^{28}Si(α,γ) 1977Ro07,2002Ba81

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Christian Ouellet, Balraj Singh	NDS 112, 2199 (2011)	24-Aug-2011

1977Ro07: E=1.4-3.8 MeV α from NRC 4 mv Van de Graaff accelerator at the National Research Council, Canada. Si crystal target. NaI detector for thick target measurements of yields and thus resonance strengths, Ge detector for measurements of γ spectra.

2002Ba81: E=2.91 MeV α from the Van de Graaff of the University of Tubingen. Thick Si target. Four fold segmented Ge detector. Measured Eγ, Iγ. Deduced resonance strengths.

1971Ch52: E=4.2-6.0 MeV α from the Van de Graaff accelerator at the Centre de Recherches Nucleaires, Strasbourg. Enriched ^{28}Si targets (98% ^{28}Si). NaI detectors for angular distributions and Ge detector for Iγ. Resonant strength data is presented in an odd fashion and should be considered approximate at best. By the same group: 1969Ve01 with angular correlation, 1967Ve05.

1971To06: E=1.4-2.7 MeV from the Caltech electrostatic generator. Enriched targets (99.91% ^{28}Si). NaI detectors. Estimated resonance strengths.

1964Sm03: α from the 3 MV Van de Graaff at Fysisch Laboratorium der Rijksuniversiteit, Utrecht. Natural Si targets. NaI detectors. Measured absolute yields, angular distributions and correlations.

Other papers: 1965La13.

^{32}S Levels

E(level)[†]	J$^{\pi}$[‡]	$T_{1/2}$	Comments
0	0^+		
2230	2^+[#]		
3778			
4280			
4460	4^+[#]		
4700			
5010	3^-[#]		
5410			
5550			
5790			
6440			
7120			
7500			
7530			
8494 *2*			Eα=1770 (2002Ba81), 1767 *2* (1977Ro07), 1776 *5* (1971To06). Resonance Strength=16 meV 3 (1977Ro07), 25 meV 7 (1971To06).
8690 *2*			Eα=1990 *3* (1977Ro07), 1995 *5* (1971To06). Resonance Strength=12 meV 2.4 (1977Ro07), 20 meV 6 (1971To06).
8861 *2*			Eα=2187 *3* (1977Ro07), 2187 *7* (1971To06). Resonance Strength=16 meV 3 (1977Ro07), 41 meV 14 (1971To06).
9023 *2*			Eα=2370 (2002Ba81), 2371 *3* (1977Ro07), 2370 *4* (1971To06). Resonance Strength=52 meV 10 (1977Ro07), 93 meV 23 (1971To06).
9065 *2*		<14 fs	Eα=2420 (2002Ba81), 2419 *2* (1977Ro07), 2415 *5* (1971To06). Resonance Strength=64 meV 13 (1977Ro07), 134 meV 34 (1971To06).
9236 *2*			Eα=2610 (2002Ba81), 2614 *2* (1977Ro07), 2618 *4* (1971To06). Resonance Strength=540 meV 100 (1977Ro07), 61 meV 15 (1971To06), 0.3 eV (1964Sm03).
9466.0 *15*	2^+		Eα=2880 (2002Ba81), 2877.5 *16* (1977Ro07). Resonance Strength=720 meV 150 (1977Ro07), 0.4 eV (1964Sm03). J$^{\pi}$: from 1964Sm03.
9486 *2*	1^-		Eα=2900 (2002Ba81), 2901 *2* (1977Ro07). Resonance Strength=830 meV 170 (1977Ro07), 0.7 eV (1964Sm03). J$^{\pi}$: from 1964Sm03.
9712 *2*	2^+		Eα=3159 *2* (1977Ro07). Resonance Strength=630 meV 130 (1977Ro07), 0.3 eV (1964Sm03). J$^{\pi}$: from 1964Sm03.

