^{4}He(^{28}Si,α):resonances   2010Lo12

	Type	Author	History Citation	Literature Cutoff Date
	Full Evaluation	Jun Chen	NDS 201,1 (2025)	31-Oct-2024

Inverse kinematics reaction. See ^{28}Si(α,α) dataset for normal kinematics reaction.

2010Lo12 (also 2011No06): E=150 MeV ^{28}Si beam was produced from the K-130 cyclotron at the JYFL facility in Finland. Helium gas target. Recoiling α-particles detected by an array of six standard silicon surface barrier detectors, each separated by 6°, with thickness of 1.5-5 mm and in area 50-200 mm^2. Measured $\sigma(E_\alpha,\theta)$. FWHM=50-100 keV. Deduced resonance, L, widths for 30 new levels from R-Matrix analysis. Discussion in terms of α-cluster structure in the quasi-continuum of ^{32}S.

^{32}S Levels

Γ_α/Γ values given under comments are upper limits in most cases. Also given under comments are $\Gamma_\alpha/\gamma_\alpha^2$, where γ_α^2 is reduced width.

E(level)	$\Gamma^\dagger$	L‡	Comments
10250	(0.04 mev)	0	Γ_α/Γ=0.40, $\Gamma_\alpha/\gamma_\alpha^2$=0.015.
10380	0.03 MeV	0	Γ_α/Γ=0.20, $\Gamma_\alpha/\gamma_\alpha^2$=0.023.
10460	0.03 MeV	0	Γ_α/Γ=0.40, $\Gamma_\alpha/\gamma_\alpha^2$=0.031.
10530	0.02 MeV	1	Γ_α/Γ=0.15, $\Gamma_\alpha/\gamma_\alpha^2$=0.024.
10650	0.02 MeV	0	Γ_α/Γ=0.40, $\Gamma_\alpha/\gamma_\alpha^2$=0.053.
10700	0.02 MeV	(5)	Γ_α/Γ=0.09.
10780	0.02 MeV	2	Γ_α/Γ=0.20, $\Gamma_\alpha/\gamma_\alpha^2$=0.023.
10880	0.02 MeV	0	Γ_α/Γ=0.40, $\Gamma_\alpha/\gamma_\alpha^2$=0.096.
10950	(0.20 mev)	2	Γ_α/Γ=0.10, $\Gamma_\alpha/\gamma_\alpha^2$=0.036.
11050	0.02 MeV	0	Γ_α/Γ=1.00, $\Gamma_\alpha/\gamma_\alpha^2$=0.14.
11250	0.02 MeV	3	Γ_α/Γ=0.02, $\Gamma_\alpha/\gamma_\alpha^2$=0.026.
11380	0.02 MeV	3	Γ_α/Γ=0.05, $\Gamma_\alpha/\gamma_\alpha^2$=0.035.
11410	(0.50 mev)	2	Γ_α/Γ=0.11, $\Gamma_\alpha/\gamma_\alpha^2$=0.11.
11570	0.03 MeV	3	Γ_α/Γ=0.06, $\Gamma_\alpha/\gamma_\alpha^2$=0.053.
11650	0.01 MeV	3	Γ_α/Γ=0.70, $\Gamma_\alpha/\gamma_\alpha^2$=0.063.
11800	0.02 MeV	(3)	Γ_α/Γ=0.25, $\Gamma_\alpha/\gamma_\alpha^2$=0.086.
11940	0.02 MeV	(2)	Γ_α/Γ=0.10, $\Gamma_\alpha/\gamma_\alpha^2$=0.29.
12000	0.02 MeV	3	Γ_α/Γ=0.20, $\Gamma_\alpha/\gamma_\alpha^2$=0.12.
12170	0.04 MeV	[3]	Γ_α/Γ=0.10, $\Gamma_\alpha/\gamma_\alpha^2$=0.17.
12260	0.03 MeV	[3]	Γ_α/Γ=0.50, $\Gamma_\alpha/\gamma_\alpha^2$=0.19.
12440	0.05 MeV	[2]	Γ_α/Γ=0.05, $\Gamma_\alpha/\gamma_\alpha^2$=0.58.
12510	0.03 MeV	[3]	Γ_α/Γ=0.30, $\Gamma_\alpha/\gamma_\alpha^2$=0.28.
12650	0.10 MeV	[2]	Γ_α/Γ=0.20, $\Gamma_\alpha/\gamma_\alpha^2$=0.75.
12730	0.03 MeV	(3)	Γ_α/Γ=0.31, $\Gamma_\alpha/\gamma_\alpha^2$=0.38.
12880	0.03 MeV	3	Γ_α/Γ=0.19, $\Gamma_\alpha/\gamma_\alpha^2$=0.46.
12930	0.05 MeV	3	Γ_α/Γ=0.66, $\Gamma_\alpha/\gamma_\alpha^2$=0.49.
13050	0.05 MeV	[3]	Γ_α/Γ=0.17, $\Gamma_\alpha/\gamma_\alpha^2$=0.55.
13110	0.06 MeV	3	Γ_α/Γ=0.32, $\Gamma_\alpha/\gamma_\alpha^2$=0.59.
13220	0.06 MeV	[3]	Γ_α/Γ=0.15, $\Gamma_\alpha/\gamma_\alpha^2$=0.67.
13270	0.05 MeV	3	Γ_α/Γ=0.22, $\Gamma_\alpha/\gamma_\alpha^2$=0.71.
13360	0.05 MeV	3	Γ_α/Γ=0.42, $\Gamma_\alpha/\gamma_\alpha^2$=0.77.
13500	0.05 MeV	3	Γ_α/Γ=0.35, $\Gamma_\alpha/\gamma_\alpha^2$=0.89.
13560	0.05 MeV	3	Γ_α/Γ=0.50, $\Gamma_\alpha/\gamma_\alpha^2$=0.94.
13620	0.05 MeV	(3)	Γ_α/Γ=0.40, $\Gamma_\alpha/\gamma_\alpha^2$=0.99.
13670	0.05 MeV	3	Γ_α/Γ=0.80, $\Gamma_\alpha/\gamma_\alpha^2$=1.00.
13790	0.07 MeV	(3)	Γ_α/Γ=(1.52), $\Gamma_\alpha/\gamma_\alpha^2$=1.10.

