^{9}Be(^{13}B,^{13}Be) 2015Ma62

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

2015Ma62: XUNDL dataset compiled by TUNL, 2015.

The authors populated neutron-unbound states in ^{13}Be using a ^{13}B beam and charge exchange reactions on a ^{9}Be target.

A beam of 71 MeV/nucleon ^{13}B ions was produced by fragmenting a 120 MeV/nucleon ^{18}O beam on a ^{9}Be target at the NSCL/A1900 beam facility. The ^{13}Be beam impinged on a 51 mg/cm^2 ^{9}Be target placed at the large-gap sweeper magnet target position. Charge-exchange reactions populating ^{13}Be states resulted in events where neutrons from the decay of ^{13}Be states were detected in the MONA-LISA array, while ^{12}Be ions from the decay were momentum analyzed and characterized using the dipole sweeper magnet. Finally the decay energy was reconstructed by the invariant-mass method.

The present results are fitted with both two- and three-resonance assumptions. The best fit includes an s-wave resonance at E_{res}=0.73 MeV *9* [$J^{\pi}=1/2^{+}$ Γ=1.98 MeV *34*] and a d-wave resonance at E_{res}=2.56 MeV *13* [$J^{\pi}=5/2^{+}$, Γ=2.29 MeV *73*].

A three-resonance fit is provided, though the approach is complex. The parameters of the lowest state are fixed by (2014Ra07) at E_{res}=0.40 MeV, Γ=0.80 MeV and $J^{\pi}=1/2^{+}$; the parameters of the highest resonance are taken from the 2-resonance fit E_{res}=2.56 MeV, Γ=2.29 MeV and $J^{\pi}=5/2^{+}$; in this case a third resonance can be fitted at E_{res}=1.05 MeV *10* with $J^{\pi}=5/2^{+}$ and Γ=0.50 MeV *20*.

^{13}Be Levels

E(level)[‡]	J^{π}[#]	Γ	E′ (MeV)[†]
0.28×10^3 *9*	$1/2^{+}$	1.98 MeV *34*	0.73 *9*
2.11×10^3 *13*	$5/2^{+}$	2.29 MeV *73*	2.56 *13*

[†] E′ is a relative excitation energy scale with E′=0 at the neutron separation energy. We use this scale because most articles report level energies with respect to the n+^{12}Be$_{g.s.}$ center of mass energy.

[‡] The ground state is taken as $E_{c.m.}$(n+^{12}Be$_{g.s.}$)=0.45 MeV *1*; see Adopted Levels. Resonance energies from the best fit, which is a two-parameter fit shown in Fig. 1. An alternate 3-resonance fit is provided in Fig. 2 and presented in Table 1.

[#] From analysis of the n+^{12}Be energy distributions of (2015Ma62).