^{96}Zr(^{30}Si,p4nγ) 1993Pa16

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	S. Ohya	NDS 111, 1619 (2010)	20-Jan-2009

1993Pa16: ^{96}Zr(^{30}Si,p4nγ) E=135 MeV, escape-suppressed Ge detectors with 45 BGO′s; measured γ, $\gamma\gamma$, DCO, $\gamma(\theta)$, deduced multipolarity and J^π.

1994Wa08: ^{114}Cd(^{11}B,4nγ) E=51 MeV, a BGO escape-suppressed Ge detector; measured doppler-shift attenuation; deduced level half-lives.

^{121}I Levels

E(level)	J^{π} &	Comments
0.0†	5/2$^+$	
132.79† *21*	7/2$^+$	
445.55‡ *23*	(7/2)$^+$	
529.19† *21*	(9/2)$^+$	
649.87 *20*	(9/2)$^+$	
801.5† *4*	(11/2$^+$)	
811.3# *3*	(11/2)$^-$	
1031.2‡ *4*	(11/2)$^+$	
1134.0† *4*	(13/2)$^+$	
1239.2# *4*	(15/2)$^-$	
1746.7‡ *5*	(15/2$^+$)	
1780.4# *4*	(19/2)$^-$	
2425.7# *5*	(23/2)$^-$	
2621.8‡ *5*	(19/2$^+$)	
3273.0# *5*	(27/2$^-$)	
3511.3@ *6*	(23/2$^+$)	
3518.1‡ *6*	(23/2$^+$)	
3704.8@ *6*	(25/2$^+$)	Probable admixture of non-collective configuration=((π 1h$_{11/2}$)(ν 1h$_{11/2}$)(ν 1g$_{7/2}$)), J^π=25/2$^+$.
4006.4@ *6*	(27/2$^+$)	
4163.9# *5*	(31/2$^-$)	
4321.5@ *6*	(29/2$^+$)	
4676.2@ *6*	(31/2$^+$)	
5000.9@ *6*	(33/2$^+$)	
5040.2# *6*	(35/2$^-$)	
5337.7?@ *6*	(35/2$^+$)	
5432.0 *6*	(39/2$^-$)	Probable admixture of non-collective configuration=((π 1h$_{11/2}$)(π 1g$_{9/2}$)$^{+2}$(ν 1h$_{11/2}$)$^{+2}_{8+}$), J^π=39/2$^-$.
5655.2 *6*	(37/2$^+$)	
6244.8 *6*	(41/2$^-$)	
6537.3 *6*	(43/2$^-$)	Probable admixture of non-collective configuration=((π 1h$_{11/2}$)(π 1g$_{9/2}$)$^{+2}$(ν 1h$_{11/2}$)$^{+2}_{10+}$), J^π=43/2$^-$.
6792.6 *6*	(41/2$^+$)	
7205.4 *6*	(43/2$^-$)	
7446.0 *6*	(45/2$^+$)	
7515.4 *6*	(47/2$^-$)	
8134.6 *6*	(49/2$^+$)	
8775.6 *6*	(51/2)	
8894.6 *6*	(51/2$^-$)	
9030.0 *6*	(53/2)	
9238.6 *6*	(55/2$^-$)	Probable admixture of non-collective configuration=((π 1h$_{11/2}$)(π 1g$_{9/2}$)$^{+2}$(ν 1h$_{11/2}$)$^{+4}_{16+}$), J^π=55/2$^-$.
9500.4 *7*		

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^{96}Zr(^{30}Si,p4nγ) 1993Pa16 (continued)

^{121}I Levels (continued)

E(level)
10283.2 7
10471.1 7
10631.7 7
10911.3 7
11142.2 7

† Band(A): 2d$_{5/2}$ (g.s.).
‡ Band(B): 1g$_{7/2}$.
# Band(C): 1h$_{11/2}$ or 1/2$^-$[550].
@ Band(D): 3quasi-particle state on 23/2$^+$. probable configuration=((π 1h$_{11/2}$)(ν 1h$_{11/2}$)(ν 1g$_{7/2}$)).
& From Adopted Levels.

