

<sup>40</sup>Ca(p,γ) 1987Zi02,1968Yo04

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	C. D. Nesaraja, E. A. Mccutchan		NDS 133, 1 (2016)	30-Sep-2015

**2014Sc05:** E(p)=1840-1847 keV. Measured yield function and  $\gamma(\theta)$  for 2882 $\gamma$  from 2882-keV level. Deduced resonance strength using absolute strength measurement and relative to the resonance triplet at E( $\alpha$ )=4.5 MeV in the <sup>40</sup>Ca( $\alpha,\gamma$ ) reaction.

**1987Zi02:** E(p)=640-3500 keV. Measured E $\gamma$ , I $\gamma$ ,  $\gamma(\theta)$ , yield function using two HPGe detectors and two Ge(Li) detectors (one with Compton-suppression). Deduce resonance strengths.

**1983Te02:** E(p)=2100 – 3100 keV. Measured E $\gamma$ , I $\gamma$ ,  $\gamma(\theta)$ , direct capture cross sections to g.s. and 1716 state using two Ge(Li) detectors.

**1979Pa16** (also **1980PaZP**): E(p)=500-2000 keV. Measured E $\gamma$ , I $\gamma$  using a Ge(Li) detector; deduced resonance strength of 2882-keV level.

**1977Ko10:** E(p)=1843 keV and 4051 keV. Measured E $\gamma$ , I $\gamma$ ,  $\gamma(\theta)$ ,  $\gamma(\text{lin pol})$  using two Ge(Li) detectors and excitation functions using a NaI(Tl) detector.

**1968Yo04** (also **1965Yo03,1965Yo02**): E(p)=648-5191 keV. Measured  $\gamma$  widths and  $\gamma(\theta)$  for g.s transitions by determining the positron activity of <sup>41</sup>Sc using a  $\beta$ -ray spectrometer consisting of two nested plastic scintillators. Also measured E $\gamma$ , I $\gamma$ ,  $\gamma(\theta)$  using two cylindrical NaI(Tl) crystals. T<sub>1/2</sub> of 1716 state measured in **1965Yo03**.

**1982McZV:** E(p)=6035-7405. 7 states reported. Deduced upper limits on E1 and M1 strengths to g.s.

**1976Fo01:** E(p)=4971 – 4979 keV. Measured E $\gamma$ , I $\gamma$ ,  $\gamma(\theta)$ , excitation function for 5937-keV level using a Ge(Li) detector.

**1971ClZR:** E(p)=4.8-12.5 MeV. Deduced resonances.

**1966En04:** E(p)=1842 keV. Measured yield function using NaI detector; deduced resonance strength of 2282-keV level.

Others: **2012Ro13, 1961Bu08**.  
**Additional information 1.**

<sup>41</sup>Sc Levels

E(level) <sup>†</sup>	J $\pi$ <sup>‡</sup>	E(p)(lab) <sup>@</sup>	(2J+1) $\Gamma_p\Gamma_\gamma/\Gamma$ <sup>&amp;</sup>	Comments
0	7/2 <sup>-</sup>			J $\pi$ : from the Adopted Levels.
1716.48 8	3/2 <sup>-</sup>	647.28	0.0018	%p>98; %IT<2 ( <b>1987Zi02</b> ) E(level): from E $\gamma$ and E(p) ( <b>1987Zi02</b> ). Radiative T <sub>1/2</sub> =0.36 ps <i>11</i> from $\Gamma_\gamma=0.0013$ eV <i>4</i> ( <b>1965Yo03</b> ). Other: 0.30 ps from $\Gamma_\gamma=0.02$ eV-b ( <b>1961Bu08</b> ). C <sup>2</sup> S=1.0 <i>3</i> relative to 1.0 for g.s. ( <b>1983Te02</b> ). %p>99; %IT<1 ( <b>1987Zi02</b> ) J $\pi$ : from $\gamma(\theta)$ in <b>1987Zi02</b> . %p>50; %IT<50 ( <b>1987Zi02</b> ) J $\pi$ : from $\gamma(\theta)$ in <b>1987Zi02</b> . %p>90; %IT<10 ( <b>1987Zi02</b> ) J $\pi$ : from $\gamma(\theta)$ and RUL ( <b>1968Yo04</b> ). J=9/2 also possible from $\gamma(\theta)$ . %p>98; %IT<2 ( <b>1987Zi02</b> ) J $\pi$ : from $\gamma(\theta)$ and RUL ( <b>1968Yo04</b> ). J=3/2,9/2 also possible from $\gamma(\theta)$ .
2096.0 5	3/2	1036.3		
2414.9 5	NOT 1/2 <sup>-</sup>	1363.2		
2588.30 7	5/2 <sup>-</sup>	1540.87	0.020 3	
2666.84 7	5/2 <sup>+</sup>	1621.39	0.018 2	
2719.38 9		1675.24	0.004 1	
2882.47 8	7/2 <sup>+</sup>	1842.66	0.384 34	%IT=41 2; %p=59 2 ( <b>1987Zi02</b> ) J $\pi$ : 7/2 from $\gamma(\theta)$ in <b>1977Ko10</b> ; E1(+M2) 2282 $\gamma$ to 7/2 <sup>-</sup> from $\gamma(\text{lin pol})$ gives $\pi=+$ . (2J+1) $\Gamma_p\Gamma_\gamma/\Gamma$ : from <b>2014Sc05</b> measured both absolute and relative to the <sup>40</sup> Ca( $\alpha,\gamma$ ) reaction. Others: 0.28 4 ( <b>2012Ro13</b> ), 0.28 5 ( <b>1979Pa16</b> ), 0.28 4 ( <b>1977Ko10</b> ), 0.39 9 ( <b>1968Yo04</b> ), 0.26 4 ( <b>1966En04</b> ), 0.30 +30-16 ( <b>1961Bu08</b> ). J $\pi$ : from $\gamma(\theta)$ and RUL ( <b>1968Yo04</b> ). J=9/2 also possible from $\gamma(\theta)$ . %p>99; %IT<1 ( <b>1987Zi02</b> ) %p>92; %IT<8 ( <b>1987Zi02</b> ) J $\pi$ : from $\gamma(\theta)$ and RUL ( <b>1968Yo04</b> ). E(level): seen in $\gamma$ decay from 5037 level.
2972.3 2	7/2 <sup>-</sup>	1934.5	0.062 8	
3014 4		1977		
3185.4 2	(5/2 <sup>-</sup> ,9/2 <sup>+</sup> )	2152.9	0.20 3	
3358.1 7	(11/2 <sup>+</sup> )			

