

# Search for Color Coherent Effects via the Observation of Double Scattering Events in CLAS

## Summary

We propose to investigate Color Coherent effects at intermediate values of  $Q^2$  ( $\sim$  few  $(GeV/c)^2$ ) using a new method of measurement. The idea is to measure the  $Q^2$  dependence of the final state interactions of recoiling protons in quasi-elastic electron scattering from light nuclei. This method is complementary to the usual measurement of the event rate without final state interactions. Calculations show that significant color transparency effects could occur for this rescattering phenomenon at energies initially available at CEBAF. The price to pay is the effort needed to detect more than one hadron in the final state. Such processes have small cross sections, so the use of large acceptance ( $4\pi$ ) detectors like CLAS is necessary.

## Introduction

One of interesting directions to investigate QCD is to study the interface between perturbative (short distance) and non-perturbative (large distance) QCD instead of the study of the reasonably well understood purely perturbative regime. The most popular reaction, where the relative role of perturbative and non-perturbative contributions has been actively discussed for a long time, is elastic electron-nucleon scattering. Both the proponents and opponents of the idea that perturbative QCD effects are dominant have presented interesting arguments. Another approach to understand this region is to examine models of the nucleon to determine those that allow a small size configuration or a point-like configuration (PLC) to develop at not too large  $Q^2$ . (The PLC is a precursor of the dominance of pQCD.) The result is that realistic quark models of a nucleon which contain a Coulomb type interaction at small interquark distances and Skyrmin models both allow a PLC to form at a momentum transfer as small as 1-2  $(GeV/c)^2$  (see analysis made in [1,2]). The opposite behavior is expected in mean-field quark-models of the nucleon, and in chiral Lagrangian models where a nucleon is considered as a structureless particle surrounded by a meson cloud.

Thus, the pressing problem now is to find experimental evidence that helps to distinguish between these two classes of models. The ideas of pQCD lead to the suggestion [3,4] that the A-dependence of quasi-exclusive processes

$$l(h) + A \rightarrow l(h) + p + (A - 1) \quad (1)$$

could be used to determine the configurations that dominate in hard two-body reactions. The notion was to explore the color screening phenomenon in QCD - the decrease of