^{28}Si(α,d),(^{3}He,p),(^{3}He,pγ) 1976De24,1974Ha38,1968Ve04

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia	NDS 111, 2331 (2010)	30-Jun-2010

Others:

1979Ve04: ^{28}Si(α,dγ): natural target, projectile E=50 MeV.

1970Gr19: ^{28}Si(^{3}He,p), natural target, projectile E=4.3-11.0 MeV.

1966Ri04: ^{28}Si(α,dγ): transistor-grade target, E=50.8 MeV.

1974De24: ^{28}Si(α,d),^{28}Si(^{3}He,p): Natural Si target, Projectile: α and ^{3}He, E=40 MeV and 24.5 MeV, respectively; E-E particle telescope followed by another particle detector; measured deuteron and proton spectra; deduced excited level energy, L value, J^π, differential σ; DWBA analysis.

1974Ha38: ^{28}Si(^{3}He,p): 99.9% enriched Si_2O target; projectile ^{3}He, E=16 and 28 MeV; The protons were detected using emulsion plates and in a multigap spectrograph for the 16 and 28 MeV data, respectively; energy resolution 35 to 40 MeV (FWHM); deduced excited level energies, L values and σ; DWBA analysis.

1968Ve04: ^{28}Si(^{3}He,pγ): projectile E=6.2 MeV; annular surface barrier detector, NaI(Tl) detector; measured particle-γ-ray angular correlation, Eγ, Iγ, δ; deduced excited level, J^π.

1970Gr19: ^{28}Si(^{3}He,p), natural target, projectile E=4.3-11.0 MeV; 14 silicon solid state detectors; proton spectra were measured between 10° to 170°; deduced GS and four lowest excited states in ^{30}P, L values.

^{30}P Levels

E(level)†	J^π†	L#	L@	Comments
0	1^+	2	(0+2)	σ_{int}= 383 and 201 μb (1974Ha38); 320 and 32 μb/sr (1976De24).
677.01 *3*	0^+			
708.70 *3*	1^+	0	(0+2)	σ_{int}=668 and 539 μb (1974Ha38); 650 (doublet) and 14 μb/sr (1976De24).
1454.23 *2*	2^+	2	(2)	σ_{int}=117 and 85 μb (1974Ha38); 95 and 13 μb/sr (1976De24).
1973.27 *4*	3^+	4	(2+4)	σ_{int}=306 and 294 μb (1974Ha38); 380 and 60 μb/sr (1976De24).
2538.95 *5*	(3^+)	2	(2+4)	σ_{int}=204 and 232 μb (1974Ha38); 260 and 35 μb/sr (1976De24).
2723.72 *7*	2^+		(2)	σ_{int}=97 and 89 μb (1974Ha38).
2839.34 *4*	(3^+)	2	(0+2,2+4)	σ_{int}=143 and 137 μb (1974Ha38); 30 μb/sr (α,d) (1976De24).
2937.46 *2*	2^+		(2)	σ_{int}=303 and 298 μb (1974Ha38); ≈200 (1976De24).
3019.2 *1*	1^+		(0+2)	σ_{int}=459 and 281 μb (1974Ha38); 400 (1976De24).
3733.80 *7*	(1^+)		(2)	σ_{int}=84 and 43 μb (1974Ha38). L: (0+2) at 28 MeV.
3835.80 *5*	2^+		(1)	σ_{int}=92 and 62 μb (1974Ha38). L: (1+3) at 28 MeV.
3928.61 *5*	3^+		(2)	σ_{int}=231 and 130 μb (1974Ha38); 180 (1976De24).
4143.63 *6*	2^-	3		σ=1300 and 55 μb/sr (1976De24).
4182.81 *6*	2^+		(1+3)	σ_{int}=2446 and 941 μb (1974Ha38).
4231.97 *9*	4^-	3	(3)	σ_{int}=533 and 610 μb (1974Ha38); 800 and 100 μb/sr (1976De24). L: (1+3) at 28 MeV.
4298.6 *2*	4^+		(4)	σ_{int}=129 and 136 μb (1974Ha38). L: (2+4) at 28 MeV.
4343.8 *1*	5^+	3,2	(2+4)	σ_{int}=202 and 114 μb (1974Ha38); 15 μb/sr (α,d) (1976De24).
4422.8 *1*	2^+		(2)	σ_{int}=94 and 67 μb (1974Ha38).
4468.33 *7*	0^+			
4502.21 *9*	1^+			σ_{int}=132 and 71 μb (1974Ha38).
4625.92 *8*	3^-		(1+3)	σ_{int}=527 and 191 μb (1974Ha38); ≈150 (1976De24). L: (3) at 28 MeV.
4736.03 *8*	3^+		(3)	σ_{int}=107 and 104 μb (1974Ha38). L: (1+3) at 28 MeV.
4926.0 *2*	$(3^-,5^-)$			E(level): 4921 keV J=1,2 in 1968Ve04. σ=160 and 50 μb/sr (1976De24) for doublet (4926 and 4937).
4937.3 *2*	1		(0+2)	σ_{int}=250 and 211 μb (1974Ha38).
5027 *4*	5^-,$(4^-,6^-)$		(2+4)	σ_{int}=126 and 95 μb (1974Ha38).
5206.8 *1*	3^+			σ_{int}=291 μb (1974Ha38).

