

³⁰Si(¹⁸O, α 2n γ) **2003La04**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen [#] and Balraj Singh		NDS 135, 1 (2016)	31-May-2016

2003La04: E=68 MeV ¹⁸O beam was produced from the VIVITRON accelerator at IReS Strasbourg. Target of a 800 μ g/cm² ³⁰Si. γ -rays were detected with the high-efficiency EUROBALL IV germanium detector array in coincidence with the Recoil Filter Detector (RFD). Measured E γ , I γ , $\gamma\gamma$, $\gamma\gamma(\theta)$ (DCO), $\gamma\gamma$ (recoil) coin, γ (lin pol). Deduced levels, branchings,

⁴²Ca Levels

E(level) [†]	J π [‡]	Comments
0.0 [#]	0 ⁺	
1524.73 [#] 20	2 ⁺	
1837 [@]	0 ⁺	
2424.3 [@] 3	2 ⁺	
2752.5 [#] 3	4 ⁺	
3189.2 [#] 3	6 ⁺	
3254.0 [@] 3	4 ⁺	
3446.8 ^{&} 3	3 ⁻	
3954.5 ^{&} 4	4 ⁻	
3999.9 3	4	
4099.7 ^{&} 3	5 ⁻	
4717.7 [@] 3	6 ⁺	
4897.5 ^{&} 4	5 ⁻	
5213.1 3	6	
5490.7 ^{&} 3	6 ⁻	
5691.9 3	6	
5744.0 ^{&} 3	7 ⁻	
5925.5 4	5,7	J π : (5) in Adopted Levels from γ from a 6896, 4 ⁺ level.
6144.6 ^{&} 3	7 ⁻	
6408.5 ^{&} 3	8 ⁻	
6553.7 ^{&} 3	9 ⁻	
6636.3 [@] 3	8 ⁺	
6718.2 3	7	
7282.0 3	9 ⁻	
7368.5 ^{&} 3	10 ⁻	
7415.9 3	8	
7634.1 4	6,8	
8297.5 ^{&} 3	11 ⁻	
8615.2 3	9	
8722.3 3	9	
8848.0 [@] 3	10 ⁺	J π : 8, 10 ⁺ in Table supplied with the priv. comm.; 10 ⁺ in figure 1 of 2003La04 .
9015.0 3	10	
9241.9? 9		Ordering of 1960-2484 cascade from 11725.3 level is not established.
9311.1 3	8,10	
9786.3 3	9,11	
10168.7 3	10,12	
11165.7 9	10,12	
11405.1 [@] 11	(12 ⁺)	
11725.8 9		
11821.1 5		
12198.1 11		

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$^{30}\text{Si}(^{18}\text{O},\alpha 2n\gamma)$ **2003La04 (continued)**

^{42}Ca Levels (continued)

E(level)[†]
 12701.4 5
 12814.8 8
 13712.9 11
 13762.9 14
 15251.8 13

- † From least-squares fit to E_γ data.
- ‡ From $\gamma\gamma(\theta)$ (DCO) and $\gamma(\text{lin pol})$.
- # Band(A): g.s., Yrast band.
- @ Band(B): Excited 0^+ band.
- & Band(C): Negative-parity structure.