γ(^{121}I)

DCO notations are:
DCO(A)=I(158° − 90°)/I(90° − 158°) for sum of gates set on the 428, 541, 645 and 847 Q(E2) γ transitions.
DCO(B)=I(134° − 90°)/I(90° − 134°) for sum of gates set on the 428, 541, 645 and 847 Q(E2) γ transitions.
DCO(C)=I(158° − 90°)/I(90° − 158°) for sum of gate set on the 689 Q(E2) γ transitions.
DCO(D)=I(134° − 90°)/I(90° − 134°) for sum of gate set on the 689 Q(E2) γ transition.

E$_\gamma$†	I$_\gamma$†	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.‡	Comments
83 1		529.19	(9/2)$^+$	445.55	(7/2)$^+$		
121 1		649.87	(9/2)$^+$	529.19	(9/2)$^+$		
132.6 3		132.79	7/2$^+$	0.0	5/2$^+$		
161.4 3		811.3	(11/2)$^-$	649.87	(9/2)$^+$		
186 1		3704.8	(25/2$^+$)	3518.1	(23/2$^+$)		
193.5 2		3704.8	(25/2$^+$)	3511.3	(23/2$^+$)		
204.3 3		649.87	(9/2)$^+$	445.55	(7/2)$^+$		
208.4 2	11.1 6	9238.6	(55/2$^-$)	9030.0	(53/2)	D(+Q)	Mult.: DCO(A)=0.47 3, DCO(B)=0.70 4.
240.5 2	9.6 5	7446.0	(45/2$^+$)	7205.4	(43/2$^-$)	D	Mult.: DCO(A)=0.38 4, DCO(B)=0.76 7.
254.3 2	12.9 7	9030.0	(53/2)	8775.6	(51/2)	D(+Q)	Mult.: DCO(A)=0.49 4, DCO(B)=0.68 6.
261.6 2	2.6 1	9500.4		9238.6	(55/2$^-$)	D	Mult.: DCO(A)=0.41 15, DCO(B)=0.50 22.
273 1		801.5	(11/2$^+$)	529.19	(9/2)$^+$		
282.2 3		811.3	(11/2)$^-$	529.19	(9/2)$^+$		
292.5 2	24 1	6537.3	(43/2$^-$)	6244.8	(41/2$^-$)	D(+Q)	Mult.: DCO(A)=0.40 4, DCO(B)=0.58 4.
301.5 2	7.9 4	4006.4	(27/2$^+$)	3704.8	(25/2$^+$)	D(+Q)	Mult.: DCO(C)=0.56 12, DCO(D)=0.67 11.
315.1 2	7.5 4	4321.5	(29/2$^+$)	4006.4	(27/2$^+$)	D(+Q)	Mult.: DCO(C)=0.68 14, DCO(D)=0.71 12.
317.4 2	5.8 3	5655.2	(37/2$^+$)	5337.7?	(35/2$^+$)	D(+Q)	Mult.: DCO(C)=0.44 11, DCO(D)=0.61 11. The order of 336.8γ and 317.4γ was not resolved in this study (1993Pa16).
324.6 2	7.0 4	5000.9	(33/2$^+$)	4676.2	(31/2$^+$)	D(+Q)	Mult.: DCO(D)=0.68 12.
332 1		1134.0	(13/2)$^+$	801.5	(11/2$^+$)		
336.8 2	4.2 2	5337.7?	(35/2$^+$)	5000.9	(33/2$^+$)	D(+Q)	Mult.: DCO(C)=0.52 12, DCO(D)=0.63 11. The order of 336.8γ and 317.4γ was not resolved in this study (1993Pa16). So the 35/2$^+$ level could have energy 5337.7 or 5318.3.
344.1 2	8.4 4	9238.6	(55/2$^-$)	8894.6	(51/2$^-$)	Q	Mult.: DCO(A)=0.93 14, DCO(B)=1.04 16.
354.7 2	4.0 2	4676.2	(31/2$^+$)	4321.5	(29/2$^+$)	D(+Q)	Mult.: DCO(D)=0.38 20.
391.8 2	68 4	5432.0	(39/2$^-$)	5040.2	(35/2$^-$)	Q	Mult.: DCO(A)=1.01 6, DCO(B)=1.08 7.

