^{13}C(p,n)

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

1960Da05, 1961Da09: ^{13}C(p,n) E≤13 MeV; measured σ(E(n),θ) for θ=15° to 170°. Deduced participation of low-lying ^{13}N states. Q=3.2372 MeV *16*.
1961Al07: ^{13}C(p,n_0) E=3.1 to 5.3 MeV; measured $\sigma(\theta)$.
1961Be13: ^{13}C(p,n); deduced E_{thres}=3.2353 MeV *15*; later revised to 3.2371 MeV *16* in (1964Bo10).
1961Wo03: ^{13}C(p,n) E=6.5-12.2 MeV; measured $\sigma(\theta_{n0})$ for θ=0° to 150°. Observed contributions from ^{13}N*(0,2.37, 3.51+3.56).
1964An15: ^{13}C(p,n_0) E=18.5 MeV; measured $\sigma(\theta)$ for θ≈5° to 130°.
1965Va23: ^{13}C(p,n) E=155 MeV; measured σ=1.9 mb *2*.
1966Bo20: ^{13}C(p,n) E=3.2 to 9.5 MeV; measured Yield(E), deduced E_{thres}=3.2354 MeV *24*.
1966Di03: ^{13}C(p,n) E=3.27 to 3.85 MeV; measured $\sigma(\theta)$ near the reaction threshold for θ=0° to 150°.
1966Ma60: Analyzed literature data; recommend E_{thres}=3.2357 MeV *7*.
1966Ri09: ^{13}C(p,n) E=3.2-9.5 MeV; measured σ. Deduced Q($^{13}N_{g.s.}$)=3004 keV *10* and E_x=3464 keV *10* to the 3/2$^-$ state.
1969Kr21: ^{13}C(p,n) E=thresh−40 MeV; measured activation σ.
1969Mo32: ^{13}C(p,n) E≈3 MeV; discussed method for correlating reaction threshold with beam energy.
1970Cl01: ^{13}C(p,n) E=30, 50 MeV; measured σ.
1974Sh06: ^{13}C(p,n) E≈3 MeV; deduced E_{thresh}=3235.7 keV *7*.
1975Li11: ^{13}C(p,n) E=16.3, 22.8 MeV; compared cross sections determined via direct and activation techniques.
1976Li08: ^{13}C(pol. p,n_0) E=7-15 MeV; measured polarization transfer coefficients along θ=0°.
1977Az01: ^{13}C(p,n) E=10-13 MeV (also ^{16}O(p,α)). Measured $T_{1/2}$=597.9 s *6*.
1980Go07: ^{13}C(p,n) E=120 MeV; analyzed relation between σ(θ=0°:(p,n)) and G-T matrix element values for the g.s. transition.
1981Ba22: ^{13}C(p,n) E=4-12 MeV; measured σ(E); results are tabulated.
1981By01: ^{13}C(p,$n_{0,1,2+3}$) E=10.1-16.75 MeV; measured σ(E,θ) for θ=0° to 150°. Potential model analysis.
1982Ta03: ^{13}C(p,n) E=60-200 MeV; measured σ(θ=0°) deduced G-T transition strengths.
1983Pe14: ^{13}C(p,n) E=26.1 MeV; compared analog states populated via (p,p) and (p,n) reactions.
1984Ta07: ^{13}C(p,n) E=160 MeV; measured D_{NN}(θ=0°) spin-transfer coefficients.
1984He20: ^{13}C(pol. p,n_0) E=5.5 MeV; measured neutron polarization at θ=40°.