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^{28}Si(α,γ) 1977Ro07,2002Ba81 (continued)

^{32}S Levels (continued)

E(level)†	J$^{\pi}$‡	Comments
9854? *6*		
9935 *6*		
9997? *6*		
10113 *6*		
10220 *2*		Eα=3739 *2* (1977Ro07). Resonance Strength=8.1 eV 16 (1977Ro07).
10285 *2*		Eα=3814 *2* (1977Ro07). Resonance Strength=2.3 eV 4 (1977Ro07).
10298 *8*		
10341 *8*		
10442 *8*		
10533 *8*		
10633 *8*		
10711 *8*		
10790	1	Eα=4391 (1971Ch52). Resonance Strength=6.0 eV 2 (1971Ch52).
10806	2	Eα=4409 (1971Ch52). Resonance Strength=33 eV 11 (1971Ch52).
10832	1	Eα=4439 (1971Ch52). Resonance Strength=10.0 eV 5 (1971Ch52).
10841	2	Eα=4449 (1971Ch52). Resonance Strength=5.0 eV 18 (1971Ch52).
10851	1	Eα=4460 (1971Ch52). Resonance Strength=0.15 eV 10 (1971Ch52).
10941	1	Eα=4563 (1971Ch52). Resonance Strength=18.0 eV 6 (1971Ch52).
10998	(4)	Eα=4628 (1971Ch52). Resonance Strength=4.2 eV 14 (1971Ch52).
11052	(4)	Eα=4690 (1971Ch52). Resonance Strength=2.2 eV 7 (1971Ch52).
11078	2	Eα=4720 (1971Ch52). Resonance Strength=30 eV 15 (1971Ch52).
11110		Eα=4757 (1971Ch52). Resonance Strength=0.10 eV<(1971Ch52).
11746	1	Eα=5483 (1971Ch52). Resonance Strength=3.7 eV 12 (1971Ch52).
11785	1	Eα=5528 (1971Ch52). Resonance Strength=0.05 eV 3 (1971Ch52).
11803	1,2	Eα=5549 (1971Ch52) this is an unresolved doublet. Resonance Strength=14 eV 5 (1971Ch52).
12021	1	Eα=5798 (1971Ch52). Resonance Strength=32 eV 11 (1971Ch52).
12048		J$^{\pi}$: 3 is reported but does not seem correct. Eα=5828 (1971Ch52). Resonance Strength=14 eV 5 (1971Ch52).

† From 2002Ba81, unless there is an α energy listed.
‡ From $\gamma(\theta)$ (1971Ch52).
# From $\gamma\gamma(\theta)$ (1969Ve01).

^{28}Si(α,γ) 1977Ro07,2002Ba81 (continued)

$\gamma(^{32}S)$

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ[#]	Comments
8494		4212[@]	<8[‡]	4280				
		4716[@]	<3[‡]	3778				
		6263	40[‡] *4*	2230	2^+			Additional information 1.
		8493	60[‡] *4*	0	0^+			Additional information 2.
8690		4909	12 *4*	3778				
		6459	56 *5*	2230	2^+			
		8687	32 *4*	0	0^+			
8861		5080	14 *4*	3778				
		6630	34 *4*	2230	2^+			
		8858	52 *5*	0	0^+			
9023		4008	19 *2*	5010	3^-			
		4742	20 *2*	4280				
		6791	61 *2*	2230	2^+			
9065		3654	43 *2*	5410				
		4604	41 *2*	4460	4^+			
		4784	17 *3*	4280				
9236		4541	8.8 *4*	4700				Additional information 3.
		5458	29.5 *11*	3778				Additional information 4.
		7004	58.7 *12*	2230	2^+			Additional information 5.
		9234	3.0 *2*	0	0^+			Additional information 6.
9466.0	2^+	3675	4 *1*	5790				
		3915	4 *1*	5550				
		4455	4 *1*	5010	3^-			
		4770	20 *2*	4700				
		5005	4 *1*	4460	4^+			
		5688	5 *1*	3778				
		7234	26 *2*	2230	2^+			
		9463	34 *2*	0	0^+			
9486	1^-	2371	2.5[‡] *3*	7120				Additional information 7.
		4480	1.5[‡] *1*	5010	3^-			Additional information 8.
		5204	10.9[‡] *6*	4280				Additional information 9.
		5708[@]	<0.5[‡]	3778				Additional information 10.
		7255[@]	<0.3[‡]	2230	2^+			Additional information 11.
		9482	85.1[‡] *7*	0	0^+			Additional information 12.
9712	2^+	5011	34 *9*	4700				
		7480	57 *6*	2230	2^+			
		9709	9 *3*	0	0^+			
10220		3100	<2	7120				
		5209	68 *2*	5010	3^-	D(+Q)	−0.06 *6*	Mult.,δ: from 1969Ve01.
		5519	<2	4700				
		5763	21 *2*	4460	4^+	D+Q	−0.09 *2*	Mult.,δ: from $\gamma\gamma(\theta)$ 1969Ve01.
		7988	11 *1*	2230	2^+	D+Q	+0.11 *5*	Mult.,δ: from $\gamma\gamma(\theta)$ 1969Ve01.
10285		5274	79 *2*	5010	3^-			
		5824	15 *2*	4460	4^+			
		8053	6 *1*	2230	2^+			
		10283	<1	0	0^+			
10790	1	3260	<10	7530				
		5779	11	5010	3^-			
		6089	12	4700				
		6509	7	4280				
		8558	33	2230	2^+			A_2=+0.3 *2* (1971Ch52). Mult.,δ: −0.3 *2* or 1.4 *12* (1971Ch52).
		10786	37	0	0^+			A_2=−0.92 *4* (1971Ch52).

