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A search for unexpected bound states in ^{15}B ¹

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Bound states in ^{15}B are to be populated through the one proton removal reaction from a ^{16}C beam produced at the RCNP EN Course through ^{18}O fragmentation. γ -decays from these states will be identified by an array of Compton-suppressed HPGe Clover detectors (CAGRA). The goals consist of i) identifying any previously unobserved and unexpected bound states in ^{15}B and ii) to assign total angular momenta to known excited states for the first time. At present only two bound states have been observed in ^{15}B , neither with firm spin or parity assignments [1]. The present work to be discussed is aimed at determining whether an excited $3/2^-$ state, a state with identical spin-parity as the ground state, resides below the neutron separation energy in ^{15}B . Such an excited $3/2^-$ state is not predicted to appear below the ^{15}B S_n by shell-model calculations using various p - sd interactions. However, a robust systematic, probably related to the s -wave trends found in the single-neutron states in this region [2], has been observed for neutron-rich $N=10$ nuclei and it suggests that the state may appear lower in excitation energy than expected. Providing some measure of validation for the $N=10$ prediction is a similar trend noticed in the energy differences between ground (p)² neutron states and excited (sd)² neutron states in the $N=8$ neutron-rich isotones [3]. In addition to a search for this unexpected state, additional spectroscopic information on ^{15}B will better aid in the understanding of the $N=10$ isotones when transitioning from ^{16}C into sparsely probed ^{14}Be . Details of the experimental procedures and motivation will be presented and discussed.

[1] Y. Kondo, T. Nakamura, N. Aoi et al., Phys. Rev. C 71, 044611 (2005).

[2] C. R. Hoffman, B. P. Kay, J. P. Schiffer, Phys. Rev. C 89, 061305(R) (2014).

[3] H. Iwasaki, A. Dewald, C. Fransen et al., Phys. Rev. Lett. 102, 202502 (2009)

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