Probing exotic structure using one-nucleon transfer reactions

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Understanding nuclear structure and the nuclear force which drives the underlying changes in orbital spacing are topics of high priority in current nuclear physics research. Tracking single-particle excitations is essential for understanding the nature of weakly bound nuclei and test various nuclear models. There are many experimental methods to study nuclear structure the a very compelling one is one-nucleon transfer reactions. Among light nuclei, Be isotopes provide a great testing ground for various nuclear models, thanks to their small number of valence nucleons and rapidly changing exotic structure. The *p*-wave normal configuration in low-lying states of ^{11}Be and *s*-wave intruder configuration in the 0+ states of ^{12}Be will be discussed in light of one-nucleon transfer reactions. Particularly, the ^{12}Be ground state is shown to be dominated by a *d*-wave component, which is a dramatic change compared to the ^{11}Be ground state, where the *s*-wave single-particle component governs the formation of the ^{11}Be one-neutron halo. Furthermore, preliminary results of low-lying resonances in ^{12}Be having dominant cross-shell neutron configurations will also be presented along with Gamow shell model (GSM) and Gamow coupled channel (GCC) calculations, which shed light on the three-body structure of ^{12}Be and the effect of coupling to the continuum. The AT-TPC and SOLARIS coupled to reaccelerated beams at FRIB will open ever increasing opportunities for using single-nucleon transfer reactions to probe the single-particle structure of exotic nuclei. Some of these ideas will be discussed based on future experiments prospects.