1985Go02: ^{13}C(p,$n_{0,2}$) E=160 MeV; measured $\sigma(\theta)$. Analyzed relation between σ(θ≈0°) and *B*(GT).
1985Wa24: ^{13}C(p,$n_{0,2}$) E=135 MeV; measured $\sigma(\theta)$. Analyzed relation between σ(θ≈0°) and *B*(GT).
1986Ki12: ^{13}C(p,n) E=800 MeV; measured $\sigma(\theta)$. Analyzed Fermi and G-T strength intensities.
1986Oh03: ^{13}C(p,n) E=35 MeV; compared low-lying analog states populated via (p,p) and (p,n) reactions.
1987Ta22: ^{13}C(pol. p,n_0) E=60-200 MeV; measured D_{NN}(θ=0°) spin-transfer coefficient.
1987Ra15, 1987Ra32: ^{13}C(p,n) E=160 MeV; measured σ(θ,E_n) for θ=0° to 50°. Analyzed G-T strength for ^{13}N*(0, 3.51, 15.1).
1987Or01: ^{13}C(p,n) E=35 MeV; measured σ(θ,E_n) for θ=0° to 150°. Analyzed ΔJ=0$^-$ component to ^{13}N*(2.37).
1987Li29: ^{13}C(p,n) E=800 MeV; measured $\sigma(E_n)$. Overview of LAMPF capabilities for charge-exchange reactions.
1988Ka30: ^{13}C(p,$n_{0,1}$) E=18.6 MeV; measured $\sigma(\theta)$.
1989Ra09: ^{13}C(pol. p,pol. n_0) E=492,590 MeV; measured σ(E_n,θ=0°). Deduced B(GT) values for ^{13}N*(0,3.51 MeV).
1989Wa16: ^{13}C(p,n) E=5-30 MeV; measured activation yields.
1990Dr10: ^{13}C(p,n) $E_{c.m.}$<13 MeV and θ≈0°. Analyzed monoenergetic neutron beam production.
1991Mi03: ^{13}C(p,n) E=200 MeV; measured σ(θ=0°) for ^{13}N*(8.92, 9.48, 10.83, 11.88, 15.06 MeV).
1991Fi11, 1991Fi05: ^{13}C(p,n) E=1-33 MeV; measured σ(E), thick target.
1993Go15: ^{13}C(p,n) E=2.5-10.5, analyzed utility to produce ^{13}N beams.
1994Ra23: ^{13}C(pol. p,n) E=186 MeV; measured σ(E_n,θ=0°−50°), multipole decomposition analysis in giant resonance region.
1994Sa36: ^{13}C(pol. p,n) E=50, 80 MeV; measured polarization transfer coefficients, D_{NN}(θ=0°).
1994Wa22: ^{13}C(pol. p,n) E=186 MeV; measured σ(E_n,θ=0°−50°), analyzing powers. Analyzed quasifree scattering.
1995Ya12: ^{13}C(p,n) E=186 MeV; measured σ(E_n,θ=0°−50°), multipole decomposition analysis to determine ΔL=1 strength. Significant strength around E_x=18-24 MeV.
1995Wa16: ^{13}C(pol. p,n) E=295 MeV; measured σ(E_n,θ=0°−10°) for ^{13}N*(0,3.51); deduced polarization transfer coefficients D_{NN}(0°).
1994Wa05: ^{13}C(p,n) E=160 MeV; measured σ(E_n,θ=0°−20°); analyzed J^π=1/2$^-$→1/2$^+$ transition to ^{13}N*(2.46).
1996Yu02: ^{13}C(p,n_0) E=200 MeV; measured $\sigma(\theta)$; analyzed large angle scattering.