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<sup>40</sup>Ca(p,γ) **1987Zi02,1968Yo04 (continued)**

<sup>41</sup>Sc Levels (continued)

E(level) <sup>†</sup>	J <sup>π</sup> <sup>‡</sup>	Γ <sup>#</sup>	E(p)(lab) <sup>@</sup>	(2J+1)Γ <sub>p</sub> Γ <sub>γ</sub> /Γ <sup>&amp;</sup>	Comments
3411.8 4	1/2 <sup>+</sup>		2385.0	0.012 4	J <sup>π</sup> : J <sup>π</sup> >5/2 from γ(θ) in 1977Ko10. J <sup>π</sup> : from 1983Te02.
3470 5	1/2 <sup>-</sup>		2445	0.11 7	(2J+1)Γ <sub>p</sub> Γ <sub>γ</sub> /Γ: other: 0.006 4 (1983Te02). J <sup>π</sup> ,E(p)(lab),(2J+1)Γ <sub>p</sub> Γ <sub>γ</sub> /Γ: from 1983Te02.
3563.0 3			2540.0	0.023 5	
3678 3				0.007	
3697.1 3	7/2 <sup>+</sup>		2677.4	0.30 4	J <sup>π</sup> : from γ(θ) and RUL (1987Zi02). J <sup>π</sup> : other: 7/2 <sup>-</sup> favored by RUL in 1968Yo04.
3775 4	3/2 <sup>-</sup>		2755		
3781.2 2	(5/2 <sup>+</sup> )		2763.5	0.110 15	
3969	1/2 <sup>+</sup>		2957	0.016 6	J <sup>π</sup> ,E(p)(lab),(2J+1)Γ <sub>p</sub> Γ <sub>γ</sub> /Γ: from 1983Te02.
4023.3 4	7/2 <sup>-</sup>		3011.7	0.077 11	J <sup>π</sup> : from γ(θ) and RUL in 1968Yo04.
4030.7 6	7/2 <sup>-</sup>		3019.3	0.091 14	J <sup>π</sup> : from γ(θ) and RUL (1987Zi02).
4245 4	5/2 <sup>+</sup>		3240	1.00	
4328 4			3325	0.14	
4441 4	(5/2 <sup>-</sup> ,7/2 <sup>-</sup> )		3440	0.17	J <sup>π</sup> : from γ(θ) and RUL in 1968Yo04.
4514 4	5/2 <sup>-</sup> ,9/2 <sup>+</sup>		3515	0.36	J <sup>π</sup> : from γ(θ) and RUL in 1968Yo04.
4810 3	(5/2 <sup>-</sup> ,7/2 <sup>-</sup> ,9/2 <sup>+</sup> )		3819	0.41	J <sup>π</sup> : from γ(θ) and RUL in 1968Yo04.
4871 6	5/2 <sup>+</sup>		3881	0.030	
4953 5	5/2 <sup>-</sup>	2.4 keV 6	3965	0.38	E(p)(lab): 3965 corresponds to 4947+4949 levels. J <sup>π</sup> : from γ(θ) and RUL in 1968Yo04.
5011 3	7/2 <sup>-</sup>		4025	0.74	J <sup>π</sup> : from γ(θ) and RUL in 1968Yo04.
5037.5 14	9/2 <sup>+</sup>		4051.2	2.40 4	E(p)(lab),(2J+1)Γ <sub>p</sub> Γ <sub>γ</sub> /Γ: from 1977Ko10. Other: E(p)=4054 (1968Yo04).
5143 9	(3/2 <sup>-</sup> )		4160	0.014	
5167 5			4185	1.20	
5200 7			4219	0.060	
5225 9			4244	0.030	
5324 7			4346	0.150	
5379 9	(5/2 <sup>+</sup> )	9.5 keV 30	4402	0.320	
5524 7			4551	0.57	
5537 9			4564	0.095	
5568 9			4596	0.18	
5574 10	(5/2 <sup>+</sup> )		4602	0.12	
5653 7	(5/2 <sup>-</sup> ,7/2 <sup>-</sup> )		4683	0.35	
5694 10			4724	0.060	
5710 10	(5/2 <sup>-</sup> ,7/2 <sup>-</sup> )	11.5 keV 30	4741	1.40	
5717 10			4748	0.20	
5773 4			4806	0.90	E(p)(lab): from 1976Fo01. E(p)=4812 8 (1968Yo04).
5801 8			4835	0.12	
5810 4			4843	0.35	E(p)(lab): from 1976Fo01. E(p)=4850 8 (1968Yo04).
5859 11	(3/2 <sup>-</sup> )		4894	0.11	
5872 11	(5/2 <sup>-</sup> ,7/2 <sup>-</sup> )	9.4 keV 20	4907	1.30	
5915 11			4952	0.15	
5937 5	(3/2 <sup>+</sup> ,5/2 <sup>+</sup> )		4974	0.50 9	E(p)(lab),(2J+1)Γ <sub>p</sub> Γ <sub>γ</sub> /Γ: from 1976Fo01. J <sup>π</sup> : 3/2 <sup>+</sup> in the Adopted Levels. T=3/2 (1976Fo01). E(p)(lab): 4974 4 (1976Fo01).
5973 11	(5/2 <sup>-</sup> ,7/2 <sup>-</sup> )	4.2 keV 20	5011		
6058 11		3.9 keV 10	5098		
6086 11			5127		

