^{13}C(^{3}He,t)

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. H. Kelley, C. G. Sheu and J. E. Purcell	NDS 198,1 (2024)	1-Aug-2024

1969Ba06: ^{13}C(^{3}He,t) E=40-50 MeV; measured σ(E(t),θ) for θ=20° to 75°. Deduced optical model parameters, level energies, L, J. Discussed shell configurations.
1970Nu02: ^{13}C(^{3}He,t) E=14 MeV; measured $\sigma(\theta)$ for $\theta\approx$10° 10 150°. Deduced optical model parameters for ^{13}N*(0,2.36 MeV).
1981Pe08: ^{13}C(^{3}He,t) E=43.6 MeV; measured σ(E(^{3}He),θ), σ(E$_t$,θ) for θ=5° to 60°. Deduced ^{13}N/^{13}C isoscalar, isovector transition amplitude ratio, β_L deformation parameters.
1987Be25: ^{13}C(^{3}He,t) E=0.6-2.3 GeV; measured σ(E$_t$,θ) for θ=0° to 4°. Deduced isovector strength ratio.
1990De31: ^{13}C(^{3}He,t) E=39.6 MeV; analyzed σ(E,θ) for θ=10° to 100°. Deduced optical model parameters.
1991Ja04: ^{13}C(^{3}He,t) E=200 MeV; measured σ(E$_t$,θ=0°). See also (1993JaZZ).
1994Ak02: ^{13}C(^{3}He,t) E=450 MeV; measured σ(E$_t$,θ=0°).
1996Fu06: ^{13}C(^{3}He,t+p) E=450 MeV; measured proton decay from ^{13}N* relevant to states populated in ^{13}C+ν interactions. Populated ^{13}N*(0, 3.51, 8.92, 10.83, 11.88, 15.06) plus SDRs at 18 and 21.5 MeV. Qualitative discussion on proton decay branches.
1996BuZZ: ^{13}C(^{3}He,t) E=60 MeV; measured $\sigma(\theta$=0°) for θ=10°−100°. Analyzed diffraction effects.
2003Bu01: ^{13}C(^{3}He,t) E=60 MeV; measured σ(E$_t$,θ) for θ=10°−120°. DWBA analysis for ^{13}N*(0, 2.36, 3.51+3.55). Discussed refractive properties.
2004Fu12: ^{13}C(^{3}He,t) E=150 MeV/nucleon; measured σ(E$_t$,θ) for θ=0°−17°. Analyzed GT strengths. Measured protons from ^{13}N* decay in coincidence with θ=0° tritons; deduced branching ratios. XUNDL dataset by McMaster (2004).
2007Ze06 , 2008Ze01: ^{13}C(^{3}He,t) E=420 MeV; measured σ(E$_t$,$\theta\approx$0°). Analyzed relation between B(GT) and σ. In (2008Ze01), the B(GT) unit cross section is normalized using the σ to ^{13}N*(15.1:3/2$^-$) and B(GT)=1.37 *7* is deduced for ^{13}N*(3.50:3/2$^-$).
2011Pe12: ^{13}C(^{3}He,t) E=420 MeV; analyzed relation between B(GT) and $\sigma(\theta$=0°). Global analysis of unit cross section.
2016De39, 2017De38: ^{13}C(^{3}He,t); analyzed ^{13}N*(2.37) wavefunction. Deduced formation of a proton halo. Developed method to determine nuclear radii of excited states. See also (2023De29).
2019Li48: ^{13}C(^{3}He,t); Eikonal approach analysis of $\sigma(\theta)$.
2023He16: ^{13}C(^{3}He,t); initial plans for development of a semicylindrical TPC chamber for charge exchange reactions.

^{13}N Levels

E(level)[†][&]	J$^\pi$[#]	L[#&]	Comments
0	1/2$^-$	0[@]	β_0=0.061 (1981Pe08).
2.36×10^3	1/2$^+$	1	β_1=0.035 (1981Pe08)
3.53×10^3		2	E(level): Doublet reported at 3.53 MeV *3* in (1969Ba06). %p$_0$ (^{12}C$_{g.s.}$) =71 *17* (2004Fu12).
3.55×10^3		3	E(level): Unresolved.
6.36×10^3	5/2$^+$	3	β_3=0.041 (1981Pe08)
6.89×10^3	3/2$^+$	1	β_1=0.025 (1981Pe08)
7.16×10^3	7/2$^+$	3	β_3=0.060 (1981Pe08)
7.38×10^3	5/2$^-$	2[@]	β_2=0.056 (1981Pe08)
8920 *40*	1/2$^-$	0[@]	J$^\pi$: From (1969Ba06). %p$_0$ (^{12}C$_{g.s.}$)=60 *9*, %p$_1$(^{12}C(4.44))=30 *5* (2004Fu12).
9.0×10^3[‡]	9/2$^+$	5	β_5=0.083 (1981Pe08)
9.48×10^3[‡]	3/2$^-$	2	%p$_0$=58 *11*, %p$_1$=43 *9* (2004Fu12).
10.36×10^3[‡]	(5/2$^-$,7/2$^-$)	2	β_2=0.019 (1981Pe08) E(level): Known doublet.
10780 *40*	(3/2,5/2)$^-$	2	β_2=0.037 (1981Pe08) E(level): Reported as 10.833 MeV in (1981Pe08). J$^\pi$: (1981Pe08) indicate L=2, which implies (3/2,5/2)$^-$, but this disagrees with the J^π=1/2$^-$ from their ^{12}C(^{3}He,d) result in (1980Pe13). %p$_0$=5 *1*, %p$_1$=54 *9*, %p$_2$=43 *16* (2004Fu12).

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^{13}C(^{3}He,t) (continued)

^{13}N Levels (continued)

E(level)[†&]	Jπ[#]	Γ[b]	L[#&]	Comments
11850 *40*	(3/2$^-$)	98 keV	2	β_2=0.20 (1981Pe08) %p$_0$=8 *1*, %p$_1$=35 *5*, %p$_2$=10 *2* (2004Fu12).
15.07×10^3	3/2$^-$		2[@]	T=3/2 β_2=0.065 (1981Pe08) %p$_0$=16 *2*, %p$_1$=13 *2*, %p$_2$=3 *1* (2004Fu12). E(level): (2004Fu12) report this state has a considerable amount of the isospin violation component in the wave function, surpassing the weak γ-ray decay rates, as the 15060, T=3/2 state in ^{13}N decays to the forbidden T=0 states in ^{12}C.
15980 *50*	7/2$^+$	163 keV	3	β_3=0.094 (1981Pe08)
17.68×10^3 *3*		1212 keV *74*	1	
18.12×10^3 *2*		276 keV *41*		
18.37×10^3 *1*		23 keV		
19.11×10^3 *1*		183 keV *41*		
19.83×10^3 *2*		1542 keV *84*	*a*	
21.20×10^3 *1*		581 keV *44*	2	
22.14×10^3 *1*		1706 keV *82*	*a*	
24.50×10^3 *4*		2.46 MeV *22*	*a*	
26.9×10^3 *9*		4.38 MeV *47*		

† From (1969Ba06) unless otherwise indicated.
‡ Observed in (1981Pe08).
# From DWBA comparison of ^{13}C and ^{13}N analog states in ^{13}C(^{3}He,^{3}He), (^{3}He,t) and ^{13}C(α,α) reactions (1981Pe08).
@ From (1969Ba06).
& Above E$_x$=17 MeV from (2004Fu12).
a Assumed ΔL=1 spin-dipole resonances.
b From (2004Fu12).