^{13}C(p,n) (continued)

1999Ha24: ^{13}C(p,n),(^{3}He,t),(π^{+},π^{0}). Analyzed giant resonance features.
2000Jo17: ^{13}C(p,n_0) E=35 MeV; measured $\sigma(\theta)$ for $\theta\approx5°-140°$. DWBA analysis.
2001Go25: ^{13}C(p,n) E=120, 160 MeV; analyzed relation between $\sigma(\theta=0°)$ and Gamow-Teller strength.
2001Wa05: ^{13}C(pol. p,n_0) E=197 MeV; measured $\sigma(\theta=0°)$; analyzed reaction mechanism; deduced GT and Fermi contributions.
2001Wa18: ^{13}C(pol. p,n_0) E=135 MeV; measured $\sigma(\theta=0°)$; analyzed reaction mechanism and $\sigma(\theta=0°)$ relation to B(GT). Deduced GT and Fermi contributions.
2002Ra51, 2002Wa23: ^{13}C(pol. p,n_0) E=197 MeV; measured $\sigma(\theta)$ for $\theta\approx0°-33°$; analyzed polarization observables.
2009De03: ^{13}C(p,n_0) E=35 MeV; analyzed $\sigma(\theta)$.
2009Os01: DWBA analysis of ^{13}C(p,n_0) investigating the density dependence of the N-nucleus potential.
2009Sa06: ^{13}C(p,n); analyzed Fermi and GT transitions across a broad range of targets at E=198, 297 MeV; deduced unit cross sections to connects $\sigma(\theta=0)$ with strengths.
2016Ta07: ^{1}H(^{13}C,^{13}N) and ^{12}C(^{13}C,^{13}N) at E≈950 MeV/nucleon; measured charge changing cross sections. Compared with GT strength.

Theory:

1969Ra36: Surveyed available data for various targets.
1970Li01: ^{13}C(p,n) E=18.5 MeV, calculated $\sigma(\theta)$.
1971Ge12: ^{13}C(p,n) E=12.2,13.3 MeV, DWBA analysis of $\sigma(\theta)$.
1982Ba14: ^{13}C(p,n) E=6 MeV Calculated $\sigma(\theta)$.
1983Kr10: ^{13}C(p,n) E=150, 160, 200 MeV; calculated $\sigma(\theta)$.
1989Am02: analysis of M1 quenching.
1989Ra15: ^{13}C(pol. p,pol. n_0) E=500 MeV; calculated polarization tranfer coefficient.
1990Mi14: Analyzed spin-flip and nonflip reactions at $\theta=0°$.

^{13}N Levels

E(level)‡	Jπ#	Comments
0	1/2⁻	Spin transfer coefficient $D_{NN}(0°)\approx0.05$ *6* (1984Ta07).
2.3×10³ *1*		
3464† *10*	(3/2⁻)	Spin transfer coefficient for $J^{\pi}=3/2^{-}$ state $D_{NN}(0°)=-0.33$ *5* (1984Ta07). E(level): From (1966Ri09). See also 3.5 MeV *1* (1970Cl01).
3.5×10³† *1*		
4.6×10³?@ *1*		E(level): This state is not observed in other studies.
6.3×10³ *1*		
7.2×10³ *2*		
8.8×10³ *2*	1/2⁻	$\sigma(\theta=0°)$=1.30 mb/sr *8* for E_x=8.92 MeV (1991Mi03).
9.48×10³	3/2⁻	E(level): From (1991Mi03); $\sigma(\theta=0°)$=0.78 mb/sr *5*.
10.83×10³	1/2⁻	E(level): From (1991Mi03); $\sigma(\theta=0°)$=1.07 mb/sr *6*.
11.6×10³ *2*	(3/2⁻)	$\sigma(\theta=0°)$=3.27 mb/sr *20* for E_x=11.88 MeV (1991Mi03).
13.3×10³@ *2*		
15.1×10³	(3/2⁻)	E(level): From (1984Ta07). Spin transfer coefficient $D_{NN}(0°)=-0.36$ *8* (1984Ta07). $\sigma(\theta=0°)$=1.85 mb/sr *11* for known T=3/2 state at E_x=15.06 MeV.

† Unresolved in (1970Cl01).
‡ From (1970Cl01).
# From L=0,2 transfer states populated in GT trnasitions along $\theta=0°$ (1991Mi03).
@ Some states are not associated with Adopted Levels because inadequate details for association are given in the literature.