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 ${}^{40}\text{Ca}(\text{p},\gamma)$  [1987Zi02](#),[1968Yo04](#) (continued) ${}^{41}\text{Sc}$  Levels (continued)

<u>E(level)<sup>†</sup></u>	<u><math>J^\pi</math><sup>‡</sup></u>	<u>E(p)(lab)<sup>@</sup></u>
6112 <i>ll</i>		5154
6116 <i>ll</i>		5158
6149 <i>ll</i>	(5/2 <sup>+</sup> )	5191

<sup>†</sup> From E(p)(c.m.)+S(p)( ${}^{41}\text{Sc}$ ) with S(p)( ${}^{41}\text{Sc}$ )=1085.00 8 ([2012Wa38](#)).

<sup>‡</sup> From  $\text{p}\gamma(\theta)$  data of [1987Zi02](#) and [1968Yo04](#), except where noted. Additional support for  $J^\pi$  assignments provided in the comments.

# From [1968Yo04](#).

@ Values are in keV, from [1987Zi02](#) up to 4 MeV, from [1968Yo04](#) above this energy, except where noted. The uncertainty is about the same as in the excitation energy.

& Values are in keV, from [1987Zi02](#) up to 4 MeV, from [1968Yo04](#) above this energy, except where noted.

<sup>40</sup>Ca(p,γ) **1987Zi02,1968Yo04** (continued)

E <sub>i</sub> (level)	J <sub>i</sub> <sup>π</sup>	E <sub>γ</sub> <sup>†</sup>	I <sub>γ</sub> <sup>‡</sup>	γ( <sup>41</sup> Sc)		Mult.#	δ <sup>#</sup>	Γ <sub>γ</sub> <sup>b</sup>	Comments
				E <sub>f</sub>	J <sub>f</sub> <sup>π</sup>				
1716.48	3/2 <sup>-</sup>	1716.4	100	0	7/2 <sup>-</sup>			0.0013 4	Γ <sub>γ</sub> : from 1965Yo03.
2414.9	NOT 1/2 <sup>-</sup>	319	<8	2096.0	3/2				
		698	100	1716.48	3/2 <sup>-</sup>				
		2414	<5	0	7/2 <sup>-</sup>				
2588.30	5/2 <sup>-</sup>	492	<0.3	2096.0	3/2				
		872	2.4 3	1716.48	3/2 <sup>-</sup>				
		2588	97.6 3	0	7/2 <sup>-</sup>	D+Q	+1.2 +11-6	0.0043	Mult.,δ: from A <sub>2</sub> =-1.02 9, A <sub>4</sub> =+0.12 17 (1968Yo04).
2666.84	5/2 <sup>+</sup>	571	<0.6	2096.0	3/2				
		950	4.2 8	1716.48	3/2 <sup>-</sup>				
		2667	95.8 8	0	7/2 <sup>-</sup>	D(+Q)	0.07 +14-7	0.0070	Mult.,δ: from A <sub>2</sub> =-0.30 14, A <sub>4</sub> =+0.39 24 (1968Yo04).
2719.38		623	<5	2096.0	3/2				
		1003	100	1716.48	3/2 <sup>-</sup>				
		2719	<7	0	7/2 <sup>-</sup>				
2882.47	7/2 <sup>+</sup>	786	0.08 3	2096.0	3/2				
		2883.1 5	99.92 3	0	7/2 <sup>-</sup>	E1(+M2)	+0.05 5	0.048	E <sub>γ</sub> : from 1977Ko10. Mult.: from A <sub>2</sub> =+0.52 3, A <sub>4</sub> =-0.06 5, POL=+0.12 3 (1977Ko10). δ: from 1977Ko10. Other: 0.04 +12-4 (1968Yo04).
2972.3	7/2 <sup>-</sup>	876	<0.2	2096.0	3/2				
		2972	100	0	7/2 <sup>-</sup>	D(+Q)	0.5 +5-4	0.010	Mult.,δ: from A <sub>2</sub> =+0.72 8, A <sub>4</sub> =-0.11 13 (1968Yo04).
3014		917	87 5	2096.0	3/2				
		3013	13 5	0	7/2 <sup>-</sup>				
3185.4	(5/2 <sup>-</sup> ,9/2 <sup>+</sup> )	466	<0.3	2719.38					
		597	<0.2	2588.30	5/2 <sup>-</sup>				
		770	<0.2	2414.9	NOT 1/2 <sup>-</sup>				
		1089	<0.2	2096.0	3/2				
		3185	100	0	7/2 <sup>-</sup>	D+Q	+0.18 +4-5	0.044	δ,Γ <sub>γ</sub> : for 5/2; δ=0.035 +17-35 and Γ <sub>γ</sub> =0.026 eV for J=9/2 (1968Yo04). Mult.,δ: from A <sub>2</sub> =-0.395 17, A <sub>4</sub> =+0.02 3 (1968Yo04).
3411.8	1/2 <sup>+</sup>	529	<3	2882.47	7/2 <sup>+</sup>				
		692	<3	2719.38					
		745	<3	2666.84	5/2 <sup>+</sup>				
		823	<2	2588.30	5/2 <sup>-</sup>				
		997	<3	2414.9	NOT 1/2 <sup>-</sup>				
		1695	100	1716.48	3/2 <sup>-</sup>				
		3411	<2	0	7/2 <sup>-</sup>				
3470	1/2 <sup>-</sup>	1759	100	1716.48	3/2 <sup>-</sup>				
		3475	<4	0	7/2 <sup>-</sup>				
3563.0		1846	100	1716.48	3/2 <sup>-</sup>				
		3563	<13	0	7/2 <sup>-</sup>				
3678		1961	36 12	1716.48	3/2 <sup>-</sup>				
		3678	64 12	0	7/2 <sup>-</sup>				
3697.1	7/2 <sup>+</sup>	684	<0.1	3014					