Continued on next page (footnotes at end of table)

^{96}Zr(^{30}Si,p4nγ) 1993Pa16 (continued)

γ(^{121}I) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	α#	Comments
396.5 *3*		529.19	(9/2)$^+$	132.79	7/2$^+$			
428.0 *2*	98 *5*	1239.2	(15/2)$^-$	811.3	(11/2)$^-$	E2	0.01339	α(K)=0.01130 *16*; α(L)=0.001674 *24*; α(M)=0.000340 *5*; α(N+..)=7.55×10^{-5} *11* α(N)=6.79×10^{-5} *10*; α(O)=7.53×10^{-6} *11* Mult.: DCO(A)=1.04 *5*, DCO(B)=1.11 *5*.
445.4 *3*		445.55	(7/2)$^+$	0.0	5/2$^+$			
510 *1*	<1	11142.2		10631.7				
516.9 *3*		649.87	(9/2)$^+$	132.79	7/2$^+$			
529.4 *3*		529.19	(9/2)$^+$	0.0	5/2$^+$			
541.2 *2*	100	1780.4	(19/2)$^-$	1239.2	(15/2)$^-$	E2	0.00688 *10*	α=0.00688 *10*; α(K)=0.00586 *9*; α(L)=0.000819 *12*; α(M)=0.0001658 *24*; α(N+..)=3.70×10^{-5} *6* α(N)=3.32×10^{-5} *5*; α(O)=3.75×10^{-6} *6* Mult.: DCO(A)=1.04 *5*, DCO(B)=1.08 *5*.
585.6 *3*		1031.2	(11/2)$^+$	445.55	(7/2)$^+$			
604.8 *3*		1134.0	(13/2)$^+$	529.19	(9/2)$^+$			
640.8 *2*	34.9 *18*	8775.6	(51/2)	8134.6	(49/2$^+$)	D(+Q)		Mult.: DCO(A)=0.42 *7*, DCO(B)=0.71 *12*.
645.4 *2*	92 *5*	2425.7	(23/2)$^-$	1780.4	(19/2)$^-$	E2	0.00432 *6*	α=0.00432 *6*; α(K)=0.00370 *6*; α(L)=0.000499 *7*; α(M)=0.0001008 *15*; α(N+..)=2.26×10^{-5} *4* α(N)=2.03×10^{-5} *3*; α(O)=2.31×10^{-6} *4* Mult.: DCO(A)=1.00 *7*, DCO(B)=1.11 *10*.
650.0 *3*		649.87	(9/2)$^+$	0.0	5/2$^+$			
653.3 *2*	16.6 *8*	7446.0	(45/2$^+$)	6792.6	(41/2$^+$)	Q		Mult.: DCO(A)=1.13 *15*, DCO(B)=1.23 *30*.
668.6 *3*		801.5	(11/2$^+$)	132.79	7/2$^+$			
679.3 *2*	5.0 *3*	5000.9	(33/2$^+$)	4321.5	(29/2$^+$)			
688.5 *2*	38.5 *19*	8134.6	(49/2$^+$)	7446.0	(45/2$^+$)	Q		Mult.: DCO(A)=1.01 *14*, DCO(B)=1.12 *16*.
715.4 *3*		1746.7	(15/2$^+$)	1031.2	(11/2)$^+$			
812.7 *2*	42 *2*	6244.8	(41/2$^-$)	5432.0	(39/2$^-$)	D(+Q)		Mult.: DCO(A)=0.31 *4*, DCO(B)=0.63 *4*.
847.3 *2*	88 *4*	3273.0	(27/2$^-$)	2425.7	(23/2)$^-$	Q		Mult.: DCO(A)=0.92 *7* DCO(B)=1.13 *9*.
875.0 *2*		2621.8	(19/2$^+$)	1746.7	(15/2$^+$)			
876.8 *2*	76 *4*	5040.2	(35/2$^-$)	4163.9	(31/2$^-$)	Q		Mult.: DCO(A)=0.99 *7*, A_2=1.17 *10*.
889.4 *2*		3511.3	(23/2$^+$)	2621.8	(19/2$^+$)			
890.9 *2*	83 *4*	4163.9	(31/2$^-$)	3273.0	(27/2$^-$)	Q		Mult.: DCO(A)=1.10 *5*, DCO(B)=1.15 *6*.
896.2 *2*		3518.1	(23/2$^+$)	2621.8	(19/2$^+$)			
908.6 *2*	21.0 *10*	7446.0	(45/2$^+$)	6537.3	(43/2$^-$)	D,Q		Mult.: DCO(A)=0.57 *6*, DCO(B)=0.86 *6*.
960.5 *2*	11.1 *6*	7205.4	(43/2$^-$)	6244.8	(41/2$^-$)	D(+Q)		Mult.: DCO(A)=0.56 *6*, DCO(B)=0.82 *8*.
978.2 *2*	14.1 *7*	7515.4	(47/2$^-$)	6537.3	(43/2$^-$)	Q		Mult.: DCO(A)=1.02 *9*, DCO(B)=1.11 *9*.
1044.6 *2*	4.3 *2*	10283.2		9238.6	(55/2$^-$)	D		Mult.: DCO(B)=0.59 *30*.
1105.5 *2*	15.7 *8*	6537.3	(43/2$^-$)	5432.0	(39/2$^-$)	Q		Mult.: DCO(A)=0.93 *8*, DCO(B)=1.09 *9*.
1131.0 *2*	2.4 *1*	10631.7		9500.4		D		Mult.: DCO(B)=0.30 *20*.

