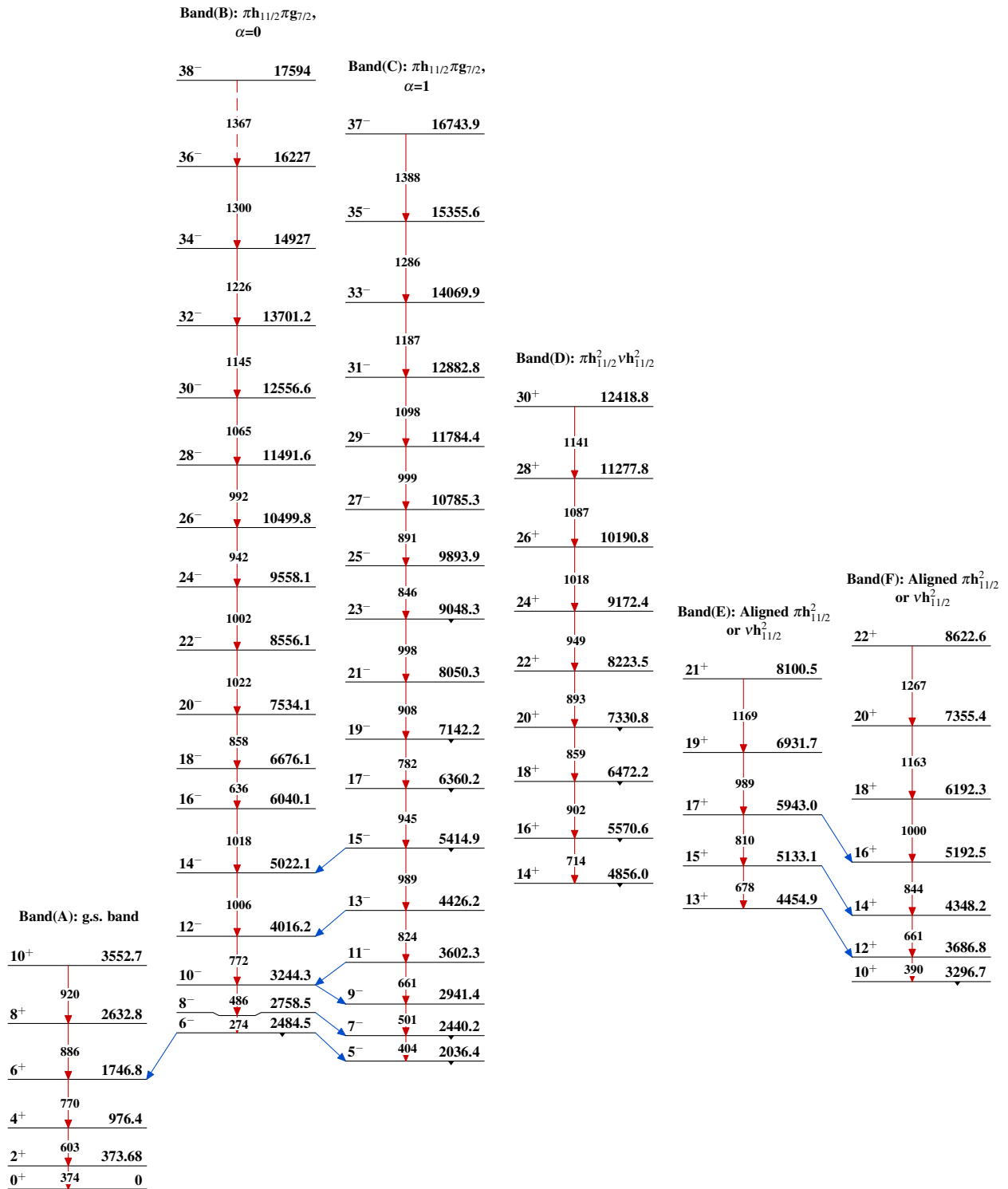


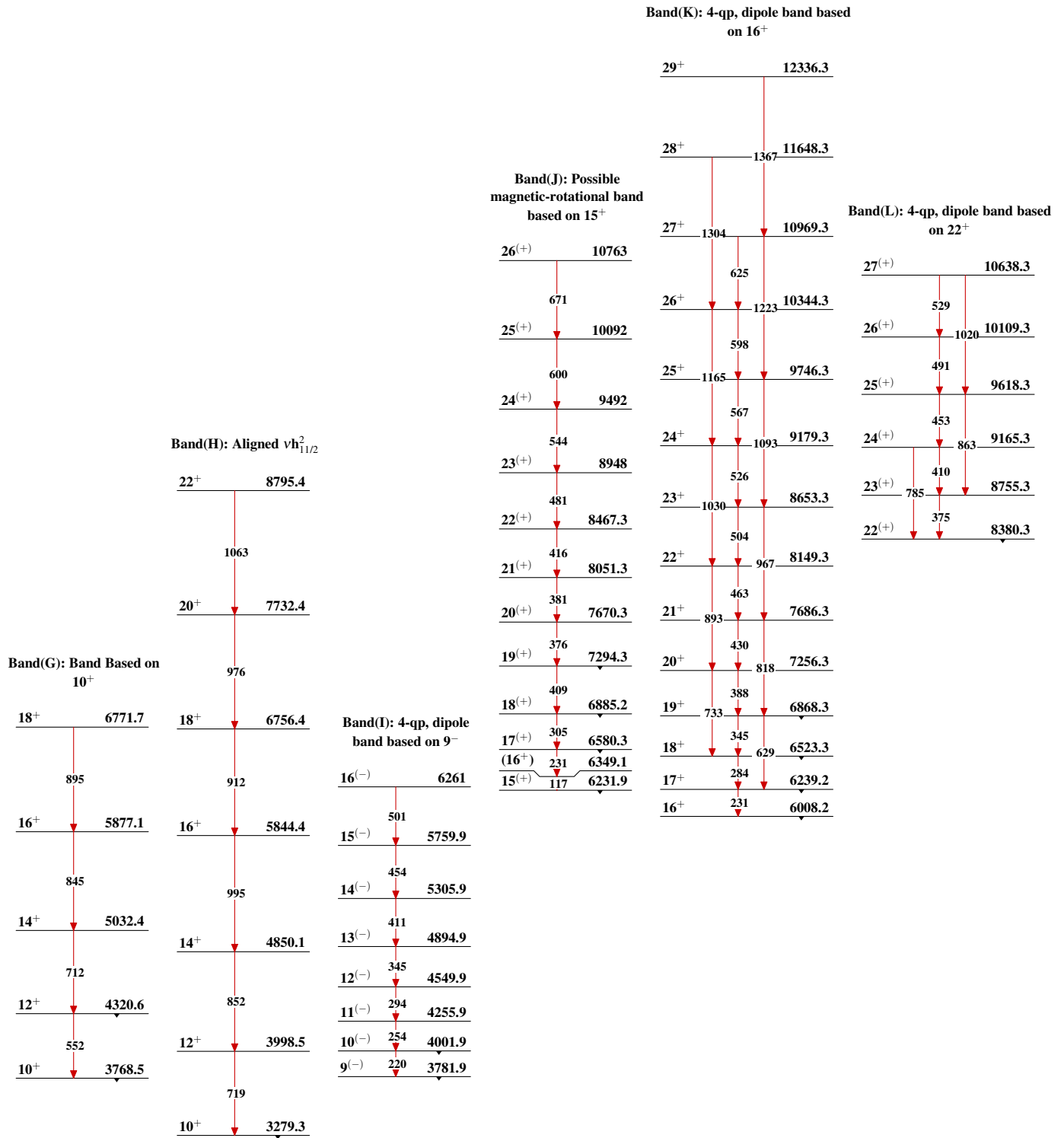
$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ 1996Pe06,1999Pe19,2002Me25

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ 1996Pe06,1999Pe19,2002Me25

$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ 1996Pe06,1999Pe19,2002Me25 (continued)

$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ 1996Pe06,1999Pe19,2002Me25 (continued)

		Band(P): SD-2 band (1999Pe19,1995Cl02)	
		J+18	x+17338.0
		J+16	1525 x+15812.9
		J+14	1441 x+14371.9
		J+12	1364 x+13007.9
		J+10	1285 x+11723.3
		J+8	1222 x+10500.9
		J+6	1152 x+9348.8
		J+4	1079 x+8269.4
		J+2	1000 x+7269.10
		J	909 6360+x
