

Two-Nucleon Knockout Reactions on $^3,^4\text{He}$

THE HALL A COLLABORATION

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ABSTRACT

We propose to study the two-nucleon knockout reactions $(e, e'pp)$ and $(e, e'pn)$ on $^3,^4\text{He}$ as a preliminary investigation of two-body currents and correlations in nuclei. The ^3He nucleus is initially selected because it is the lightest non-trivial nuclear system where realistic wave functions are available. We plan to measure electron-proton-proton and electron-proton-neutron angular correlation cross sections in geometries where the kinematics may permit simplified interpretation of the data and that selectively emphasize various components of the knockout mechanism. We expect to observe signatures of three important effects that contribute to the knockout process, namely initial state short-range correlations, two-body meson exchange currents and final state interactions. We plan to carry out these measurements using the 1-4 GeV CW electron beam at CEBAF and the two high resolution spectrometers in Hall A for detecting electrons and protons. A third detector arm, a segmented plastic scintillator hodoscope, is being developed for detecting protons and neutrons. This third arm and a high power cryogenic ^3He target capable of luminosities $L = 10^{38} \text{ cm}^{-2}\text{s}^{-1}$ will make these experiments feasible.