$\gamma(^{42}\text{Ca})$

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Mult.	$\gamma(^{42}\text{Ca})$	Comments
1524.73	2 ⁺	1524.7 2	100	0.0	0 ⁺		DCO=0.98 8	
2424.3	2 ⁺	899.5 3		1524.73	2 ⁺		DCO=1.00 18	
		2424.2 [‡]		0.0	0 ⁺			
2752.5	4 ⁺	1227.7 2	100	1524.73	2 ⁺		DCO=0.99 8	
3189.2	6 ⁺	436.7 1	100	2752.5	4 ⁺		DCO=1.09 11	
3254.0	4 ⁺	501.5 2	40 4	2752.5	4 ⁺		DCO=1.02 16	
		829.7 [‡]	5 1	2424.3	2 ⁺			
		1729.2 3	100 7	1524.73	2 ⁺		DCO=0.96 16	
3446.8	3 ⁻	694.4 [‡]		2752.5	4 ⁺			
		1022.5 3	80 10	2424.3	2 ⁺			
		1922.0 3	100 10	1524.73	2 ⁺			
3954.5	4 ⁻	507.7 2		3446.8	3 ⁻		DCO=2.2 5	
		1202.0 [‡]		2752.5	4 ⁺			
3999.9	4	1575.6 3	58 8	2424.3	2 ⁺			
		2475.1 3	100 12	1524.73	2 ⁺		DCO=1.04 29	
4099.7	5 ⁻	145.2 [‡]	2 1	3954.5	4 ⁻			
		910.5 2	100 3	3189.2	6 ⁺	#	DCO=1.61 15	
		1347.3 2	60 3	2752.5	4 ⁺	#	DCO=1.57 13	
4717.7	6 ⁺	1463.7 3	95 5	3254.0	4 ⁺	#	DCO=1.08 14	
		1528.5 [‡]	32 7	3189.2	6 ⁺			
		1965.2 4	100 3	2752.5	4 ⁺	#	DCO=1.01 15	
4897.5	5 ⁻	797.8 3	100.0	4099.7	5 ⁻		DCO=0.94 22	
5213.1	6	1213.2 3	100 10	3999.9	4			
		1959.1 4	75 9	3254.0	4 ⁺			
5490.7	6 ⁻	1536.1 [‡]	1.0 3	3954.5	4 ⁻		DCO=1.00 7	
		2301.4 2	100 3	3189.2	6 ⁺		Mult.: possible magnetic character from $\gamma(\text{lin pol})$; but 6 ⁻ to 6 ⁺ requires E1(+M2).	
5691.9	6	974.1 2		4717.7	6 ⁺		DCO=1.00 26	
		2437.8 3		3254.0	4 ⁺		DCO= 1.4 4 (?).	
5744.0	7 ⁻	253.3 1	2.6 2	5490.7	6 ⁻		DCO=1.72 22	
		1026.3 2	4.0 4	4717.7	6 ⁺		DCO=1.69 28	
		1644.2 1	100 3	4099.7	5 ⁻	#	DCO=1.02 8	

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$^{30}\text{Si}(^{18}\text{O},\alpha 2n\gamma)$ 2003La04 (continued)