Continued on next page (footnotes at end of table)

$^{96}Zr(^{30}Si,p4n\gamma)$ **1993Pa16 (continued)**

$\gamma(^{121}I)$ (continued)

E_γ †	I_γ †	E_i(level)	J^π_i	E_f	J^π_f	Mult.‡	Comments
1137.4 *2*	4.0 *2*	6792.6	$(41/2^+)$	5655.2	$(37/2^+)$	Q	Mult.: DCO(C)=0.94 *14*, DCO(D)=1.10 *15*.
1232.5 *2*	5.6 *3*	10471.1		9238.6	$(55/2^-)$	D	Mult.: DCO(B)=0.53 *25*.
1360.6 *2*	6.7 *4*	6792.6	$(41/2^+)$	5432.0	$(39/2^-)$	D	Mult.: DCO(A)=0.66 *8*, DCO(B)=0.82 *12*.
1379.4 *2*	13.2 *7*	8894.6	$(51/2^-)$	7515.4	$(47/2^-)$	Q	Mult.: DCO(A)=0.99 *11*, DCO(B)=1.22 *16*.
1393.3 *2*	1.6 *1*	10631.7		9238.6	$(55/2^-)$		
1672.7 *2*	1.5 *1*	10911.3		9238.6	$(55/2^-)$		
1903.6 *2*	2.4 *1*	11142.2		9238.6	$(55/2^-)$		

† Limited information is given by 1993Pa16: (1) transitions lying above the band head of $1h_{11/2}$ band; (2) transitions lying above the $25/2^+$ member of the $9/2^+[404]$ band; Iγ's are relative to Iγ(541.2γ)=100 in $^{96}Zr(^{30}Si,p4n\gamma)$ E=135 MeV; see $^{114}Cd(^{11}B,4n\gamma)$ for the details of the decay pattern for the down stream shown in this data set.

