

ABSTRACT

This is a new version of the proposal E97-106 that originally was submitted and approved in 1997 [1]. We propose to use the $(e, e'p + N)$ reaction on ^{12}C in hall A as a tool to measure short range nucleon-nucleon correlations (NN SRC). In the context of this proposal we refer to NN SRC has a pre-existing pair of nucleons which have back-to-back high momenta balancing each other. The two existing magnetic spectrometers will be used to measure the $(e, e'p)$ part of the reaction. The measurement requires a third spectrometer (BigBite) and an array of scintillation counters, to simultaneously measure neutrons and protons in coincidence with the outgoing high momentum electron and proton. We propose to use segmented scintillators as the only focal plan detectors for BigBite. This will simplify the Bigbite commissioning and allow high singles rates with sufficient resolution for this measurement.

We choose kinematical conditions that will allow us to determine the fraction of $(e, e'p)$ events which are associated with NN SRC. This will be done as a function of the momentum of the proton in the nucleus in the range 250-600 MeV/c. It will also allow us to compare between pn and pp correlated pairs in nuclei.

This proposal expands the existing limits to large Q^2 , $x > 1$, and "exclusiveness" which were not covered by earlier data or other proposals to Jefferson Lab (JLab). We will discuss the importance of these kinematical constraints for the identification of NN short range correlations in nuclei and how they may overcome the obstacles from final state interactions, meson exchange currents and resonance production.

We would like to emphasize that this proposal is the only proposal to measure simultaneously both the $(e, e'p)$ as well as $(e, e'p + n)$ and $(e, e'p + p)$ reactions. We chose an optimized kinematics to minimize the competing processes and at this kinematics we will study the different contributions.

A letter of intent to perform a similar measurement on ^3He using the same experimental equipment as this proposal is being submitted.