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<sup>40</sup>Ca(p,γ) **1987Zi02,1968Yo04** (continued)

γ(<sup>41</sup>Sc) (continued)

E <sub>i</sub> (level)	J <sub>i</sub> <sup>π</sup>	E <sub>γ</sub> <sup>†</sup>	I <sub>γ</sub> <sup>‡</sup>	E <sub>f</sub>	J <sub>f</sub> <sup>π</sup>	Mult.#	δ <sup>#</sup>	Γ <sub>γ</sub> <sup>b</sup>	Comments		
3697.1	7/2 <sup>+</sup>	814	3.1 4	2882.47	7/2 <sup>+</sup>						
		1030	4.1 2	2666.84	5/2 <sup>+</sup>	D+Q	0.26 18		Mult.,δ: from A <sub>2</sub> =-0.9 3, A <sub>4</sub> =+0.5 5 (1987Zi02).		
		1109	<0.1	2588.30	5/2 <sup>-</sup>						
		1282	<0.1	2414.9	NOT 1/2 <sup>-</sup>						
		1601	1.0 1	2096.0	3/2						
		3697	91.8 4	0	7/2 <sup>-</sup>	D(+Q)	0.06 10	0.070	Mult.,δ: from A <sub>2</sub> =+0.44 4, A <sub>4</sub> =-0.10 4 (1987Zi02). Other: A <sub>2</sub> =+0.54 3, A <sub>4</sub> =-0.01 5, δ=0.07 +71-7 (1968Yo04).		
3775	3/2 <sup>-</sup>	3775	100	0	7/2 <sup>-</sup>	D(+Q)	0.00 11	0.025	Mult.,δ: from A <sub>2</sub> =-0.14 5, A <sub>4</sub> =-0.03 8 (1968Yo04).		
3781.2	(5/2 <sup>+</sup> )	768	1 1	3014							
		898	2 1	2882.47	7/2 <sup>+</sup>						
		1062	1 1	2719.38							
		1114	6 1	2666.84	5/2 <sup>+</sup>						
		1193	1 1	2588.30	5/2 <sup>-</sup>						
		1685	2 1	2096.0	3/2						
		2064	20 1	1716.48	3/2 <sup>-</sup>						
		3781	67 3	0	7/2 <sup>-</sup>						
		4023.3	7/2 <sup>-</sup>	1140	<0.7	2882.47	7/2 <sup>+</sup>				
				1304	<0.5	2719.38					
1356	24 1			2666.84	5/2 <sup>+</sup>						
1434	2.0 5			2588.30	5/2 <sup>-</sup>						
1927	0.5 5			2096.0	3/2						
2306	2.3 6			1716.48	3/2 <sup>-</sup>						
4023	71 1			0	7/2 <sup>-</sup>	D+Q	+1.1 4	0.016	Mult.,δ: A <sub>2</sub> =+0.506 15, A <sub>4</sub> =-0.332 22 (1968Yo04).		
4030.7	7/2 <sup>-</sup>			1148	<0.4	2882.47	7/2 <sup>+</sup>				
		1442	<0.3	2588.30	5/2 <sup>-</sup>						
		1934	<0.2	2096.0	3/2						
		2314	2.0 6	1716.48	3/2 <sup>-</sup>						
		4030	98.0 6	0	7/2 <sup>-</sup>	D+Q	-1.14 15	0.025	Mult.,δ: from A <sub>2</sub> =+0.46 4, A <sub>4</sub> =-0.27 4 (1987Zi02). Other: A <sub>2</sub> =+0.45 4, A <sub>4</sub> =-0.02 5, δ=0.05 +120-5 (1968Yo04).		
		4245	5/2 <sup>+</sup>	1232	15 1	3014					
1363	11.7 6			2882.47	7/2 <sup>+</sup>						
1526	<0.1			2719.38							
1578	4.3 3			2666.84	5/2 <sup>+</sup>	D+Q	+0.14 9		Mult.,δ: from A <sub>2</sub> =+0.36 7, A <sub>4</sub> =-0.21 9 (1987Zi02). Other: δ=-1.8 3 is alternative solution to γ(θ) (1987Zi02).		
1657	0.4 1			2588.30	5/2 <sup>-</sup>						
1830	0.6 2			2414.9	NOT 1/2 <sup>-</sup>						
2149	51 1			2096.0	3/2	D+Q	0.06 2		Mult.,δ: A <sub>2</sub> =-0.54 2, A <sub>4</sub> =+0.02 2 (1987Zi02).		
2529	0.2 2			1716.48	3/2 <sup>-</sup>						
4245	16.8 5			0	7/2 <sup>-</sup>	D(+Q)	0.03 5	0.051	Mult.,δ: from A <sub>2</sub> =-0.10 4, A <sub>4</sub> =+0.01 5 (1987Zi02). Other: +0.035 +110-35 (1968Yo04).		
4328				1661	<1	2666.84	5/2 <sup>+</sup>				
		1740	18.5 14	2588.30	5/2 <sup>-</sup>						
		1913	<0.9	2414.9	NOT 1/2 <sup>-</sup>						