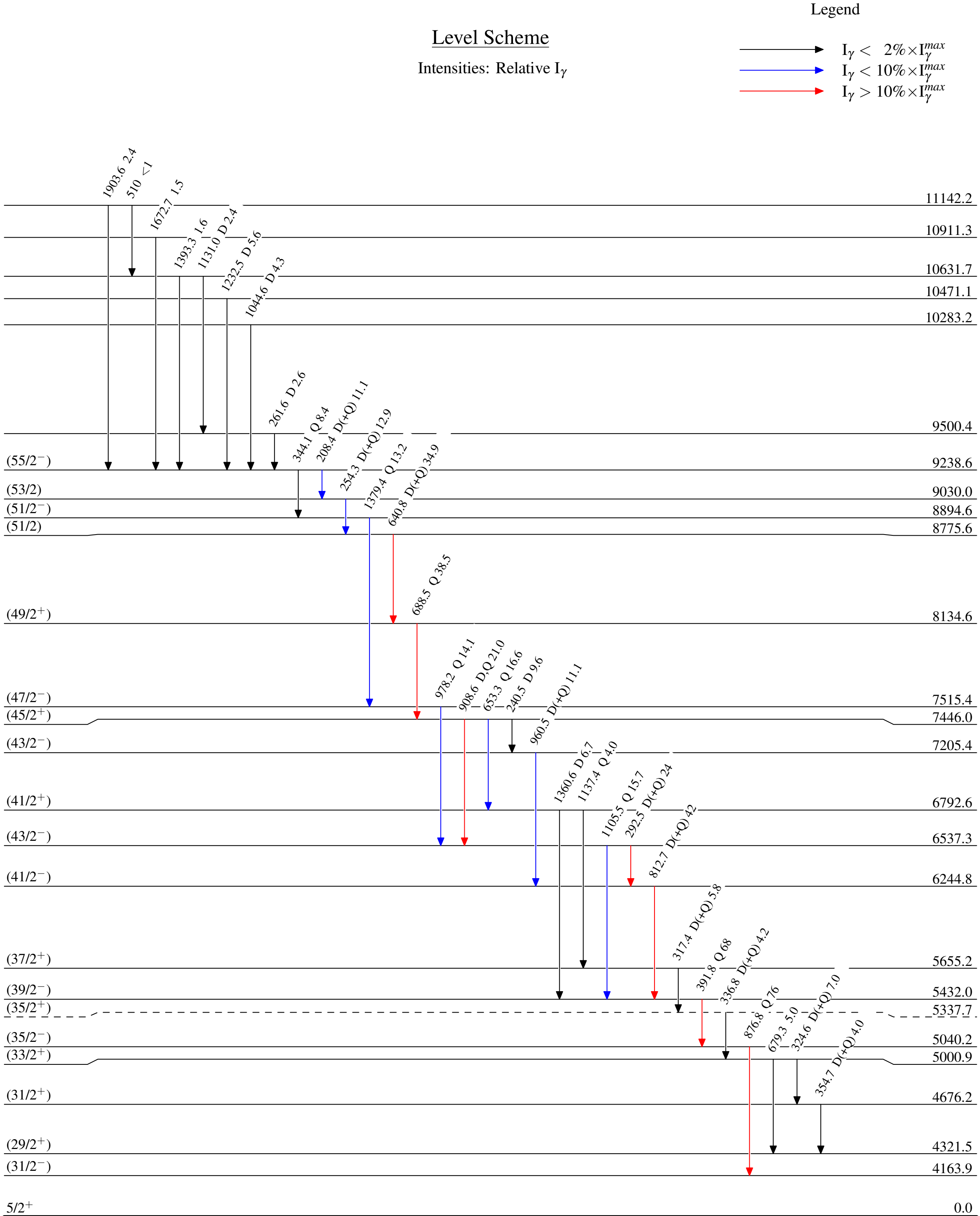
‡ From DCO ratios, unless noted otherwise.

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.

