^{46}Ti(p,t),(p,tγ) 1972Ra05

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 190,1 (2023)	20-Jun-2023

Target ^{46}Ti $J^{\pi}=0^{+}$.

Also includes (t,pγ) from 1978Fr10.

1972Ra05: E=51 MeV (FWHM=24 keV) proton beam produced from the Oak Ridge isochronous cyclotron. A target of thin foil of isotopically enriched ^{46}Ti. Tritons momentum-analyzed with a broad-range spectrograph and spectra recorded on 50–μm-thick Kodak NTB photographic plates. Measured σ(E$_t$,θ). Deduced levels, J, π, L, spectroscopic factors from DWBA analysis. Report 23 levels. Uncertainty in cross section is 15%.

1973Ba13 (also 1970Ba40): E(p)=19, 23, 27 MeV (FWHM=80 keV) proton beam produced from the University of Colorado 1.3 m sector focusing cyclotron. ΔE-E counter telescopes of surface barrier detectors. Measured σ(E$_t$,θ). Deduced levels, J^{π}, L from DWBA analysis. Report 19 levels.

1972Ko43 (also 1970Lo08): E(p)=40 MeV proton beam produced from the cyclotron of Grenoble. ΔE-E telescopes of surface barrier detectors. Measured σ(E$_t$, θ). Deduced levels, J^{π}, L from DWBA analysis. Report 20 levels.

1978Ko27: E≈42-46 MeV proton produced from the Princeton University Cyclotron. 132 μg/cm^2 enriched ^{46}Ti target (86.1%). A 60 cm resistive-wire proportional counter backed by a plastic scintillator. Measured particle spectra. Deduced levels.

1978Fr10 (also 1979Fr04, 1976Fr01): E=42 MeV proton beam produced from the Princeton AVF cyclotron. A 1 mg/cm^2 target isotopically enriched to 84% ^{46}Ti. Tritons detected with a 2.5 cm thick by 50 cm long resistive-wire proportional counter, charged particles detected with surface barrier detectors and γ-rays detected with a 10 cm by 13 cm NaI(Tl) detector. Measured Eγ, tγ coin, tα coin. Deduced α and γ branching ratio from 9338 and 9298 levels.

1975Mo26: E=46.0 MeV (FWHM=10 keV) proton from the Michigan State University Cyclotron. A 270 μg/cm^2 self-supporting foil of ^{46}Ti. Tritons analyzed with an Enge split-pole spectrograph. Measured σ(E$_t$,θ). Deduced levels splitting between 9310 and 9330 levels.

Others:

1964Ba34: E=39.8 MeV beam from the University of Minnesota linear accelerator. Measured σ(θ) for g.s. and 1082 levels.

1964Ga02: E=38.7 MeV beam from the Berkeley 88-inch cyclotron. Measured σ(E$_t$,θ).

2012La02 (also 2012GuZY): (p,t), (p,tγ),E=15, 32 MeV at the Oslo Cyclotron Laboratory (OCL). Measured primary continuum γ spectra, and particle spectra; deduced nuclear level density, and γ-strength function.

^{44}Ti Levels

Spectroscopic factor C^{2}S is defined by N×g×C^{2}S=$\sigma(\theta)^{exp}/\sigma(\theta)^{DWBA}$, where N is the normalization factor and g=(2J$_f$+1)/(2J$_i$+1) (1966Ba54).

E(level)[†]	L[‡]	C^{2}S[‡]	Comments
0	0	3.3	
1082 *2*	2	1.4	E(level): other: 1083 used for calibration (1973Ba13).
1903 *7*	0	0.02	E(level): other: 1890 *20* (1973Ba13). L: other: (2,3) from 1973Ba13.
2450 *5*	(4)	0.24	E(level): other: 2430 *20* (1973Ba13).
2535 *5*	(2)	0.16	E(level): other: 2530 *20* (1973Ba13).
2885 *5*	2	2.7	E(level): other: 2870 used for calibration (1973Ba13). L: other: 3 from 1972Ko43, (2,3) from 1973Ba13.
3175 *5*	(2)	0.38	E(level): other: 3160 *20* (1973Ba13). L: other: (4) from 1973Ba13.
3365 *5*	4	0.52	E(level): other: 3350 *20* (1973Ba13).
3730 *20*			E(level): from 1973Ba13 only. L: (2,3) suggested by 1973Ba13, but no fit obtained for σ(θ).
3942 *5*	3		E(level): other: 3930 *20* (1973Ba13). L: other: 2 from 1973Ba13.
3980 *5*	4	0.15	
4015 *5*	(5,6)	0.13	
4060 *5*	4	0.73	E(level): other: 4040 *20* (1973Ba13).