γ(<sup>41</sup>Sc) (continued)

<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>γ</sub><sup>†</sup></u>	<u>I<sub>γ</sub><sup>‡</sup></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>	<u>Mult.<sup>#</sup></u>	<u>δ<sup>#</sup></u>	<u>Γ<sub>γ</sub><sup>b</sup></u>	<u>Comments</u>
4328		2232	<0.6	2096.0	3/2				
		4328	81.5 14	0	7/2 <sup>-</sup>				
4441	(5/2 <sup>-</sup> ,7/2 <sup>-</sup> )	1255	21.0 15	3185.4	(5/2 <sup>-</sup> ,9/2 <sup>+</sup> )				
		1558	8 2	2882.47	7/2 <sup>+</sup>				
		1721	<0.7	2719.38					
		1773	32.4 17	2666.84	5/2 <sup>+</sup>				
		1852	<0.7	2588.30	5/2 <sup>-</sup>				
		4440	38.6 18	0	7/2 <sup>-</sup>				
4514	5/2 <sup>-</sup> ,9/2 <sup>+</sup>	4514 <sup>a</sup>		0	7/2 <sup>-</sup>	D+Q		0.083	A <sub>2</sub> =+0.48 23, A <sub>4</sub> =+0.41 34 (1968Yo04). Mult.: from A <sub>2</sub> =-0.394 24, A <sub>4</sub> =+0.013 23 (1968Yo04). δ,Γ <sub>γ</sub> : δ=0.16 +5-4 and Γ <sub>γ</sub> = 0.083 eV for J=5/2 and δ=0.035 +18-35 and Γ <sub>γ</sub> =0.050 eV for J=9/2 (1968Yo04).
4810	(5/2 <sup>-</sup> ,7/2 <sup>-</sup> ,9/2 <sup>+</sup> )	4810 <sup>a</sup>		0	7/2 <sup>-</sup>	D+Q	0.17 12	0.093	Mult.,δ: from A <sub>2</sub> =-0.408 23, A <sub>4</sub> =+0.03 3 (1968Yo04). δ,Γ <sub>γ</sub> : for J=5/2; δ=0.035 +9-35 and I(γ+ce)=0.056 eV for J=9/2 (1968Yo04).
4871	5/2 <sup>+</sup>	4871		0	7/2 <sup>-</sup>			0.007	
4953	5/2 <sup>-</sup>	4953		0	7/2 <sup>-</sup>	D+Q	+0.25 9	0.088	Mult.,δ: from A <sub>2</sub> =-0.51 8, A <sub>4</sub> =+0.01 10 (1968Yo04).
5011	7/2 <sup>-</sup>	5011 <sup>a</sup>		0	7/2 <sup>-</sup>	D+Q	0.81 16	0.13	Mult.,δ: from A <sub>2</sub> =+0.56 4, A <sub>4</sub> =-0.16 5 (1968Yo04).
5037.5	9/2 <sup>+</sup>	1678.8 <sup>@</sup> 5	2.7 <sup>@</sup> 5	3358.1	(11/2 <sup>+</sup> )				A <sub>2</sub> =-0.17 18, A <sub>4</sub> =+0.07 19 (1977Ko10).
		2153.9 <sup>@</sup> 5	26 <sup>@</sup> 2	2882.47	7/2 <sup>+</sup>	D+Q	+0.017 +22-7		Mult.,δ: from A <sub>2</sub> =-0.27 4, A <sub>4</sub> =-0.02 4 (1977Ko10).
		5036.9 <sup>@</sup> 5	72 <sup>@</sup> 2	0	7/2 <sup>-</sup>	D+Q	+0.017 +8-15	0.33	Mult.,δ: from A <sub>2</sub> =-0.28 4, A <sub>4</sub> =-0.03 4 (1977Ko10). δ: from 1977Ko10. Other:+0.035 +260-35 (1968Yo04).
5143	(3/2 <sup>-</sup> )	5143		0	7/2 <sup>-</sup>			0.005	
5379	(5/2 <sup>+</sup> )	5379		0	7/2 <sup>-</sup>			0.072	
5574	(5/2 <sup>+</sup> )	5574		0	7/2 <sup>-</sup>			0.028	
5653	(5/2 <sup>-</sup> ,7/2 <sup>-</sup> )	5653		0	7/2 <sup>-</sup>			0.081	Γ <sub>γ</sub> : for J=5/2; 0.061 eV for J=7/2 (1968Yo04).
5710	(5/2 <sup>-</sup> ,7/2 <sup>-</sup> )	5710		0	7/2 <sup>-</sup>			0.314	Γ <sub>γ</sub> : for J=5/2; 0.236 eV for J=7/2 (1968Yo04).
5859	(3/2 <sup>-</sup> )	5859		0	7/2 <sup>-</sup>			0.036	
5872	(5/2 <sup>-</sup> ,7/2 <sup>-</sup> )	5872		0	7/2 <sup>-</sup>			0.308	Γ <sub>γ</sub> : for J=5/2; 0.231 eV for J=7/2 (1968Yo04).
5937	(3/2 <sup>+</sup> ,5/2 <sup>+</sup> )	1690.4 <sup>&amp;</sup> 8	60 <sup>&amp;</sup> 3	4245	5/2 <sup>+</sup>	D(+Q) <sup>&amp;</sup>	-0.04 8		δ: or -3.7 10 for J=3/2; δ=-0.40 6 for J=5/2 (1976Fo01). Mult.: A <sub>2</sub> =-0.04 2 (1976Fo01).
		2161.0 <sup>&amp;</sup> 15	5 <sup>&amp;</sup> 3	3781.2	(5/2 <sup>+</sup> )				
		2523.0 <sup>&amp;</sup> 24	18 <sup>&amp;</sup> 3	3411.8	1/2 <sup>+</sup>				
		3270.4 <sup>&amp;</sup> 15	17 <sup>&amp;</sup> 2	2666.84	5/2 <sup>+</sup>	D+Q <sup>&amp;</sup>	-0.41 16		δ: or -1.5 4 for J=3/2; δ=-0.13 23 for J=5/2

