

Proposal Number: PR12-09-011

Hall: C

Title: Studies of the L-T Separated Kaon Electroproduction Cross Section from 5-11 GeV

Contact person: T. Horn *et al.*

Beam time request:

Days requested for approval: 47 (= 43+4)
Tune up included in beam line request: Yes

Beam characteristics:

Energy: 9 different energies in Table I
Part I: 7 energies
Part II: 4 energies
Part III: 6 energies
Current: 90 microA
Polarization: no

Targets:

Nuclei: 1H (8cm, 4cm), dummy
Rastering: Yes
Polarized: No

Spectrometers:

HMS Yes
SHMS Yes
Other (BigCal, etc.): none

Special requirements/requests:

Aerogel detector in SHMS

Technical Comments:

The proponents have extensive experience since this is at least the 3rd generation measurement of L-T separated forward meson production in Hall C. The significantly new feature will be the SHMS which has a pre-bender. New calibration procedures will need to be developed for commissioning the SHMS.

The familiar HMS will be used for e⁻ detection. The presumably already-commissioned SHMS will be used for K⁺ detection. The angle and momentum ranges in Table I of the proposal are consistent with HMS-SHMS angle and momentum ranges.

However, constant vigilance over the SHMS design will be required to make sure that a separation angle as small as 16 degrees will be achievable (potentially required for a cross-check with a CERN F_k measurement).

This program requires 8 cm and 4 cm LH_2 cells with minimal density changes with a rastered 90 microA beam. The existing 4 cm tuna-can cell design performs well provided the beam is properly centered. A suitable 8 cm cell may need to be developed by the target group. The collaboration should consider using a 10 cm cell, one of the planned standard target lengths.

In the early years of 12 GeV operation, the practical limit on beam current for 11 GeV running will be 75uA. The use of longer target cells may compensate for this limitation.

The proponents argue on the one hand that this experiment is a logical candidate for early running because it is not as systematics limited as L/T studies in $(e,e'\pi^+)$. But on the other hand, they have only asked for 4 days for calibrations. If this experiment runs earlier, it may need more time for calibrations.

As the proponents point out, full $\pi^+/K^+/p$ separation can be complicated at these energies. A run-by-run plan for PID should be a high point of every readiness review. In addition to the heavy gas Cerenkov for which one of the co-spokespersons has taken responsibility, several aerogel detectors need to be funded and built.

About half of the requested running time is at non-standard energies. Thus single hall running may be required for those portions of the experiment.

The large number of beam energies is surprisingly well-motivated. This proposal consists of 3 parts which could have easily resulted in 3 separate proposals. In addition, each L/T separation at fixed Q^2 requires at least two beam energies, and minimizing the error in the L/T separations generally requires non-standard energies. Considerable flexibility in scheduling will be required. As for the collaboration, they will have to become very good at remembering to reconfigure the particle identification detectors in the SHMS with almost every significant momentum change.