Adopted Levels

S(p)=−1.9×10^3 *2*; Q(α)=−11.6×10^3 *20* 2017Ho10

The mass excess of ^{10}N is 38.1 MeV *2* (2017Ho10); see also ΔM=38.8 MeV *4* (2017Wa10).

The ^{10}N nucleus is particle unstable to proton decay. Early theoretical studies, often guided by comparisons with ^{10}Li, were focused on predictions of its ground state binding energy (1974Ir04, 1982Ng01, 1984An18, 1997Ba54, 1997Po12, 2000Po32, 2009Ba41). In (1997Ao05, 2001Ao04) a detailed comparison of measured ^{10}Li and predicted ^{10}N properties is given that suggests the low-lying ground state may be determined by an *s*-wave resonance in the ^{9}C+p system.

On the other hand, discussion in 2004Ti06 suggested the E_{rel}(^{9}C+p)=2.6 MeV observed in the ^{10}B(^{14}N,^{14}B)^{10}N reaction was explained by large L=2 two-nucleon transfer amplitudes calculated for ^{10}B+2p→^{12}Ng.s. and ^{12}Ng.s.→^{10}N(1$^+$), and that the observed state was the analog of the 0.24 MeV J^π=1$^+$ state of ^{10}Li. The same view point is expressed in 2013Sh19. However, so far there is no experimental evidence in support of J^π=1$^+$ for any ^{10}N states.

The near-threshold s-wave state in ^{9}Li+n (see ^{10}Li) implies a broad s-wave ground state about 1.8 MeV above the ^{9}C+p threshold in ^{10}N; see calculations and discussion in (2004Ti06, 2013Fo22, 2013Sh19).

^{10}N Levels

Cross Reference (XREF) Flags

A ^{1}H(^{9}C,p)
B ^{10}B(^{14}N,^{14}B)

E(level)†	J^π	Γ (MeV)‡	$E_{rel.}$(^{9}C+p) (MeV)	XREF	Comments
0	(1$^-$)	2.5 MeV *+20−15*	1.9 *2*	A	%p=100 T=2
0.9×10^3 *3*	(2$^-$)	2.0 MeV *+7−5*	2.8 *2*	AB	%p=100 T=2

† $E_{g.s.}$ from E_{res}(^{9}C+p)=1.9 MeV *2*. See alternate analysis described in ^{1}H(^{9}C,p).

‡ Γ_p≈Γ.

^{1}H(^{9}C,p) 2017Ho10

2017Ho10:

The authors studied resonances in the ^{1}H(^{9}C,p) reaction at E_{cm}<5.5 MeV using a stopping thickness Methane gas (CH_4) target. The data were analyzed using standard Thick Target Inverse Kinematics (TTIK) techniques. Evidence for two l=0 resonant states with ambiguous spin-parity assignments is presented and discussed.

A beam of 23.4 MeV/nucleon ^{9}C was produced at the MARS facility at the Cyclotron Texas A&M Cyclotron Institute using the ^{10}B(p,2n) reaction. A 1 mm thick BC-404 scintillator located near the entrance of a CH_4 filled TPC scattering chamber provided particle identification and degraded the beam to 9.3 MeV/nucleon. A windowless ionization chamber, inside the gas volume, provided further particle ID after the entrance window.

As the ^{9}C ions slowed in the CH_4 gas, energetic protons were produced in scattering reactions. Protons were detected using a set of three ≈1000 μm thick segmented Si detectors that were used to obtain angular distributions for θ_{cm}=129° to 154°, 139° to 162° and 166° to 170°. The data were analyzed using standard TTIK techniques; however, because the detectors were not thick enough to stop all protons, the excitation functions were analyzed by dividing the final proton energy spectra into 3 regions for stopped, close to punch through, and unambiguous punch through protons. The combined analysis of the Si detector energies along with trajectories from the 3D TPC provided further information on the scattered proton momenta.

The angular distributions were analyzed using the MiniMatrix multi-channel multi-level R-Matix code. Two fit solutions that include two L=0 $J^\pi=1^-$ and 2^- resonances are discussed in the text; no apparent preference given for either fit.

While the present result appears to show no preference in the fit, the results of 2002Le16 found a resonance at E_{res}=2.64 MeV *40* with Γ=2.3 MeV *16*; this state compares with the first excited state and consideration of this Γ may suggest a weak favor for the parameters in Fit 2.

	Fit 1			Fit 2		
	J^π	E_{res} (MeV)	Γ(MeV)	J^π	E_{res} (MeV)	Γ(MeV)
g.s.	2^-	2.2 *2*	3.1 *+9−7*	1^-	1.9 *2*	2.5 *+20−15*
1st	1^-	2.8 *2*	1.2 *+6−4*	2^-	2.8 *2*	2.0 *+7−5*

^{10}N Levels

E(level)†	J^π	Γ (MeV)‡	$E_{rel.}$(^{9}C+p) (MeV)
0	(1^-)	2.5 MeV *+20−15*	1.9 *2*
0.9×10^3 *3*	(2^-)	2.0 MeV *+7−5*	2.8 *2*

† $E_{g.s.}$ from Fit 2 with E_{res}(^{9}C+p)=1.9 MeV *2*. See alternate analysis described above.

‡ $\Gamma_p\approx\Gamma$.

$^{10}B(^{14}N,^{14}B)$ 2002Le16,2003Le26

2002Le16,2003Le26.

The authors studied the unbound ^{10}N nucleus at GANIL using the $^{10}B(^{14}N,^{14}B)^{10}N$ multinucleon transfer reaction. A ^{14}N beam with E(^{14}N) = 30 MeV/nucleon collided with a ^{10}B sandwiched target. Ejectiles were momentum analzyed at θ=1.2°−4.5° using the SPEG spectrometer.

A l=0 resonance was observed to be 2.6 MeV *4* above the ^{9}C+p threshold and the width was 2.3 MeV *16*. This work is credited with the first observation of ^{10}N (2012Th01).

^{10}N Levels

E(level)†	Γ (MeV)‡	L	$E_{rel.}(^{9}C+p)$ (MeV)
0.7×10^{3} *4*	2.3 MeV *16*	0	2.6 *4*

† Deduced assuming $E_{g.s.}$= $E_{res}(^{9}C+p)$=1.9 MeV *2* from 2017Ho10.

‡ $\Gamma_p\approx\Gamma$.

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