^{9}Be(^{13}O,^{12}N) 2012Ja11,2013So11

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

2012Ja11: XUNDL dataset compiled by TUNL, 2012.

A beam of E(^{13}O)=30.3 MeV/nucleon ions was created using the ^{1}H(^{14}N,^{13}O)2n reaction at E(^{14}O)=38 MeV/nucleon at the Texas A&M cyclotron facility. The beam was purified with the MARS spectrometer. The ^{13}O projectiles impinged on a 45.6 mg/cm^2 ^{9}Be target and sometimes underwent 1n and 1p knockout reactions that populated ^{12}O and ^{12}N states, respectively.

All excited states in ^{12}N are unbound to proton decay. The ejectiles decayed and the resulting 2p+^{10}B of interest here were detected in a 10 cm x 10 cm position sensitive Si strip detector that was backed by a 32 element CsI(Tl) array to give ΔE-E particle identification. A kinematic reconstruction of the 2p+^{10}B momenta yielded the excitation energies of produced ^{12}N.

2013So11: XUNDL dataset compiled by TUNL, 2013.

A beam of E(^{13}O)=30.3 MeV/nucleon ions, produced via ^{1}H(^{14}N,^{13}O) reaction at the Texas A&M MARS facility, impinged on a 45.6 mg/cm^2 ^{9}Be target. Breakup particles were detected in a 10 cm×10 cm segmented ΔE-E telescope located on the beam axis, 18 cm from the target.

Momentum analysis of the breakup particles permitted the kinematic reconstruction of the invariant mass and determination of excitation energies for ^{12}N*(p+^{11}C) and ^{13}O*(p+^{12}N and 2p+^{11}C) states involved in the reactions. The intrinsic width resolution was roughly 50 keV and there was a 10 keV systematic uncertainty in the invariant mass energy. The excitation spectrum of p+^{11}C was analyzed to deduce ^{12}N excited states.

Two states were observed and analyzed using both Breit-Wigner fits to the data and an R-matrix analysis.

The first and second excited states of ^{12}N are observed. The energy is taken as the average of values deduced using Breit-Wigner and R-matrix analyses. The width of the E_x=1.2 MeV $J^\pi=2^-$ state is found to be significantly narrower than previously reported values; Γ=55 keV *20*, compared with Γ=118 keV *14* from (1990Aj01) evaluation.

With the new data the IMME can be fitted with a parabolic form (2012Ja11).

^{12}N Levels

E(level)	J^π	$T_{1/2}$ or Γ	Comments
0	1^+†	11.000† ms *16*	^{12}N were observed in the ΔE-E telescope.
968 *10*	2^+†	<20† keV	Observed in p+^{11}C spectrum and used for detector characterization.
1179 *17*	2^-	55 keV *20*	E(level): From E(p+^{11}C)=576 keV *7*.
12196 *29*	0^+	<110 keV	E(level): From E(2p+^{10}B*(1740))=1.165 MeV *20* and ΔM=29534 keV *29*. Γ: Deduced after correcting for experimental resolution.
≈14200			E(level): From E(2p+^{10}B*(1740))≈3.17 MeV.

† From Adopted Levels.