Abstract Submitted
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Universality and the matter radius of Carbon-22[1] DANEL PHILLIPS, BIJAYA ACHARYA, Ohio University, CHEN JI, TRIUMF — Recently, Tanaka et al. measured the matter radius of ^{22}C to be $\langle r_m^2 \rangle^{1/2}$=5.4 ± 0.9 fm. This suggests that ^{22}C is an s-wave two-neutron halo, with the two neutrons orbiting a ^{20}C core. We address this finding using an effective field theory (EFT) that employs core and neutron degrees of freedom and is designed for systems with a large two-body scattering length. This EFT enables the derivation of universal predictions for three-body systems which are built on such two-body interactions and have a large matter radius. We show that, at leading order in the EFT, the matter radius of any s-wave two-neutron halo is given by a function of the neutron-core scattering length and the halo nucleus' two-neutron separation energy. We display this function and discuss its general properties. Specializing to the case of ^{22}C, we use our general function, together with the datum of Tanaka et al., to set limits on the binding energy of ^{22}C for different values of the ^{21}C resonance energy. Our analysis includes a consideration of the higher-order corrections in the EFT, allowing us to set an upper bound on the ^{22}C binding energy which includes both these uncertainties and those in the original measurement.

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