Proposed Systematic Studies

A. Surface μ and π stopping distributions

GOAL: Optimize stopping in target.
Modify the thickness of absorber.

Goal: Study Sensitivity to Proton beam movement.
Move proton beam in controlled way.

Goal: Study Sensitivity to M13 magnet stability.
Change M13 magnets in controlled way.

Goal: Study Sensitivity to Changes in Fringe field region.
Tune shield coil current in controlled way.

Goal: Study μ depolarization in PC(gas).
Trigger on stops obviously in chambers.

- SiLi threshold above positron.
  Common stop & 10μsec time window.
  Reconstruct events to estimate number stopping in target!
  (Would on-line reconstruction capability be useful?)
  (Position according to PC's at target?)

Add the following to SiLi trigger.
Scaling and histograming the following types of events would serve for evaluating and later for monitoring the stopping distribution.

0 Muon (SiLi) trigger.
i. Hit in PC(s) downstream of target.
ii. Hit in PDC(s) downstream of target.
iii. No hit in last PC(s) upstream of target.
iv. No hit in last PDC(s) upstream of target.
v. Hit/No hit in PC(s) downstream of target
With/without hit in upstream PC's.
vi. Hit/No hit in PDC(s) downstream of target
With combinations of (v).
vii. Other Combinations.

B. Response to passing μ's

GOAL: Study upstream - downstream equivalence.

i. Add absorber to have μ's stop in upstream SiLi.
Upstream SiLi + info from surrounding PC's and PDC's as trigger.
Track positron through entire system of PDC's with no μ hits.
ii. Remove absorber and upstream SiLi to have μ's stop in downstream SiLi.
Downstream SiLi + info from surrounding PC's and PDC's as trigger.
Track positron through entire system of PDC's with μ hits in all PDC's.

Goal: Large angle rays and upstream-downstream chamber alignment etc.

C. **Repeat B. to Study response to passing π's**

GOAL: Influence of π's in beam stopping in upstream region.

Goal: μ edge at 30MeV/c as calibration point.

Goal: 70 MeV e^+ as calibration point.

Goal: Use 4 MeV pulse in SiLi to study unpolarised μ^+ concept and positron endpoint determinations.

D. **30 MeV/c e^+'s Beam studies.**

GOAL: Study efficiency of SiLi for e^+'s.

Goal: Wire position determinations. (Large phase space beam).

Goal: Calibration for upstream/downstream monitoring.

E. **52 MeV/c Beam e^+'s edge.**

GOAL: Calibration point.

Goal: Extra calibration points.

Shift edge with degrader at M13 midplane.
Edge will survive how much degrader?

Goal: Wire position determinations. (Large phase space beam).

F. **Stopping distribution vs channel momentum setting.**

GOAL: Calibrate range curve of detector materials. (μ's and π's).

G. **Various stopping target materials.**

GOAL: Study depolarization effect.

i. High Z metals $\Rightarrow$ non depolarizing materials.
ii. Mylar and other depolarizing materials.
(Not dependent on determination of vertex!)

Goal: Study vertex reconstruction. Mesh Target?

H. **Cosmic rays.**

GOAL: Wire and Plane position determinations. Require special trigger and counters around outside of spectrometer.

I. **P_μ dependence on Beamline momentum.**

GOAL: Sample vs depth in production target.

Extrapolate to zero depth.

J. **P_μ dependence on radial position in stopping target.**

GOAL: Sample vs angle of μ

Extrapolate to zero angle.

K. **Dependence on μ^+ rate in spectrometer.**

GOAL: Why only one μ^+ at a time in target?

Proposed Triggers.

A. **Stopped surface μ's (Minimum bias)**

Common stop & 10μsec time window.
Polarized spectrum!

- SiLi threshold above positron.
  ≈60% will stop.
- Biased versions for monitoring.
  (Second level triggers?)
  i. No hit in PC(s) downstream of target.
  ii. Hit in PC(s) downstream of target. (Stops in PC gas).
  iii. No hit in last PC(s) upstream of target. (Stops in PC gas).
  iv. 10 hits in chambers after 0.5μsec.
  (Require a potential positron track).
  v. Combinations of above.

B. **Beam e^+'s (Minimum bias)**

Common stop & 1μsec time window.
Backward vs forward efficiency monitoring.

- SiLi threshold below positron (and below muon).
- Prescale ≈ 100

C. **Stopped π's (Minimum bias?)**

Common stop & 10μsec time window.
Unpolarized spectrum.

- SiLi threshold above positron and no LARGE(μ) 2nd hit in target area PC's.
- Biased versions for monitoring.
  (Second level triggers?)
  0 SiLi threshold above positron. (Minimum bias)
  i. No hit in PC(s) downstream of target.
  ii. Hit in PC(s) downstream of target. (Stops in PC gas).
  iii. No hit in last PC(s) upstream of target. (Stops in PC gas).
  iv. 10 hits in chambers after 0.5μsec.
  (Require a potential positron track).
  v. Combinations of above.

Replace SiLi?

1877 backplane output; TTL equivalent of input ECL!

Time Over Threshold (TOTH) makes "Pulse Height Decisions Possible"

Logic Box $\Rightarrow$ N coincident upstream wires saw large pulse!

TOTH Sum of all upstream chambers followed by discriminator set at N hits?

e^+ - μ^+ separation should be easy!

Backplane outputs also necessary/useful for: Scalar monitoring and Special Triggers.

Absorber wheel?

Target wheel?