^{9}Be(^{13}B,^{12}Be) 2014Sm03

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

2014Sm03: XUNDL dataset compiled by TUNL, 2014.

Neutron unbound states in ^{12}Be (S_{1n}=3.17 MeV and S_{2n}=3.67 MeV) were populated using one-proton removal reactions on ^{13}B. A beam of 71 MeV/nucleon ^{13}B ions, produced by fragmenting a ^{18}O beam on a thick beryllium target at the NSCL, impinged on 51 mg/cm^2 ^{9}Be foil at the MoNA-LISA/sweeper magnet target position. One-proton removal reactions populated states in ^{12}Be; neutron unbound levels were studied by detecting the momenta of breakup neutrons in the MoNA-LISA array and the momenta of beryllium remnants after analysis in the sweeper dipole magnet and associated detectors.

The ^{10}Be+2n and ^{11}Be+n invariant mass spectra were deduced and analyzed. A peak at E(^{11}Be+n)=1243 keV *21* was observed that was consistent with L=1 decay. Analysis of the ^{10}Be+2n decay energy spectrum (with causality cuts to minimize cross-talk from multiple interactions of a single neutron) gave no evidence of such a resonance.

A critical issue in the analysis was the ambiguity in determining the ^{11}Be state that is populated; the reaction populated either the $J^{\pi}=1/2^{+}$ ground state or $J^{\pi}=1/2^{-}$ E_x=320−keV state. Significant discussion is included, which suggests the ^{12}Be parent has J=2, π=− and E_x=4412 keV *26*. It is possible that π=+, which implies E_x=4732 keV *26*.

^{12}Be Levels

E(level)	J^{π}	Γ	L	Comments
4412 *26*	(2$^-$)	634 keV *60*	1	E(level): E_{rel}(^{11}Be+n)=1243 keV *21*; however the ^{11}Be final state is ambiguous. Decay to ^{11}Be$_{g.s.}$ is favored, but decay to ^{11}Be*(320) is not excluded. Decay to ^{11}Be*(320) would imply E_x=4732 keV *26*. J^{π}: The observed decay via L=1 implies π=− for decay to ^{11}Be$_{g.s.}$. However if decay is to ^{11}Be*(320) then π=+. Γ: A limit of Γ(^{10}Be+2n)/Γ<0.05 is deduced.