NUCLEAR STRUCTURE STUDIES VIA ONE-NUCLEON REMOVAL REACTIONS AT THE FRS

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The fragment separator FRS was used as an energy-loss spectrometer to measure longitudinal momentum distributions of fragments after one-nucleon removal reactions for different secondary beams at relativistic energies. The one-nucleon removal and total-interaction cross-sections of these secondary beams were also measured with the same experimental setup. In the past, a narrow momentum distribution of the fragments and a large interaction cross-section were considered as a clear signature of a halo. ¿From the study of heavier systems we have learnd that the information obtained from the one-nucleon removal cross-sections in addition, is necessary to test theoretical predictions describing the nuclear structure of halo nuclei from different models. With this technique only inclusive measurements were possible, no direct experimental evidence of the mixture of configurations for the halo nuclei in its ground state was given. The upgrade of our experimental setup has allowed us to detected gamma rays around the one-nucleon removal target in coincidence with the longitudinal momentum distributions and removal cross sections. This technique, one of the few examples of in-beam spectroscopy at relativistic energies, combined with secondary nuclear reaction has added new information that will allow us to better understand the nature of halo nuclei by means of exclusive measurements. During this talk, experimental results on momentum distributions, one-nucleon removal and interaction cross-sections for several C, B, and O isotopes will be presented, in coincidence with gamma ray detection. The isotopes studied range from tightly bound nuclei to neutron-rich (^{19}C, ^{24}O) or proton-rich (^{8}B,^{9}C) halo candidates and they will be compared with theoretical calculations.

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