$\gamma(^{42}\text{Ca})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Mult.	Comments
5744.0	7 ⁻	2554.7 2	72 3	3189.2	6 ⁺	#	DCO=1.60 20
5925.5	5,7	2736.2 4	100.0	3189.2	6 ⁺		DCO=2.1 4
6144.6	7 ⁻	2955.3 2	100.0	3189.2	6 ⁺	#	DCO=1.76 25
6408.5	8 ⁻	263.9 1	20.0 13	6144.6	7 ⁻		DCO=1.92 18
		664.6 2	5.0 7	5744.0	7 ⁻		DCO=1.84 26
		917.8 2	100 3	5490.7	6 ⁻	#	DCO=0.97 10
		3219.2 3	16 2	3189.2	6 ⁺	@	DCO=1.07 15
6553.7	9 ⁻	145.2 1	35 2	6408.5	8 ⁻		DCO=2.07 19
		409.1 2	3.0 5	6144.6	7 ⁻		
		809.7 1	100 4	5744.0	7 ⁻	#	DCO=1.06 9
		3364.4 3	11 1	3189.2	6 ⁺	[E3]	DCO=0.80 12
							Mult.: possible magnetic character from $\gamma(\text{lin pol})$; but 9 ⁻ to 6 ⁻ requires E3.
6636.3	8 ⁺	1918.6 2	100 5	4717.7	6 ⁺	#	DCO=1.03 18
		3447.1 4	16 2	3189.2	6 ⁺		DCO=1.03 23
6718.2	7	1505.1 2	100 9	5213.1	6		DCO=1.52 20
		2000.4 3	64 7	4717.7	6 ⁺		
		3528.8 5	52 5	3189.2	6 ⁺		Mult.: $\Delta J=1$ transition.
7282.0	9 ⁻	728.3 1	30 3	6553.7	9 ⁻		DCO=1.06 16
		873.5 2	100 8	6408.5	8 ⁻	@	DCO=1.80 26
7368.5	10 ⁻	814.8 1	100 3	6553.7	9 ⁻	@	DCO=1.85 18
		959.9 2	3.5 6	6408.5	8 ⁻		DCO=0.95 15
7415.9	8	779.6 2	35 3	6636.3	8 ⁺		DCO=0.99 12
		1723.9 3	30 5	5691.9	6		
		2698.1 $\frac{3}{2}^{\pm}$	4.0 12	4717.7	6 ⁺		
		4226.6 $\frac{3}{2}^{\pm}$	100 5	3189.2	6 ⁺		Mult.: possible magnetic character.
7634.1	6,8	1708.5 4		5925.5	5,7		
		1942.2 3		5691.9	6		
		2916.3 3		4717.7	6 ⁺		DCO=1.1 3
		4444.8 $\frac{3}{2}^{\pm}$		3189.2	6 ⁺		
8297.5	11 ⁻	929.0 1	100 4	7368.5	10 ⁻	@	DCO=1.52 16
		1743.8 2	65 4	6553.7	9 ⁻	#	DCO=0.99 10
8615.2	9	1199.3 3	34 4	7415.9	8		
		1896.9 2	100 8	6718.2	7		DCO=0.99 15
		1978.7 3	54 7	6636.3	8 ⁺		DCO=2.3 4
		2061.4 $\frac{3}{2}^{\pm}$	9 2	6553.7	9 ⁻		
8722.3	9	1306.4 2	90 9	7415.9	8		DCO=1.68 26
		1440.3 3	30 5	7282.0	9 ⁻		
		2004.0 3	86 15	6718.2	7		
		2085.9 2	100 10	6636.3	8 ⁺		DCO=1.57 20
		2168.6 3	36 6	6553.7	9 ⁻		
8848.0	10 ⁺	2211.6 2	100.0	6636.3	8 ⁺	#	DCO=0.97 15
9015.0	10	292.7 2	11 2	8722.3	9		DCO=2.20 30
		399.9 1	26 2	8615.2	9		DCO=1.76 15
		717.6 3	5 1	8297.5	11 ⁻		
		1599.1 1	100 4	7415.9	8		DCO=1.04 15
		1733.0 2	67 10	7282.0	9 ⁻		DCO=1.50 22
		2378.6 3	13 2	6636.3	8 ⁺		DCO=0.98 29
		2461.3 3	15 2	6553.7	9 ⁻		DCO= 0.96 18 (?).
9241.9?		1960		7282.0	9 ⁻		
9311.1	8,10	1677.0 3	90 6	7634.1	6,8		Mult.: $\Delta J=0,2$ transition.
		2674.7 3	100 12	6636.3	8 ⁺		DCO=1.05 20

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$^{30}\text{Si}(^{18}\text{O},\alpha 2n\gamma)$ 2003La04 (continued) $\gamma(^{42}\text{Ca})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Mult.	Comments
9786.3	9,11	475.2 1	14 1	9311.1	8,10		DCO=1.91 22
		771.3 1	100 3	9015.0	10	@	DCO=1.61 12
		938.3 2	16 1	8848.0	10 ⁺	@	DCO=1.57 16
		1063.9 3	24.0 14	8722.3	9		DCO=1.01 14
		1171.0 2	16.0 15	8615.2	9		DCO=1.00 16
		1488.8 1	44 2	8297.5	11 ⁻	@	DCO=0.99 10
10168.7	10,12	2417.8 2	28 2	7368.5	10 ⁻		DCO=1.08 16
		382.4 1	100 3	9786.3	9,11		DCO=1.84 18
		1153.6 3	29 2	9015.0	10		DCO=1.02 14
11165.7	10,12	1871.2 2	11 1	8297.5	11 ⁻	DCO=2.06 23	
11405.1	(12 ⁺)	2868.1 8	100.0	8297.5	11 ⁻	DCO=2.18 33	
11725.8		2557	100.0	8848.0	10 ⁺		
		2484		9241.9?			
11821.1		4357		7368.5	10 ⁻		
		1652.3 4	83 11	10168.7	10,12		DCO=1.87 27
12198.1		2034.6 8	100 7	9786.3	9,11		
		3350		8848.0	10 ⁺		
12701.4		880.3 2		11821.1			
		2533 1		10168.7	10,12		
12814.8		2646		10168.7	10,12		
		4517		8297.5	11 ⁻		
13712.9		5415		8297.5	11 ⁻		
13762.9		2037		11725.8			
15251.8		2437		12814.8			

[†] From private communication received from first author (M. Lach) on March 19, 2003, as an e-mail reply.

