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Proton halos in Cluster effective field theory

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Proton halos are loosely bound nuclei consisting of a core plus valence proton(s). Compared to neutron halos, a proton halo system is more involved due to the presence of the Coulomb repulsion. We study these systems using the so called Halo, or Cluster, effective field theory (EFT). In this EFT the core of the halo nucleus is treated as a structureless, effective degree-of-freedom. The main advantages of using EFT are the systematic way of improving results, by including higher orders, and the fact that error estimates can be extracted at each order. We have considered one-proton halos bound due to an S-wave interaction to next-to-leading order and due to a P-wave interaction at leading order. Results that will be shown include the astrophysical S-factors for the reactions 16O(p,γ)17F*and 7Be(p,γ)8B and the charge radii of the one-proton halo states 17F* and 8B.

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