

$^1\text{H}(^{12}\text{Be}, ^{13}\text{Be})$ [2023Hu20](#)

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	J. H. Kelley, C. G. Sheu and J. E. Purcell		NDS 198,1 (2024)	1-Aug-2024

XUNDL dataset compiled by TUNL (2023).

T=5/2 states in ^{13}B were populated using thick-target inverse kinematics scattering techniques. An R-matrix analysis of the excitation function determined the J^π values for the near-threshold resonances. Using these results, the J^π values for near threshold n+ ^{12}Be analog resonances in ^{13}Be were deduced using isospin symmetry arguments.

A beam of 6.0 MeV/nucleon ^{12}Be ions from the TRIUMF ISAC-II facility entered the TexAT active target time-projection chamber, and backscattered protons were detected using a set of six $\Delta\text{E-E}$ detector telescopes at the downstream wall of the TexAT chamber. The reaction kinematics were determined from analysis of the incident ^{12}Be and recoiling ^{12}Be and proton tracks. Excitation functions for elastic scattering were obtained by analyzing events in the different $\Delta\text{E-E}$ telescopes separately.

Evidence for a $J^\pi=1/2^+$ resonance at $E_{\text{c.m.}}=2.45$ MeV and a $J^\pi=5/2^+$ resonance at $E_{\text{c.m.}}=4.15$ MeV was found using the MINRMATRIX code. The authors explored any improvement of the fit by adding $J^\pi=1/2^-$ and or $3/2^-$ states, but found their experimental data were not sensitive to negative parity states. Expanding on this point, the *conclusion* discussion indicates participation of negative parity states cannot be excluded. The p+ ^{12}Be reaction can populate T=3/2 and 5/2 states, but an argument is made for preferential population of T=5/2 resonances; in this case, the observed resonances may be related to expected ^{13}Be resonances by isospin symmetry arguments. As a result, $J^\pi=1/2^+$ and $5/2^+$ neutron unbound states in ^{13}Be are expected at $E_{\text{c.m.}}=0.6$ MeV 1 and 2.34 MeV 6, respectively. These agree well with known states in ^{13}Be , and the authors claim this is the first definitive determination of J^π values in ^{13}B .

 ^{13}B Levels

E(level) [†]	J^π [†]	Γ [†]	S	Comments
18.25×10^3 10	$1/2^+$	0.7 MeV +4-3	0.16 +9-6	T=(5/2) Γ : $\Gamma=0.66$ MeV +40-25. E(level): From $E_{\text{c.m.}}(\text{p}+^{12}\text{Be})=2.45$ MeV 10.
19.95×10^3 6	$5/2^+$	0.60 MeV 10	0.49 8	T=(5/2) E(level): From $E_{\text{c.m.}}(\text{p}+^{12}\text{Be})=4.15$ MeV 6.

[†] From R-matrix analysis in ([2023Hu20](#)).