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^{28}Si(α,d),(^{3}He,p),(^{3}He,pγ) 1976De24,1974Ha38,1968Ve04 (continued)

^{30}P Levels (continued)

E(level)†	L#	L@	Comments
5230.1 *3*			σ_{int}=49 and 133 μb (1974Ha38).
5410 *15*		(0+2)	σ=260 (1976De24).
5496 *15*		(0+2)	L: at 28 MeV.
5594 *15*			
5704 *15*			
5807 *15*			
5883 *15*			
5997 *15*			
6089 *15*			σ=1200 (1976De24).
6230 *15*			
6294 *15*			
6476 *15*	(3,4)		σ=400 and ≈30 μb/sr (1976De24).
6661 *15*			σ=2000 (1976De24).
6775 *15*			
6865 *15*			σ=700 (1976De24).
6916 *15*			
7040 *15*			σ=300 (1976De24).
7180 *15*			σ ≈ 500 (1976De24).
7289 *15*	(6)		E(level): 7231(50) in 1976De24.
7339 *15*	(6)		E(level): 7392(50) in 1976De24.
7628‡ *50*			σ=820 (1976De24).
7972‡ *50*			σ=2000 (1976De24).

† Up to 5230 keV from Adopted Levels, above level energies are from 1974Ha38, except otherwise noted.
‡ From 1976De24.
# From ((α,D) – 1976De24).
@ From ((^{3}He,p) at 16 MeV – 1974Ha38). These data are in good agreement with the data in 1976De24 (^{3}He,p) and in 1970Gr19 (^{3}He,p).

γ(^{30}P)

E_i(level)	J_i^π	E_γ†	I_γ#	E_f	J_f^π	Comments
1454.23	2+	745.53 *4*	5 *4*	708.70	1+	
		1454.23 *2*	95 *4*	0	1+	A_2=0.83(3), A_4=0.00(5) (1968Ve04).
1973.27	3+	519‡	<4	1454.23	2+	
		1264.57 *5*	59 *5*	708.70	1+	A_2=0.29(8), A_4=−0.15(14) (1968Ve04).
		1973.27 *4*	41 *5*	0	1+	A_2=0.29(10), A_4=−0.38(16) (1968Ve04).
2538.95	(3+)	565.68 *6*	<10	1973.27	3+	
		1085‡	5 *4*	1454.23	2+	
		1830.25 *6*	<5	708.70	1+	I_γ: For doublet.
		1862‡		677.01	0+	
		2538.95 *5*	95 *4*	0	1+	A_2=0.29(10), A_4=−0.52(15) (1968Ve04).
2723.72	2+	750‡	<2	1973.27	3+	
		1269‡	<3	1454.23	2+	
		2015‡	<2	708.70	1+	I_γ: For doublet.
		2047‡	<2	677.01	0+	
		2723.72 *7*	100	0	1+	A_2=0.42(10), A_4=0.36(14) (1968Ve04).
2839.34	(3+)	1385.11 *4*	28 *4*	1454.23	2+	
		2130.64 *5*	50 *4*	708.70	1+	A_2=0.50(15), A_4=−0.37(23) (1968Ve04).

