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Precision measurements in light, weakly bound nuclei[1]

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Precision measurements of the properties of light ($A \leq 12$) radioactive nuclei offer the opportunity to study nuclear forces under extreme neutron-to-proton ratios in relatively simple systems that are accessible to high-precision *ab-initio* nuclear theory. These measurements guide the development of effective models to accurately describe nuclear structure and reactions. Due to their weakly bound character, these nuclei also exhibit rich phenomenology, of which the so-called halo nuclei are perhaps the most remarkable: nuclei that consist of a core plus a halo of dilute nuclear matter with unusually large extend. For example, ^{11}Li and ^{11}Be are archetypes of two-neutron and one-neutron halo nuclei, respectively. I will provide a (selective) overview of recent measurements of these light nuclei that push the precision frontier and use a combination of electromagnetic, strong, and weak probes. Examples are laser spectroscopic measurements that use tiny energy shifts of bound electronic states to extract nuclear ground state properties, nuclear reaction studies using gamma spectroscopy to probe the wave functions of excited states, and beta decay measurements that exploit the relative simplicity of these isotopes to push the limit of knowledge of the weak interaction and search for new physics.

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