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^{32}S Levels (continued)

E(level)	$\Gamma^\dagger$	$L^\ddagger$	Comments
13830	0.07 MeV	(4)	Γ_α/Γ=0.70, $\Gamma_\alpha/\gamma_\alpha^2$=0.51.
14030	0.06 MeV	(3)	Γ_α/Γ=0.78, $\Gamma_\alpha/\gamma_\alpha^2$=1.40.
14110	0.05 MeV	5	Γ_α/Γ=0.37, $\Gamma_\alpha/\gamma_\alpha^2$=0.22.
14160	0.05 MeV	4	Γ_α/Γ=0.65, $\Gamma_\alpha/\gamma_\alpha^2$=0.69.
14220	0.05 MeV	3	Γ_α/Γ=0.50, $\Gamma_\alpha/\gamma_\alpha^2$=1.60.
14370	0.11 MeV	3	Γ_α/Γ=0.90, $\Gamma_\alpha/\gamma_\alpha^2$=1.70.
14550	0.07 MeV	(5)	Γ_α/Γ=0.50, $\Gamma_\alpha/\gamma_\alpha^2$=0.35.
14730	0.08 MeV	[4]	Γ_α/Γ=0.90, $\Gamma_\alpha/\gamma_\alpha^2$=1.10.
14810	0.06 MeV	4	Γ_α/Γ=0.78, $\Gamma_\alpha/\gamma_\alpha^2$=1.20.
14980	0.04 MeV	4	Γ_α/Γ=0.65, $\Gamma_\alpha/\gamma_\alpha^2$=1.30.
15140	0.04 MeV	5	Γ_α/Γ=0.30, $\Gamma_\alpha/\gamma_\alpha^2$=0.59.
15230	0.05 MeV	(5)	Γ_α/Γ=0.20, $\Gamma_\alpha/\gamma_\alpha^2$=0.64.
15330	0.05 MeV	5	Γ_α/Γ=0.23, $\Gamma_\alpha/\gamma_\alpha^2$=0.69.
15380	0.05 MeV	5	Γ_α/Γ=0.26, $\Gamma_\alpha/\gamma_\alpha^2$=0.72.
15440	0.05 MeV	5	Γ_α/Γ=0.80, $\Gamma_\alpha/\gamma_\alpha^2$=0.76.
15530	0.08 MeV	5	Γ_α/Γ=0.75, $\Gamma_\alpha/\gamma_\alpha^2$=0.81.
15610	0.05 MeV	5	Γ_α/Γ=0.85, $\Gamma_\alpha/\gamma_\alpha^2$=0.86.
15720	0.05 MeV	(6)	Γ_α/Γ=0.55, $\Gamma_\alpha/\gamma_\alpha^2$=0.30.
15760	0.05 MeV	(5)	Γ_α/Γ=0.53, $\Gamma_\alpha/\gamma_\alpha^2$=0.96.
15820	0.05 MeV	(5)	Γ_α/Γ=0.50, $\Gamma_\alpha/\gamma_\alpha^2$=1.00.
15890	0.05 MeV	(4)	Γ_α/Γ=0.39, $\Gamma_\alpha/\gamma_\alpha^2$=2.20.
15960	0.05 MeV	6	Γ_α/Γ=0.45, $\Gamma_\alpha/\gamma_\alpha^2$=0.37.
16060	0.08 MeV	5	Γ_α/Γ=0.78, $\Gamma_\alpha/\gamma_\alpha^2$=1.20.
16160	0.07 MeV	6	Γ_α/Γ=0.66, $\Gamma_\alpha/\gamma_\alpha^2$=0.44.