[‡] From level-energy difference.

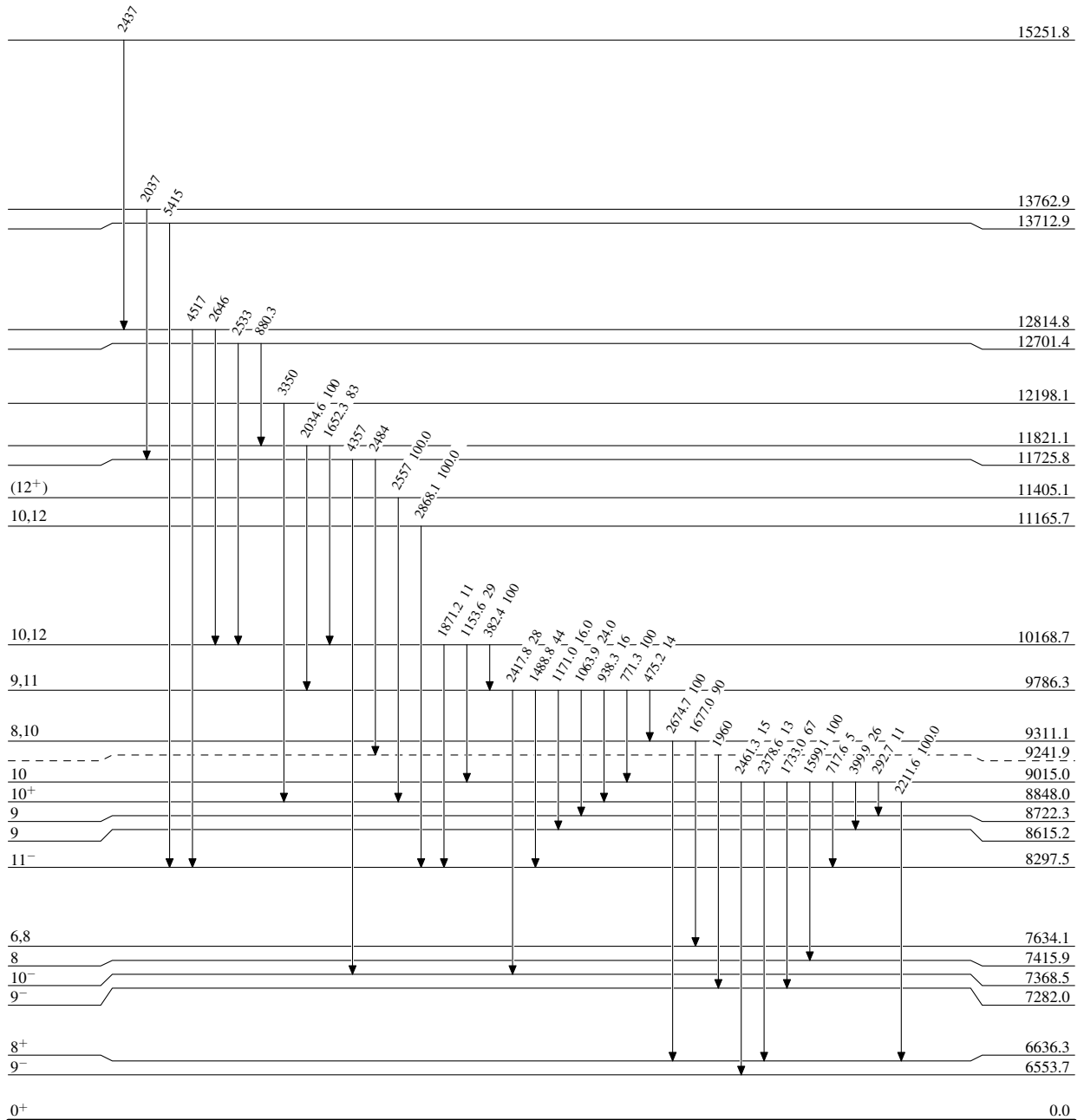
Electric character from $\gamma(\text{lin pol})$.