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^{28}Si(α,γ) 1977Ro07,2002Ba81 (continued)

$\gamma(^{32}S)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.#	δ#	Comments
10806	2	5395	4	5410				
		5795	10	5010	3^-			
		6105	2	4700				
		6525	9	4280				
		8574	46	2230	2^+	D+Q	−0.19 *6*	A_2=+0.25 *10*, A_4=−0.40 *18* (1971Ch52).
		10802	29	0	0^+			A_2=+0.4 *1*, A_4=−1.2 *2* (1971Ch52).
10832	1	5421	<10	5410				
		5821	15	5010	3^-			
		8600	<10	2230	2^+			
		10828	85	0	0^+			A_2=−1.0 *1* (1971Ch52).
10841	2	5430	10	5410				
		5830	10	5010	3^-			
		6560	30	4280		D+Q	+0.54 *15*	A_2=+1.1 *1*, A_4=−0.08 *15* (1971Ch52).
		8609	40	2230	2^+	D+Q	+0.60 *12*	A_2=+1.1 *1*, A_4=+0.05 *10* (1971Ch52).
		10837	10	0	0^+			A_2=−0.30 *4*, A_4=−0.64 *5* (1971Ch52).
10851	1	6570	<15	4280				
		8618	<30	2230	2^+			
		10847	>55	0	0^+			A_2=−1.1 *1* (1971Ch52).
10941	1	8708	28	2230	2^+			A_2=−0.1 *2* (1971Ch52). δ: 0.00 *18* or 3.0 *15* (1971Ch52).
		10937	72	0	0^+			A_2=−1.10 *5* (1971Ch52).
10998	(4)	4557	8	6440				
		5987	4	5010	3^-			
		6537	88	4460	4^+			A_2=+0.21 *7*, A_4=+0.14 *10* (1971Ch52).
11052	(4)	4611	<5	6440				
		6041	<5	5010	3^-			
		6590	100	4460	4^+			A_2=+0.14 *7*, A_4=+0.15 *8* (1971Ch52).
11078	2	11074	100	0	0^+			A_2=+0.6 *3*, A_4=−1.8 *4* (1971Ch52).
11110		6099	<40	5010	3^-			
		8877	>60	2230	2^+			
11746	1	7464	98	4280				A_2=+0.15 *2* (1971Ch52). δ: −0.21 *2* or 1.8 *1* (1971Ch52).
		11741	2	0	0^+			A_2=−1.0 *1* (1971Ch52).
11785	1	11780	100	0	0^+			A_2=−0.95 *6* (1971Ch52).
11803	1,2	4682	<5	7120				I_γ: intensity seen in only one part of the doublet.
		11798	100	0	0^+			A_2=+0.40 *15*, A_4=−1.4 *2* (1971Ch52).
12021	1	4520	7	7500				
		4900	10	7120				
		9788	10	2230	2^+			
		12016	73	0	0^+			A_2=−1.1 *1* (1971Ch52).
12048		6497	<10	5550				
		12043	100	0	0^+	(D)		Mult.,δ: D+Q with δ=−0.03 2. A_2=−0.40 *4*, A_4=+0.08 *6* (1971Ch52).