16250	0.07 MeV	[5]	Γ_α/Γ=0.52, $\Gamma_\alpha/\gamma_\alpha^2$=1.30.
16330	0.06 MeV	5	Γ_α/Γ=0.47, $\Gamma_\alpha/\gamma_\alpha^2$=1.40.
16370	0.05 MeV	[5]	Γ_α/Γ=0.27, $\Gamma_\alpha/\gamma_\alpha^2$=1.40.
16480	0.05 MeV	5	Γ_α/Γ=0.40, $\Gamma_\alpha/\gamma_\alpha^2$=1.50.
16650	0.05 MeV	6	Γ_α/Γ=0.20, $\Gamma_\alpha/\gamma_\alpha^2$=0.64.
16690	0.05 MeV	(6)	Γ_α/Γ=0.35, $\Gamma_\alpha/\gamma_\alpha^2$=0.65.
16780	0.13 MeV	6	Γ_α/Γ=0.66, $\Gamma_\alpha/\gamma_\alpha^2$=0.70.
16870	0.05 MeV	6	Γ_α/Γ=0.48, $\Gamma_\alpha/\gamma_\alpha^2$=0.74.
16970	0.07 MeV	6	Γ_α/Γ=0.30, $\Gamma_\alpha/\gamma_\alpha^2$=0.79.
17060	0.07 MeV	6	Γ_α/Γ=0.40, $\Gamma_\alpha/\gamma_\alpha^2$=0.84.
17260	0.05 MeV	5	Γ_α/Γ=0.49, $\Gamma_\alpha/\gamma_\alpha^2$=2.20.
17350	0.07 MeV	7	Γ_α/Γ=0.05, $\Gamma_\alpha/\gamma_\alpha^2$=0.32.
17420	0.07 MeV	[7]	Γ_α/Γ=0.32, $\Gamma_\alpha/\gamma_\alpha^2$=0.34.
17570	0.10 MeV	[7]	Γ_α/Γ=0.15, $\Gamma_\alpha/\gamma_\alpha^2$=0.37.
17690	0.08 MeV	7	Γ_α/Γ=0.28, $\Gamma_\alpha/\gamma_\alpha^2$=0.41.
17800	0.07 MeV	(7)	Γ_α/Γ=0.39, $\Gamma_\alpha/\gamma_\alpha^2$=0.44.
17880	0.06 MeV	[7]	Γ_α/Γ=0.25, $\Gamma_\alpha/\gamma_\alpha^2$=0.47.
17940	0.07 MeV	7	Γ_α/Γ=0.35, $\Gamma_\alpha/\gamma_\alpha^2$=0.49.
18060	0.11 MeV	7	Γ_α/Γ=0.44, $\Gamma_\alpha/\gamma_\alpha^2$=0.53.
18220	0.10 MeV	7	Γ_α/Γ=0.35, $\Gamma_\alpha/\gamma_\alpha^2$=0.58.
18400	0.08 MeV	[9]	Γ_α/Γ=0.31, $\Gamma_\alpha/\gamma_\alpha^2$=0.036.
18470	0.10 MeV	7	Γ_α/Γ=0.44, $\Gamma_\alpha/\gamma_\alpha^2$=0.68.
18560	0.07 MeV	7	Γ_α/Γ=0.35, $\Gamma_\alpha/\gamma_\alpha^2$=0.72.
18660	0.08 MeV	7	Γ_α/Γ=0.36, $\Gamma_\alpha/\gamma_\alpha^2$=0.77.
18750	0.07 MeV	7	Γ_α/Γ=0.25, $\Gamma_\alpha/\gamma_\alpha^2$=0.81.
18810	0.06 MeV	[7]	Γ_α/Γ=0.10, $\Gamma_\alpha/\gamma_\alpha^2$=0.83.

