^{50}Ti(p,α) 1982Ab03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	S. Ota and E. A. Mccutchan	NDS 203,1 (2025)	1-Apr-2025

1982Ab03: E(p)=40.35 MeV. Measured $\sigma(\theta(c.m.)\approx20°-80°)$ using two ΔE-E Si telescopes and four single E Si detectors (FWHM=70-80 keV); comparison to DWBA calculations.
1965Pl01: E(p)=9-10 MeV. Measured $\sigma(\theta)$ using a broad-range magnetic spectrograph and Kodak NTA emulsion plates.

^{47}Sc Levels

E(level)[†]	J$^\pi$[‡]	σ(exp)/σ(theory)[‡]	Comments
0.0	7/2$^-$[#@]	1.0	σ(exp)/σ(theory): 1.0 for shell model calculation. transferred nucleons=$((\pi\ 1f7/2)_{7/2-}\ (\nu\ 1f7/2)^2_{0+})$ for zero order. ^{47}Sc=0.928$((\pi\ 1f7/2)_{7/2-}\ (\nu\ 1f7/2)^6_{0+})$ − 0.37$((\pi\ 1f7/2)_{7/2-}\ (\nu\ 1f7/2)^6_{2+})$ − 0.025$((\pi\ 1f7/2)_{7/2-}\ (\nu\ 1f7/2)^6_{4+})$ for shell model.
7.7×10^2	3/2$^+$[&]	2.1	E(level): other: 774 *10* (1965Pl01). transferred nucleons=$((\pi\ 1d3/2)_{3/2+}\ (\nu\ 1f7/2)^2_{0+})$ for zero order.
815 *10*			E(level): from 1965Pl01.
1.14×10^3	11/2$^-$[#@]	0.4	transferred nucleons=$((\pi\ 1f7/2)_{7/2-}\ (\nu\ 1f7/2)^2_{2+})$ for zero order. ^{47}Sc=0.926$((\pi\ 1f7/2)_{7/2-}\ (\nu\ 1f7/2)^6_{2+})$ − 0.376$((\pi\ 1f7/2)_{7/2-}\ (\nu\ 1f7/2)^6_{4+})$ − 0.035$((\pi\ 1f7/2)_{7/2-}\ (\nu\ 1f7/2)^6_{6+})$ for shell model. σ(exp)/σ(theory): 0.9 for shell model calculation.
1.37×10^3	1/2$^+$[&]	2.8	E(level): other: 1337 *15* (1965Pl01). transferred nucleons=$((\pi\ 2s1/2)_{1/2+}\ (\nu\ 1f7/2)^2_{0+})$ for zero order.
1427 *10*			E(level): from 1965Pl01. Tentatively assigned to ^{47}Sc as peak only observed at 2 angles.
1568 *10*			E(level): from 1965Pl01. Tentatively assigned to ^{47}Sc as peak only observed at 2 angles. As no similar level was observed in any other reactions, level is not adopted by evaluators.
1.83×10^3	5/2$^-$[#]	16.5[a]	transferred nucleons=$((\pi\ 1f7/2)_{7/2-}\ (\nu\ 1f7/2)^2_{2+})$ for zero order.
2.38×10^3	5/2$^+$[&]	0.9	transferred nucleons=$((\pi\ 1d5/2)_{5/2+}\ (\nu\ 1f7/2)^2_{0+})$ for zero order. σ(exp)/σ(theory): agreement with other values is purely fortuitous since the 1d5/2$^+$ state is highly fragmented. J$^\pi$: note that J^π=3/2$^+$ is given in Fig. 4 of 1982Ab03.
2.65×10^3			
3.09×10^3	15/2$^-$[#@]	1.6	σ(exp)/σ(theory): 0.6 for shell model calculation. transferred nucleons=$((\pi\ 1f7/2)_{7/2-}\ (\nu\ 1f7/2)^2_{6+})$ for zero order. ^{47}Sc=−0.639$((\pi\ 1f7/2)_{7/2-}\ (\nu\ 1f7/2)^6_{4+})$ + 0.769$((\pi\ 1f7/2)_{7/2-}\ (\nu\ 1f7/2)^6_{6+})$ for shell model.
3.49×10^3	9/2$^-$		J$^\pi$: from Fig. 4 of 1982Ab02.
3.83×10^3			
5.57×10^3	3/2$^-$[#]	16.0[a]	transferred nucleons=$((\pi\ 1f7/2)_{7/2-}\ (\nu\ 1f7/2)^2_{2+})$ for zero order. σ(exp)/σ(theory): if ^{50}Ti=$((^{48}Ca\ 0^+)\ (0.92(\pi\ 1f7/2)^2_{0+})$ + 0.39$(\pi\ 2p3/2)^2_{0+})$ is assumed, σ(exp)/σ(theory)=1.5.
5.79×10^3			
5.98×10^3			
6.63×10^3			
8.40×10^3	7/2$^-$[#]	2.9	transferred nucleons=$((\pi\ 1f7/2)_{7/2-}\ (\nu\ 1f7/2)^2_{0+})$ for zero order. evaluator suggests that this may be the IAS of ^{47}Ca g.s.

† From 1982Ab03, except where noted.
‡ From DWBA analysis. σ(theory)=Nσ(DWBA). Value is from a zero-order calculation. Value from shell model calculation given in the commnets. Normalized to 1.0 for g.s. (N=3.3×10^7 for zero-order, 2.57×10^7 for shell-model).

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^{50}Ti(p,α) 1982Ab03 (continued)

^{47}Sc Levels (continued)

$^{50}Ti=((^{40}Ca\ 0^+)\ (\pi\ 1f7/2)^2_{0+}\ (\nu\ 1f7/2)^8_{0+})$; $^{47}Sc=((^{40}Ca\ 0^+)\ (\pi\ 1f7/2)_{-7/2}\ (\nu\ 1f7/2)^6_J)$ for zero-order calculation.

@ $^{50}Ti=((\pi\ 1f7/2)^2_{0+}\ (\nu\ 1f7/2)^6_{0+})$ for shell-model calculation. All possible configurations were allowed for the transferred nucleons.

& $^{50}Ti=((^{40}Ca\ 0^+)\ (\pi\ 1f7/2)^2_{0+}\ (\nu\ 1f7/2)^8_{0+})$; $^{47}Sc=((^{40}Ca\ 0^+)\ (\pi\ 1f7/2)^2\ (\pi\ lj)^{-1}_J\ (\nu\ 1f7/2)^6_{0+})$ for zero-order calculation.

[a] Note that the extremely high value indicates that these states can not be adequately described in this simple calculation.