^{12}C(n,n′),(n,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

1958Hu18: ^{12}C(n,n′) E_n=4.4-8 MeV, four resonances are reported in the yield of 4.4 MeV γ-rays, at En=6.30,6.49,7.6,7.87 and 8.15 MeV, corresponding to ^{13}C*(10.76,10.94,12.0,12.21,12.47 MeV). The differential cross section at 90° reaches a maximum of 60 mb/sr at 7.87 MeV.
1959Ha13: ^{12}C(n,n′γ) E=4.6-9.8 MeV; measured the cross section for the production of 4.43 MeV γ rays. Ten resonances were observed in this energy range and the maximum cross section of 45 mb/sr was obtained at a neutron-energy of 8.1 MeV.
1960He10: ^{12}C(n,n′) E=14 MeV; measured the angular distribution of inelastically scattered neutrons from ^{12}C*(9.6 MeV) for θ=30° to 150°. Time-of-flight measurement.
1962Ba25: ^{12}C(n,n′) E=15 MeV; measured σ(E,θ=40°).
1968Bo34: ^{12}C(n,n′) E=14-21 MeV; measured σ(E).
1970De14: ^{12}C(n,n) E=17-20.5 MeV; measured σ(E;En′,θ) for θ≈10° to 150°. Deduced optical model parameters, E_x=23 MeV resonance energy, J, π.
1970Dr11: ^{12}C(n,n′γ) E=5.8-7.5 MeV; measured differential cross sections for inelastic scattering via ^{12}C(4.4 MeV); θ=25° to 90°.
1972Ga13: C(n,n′) E=3-7 MeV; measured σ(E;θ).
1974Po03: ^{12}C(n,nγ) E=14.9 MeV; measured nγ-coin. ^{13}C deduced threshold and level energies.
1987BeYP: ^{12}C(pol. n,n′) E=16.1 MeV; measured analyzing power. ^{13}C deduced resonances, Γ, L.

Theory:
1970Ca13: ^{12}C(n,n′γ) E<9 MeV; analyzed available data; deduced J, π.
1971LeZG: ^{12}C(n,n′), calculated σ(θ), P(θ), phase shifts. Calculated resonance energies, Γ, J, π.
1982Kn02: ^{12}C(n,n′) E=0.0-9 MeV; analyzed data. Deduced levels, J, π, reduced widths. R-matrix analysis, comparison to model predictions.
2017HaZY: ^{12}C(n,n′) E=5.3-6.45 MeV; calculated σ, σ(θ), analyzing power.
2017Lo02: ^{12}C(n,n′) E=17.29 MeV; analyzed differential σ(θ) data.

^{13}C Levels

E(level)†	Γ	L	E_n(res.) (keV)	Comments
9522	<80 keV		4960	E_n(res.) (keV),Γ: From (1959Ha13).
9946	<80 keV		5420	E_n(res.) (keV),Γ: From (1959Ha13).
10463	200 keV		5980	E_n(res.) (keV),Γ: From (1959Ha13).
10758			6300	E_n(res.) (keV): From (1959Ha13).
10804	120 keV		6350	E_n(res.) (keV),Γ: From (1959Ha13).
10970	<80 keV		6530	E_n(res.) (keV): From E_{res}=6530 keV which is the average of 6490 keV (1958Hu18) and 6570 keV (1959Ha13). Γ: From (1959Ha13).
11080	<80 keV		6650	E_n(res.) (keV),Γ: From (1959Ha13).
11865	260 keV		7500	E_n(res.) (keV),Γ: From (1959Ha13).
11957			7600	E_n(res.) (keV): From (1958Hu18).
12178	180 keV		7840	E_n(res.) (keV): From E_{res}=7840 keV which is the average of 7870 keV (1958Hu18) and 7810 keV (1959Ha13). Γ: From (1959Ha13).
12460	220 keV		8145	E_n(res.) (keV): From E_{res}=8145 keV which is the average of 8150 keV (1958Hu18) and 8140 keV (1959Ha13). Γ: From (1959Ha13).
13534	500 keV		9310	E_n(res.) (keV),Γ: From (1959Ha13).
19798 *92*	≈100 keV	1	16.1×10^3 *1*	E_n(res.) (keV): From E_{res}=16.1 MeV *1* (1987BeYP: however authors deduced E_x=19.9 MeV *1*). Γ,L: From (1987BeYP). The observed Γ corresponds to τ≈7×10^{-21} sec.

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^{12}C(n,n′),(n,n′γ):res (continued)

^{13}C Levels (continued)

E(level)[†]	J^{π}	Γ	E_n(res.) (keV)	Comments
23.0×10^3 *2*	5/2$^-$,1/2$^-$,3/2$^+$,7/2$^-$	1.6 MeV	19600	E(level),J^{π},Γ,E_n(res.) (keV): From (1970De14). J^{π}: 5/2$^-$ is concluded in (1970De14); yet they are unable to eliminate (1/2$^-$, 3/2$^+$, 7/2$^-$).

[†] Level energies are deduced using ^{12}C, ^{13}C and n masses from (2021Wa16: AME-2020) and the resonance energy E_n(res) except where noted. $E_x=S_n+E_{c.m.}$(relativistic).