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Experimental Tests of Ab Initio Calculations of Nuclear Structure

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Ab Initio or first-principle methods have been very successful in calculating many properties of light nuclei. These methods use the most modern formulations of two- and three-nucleon interactions and have provided very accurate reproductions of the binding energies and level spectra for light nuclei over the past several years. These approaches have also been used to predict other properties, such as spectroscopic overlaps, nucleon densities and correlations, and electro-magnetic transition rates. In some cases, the agreement between theory and experiment has been less good, with notable discrepancies between data and predictions. I will describe two very different experiments that provide varied data that may be compared to predictions from Quantum Monte Carlo calculations. The first involves the Z dependence of E2 electro-magnetic transition rates in the T=1 (^{10}C,^{10}B,^{10}Be) triplet. The second example concerns spectroscopic overlaps and two-neutron densities in the so-called "super-heavy"isotope of hydrogen ^{5}H, studied by proton removal with the ^{6}He(d,^{3}He)^{5}H reaction at the National Superconducting Cyclotron Laboratory at Michigan State University.

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