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^{28}Si(α,d),(^{3}He,p),(^{3}He,pγ) 1976De24,1974Ha38,1968Ve04 (continued)

γ(^{30}P) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[#]	E_f	J_f^π	Comments
2839.34	(3$^+$)	2839.34 *4*	22 *3*	0	1$^+$	A_2=0.47(11), A_4=−0.10(17) (1968Ve04).
2937.46	2$^+$	1483.23 *3*	47 *6*	1454.23	2$^+$	
		2260.45 *4*	43 *6*	677.01	0$^+$	
		2937.46 *2*	10 *6*	0	1$^+$	
3019.2	1$^+$	2342.2 *1*	100	677.01	0$^+$	A_2=−0.74(14), A_4=−0.11(23) (1968Ve04).
		3019[‡]	<1	0	1$^+$	
3733.80	(1$^+$)	796.30 *7*	7 *3*	2937.46	2$^+$	
		2279.60 *7*	18 *6*	1454.23	2$^+$	
		3056.80 *8*	29 *5*	677.01	0$^+$	
		3733.80 *7*	46 *6*	0	1$^+$	A_2=−0.03(6), A_4=−0.01(11) (1968Ve04).
3835.80	2$^+$	898.34 *5*	60 *6*	2937.46	2$^+$	A_2=0.32(12), A_4=−0.23(19) (1968Ve04).
		2381.57 *5*	16 *4*	1454.23	2$^+$	
		3159[‡]	18 *6*	677.01	0$^+$	E_γ: In Adopted Gammas a 3127γ is feeding 1$^+$ state at 708 keV.
		3836[‡]	6 *3*	0	1$^+$	
3928.61	3$^+$	991.15 *5*	55 *6*	2937.46	2$^+$	A_2=0.39(9), A_4=−0.06(16) (1968Ve04).
		2474.38 *5*	35 *6*	1454.23	2$^+$	
		3220[‡]	<10	708.70	1$^+$	I_γ: For doublet.
		3252[‡]		677.01	0$^+$	
		3928[‡]	<6	0	1$^+$	
4143.63	2$^-$	2689.40 *6*	16 *5*	1454.23	2$^+$	
		3434.93 *7*	14 *5*	708.70	1$^+$	
		4143.63 *6*	70 *4*	0	1$^+$	A_2=−0.43(3), A_4=−0.07(5) (1968Ve04).
4182.81	2$^+$	1245[‡]		2937.46	2$^+$	E_γ: This γ-ray is not in the Adopted Gammas.
		3474.11 *7*		708.70	1$^+$	
		4182.81 *6*		0	1$^+$	
4231.97	4$^-$	1693.02 *10*	19 *4*	2538.95	(3$^+$)	
		2258.70 *10*	69 *4*	1973.27	3$^+$	
		2778[‡]	12 *5*	1454.23	2$^+$	E_γ: In Adopted Gammas a 1392.63γ feeding a (3$^+$) level at 2839 keV.
		4232[‡]	<10	0	1$^+$	
4502.21	1$^+$	1483[‡]		3019.2	1$^+$	
		3047.98 *9*	58 *5*	1454.23	2$^+$	A_2=0.04(13), A_4=−0.10(21) (1968Ve04).
		3793.51 *9*	<9	708.70	1$^+$	
		4502.21 *9*	42 *5*	0	1$^+$	A_2=−0.01(3), A_4=−0.09(5) (1968Ve04).
4625.92	3$^-$	1688.46 *8*	27 *5*	2937.46	2$^+$	A_2=0.10(27), A_4=0.42(43) (1968Ve04).
		2652.65 *9*	14 *6*	1973.27	3$^+$	
		3171.69 *8*	59 *7*	1454.23	2$^+$	A_2=0.27(7), A_4=−0.05(11) (1968Ve04).
		3917	<11	708.70	1$^+$	I_γ: For doublet.
		3949		677.01	0$^+$	
4736.03	3$^+$	1798.57 *7*	58 *6*	2937.46	2$^+$	A_2=−0.27(07), A_4=0.14(11) (1968Ve04).
		3281.80 *7*	18 *5*	1454.23	2$^+$	
		4027.33 *9*	15 *5*	708.70	1$^+$	I_γ: For doublet.
		4059[‡]		677.01	0$^+$	
		4736.03 *7*	9 *5*	0	1$^+$	

[†] From Adopted Gammas, except otherwise noted.
[‡] Reported in 1968Ve04. γ-ray energy calculated from level energy difference by the evaluator.
[#] From 1968Ve04.