† For levels below 10790 from 1977Ro07, levels above from 1971Ch52, except where noted.
‡ From 2002Ba81.
# From 1971Ch52.
@ Placement of transition in the level scheme is uncertain.

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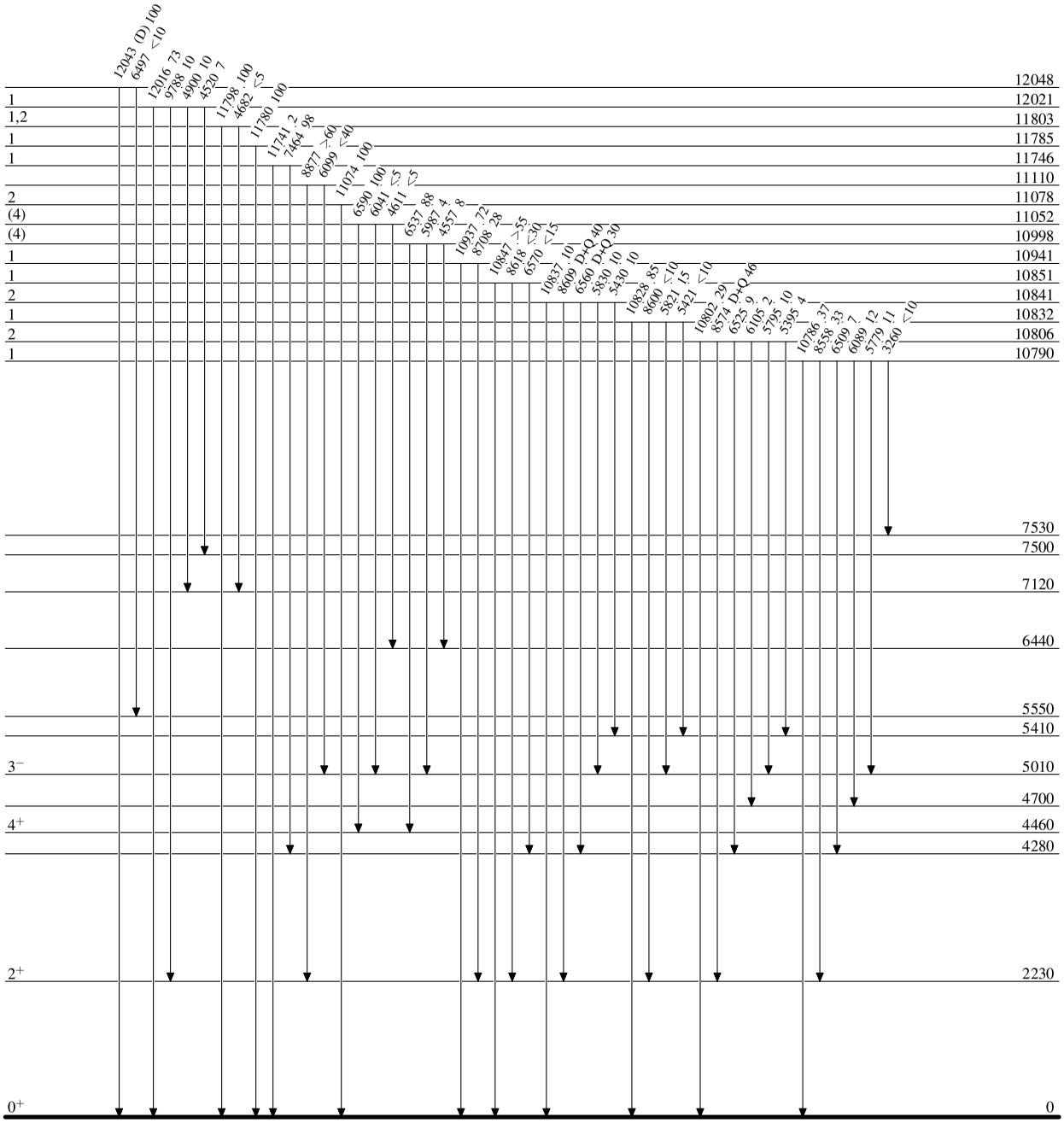
Level Scheme

