

# CEBAF Program Advisory Committee Ten Proposal Cover Sheet

This document must be received by close of business on Tuesday, December 19, 1995 at:

CEBAF  
User Liaison Office, Mail Stop 12 B  
12000 Jefferson Avenue  
Newport News, VA 23606

(Choose one)

- New Proposal Title:  
 Update Experiment Number: 94-023  
 Letter-of-Intent Title:

## Contact Person

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Experimental Hall: A Days Requested for Approval: 24

## CEBAF Use Only

Receipt Date: 12/19/95 PR 95-017

By: sp





# LAB RESOURCES REQUIREMENTS LIST

CEBAF Proposal No.: FR 94 - 023 Date: \_\_\_\_\_  
(For CEBAF User Liaison Office use only.)

List below significant resources — both equipment and human — that you are requesting *from CEBAF* in support of mounting and executing the proposed experiment. Do not include items that will be routinely supplied to all running experiments, such as the base equipment for the hall and technical support for routine operation, installation, and maintenance.

**Major Installations** (either your equip. or new equip. requested from CEBAF)

LNH polarized target  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

New Support Structures: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Data Acquisition/Reduction**

Computing Resources: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

New Software: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Major Equipment**

Magnets standard Hall A  
\_\_\_\_\_

Power Supplies \_\_\_\_\_  
\_\_\_\_\_

Targets vacuum coupled glass target  
\_\_\_\_\_

Detectors \_\_\_\_\_  
\_\_\_\_\_

Electronics \_\_\_\_\_  
\_\_\_\_\_

Computer Hardware \_\_\_\_\_  
\_\_\_\_\_

Other \_\_\_\_\_  
\_\_\_\_\_

**Other**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

UPDATE ON PROPOSAL PR-94-023 TO CEBAF PAC 10

**Measurement of small components of the  ${}^3\text{He}$   
wave function using  ${}^3\overrightarrow{\text{He}}(\vec{e},e'p)$  in Hall A**

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M. B. Leuschner, V. Pomeroy, Timothy P. Smith, A. Volosov  
*University of New Hampshire*

J. LeRose, B. Wojtsekowski  
*CEBAF*

R. Lourie, S. vanVerst  
*University of Virginia*

seeking the endorsement of the Hall A Collaboration

F. W. Hersman, contact person

**ABSTRACT**

Proposal PR94-023 to measure small components of the  ${}^3\text{He}$  wave function using  ${}^3\overrightarrow{\text{He}}(\vec{e},e'p)$  in Hall A was deferred by the PAC8. At PAC9 we addressed concern about the optimal choice of kinematics. In this update we reiterate our commitment to this physics, and include recent calculations related to extracting the S'-state.

Measuring double polarization observables for proton knockout from  ${}^3\text{He}$  in the quasifree region will help to clarify the spin structure of the  ${}^3\text{He}$  wave function. Sensitivity to the D-state and S'-state admixtures are particularly emphasized. Considerable evidence has been presented in the original proposal and update on sensitivity to the D-state and the control of final state interactions with optimal choice of kinematics. Sensitivity of the observables to the S'-state is less fully explored.

Nogorny reported in a recent CEBAF seminar that quasifree proton knockout to the two body final state should be insensitive to the S'-state admixture. The reason cited was the single isospin available to the final state projects off the mixed isospin S'-state. He suggested that deuteron knockout could provide an unambiguous measure of the S' amplitude. He recognized, however, that the isospin combinations in the three body final state (which he could not calculate) would allow the necessary isospins to exhibit sensitivity to the S'-state.

Laget has been unable to produce calculations specifically turning on and off the S'-state. Since his solutions are full solutions to the Fadeev equations (in partial wave expansion), the S'-state amplitude does not appear as a free parameter. Nevertheless, he has recently been able to provide calculations exploring the kinematical regions likely to be sensitive to the S'-state amplitude. He calculates the double asymmetries in two ways: first using the exact Fadeev solutions, and a second time setting the triplet S equal to the singlet S. Since the S'-state will affect the wave function by modifying the ratio of these S-wave amplitudes, the kinematic regions where these two calculations differ offer sensitivity to the S'-state.

The results are plotted in the accompanying figure. The plot shows the asymmetries of the three body final state as a function of excitation energy of the final n-p system. Fixed recoil momentum kinematics of  $p_m=335$  MeV/c were chosen. This plot indicates considerable sensitivity to the S'-state in the asymmetry  $A'_x$  with target axis perpendicular to the momentum transfer. The small separation between the final plane wave curve and the full curve indicates that final state interactions modify the asymmetries only minimally.

In summary, new calculations have shown that asymmetries measured in PR94-023 will provide sensitivity to the D-state and S'-state of  ${}^3\text{He}$ . Extractions of these states will require detailed comparisons of the asymmetries to quantitative calculations for the momentum transfer dependence and missing energy dependence of the reaction.

$${}^3\text{He}(\vec{e}, e\gamma)np$$

$\theta_p = 0$     $\varphi = 0$     $0.100195$   
 $T_{pd} = 398$     $E_\gamma = 668 \text{ keV}$   
 $P_d = 335$

