

³⁰Si(α ,p) 1970Be01,1969Ha40,1987Da03

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh		NDS 199,1 (2025)	30-Sep-2024

1970Be01: E=12, 15, and 16.5 MeV α beams were produced from the Notre Dame FN tandem accelerator. Target was 60 $\mu\text{g}/\text{cm}^2$ enriched SiO_2 on a 30 $\mu\text{g}/\text{cm}^2$ carbon backing. Reaction products were momentum-analyzed with a broad-range magnetic spectrograph and detected with nuclear track plates. Measured proton spectra. Deduced levels. Comparisons with available data.

1969Ha40: E=16.5 MeV α beam was produced from the Argonne accelerator. Target was 75 $\mu\text{g}/\text{cm}^2$ carbon-backed ³⁰Si, 95.55% enriched. Reaction products were momentum-analyzed with the Argonne magnetic spectrograph and detected with nuclear emulsions. Measured proton spectra. Deduced levels. Comparisons with available data.

1987Da03: E=25 MeV α beam was produced from the University of Birmingham Radial Ridge cyclotron. Target was about 100 $\mu\text{g}/\text{cm}^2$ self-supporting SiO_2 . Reaction products were detected with ΔE -E telescopes consisting of a pair of solid-state detectors. Measured $\sigma(E_p, \theta)$. Deduced levels, J, π , relative spectroscopic factors from DWBA analysis.

1968Be13: E=10.98 MeV α beam was produced from the Argonne cyclotron. Target was 35 $\mu\text{g}/\text{cm}^2$ SiO (95.55% enriched). Reaction products were momentum-analyzed with the Argonne magnetic spectrograph (FWHM=15 keV) and detected with nuclear emulsions. Measured proton spectra. Deduced levels. **1968Be13** also report $\sigma(\theta)$ data on ³⁰Si(α ,p).

1967Cu01: E=9.5 MeV α beam was produced from the Harwell Van de Graaff accelerator. Target was highly-enriched ³⁰Si. Protons were detected with a surface-barrier detector. Measured proton spectrum. Deduced levels.

[Additional information 1.](#)

³³P Levels

E(level) [†]	J ^π [‡]	S _{rel} [‡]	Comments
0	1/2 ⁺	1	
1433 5	3/2 ⁺ @	0.813	E(level): other: 1436 8 (1968Be13), 1430 10 (1967Cu01).
1846 5	5/2 ⁺ @	0.035	E(level): others: 1845 7 (1969Ha40), 1852 8 (1968Be13), 1810 10 (1967Cu01).
2541 4	3/2 ⁺ @	0.244	E(level): from 1969Ha40 . Others: 2540 5 (1970Be01), 2540 8 (1968Be13); 2420 30 from 1967Cu01 is discrepant.
3281 6	(3/2,5/2 ⁺)		E(level): weighted average of 3282 6 (1970Be01) and 3279 9 (1969Ha40).
3495 5	5/2 ⁺ @	0.080	E(level): others: 3496 7 (1969Ha40), 3500 8 (1968Be13).
3631 4	7/2 ⁺ @	0.149	E(level): others: 3631 7 (1969Ha40), 3638 8 (1968Be13).
4058 5	(3/2 ⁺ ,5/2 ⁺)		E(level): other: 4056 7 (1969Ha40).
4231 5			E(level): other: 4231 7 (1969Ha40).
4862 4			E(level): weighted average of 4863 4 (1970Be01) and 4855 12 (1969Ha40).
5045 7	(3/2)		
5191 5	(13/2,15/2 ⁻)		E(level): weighted average of 5190 5 (1970Be01) and 5196 12 (1969Ha40).
5411 4			
5457 4			
5504 5			
5557 4			
5663 5			Additional information 2.
5731 5			
5795 7			
5931 4			
5985 4			
6176 7			
6327 5			
6432 4			
6509 4			
6559 4			
6.94×10 ³ # 15	(5/2,7/2)		
7.31×10 ³ # 15	(9/2,11/2,13/2 ⁺)		
7.62×10 ³ # 15	(1/2,3/2 ⁺)		
8.08×10 ³ # 15	(9/2,11/2)		

Continued on next page (footnotes at end of table)

 $^{30}\text{Si}(\alpha, \text{p})$ [1970Be01](#), [1969Ha40](#), [1987Da03](#) (continued)

 ^{33}P Levels (continued)

<u>E(level)[†]</u>	<u>J^π[‡]</u>
8.85×10^3 [#] <i>15</i>	(3/2 ⁺ , 5/2, 7/2)
9.94×10^3 [#] <i>15</i>	(1/2 to 11/2)
10.12×10^3 [#] <i>15</i>	(1/2 to 13/2)

[†] From [1970Be01](#), unless otherwise noted. An uncertainty of 4 keV in E(level)=3631 of the reference level has been added in quadrature to the original uncertainty given in [1970Be01](#).

[‡] From DWBA analysis of measured $\sigma(\theta)$ in [1987Da03](#) with S value for relative spectroscopic factor, unless otherwise noted. As stated in [1987Da03](#), the cluster DWBA calculations reproduce the general shape of measured $\sigma(\theta)$ well up to small angles (at 50°–70°) but fall off more quickly than the data at larger angles; general features of the angular distributions of differential cross section are reproduced in most cases although the DWBA calculations may underestimate the details.

[#] From [1987Da03](#). Probably complex levels.

[@] From the Adopted Levels, as quoted from literature in [1987Da03](#).