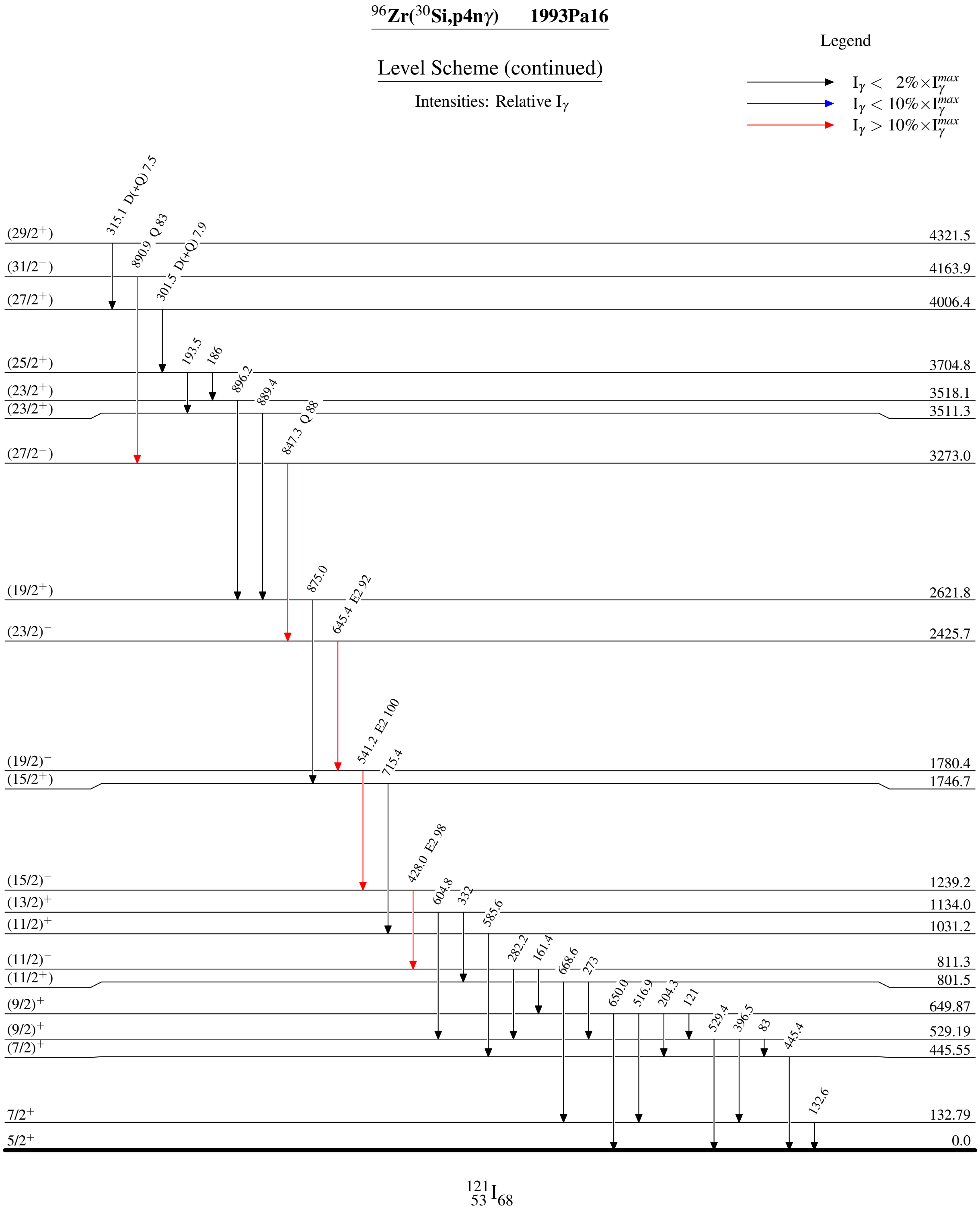
$^{96}Zr(^{30}Si,p4n\gamma)$ 1993Pa16

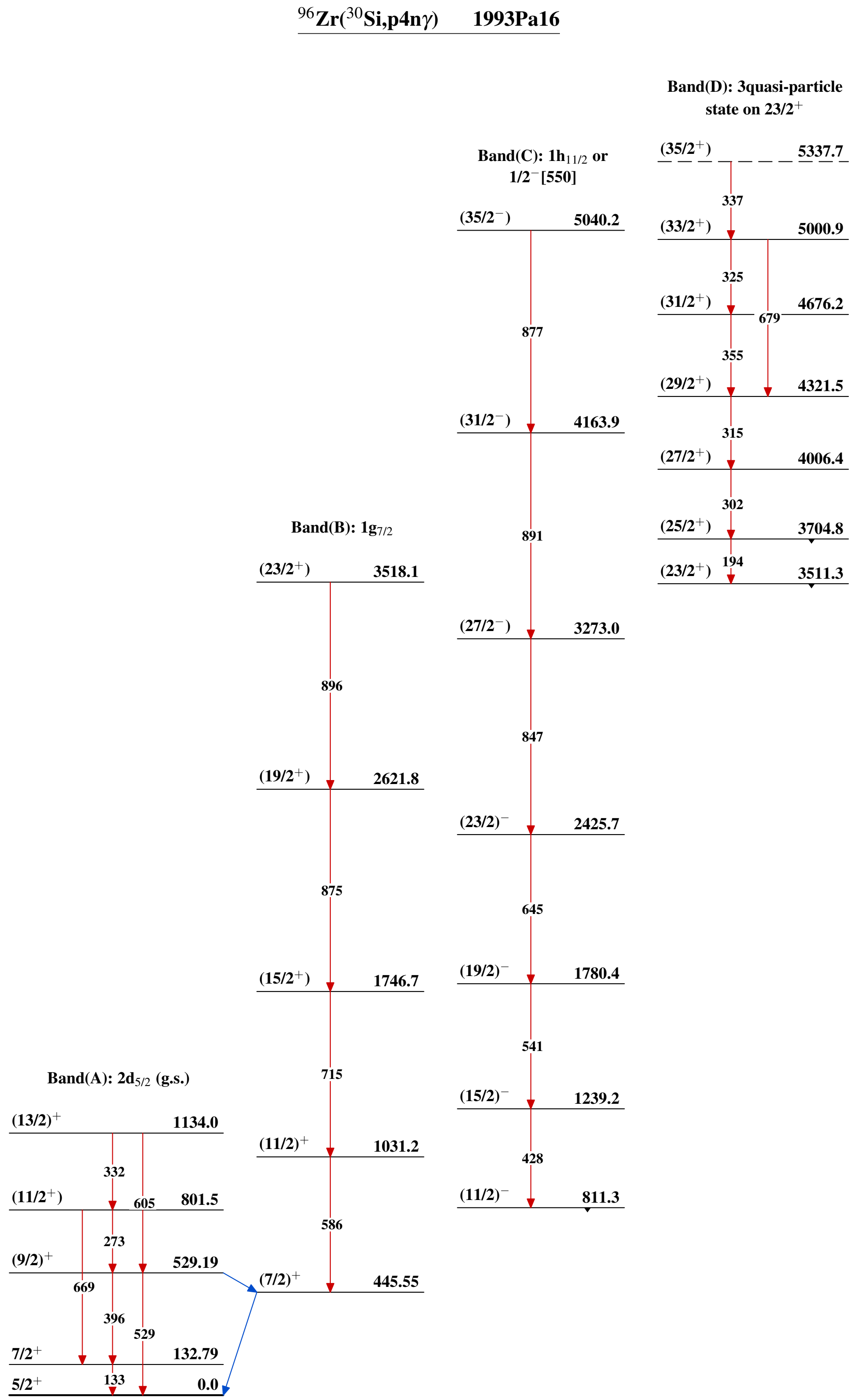
Level Scheme

Intensities: Relative I_γ



$^{121}_{53}I_{68}$


^{96}Zr(^{30}Si,p4nγ) 1993Pa16
Level Scheme (continued)
Intensities: Relative I_γ
Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
(29/2+) 4321.5
(31/2−) 4163.9
(27/2+) 4006.4
(25/2+) 3704.8
(23/2+) 3518.1
(23/2+) 3511.3
(27/2−) 3273.0
(19/2+) 2621.8
(23/2)− 2425.7
(19/2)− 1780.4
(15/2+) 1746.7
(15/2)− 1239.2
(13/2)+ 1134.0
(11/2)+ 1031.2
(11/2)− 811.3
(11/2+) 801.5
(9/2)+ 649.87
(9/2)+ 529.19
(7/2)+ 445.55
7/2+ 132.79
5/2+ 0.0
315.1 D(+Q) 7.5
890.9 Q 83
301.5 D(+Q) 7.9
193.5
186
896.2
889.4
847.3 Q 88
875.0
645.4 E2 92
541.2 E2 100