^{4}He(^{28}Si,α):resonances   2010Lo12 (continued)

^{32}S Levels (continued)

E(level)	$\Gamma^{\dagger}$	L‡	Comments
18890	0.07 MeV	(7)	Γ_α/Γ=0.18, $\Gamma_\alpha/\gamma_\alpha^2$=0.87.
18980	0.06 MeV	(7)	Γ_α/Γ=0.23, $\Gamma_\alpha/\gamma_\alpha^2$=0.92.
19120	0.07 MeV	(7)	Γ_α/Γ=0.22, $\Gamma_\alpha/\gamma_\alpha^2$=0.99.
19190	0.06 MeV	[7]	Γ_α/Γ=0.08, $\Gamma_\alpha/\gamma_\alpha^2$=1.00.
19250	0.07 MeV	[7]	Γ_α/Γ=0.07, $\Gamma_\alpha/\gamma_\alpha^2$=1.10.
19320	0.07 MeV	8	Γ_α/Γ=0.18, $\Gamma_\alpha/\gamma_\alpha^2$=0.34.
19450	0.06 MeV	[7]	Γ_α/Γ=0.10, $\Gamma_\alpha/\gamma_\alpha^2$=1.20.
19500	0.07 MeV	(8)	Γ_α/Γ=0.20, $\Gamma_\alpha/\gamma_\alpha^2$=0.38.
19610	0.09 MeV	8	Γ_α/Γ=0.11, $\Gamma_\alpha/\gamma_\alpha^2$=0.41.
19690	0.07 MeV	8	Γ_α/Γ=0.57, $\Gamma_\alpha/\gamma_\alpha^2$=0.43.
19800	0.09 MeV	(7)	Γ_α/Γ=0.37, $\Gamma_\alpha/\gamma_\alpha^2$=1.40.
20090	0.07 MeV	[8]	Γ_α/Γ=0.37, $\Gamma_\alpha/\gamma_\alpha^2$=0.55.
20200	0.07 MeV	[8]	Γ_α/Γ=0.15, $\Gamma_\alpha/\gamma_\alpha^2$=0.58.
20270	0.07 MeV	[8]	Γ_α/Γ=0.15, $\Gamma_\alpha/\gamma_\alpha^2$=0.61.
20320	0.07 MeV	(8)	Γ_α/Γ=0.20, $\Gamma_\alpha/\gamma_\alpha^2$=0.62.
20410	0.08 MeV	8	Γ_α/Γ=0.42, $\Gamma_\alpha/\gamma_\alpha^2$=0.65.
20530	0.08 MeV	8	Γ_α/Γ=0.26, $\Gamma_\alpha/\gamma_\alpha^2$=0.70.
20610	0.07 MeV	[8]	Γ_α/Γ=0.15, $\Gamma_\alpha/\gamma_\alpha^2$=0.73.
20680	0.07 MeV	[8]	Γ_α/Γ=0.13, $\Gamma_\alpha/\gamma_\alpha^2$=0.75.
20750	0.07 MeV	(8)	Γ_α/Γ=0.22, $\Gamma_\alpha/\gamma_\alpha^2$=0.78.
20800	0.07 MeV	[8]	Γ_α/Γ=0.10, $\Gamma_\alpha/\gamma_\alpha^2$=0.80.