		Band(O): SD-1 band (1999Pe19,1995Cl02, 1987Be32)	
(51 ⁻)		27518.0	
		1815	
49 ⁽⁻⁾		25702.9	
		1733	
47 ⁽⁻⁾		23970.3	
		1644	
45 ⁽⁻⁾		22325.9	
		1559	
43 ⁽⁻⁾		20766.8	
		1477	
41 ⁽⁻⁾		19290.2	
		1399	
39 ⁽⁻⁾		17891.3	
		1325	
37 ⁽⁻⁾		16566.0	
		1255	
35 ⁽⁻⁾		15311.1	
		1186	
33 ⁽⁻⁾		14124.9	
		1118	
31 ⁽⁻⁾		13007.4	
		1050	
29 ⁽⁻⁾		11957.3	
		984	
27 ⁽⁻⁾		10973.6	
		918	
(25 ⁻)		10055.2	
		858	
(23 ⁻)		9197.3	
		795	
21 ⁽⁻⁾		8402.3	
		717	
19 ⁽⁻⁾		7685.5	
		657	
17 ⁽⁻⁾		7028.9	
Band(M): Band based on 14 ⁺		18 ⁺	6546.3
		16 ⁺	851 5695.4
		14 ⁺	673 5022.5
		Band(N): Possible $K^\pi=2^+$, γ band	
		5 ⁺	2046.5
		3 ⁺	816 1230.5
		2 ⁺	368 862.4

$^{110}\text{Pd}(^{30}\text{Si},4n\gamma)$ 1996Pe06,1999Pe19,2002Me25 (continued)