Investigation of the In-medium Kaon-Nucleon Interaction

M. H. Wood, Canisius College for the CLAS Collaboration

One method to study the strong interaction inside of the nucleus is with the absorption of hadrons. The E01-112 experiment in Hall B at the Thomas Jefferson National Accelerator provided data on the photo-production of the K^0_s in nuclei of deuterium, carbon, iron, and lead. The kaon is interesting since the antikaon-nucleon potential is attractive, leading to predictions of strangeness in a dense environment like a neutron star. On the other hand, the kaon-nucleon potential is repulsive, indicating that kaons should traverse the medium with fewer interactions. The absorption of the K^0_s by a bound nucleon inside a nucleus will indicate how the potential changes; is it strengthened or weakened in the medium. In this talk, I will present preliminary transparency ratios versus mass number.

Simulations for Kaon Absorption Studies

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The three pieces needed to determine the K^0_s transparency ratios are the kaon yields, the target thickness, and the detector acceptance. This poster will describe our simulations for the neutral kaon acceptance by the CLAS detector for the E01-112 experiment. The experiment was conducted in Hall B at the Thomas Jefferson National Accelerator Facility for the purpose of searching for medium modifications of mesons. The reactions are the photo-production of mesons from targets of deuterium, carbon, iron, and lead. Our calculations employ the PLUTO++ software for the generator and GSIM to simulate the detector.

Mining for omega and f_1 decays in CLAS Data

A. Beiter and M. H. Wood, Canisius College for the CLAS Collaboration

One advantage of the CLAS detector at the Thomas Jefferson National Accelerator Facility (TJNAF) is its ability to reconstruct multi-particle decays. For this reason, we are mining the E02-104 data set for the exclusive decays of the omega and f_1 mesons. Each meson has either three or four particles in the final state. Our goal is to determine the reaction rates with CLAS and extrapolate to those for the E12-06-117 experiment, that will run when the CLAS12 detector is built for the TJNAF 12-GeV upgrade. The focus of the latter experiment is to understand the hadronization process from free quarks to color-neutral hadrons. This poster will describe our work using the data mining software developed by the group at Old Dominion University under a grant from the Department of Energy.

Development of the PCAL Reconstruction Software

C. King and M. H. Wood, Canisius College for the CLAS Collaboration

The 12-GeV upgrade at the Thomas Jefferson National Accelerator Facility requires that the CLAS in Hall B be upgraded for the new kinematics at the higher beam energies. The new CLAS12 detector will include a component called the Pre-shower Calorimeter or PCAL. The PCAL will enhance the capabilities of the existing calorimeters and allow for greater acceptance over a wider range of momenta of particles like the neutral pion. The responsibility of the group at Canisius College is the PCAL reconstruction software. This poster will describe the software development and how it utilizes the Service-Oriented Architecture of CLAS12.