# E94-139

## Measurement of the Nuclear Dependence and Momentum Transfer Dependence of Quasielastic (e,e′p) Scattering at Large Momentum Transfer

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The Color Transparency (CT) conjecture by Mueller and Brodsky has stimulated great interest. CT was first discussed in terms of perturbative QCD considerations. However, recent work indicates that this phenomenon occurs in a wide variety of model calculations with nonperturbative reaction mechanisms. The existence of CT requires that high momentum transfer scattering should take place via selection of amplitudes in the initial and final state hadrons characterized by a small transverse size. Secondly, this small object should be 'color neutral' outside of this small radius in order not to radiate gluons. Finally, this compact size must be maintained for some distance in traversing the nuclear medium. Unambiguous observation of CT would provide a new means to study the strong interaction in nuclei.

CEBAF has several advantages to offer in searching for CT effects in quasielastic A(e,e′p) measurements. Data from experiments NE18 at SLAC and E91-013 and E91-007 at CEBAF will provide a baseline for conventional Glauber calculations; the fundamental electron-proton scattering cross-section is smoothly varying and accurately known in this kinematic range; the high duty factor, the high luminosity, the large solid angle high momentum Hall C spectrometers and the high missing energy resolution all contribute to making high quality, precision measurements feasible. In particular, the high missing energy resolution at high $Q^2$ will provide an unprecedented opportunity to study the dependence of the nuclear transparency on the initial proton state. As the beam energy at CEBAF increases the momentum transfer accessible also rises. 6 GeV beam energy allows measurements at almost 9 $(GeV/c)^2$.

This experiment will measure the (e,e′p) cross section as a function of A and $Q^2$ up to the highest $Q^2$ attainable at CEBAF. It will extend the $Q^2$ range of the approved experiments E91-013 and E91-007 to 8.7 $(GeV/c)^2$, for the target nuclei $^2$H, $^4$He, $^{12}$C, and $^{56}$Fe. At the highest $Q^2$ one hopes to see conclusive effects of color transparency, the effect of the diminishing of Final-State Interactions if the scattering occurs on a small object.