^{12}C(n,γ):res

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

1950Ki68: ^{12}C(n,γ) E=slow; measured E_γ, I_γ.
1963Ma60: ^{12}C(n,γ) E≈30,65 keV; measured neutron radiative capture cross sections for Z≤92.
1975Ar19: ^{12}C(n,γ_0) E=14 MeV; measured γ-yields, $I_\gamma(\theta)$. There is an indication γ_0 peaks at backward angles.
1984Wo05: ^{12}C(n,γ_0),(pol. n,γ_0) E=12-18.8 MeV; measured $\sigma(\theta)$, analyzing power for $\theta\approx50°-140°$. Deduced states at E_x=16-21.75 MeV. Combined analysis with other data indicates a secondary doorway state. Deduce a_1, a_2, b_1, b_2 from Legendre fit.
1985AuZZ: ^{12}C(n,γ) E=6.5-18.5 MeV; measured $\sigma(\theta)$. ^{12}C(pol. n,γ) E=12-18.8 MeV; measured analyzing, vector analyzing power vs θ. ^{13}C deduced resonances, doorway characteristics.
1986Be17: ^{12}C(n,γ) E=7-19.5 MeV; measured $\sigma(E,\theta=90°)$. Deduced $T_<$=1/2 giant resonance at E_x=20.8 MeV with $\Gamma\approx2.5$ MeV along with lower unresolved strength near $E_n\approx$ 10 MeV identified as the *pygmy* resonance. DSD model.
1987Au02: ^{12}C(n,γ) E=6.5-18.5 MeV; measured $\sigma(E,\theta)$, θ=90°. Pygmy and giant resonance region. Direct-semidirect calculations.
1988McZT: ^{12}C(n,γ); analyzed $\sigma(E_n)$.
1989Hu15: ^{12}C(n,γ) E=14.2 MeV; measured $\gamma(\theta)$; deduced γ-multipolarity. Direct-semidirect model.
1990Ha19: ^{12}C(n,γ) E=8-11 MeV; measured $\sigma(\theta=90°)$ in the Pygmy and giant resonance region.
1990Ma52: ^{12}C(n,γ) E<46 keV; measured effective capture σ(E); deduced Maxwellian averaged σ.
1991Hu05: ^{12}C(n,γ) E=7-14 MeV; measured $\sigma(\theta)$ vs E, E_γ, I_γ, $\gamma(\theta)$. Analyzed pygmy resonance.
1991Na06,1991Na19: ^{12}C(n,γ) E=30 keV, stellar energy; measured capture σ, Eγ, Iγ; deduced nucleosynthesis implications.
1992Wi08: ^{12}C(pol. n,γ) E=20-35 MeV; measured $\gamma(\theta)$, A_y vs E, γ(recoil)-coin; deduced E2, E1 capture interference. Direct semidirect model. Deduce a_1, a_2, b_1, b_2 from Legendre fit.
1994Oh02, 1996Na27: ^{12}C(n,γ) E=10-250 keV; measured E_γ, I_γ, σ(E); deduced Maxwellian averaged σ and astrophysical implications.
1998Ki09: ^{12}C(n,γ) E=550 keV; measured E_γ, I_γ; deduced partial capture σ. Deduced spectroscopic factor of $^{13}C^*$(3.09 MeV).
1999Oh04: ^{12}C(n,γ) E≈42 keV; measured capture σ(E), E_γ, I_γ.
2008Oh05: XUNDL dataset compiled by McMaster, 2008.
E(n)=10-80 keV neutrons produced in the ^{7}Li(p,n) reaction using the 3.2 MV Pelletron accelerator at the Tokyo Institute of Technology. Measured Eγ, Iγ, $\gamma\gamma$ coin using anti-Compton NaI(Tl) spectrometer, time-of-flight method. Non-resonant study.

