^{14}N(p,t) 2015Ch50

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. H. Kelley, J. E. Purcell and C. G. Sheu	NP A968, 71 (2017)	1-Jan-2017

2015Ch50: XUNDL dataset compiled by TUNL, 2015; updated, 2017.

The authors used the ^{14}N(p,t) reaction to populate ^{12}N levels to resolve conflicting information on ^{12}N levels.

A beam of 38 MeV protons, from the ORNL/Holifield beam facility, impinged on a ^{nat}N (99.632% ^{14}N) gas target with (5-6)×10^{18} atoms/cm^2 at the target position of the JENSA gas-jet target system. The reaction products were detected in the position sensitive SIDAR ΔE-E array, which covered θ=19°−54°.

Angular distributions for triton groups were analyzed via DWBA analysis. Levels up to E_x≈7.5 MeV are discussed and compared with previous results. The analysis of prior results was guided by comparison with analog levels in ^{12}C and ^{12}B, the present analysis suggests firmer J^π values and new levels at E_x=4561 and 6275 keV.

2017Ch19: The data of (2015Ch50) were reanalyzed, with an emphasis of identifying proton decay from ^{12}N states. For events where a triton from ^{14}N(p,t) reactions was detected in a ΔE-E detector, the events with energy deposited in a different ΔE detector, within 6 μs, were evaluated in the search for proton emission from ^{12}N states. The *triton energy* vs *decay particle energy* plots showed bands that were easily associated with p_0, p_1 and p_2 proton emission to the ^{11}C ground, first and second excited states, respectively. The projections of the different proton bands onto the triton energy axis revealed contributions from the various proton groups. The results on p_2 were not sufficient for a meaningful analysis.

The branching ratios were obtained by assuming isotropic proton emission; the uncertainties include a 30% systematic uncertainty. While the initial intent of the study was not to obtain the proton branching ratios for decay from the ^{12}N* levels, the article was prepared since the data reveals the capability of these studies using the SIDAR array.

1976Yo03: E_p=51.9 MeV, measured $\sigma(\theta)$.

1976Ce02: E_p=52.5 MeV, measured $\sigma(\theta)$.

References in (1980Aj01): Indicate ΔM(^{12}N)=17338 keV *1*.

^{12}N Levels

E(level)[#]	J^π[#]	Γ[†#]	L[#]	dσ/dΩ (30°) relative to ground state	Comments
0	1^+	<179 keV	2	1	
956 *8*	2^+	<179 keV	2	0.49 *1*	
1195 *30*	2^-	116 keV *74*	1,2	0.06 *1*	
2438 *16*	0^+	77 keV *92*	2[‡]	0.09 *1*	%p_0=82 *26*.
3135 *19*	2^+	217 keV *82*	2	0.03 *1*	%p_0=48 *15*.
3558 *7*	1^+	245 keV *56*	(2,0)[‡]	0.20 *2*	%p_0=36 *11*.
4.16×10^3? *10*					E(level): From E_x=4157 keV *102*. J^π=2−&4$^-$ in Adopted Levels.
4561 *24*	$(1,2)^+$	517 keV *72*	(2,0)[‡]	0.26 *2*	%p_0=6 *2* $ %p_1= 90 *50*.
5346 *9*	$(1,2,3)^+$	340 keV *91*	2	0.11 *2*	%p_0=17 *6* $ %p_1=69 *21*.
6275 *21*	$(1^-,3^+)$	256 keV *88*	(1,2)[‡]	0.17 *2*	%p_0=12 *4* $ %p_1=17 *5*.
7.30×10^3? *11*					E(level): Likely multiplet. Γ: Broad.

[†] The experimental resolution has been removed from all widths except for ^{12}N*(0,956).

[‡] Likely admixture based on DWBA analysis.

[#] From (2015Ch50).