<sup>40</sup>Ca(p,γ) [1987Zi02](#),[1968Yo04](#) (continued)

γ(<sup>41</sup>Sc) (continued)

<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>γ</sub><sup>†</sup></u>	<u>I<sub>γ</sub><sup>‡</sup></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>	<u>Γ<sub>γ</sub><sup>b</sup></u>	<u>Comments</u>
							( <a href="#">1976Fo01</a> ).
							Mult.: A <sub>2</sub> =+0.27 21 ( <a href="#">1976Fo01</a> ).
5937	(3/2 <sup>+</sup> ,5/2 <sup>+</sup> )	3843 <sup>&amp;c</sup>	<13 <sup>&amp;</sup>	2096.0	3/2		
5973	(5/2 <sup>-</sup> ,7/2 <sup>-</sup> )	5973		0	7/2 <sup>-</sup>	0.092	Γ <sub>γ</sub> : for J=5/2; 0.069 eV for J=7/2 ( <a href="#">1968Yo04</a> ).
6149	(5/2 <sup>+</sup> )	6149		0	7/2 <sup>-</sup>	0.19	

<sup>†</sup> From level-energy differences, rounded off to nearest keV, except where noted.

<sup>‡</sup> Relative branching ratios from [1987Zi02](#), except where noted.

# From γ(θ). Angular distribution coefficients provided in the comments.

@ From [1977Ko10](#).

& From [1976Fo11](#). Multipolarities from γ(θ) measurements.

<sup>a</sup> From [1968Yo04](#).

<sup>b</sup> In eV from [1968Yo04](#), except where noted.

<sup>c</sup> Placement of transition in the level scheme is uncertain.