@ Magnetic character from $\gamma(\text{lin pol})$.

$^{30}\text{Si}(^{18}\text{O},\alpha 2n\gamma)$ 2003La04

Level Scheme

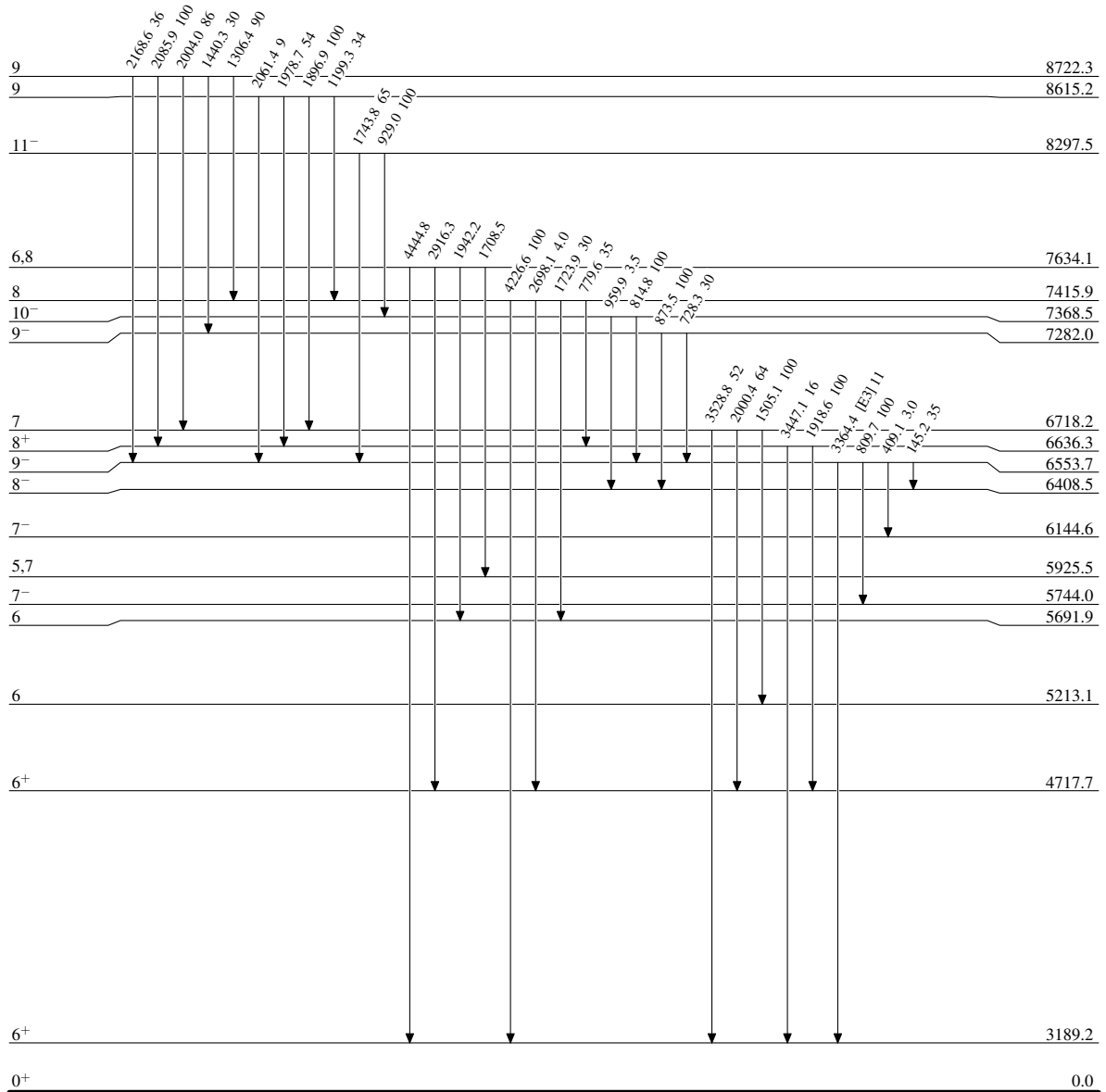
Intensities: Relative photon branching from each level