Continued on next page (footnotes at end of table)

^{46}Ti(p,t),(p,tγ) 1972Ra05 (continued)

^{44}Ti Levels (continued)

E(level)[†]	L[‡]	C^2S[‡]	Comments
4500 *20*			E(level): from 1973Ba13 only.
4605 *5*	0	0.07	E(level): other: 4600 *50* (1973Ba13).
4792 *5*	(2)	0.63	E(level): other: 4770 *20* (1973Ba13).
5055 *5*	(4)	0.50	E(level): other: 5050 *20* (1973Ba13).
5315 *10*			E(level): other: 5300 *50* (1973Ba13).
5415 *10*	(2)	0.22	E(level): other: 5500 *50* (1973Ba13).
6030 *10*	(4)	0.56	E(level): other: 6000 *50* (1973Ba13).
6535 *10*			E(level): other: 6500 *50* (1973Ba13).
6598 *7*	2	0.23	T=1 E(level): weighted average of 6600 *10* (1972Ra05) and 6597 *7* (1978Ko27).
6959 *7*	(4)	1.06	T=(1) E(level): weighted average of 6965 *10* (1972Ra05) and 6956 *7* (1978Ko27).
7216			E(level): from 1978Fr10.
7670 *10*			
9304	0	0.05	%α=87 *20* (1978Fr10); %p<6 (1978Fr10) E(level): unweighted average of 9310 (1975Mo26) and 9298 (1978Fr10). C^2S: from relative values of 1975Mo26 for 9304 and 9350 levels. L: from 1975Mo26.
9336 *8*	0	0.55,0.30	%p<4 (1978Fr10) T=2 $\Gamma\alpha/\Gamma$=0.32 *5*; Γ_γ/Γ=0.54 *11* (1978Fr10) E(level): weighted average of 9330 *10* (1972Ra05) and 9340 *8* (1978Ko27). α decay to ^{40}Ca g.s. γ decay is mainly to 7216, T=1 level through 2122γ.

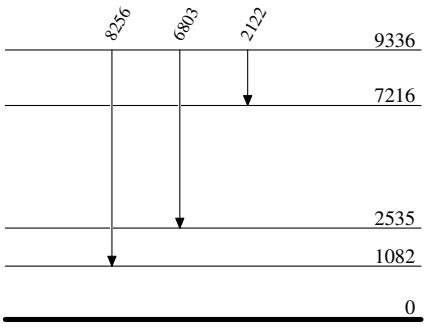
[†] From 1972Ra05, unless otherwise noted.
[‡] From comparison of $\sigma(\theta)$ distributions with DWBA predictions (1972Ra05).

$\gamma(^{44}Ti)$

E_γ	E_i(level)	E_f	Comments
2122	9336	7216	E_γ: from 1978Fr10. B(M1)(W.u.)=3.8, Γ_γ=0.75 eV 19 (1978Fr10).
6803	9336	2535	E_γ: from 1978Fr10. B(M1)(W.u.)<6.4×10^{-3}, Γ_γ<6.9×10^{-3} eV (1978Fr10).
8256	9336	1082	E_γ: from 1978Fr10. B(M1)(W.u.)<7.9×10^{-3}, Γ_γ<2.2×10^{-3} eV (1978Fr10).

^{46}Ti(p,t),(P,tγ) 1972Ra05

Level Scheme



$^{44}_{22}Ti_{22}$