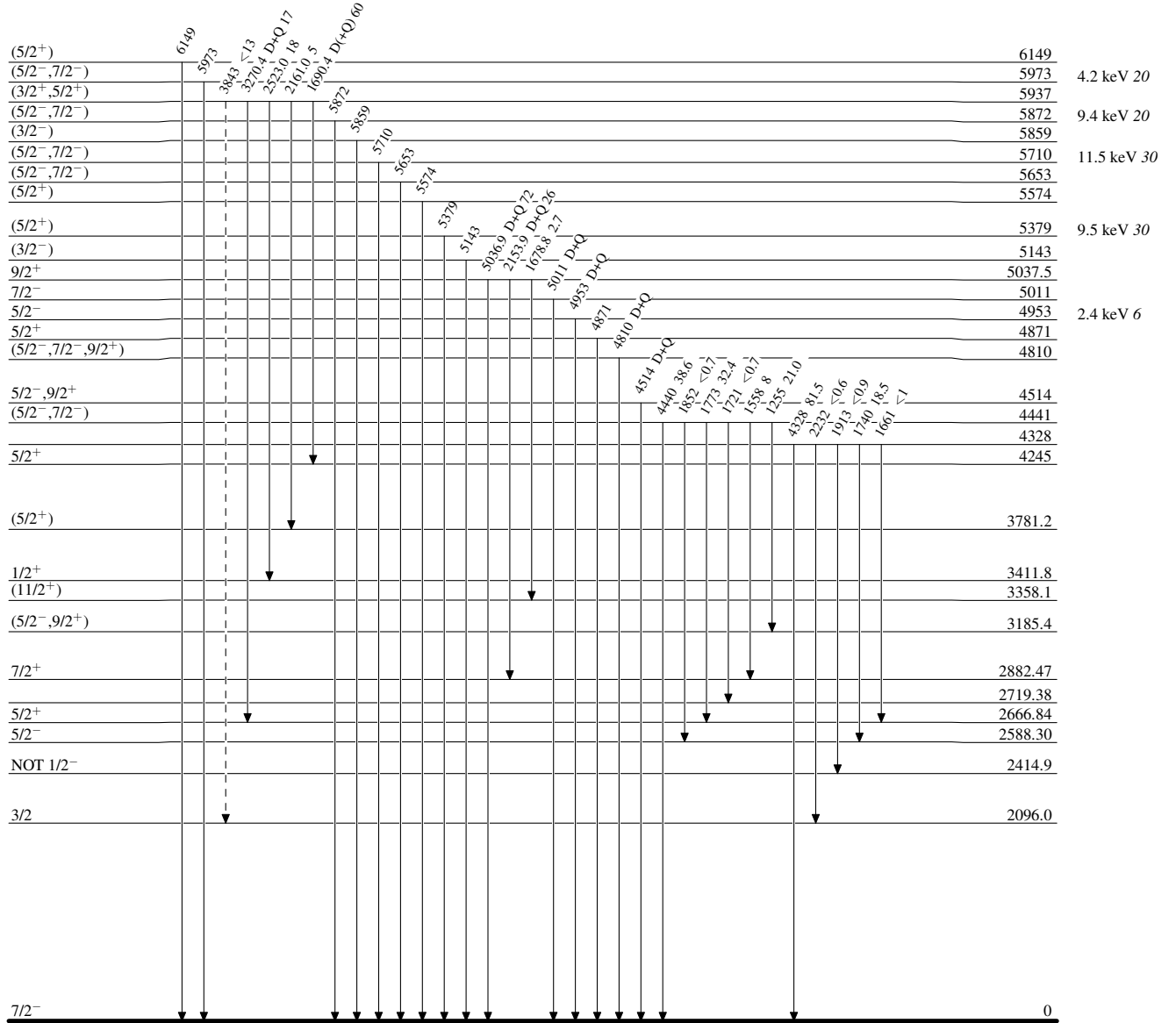
$^{40}\text{Ca}(p,\gamma)$  1987Zi02,1968Yo04

Legend

Level Scheme

Intensities: % photon branching from each level

-----▶  $\gamma$  Decay (Uncertain)