20860	0.06 MeV	(8)	Γ_α/Γ=0.15, $\Gamma_\alpha/\gamma_\alpha^2$=0.83.
20950	0.07 MeV	[8]	Γ_α/Γ=0.13, $\Gamma_\alpha/\gamma_\alpha^2$=0.87.
21050	0.07 MeV	[9]	Γ_α/Γ=0.10, $\Gamma_\alpha/\gamma_\alpha^2$=0.26.
21280	0.07 MeV	9	Γ_α/Γ=0.15, $\Gamma_\alpha/\gamma_\alpha^2$=0.29.
21430	0.07 MeV	9	Γ_α/Γ=0.06, $\Gamma_\alpha/\gamma_\alpha^2$=0.33.
21490	0.07 MeV	9	Γ_α/Γ=0.08, $\Gamma_\alpha/\gamma_\alpha^2$=0.34.
21590	0.07 MeV	9	Γ_α/Γ=0.19, $\Gamma_\alpha/\gamma_\alpha^2$=0.36.
21720	0.07 MeV	[9]	Γ_α/Γ=0.12, $\Gamma_\alpha/\gamma_\alpha^2$=0.39.
21810	0.08 MeV	(9)	Γ_α/Γ=0.33, $\Gamma_\alpha/\gamma_\alpha^2$=0.41.
22000	0.10 MeV	[9]	Γ_α/Γ=0.24, $\Gamma_\alpha/\gamma_\alpha^2$=0.46.
22170	0.10 MeV	9	Γ_α/Γ=0.22, $\Gamma_\alpha/\gamma_\alpha^2$=0.50.
22240	0.10 MeV	9	Γ_α/Γ=0.13, $\Gamma_\alpha/\gamma_\alpha^2$=0.52.
22310	0.07 MeV	9	Γ_α/Γ=0.09, $\Gamma_\alpha/\gamma_\alpha^2$=0.53.
22390	0.09 MeV	8	Γ_α/Γ=0.35, $\Gamma_\alpha/\gamma_\alpha^2$=1.60.
22590	0.07 MeV	[9]	Γ_α/Γ=0.28, $\Gamma_\alpha/\gamma_\alpha^2$=0.61.
22710	0.10 MeV	[9]	Γ_α/Γ=0.37, $\Gamma_\alpha/\gamma_\alpha^2$=0.65.
22810	0.10 MeV	9	Γ_α/Γ=0.16, $\Gamma_\alpha/\gamma_\alpha^2$=0.69.
23030	0.20 MeV	(9)	Γ_α/Γ=0.21, $\Gamma_\alpha/\gamma_\alpha^2$=0.76.
23160	0.07 MeV	9	Γ_α/Γ=0.07, $\Gamma_\alpha/\gamma_\alpha^2$=0.81.
23260	0.20 MeV	9	Γ_α/Γ=0.09, $\Gamma_\alpha/\gamma_\alpha^2$=0.84.
23430	0.20 MeV	[9]	Γ_α/Γ=0.05, $\Gamma_\alpha/\gamma_\alpha^2$=0.90.
23750?	0.10 MeV	10	Γ_α/Γ=0.18, $\Gamma_\alpha/\gamma_\alpha^2$=0.29.

† Upper limits in most cases.
‡ From R-matrix analysis (2010Lo12).