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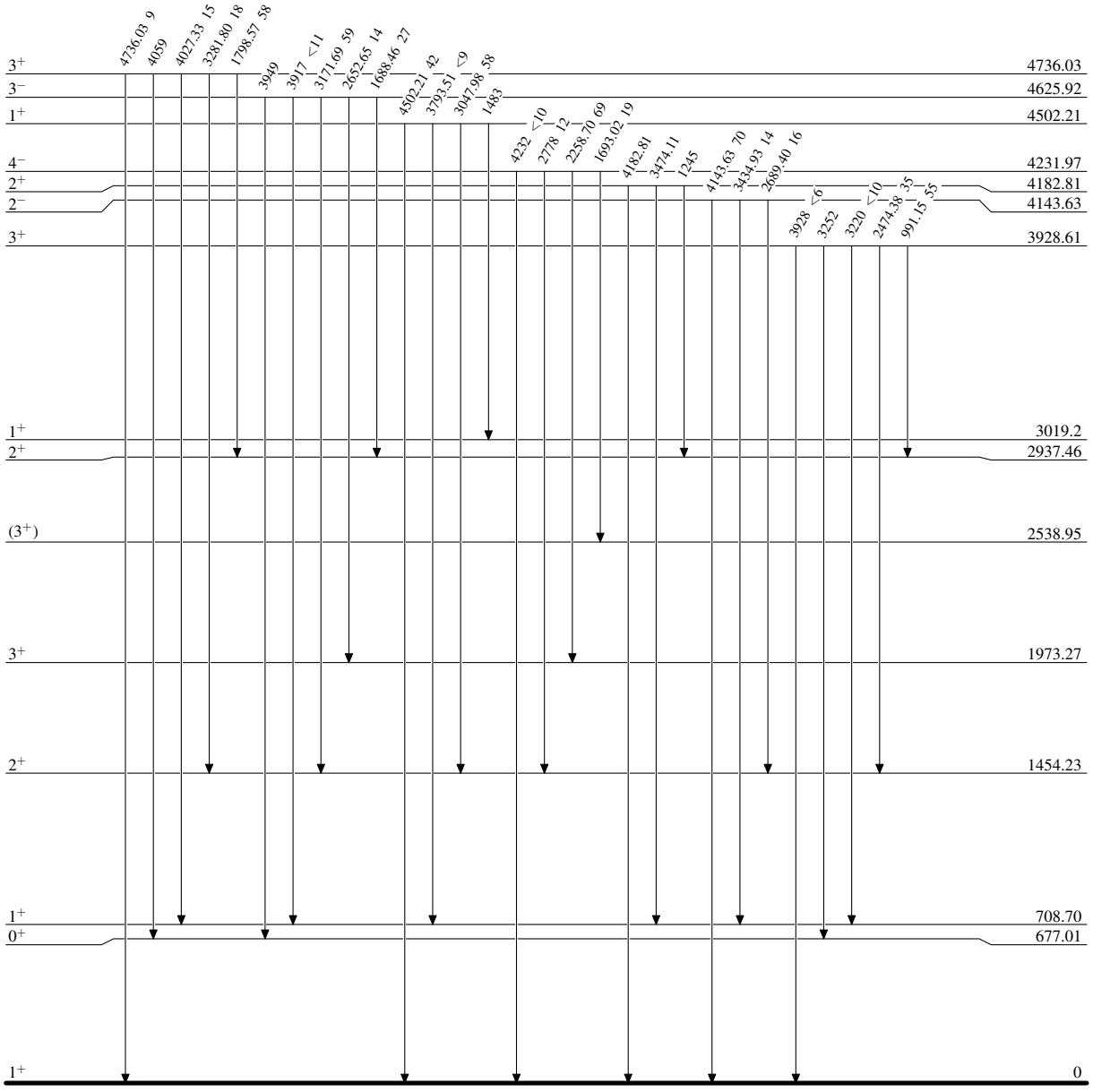
Level Scheme