Theory:
1971Al33,1971AlYV: ^{12}C(n,γ) E≈30 keV; compiled experimental Maxwellian averaged σ; deduced empirical correlation between σ and nucleosynthesis abundances.
1974Ma10: ^{12}C(n_0,γ); analyzed isospin splitting in the giant dipole resonance.
1986Li16: ^{12}C(pol. n,γ) E≤9 MeV; calculated polarization effects.
1987LyZY: ^{12}C(n,γ) E=slow; analyzed data; deduced model parameters, capture mechanism.
1990Wa22: ^{12}C(n,γ); analyzed data; deduced calibration γ-energies. Proposed E_γ=3683.915 keV *15* for transition 3.684→0.
1991Ho18: ^{12}C(n,γ) E=threshold−30 keV; calculated σ; deduced reaction mechanism.
1993Ho06: ^{12}C(n,γ) E≈8-20 MeV; analyzed $\sigma(\theta)$ vs E; deduced GDR, resonance parameters. Unified formalism.
1994Ot04: ^{12}C(n,γ) E<0.5 MeV; calculated σ(E); deduced S-factor. Kinematically complete approach.
1995Li31: ^{12}C(n,γ) E≈6-20 MeV; calculated capture $\sigma(\theta)$ vs E. Direct-semidirect model.
1995Me14: ^{12}C(n,γ) E≲500 keV; calculated capture σ(E). Direct capture model.
1996Re16: ^{12}C(n,γ); analyzed inverse Coulomb dissociation reaction and relevance for astrophysical input.
1997Du09: ^{12}C(n,γ) $E_{c.m.}\leq0.5$ MeV; calculated capture σ(E). Calculated levels, B(λ), rms radius vs R(c). Multicluster approach.
1997Li10: ^{12}C(n,γ) E<600 keV; calculated σ(En); deduced influence of scattering potential depth. Consistent direct-semidirect model.
1997Ti03: Analyzed vertex constants for capture reactions.
1998Ki01: ^{12}C(n,γ) E<1 MeV; calculated σ; deduced optical potential features.
1999MeZW: ^{12}C(n,γ) E<0.8 MeV; analyzed capture σ; deduced parameters.
2003Wu01: ^{12}C(n,γ) E=0-1 MeV; calculated σ. Asymptotic normalization coefficient method, comparison with data.
2004Ba62: ^{12}C(n,γ) E=0-0.6 MeV; calculated S-factors, σ(E) for radiative capture. Taylor expansion.
2004Hu10: ^{12}C(n,γ) E=low; calculated astrophysical reaction rate, resonance effects.
2009Wa17: ^{12}C(n,γ) $E_{c.m.}$<1 MeV; analyzed σ, spectroscopic factors and other parameters for nonresonant neutron capture using

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simple polynomials obtained from Taylor expansions. Comparison with experimental data.

2010Hu11: ^{12}C(n,γ) $E_{c.m.}$<2 MeV; calculated binding energies, σ, S-factors, spectroscopic factors. Single-particle potential model.

2012Pr13, 2020Pr08: ^{12}C(n,γ) E<20 MeV; calculated Maxwellian-averaged σ,astrophysical reaction rates, neutron thermal σ, Westcott factors, resonance integrals.

2013Di12: ^{12}C(n,γ) E<20 MeV; analyzed available data; deduced recommended σ, k_{eff}.

2013Du08: ^{12}C(n,γ) E<1 MeV; calculated σ, low-energy phase shifts. Potential cluster model, comparison with available data.

2013Du16: ^{12}C(n,γ) E<1 MeV; calculated σ, phase shifts. Young diagrams, potential cluster model.

2017HaZY: ^{12}C(n,γ) E=0-0.2 MeV; calculated σ.

2018Br05: ^{12}C(n,γ) E=30 keV; calculated Maxwellian-averaged σ.

2024Sa13: ^{12}C(n,γ); R-matrix analysis of the astrophysically relevant region of the reaction.

^{13}C Levels

E(level)†	J^π	Γ	Comments
0	1/2$^-$		
20520 *70*		510 keV *70*	E(level),Γ: From the analyzing power data in (1984Wo05): secondary doorway state.
21050 *60*		4.2 MeV *4*	E(level),Γ: From the analyzing power data in(1984Wo05): primary doorway state. See also E_x≈20.81 MeV and Γ≈2.5 MeV in (1986Be17).

† (1986Be17) also observed an unresolved broad peak at E_n(res)≈10 MeV (E_x≈14180 keV).

γ(^{13}C)

E_γ†	E_i(level)	E_f	J^π_f
20.520×10^3	20520	0	1/2$^-$
21.050×10^3	21050	0	1/2$^-$

† From level energy difference.

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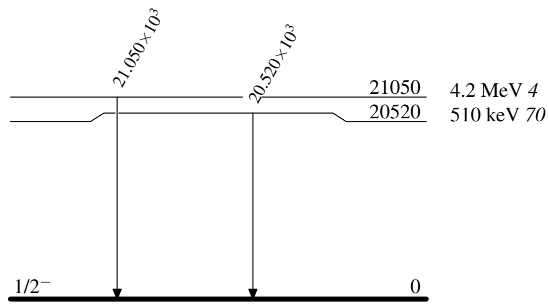
Level Scheme



$^{13}_{6}C_{7}$