715.4
428.0 E2 98
604.8
332
585.6
282.2
161.4
668.6
273
650.0
516.9
204.3
121
529.4
396.5
83
445.4
132.6
$^{121}_{53}I_{68}$


$^{96}Zr(^{30}Si,p4n\gamma)$ 1993Pa16
Band(D): 3quasi-particle state on 23/2+
Band(C): 1h11/2 or 1/2− [550]
Band(B): 1g7/2
Band(A): 2d5/2 (g.s.)
(35/2+) 5337.7
(33/2+) 5000.9
(31/2+) 4676.2
(29/2+) 4321.5
(27/2+) 4006.4
(25/2+) 3704.8
(23/2+) 3511.3
337
325
679
355
315
302
194
(35/2−) 5040.2
(31/2−) 4163.9
(27/2−) 3273.0
(23/2)− 2425.7
(19/2)− 1780.4
(15/2)− 1239.2
(11/2)− 811.3
877
891
847
645
541
428
(23/2+) 3518.1
(19/2+) 2621.8
(15/2+) 1746.7
(11/2)+ 1031.2
(7/2)+ 445.55
896
875
715
586
(13/2)+ 1134.0
(11/2+) 801.5
(9/2)+ 529.19
7/2+ 132.79
5/2+ 0.0
332
605
273
669
396
529
133

$^{121}_{53}I_{68}$