 $^{42}_{20}\text{Ca}_{22}$

$^{30}\text{Si}(^{18}\text{O},\alpha 2n\gamma)$ 2003La04

Level Scheme (continued)

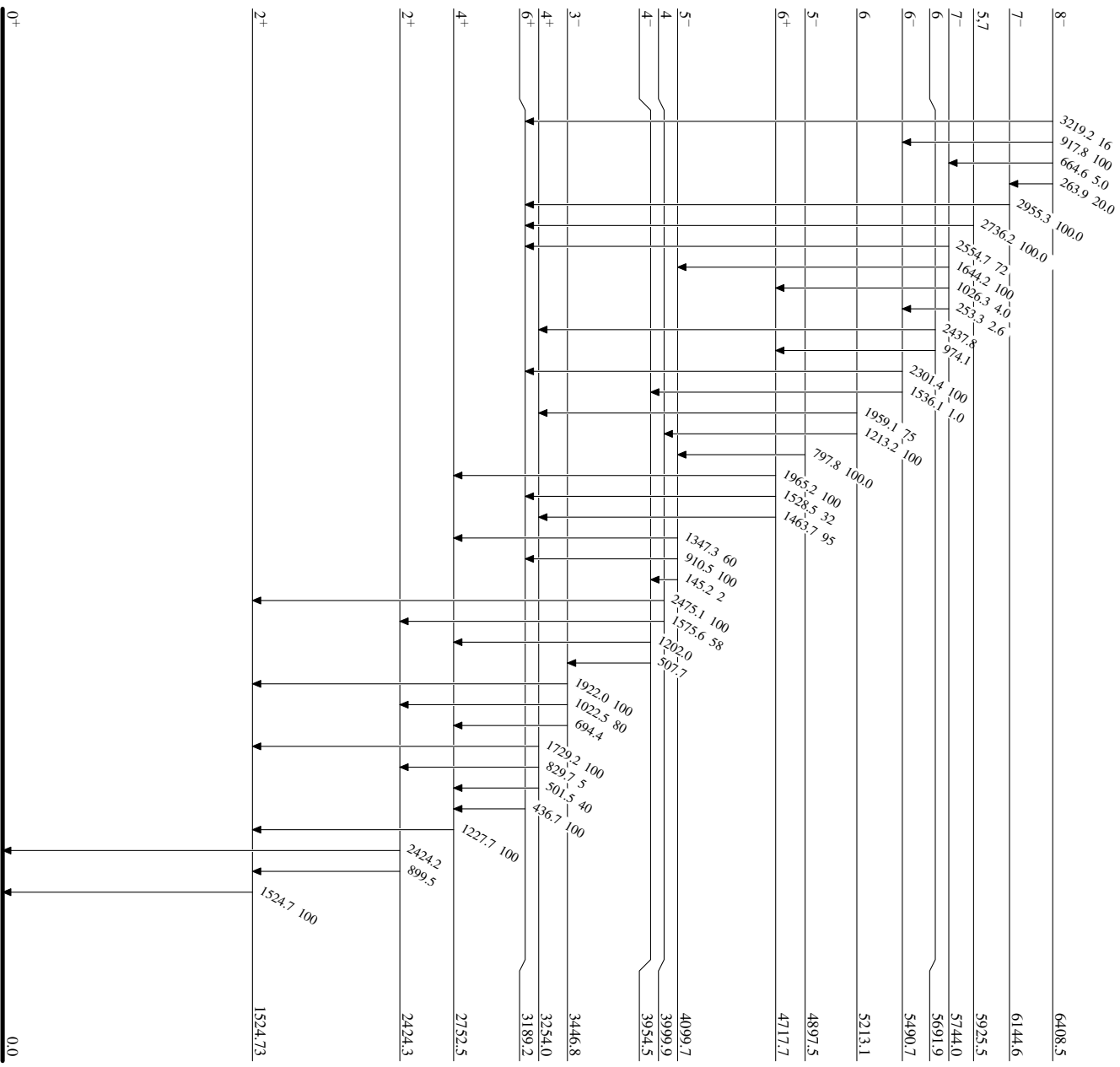
Intensities: Relative photon branching from each level