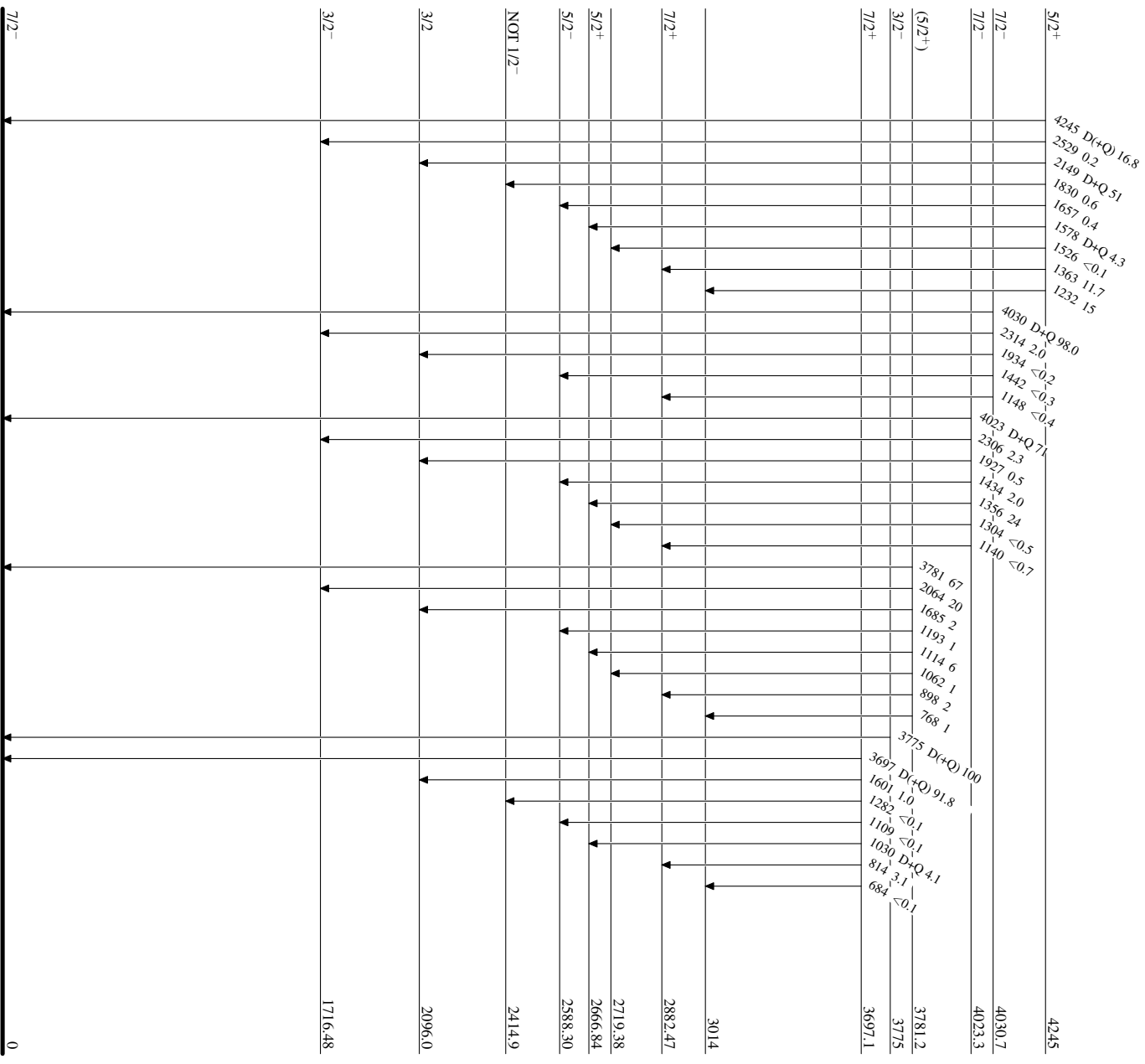
$^{41}_{21}\text{Sc}_{20}$



<sup>40</sup>Ca(p,γ) 1987Zr02,1968Y004

Level Scheme (continued)

Intensities: % photon branching from each level

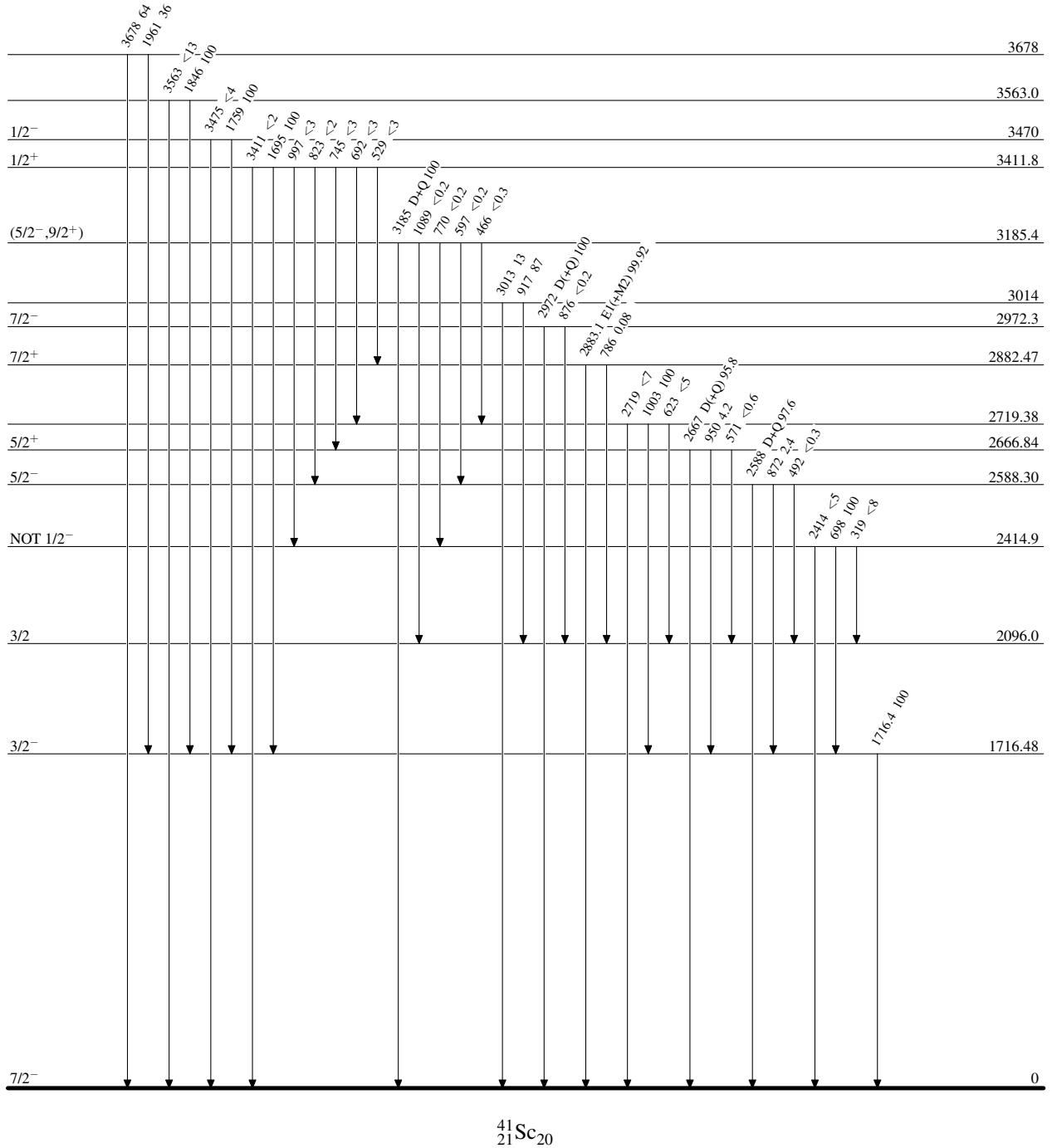


<sup>41</sup>Sc<sub>20</sub>

$^{40}\text{Ca}(p,\gamma)$  1987Zi02,1968Yo04

## Level Scheme (continued)

Intensities: % photon branching from each level

 $^{41}_{21}\text{Sc}_{20}$