Intensities: % photon branching from each level

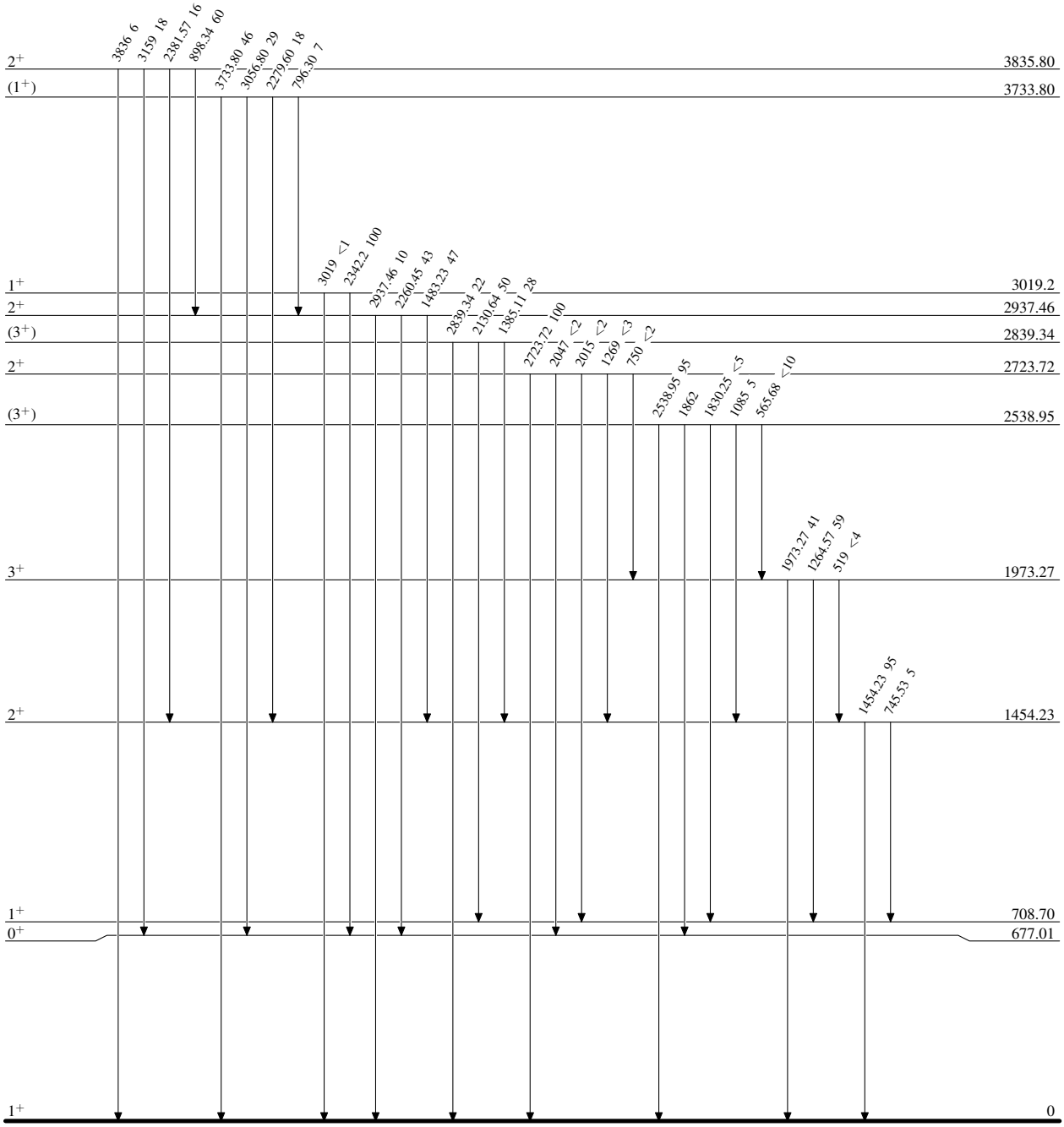


$^{30}_{15}P_{15}$

^{28}Si(α,d),(^{3}He,p),(^{3}He,pγ) 1976De24,1974Ha38,1968Ve04

Level Scheme (continued)

Intensities: % photon branching from each level



$^{30}_{15}P_{15}$