 $^{42}_{20}\text{Ca}_{22}$

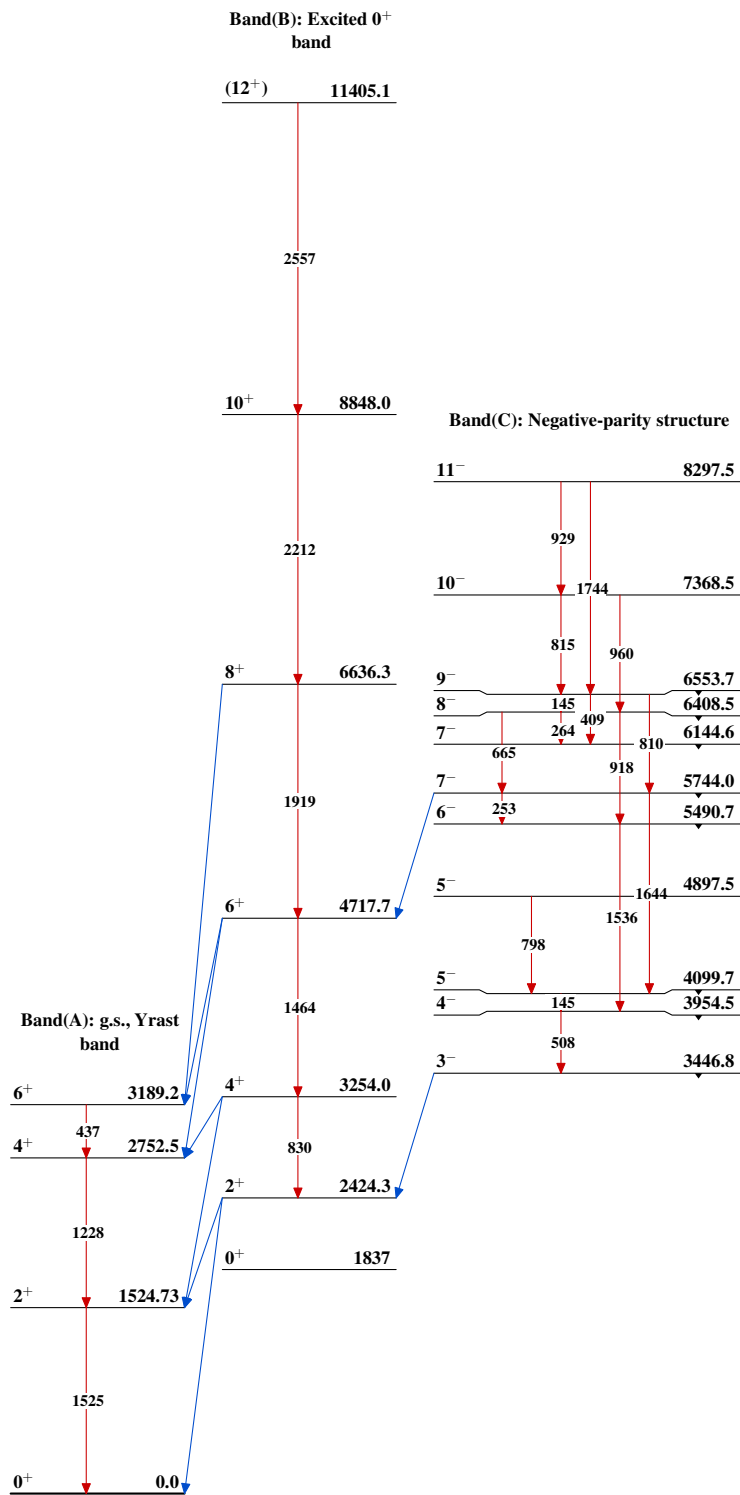
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Level Scheme (continued)

Intensities: Relative photon branching from each level



⁴²Ca₂₂

$^{30}\text{Si}(^{18}\text{O},\alpha 2n\gamma)$ 2003La04 $^{42}_{20}\text{Ca}_{22}$