Intensities: % photon branching from each level



$^{32}_{16}S_{16}$

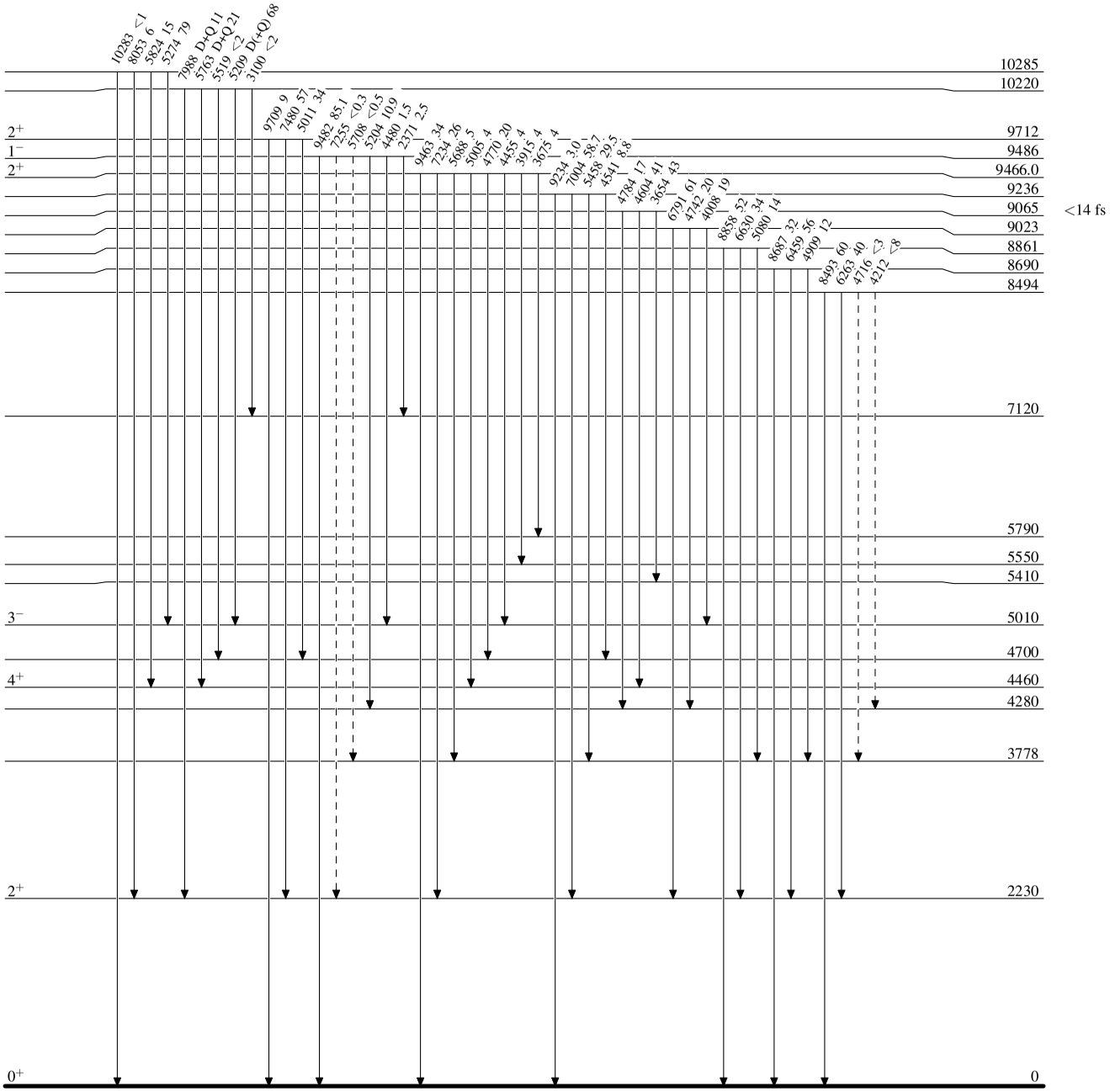
^{28}Si(α,γ) 1977Ro07,2002Ba81

Legend

Level Scheme (continued)

Intensities: % photon branching from each level

– – – – – – ► γ Decay (Uncertain)



$^{32}_{16}S_{16}$