Data Analysis

Problems We Need to Face

“Normal” Inefficiencies

Incident Muon Confusion

Extracting the Physics

“Normal” Inefficiencies

Early Monte Carlo studies imply we will need at least 7 x and 7 y track measurements for good reconstruction efficiency

This should be trivial for tracks with $|\theta| < 40^{o}$.

Tracks with $|\theta| > 40^{o}$ will either deposit substantial dE/dx in a single cell or hit multiple cells in a plane.

$\Rightarrow$ “Statistical” inefficiencies shouldn’t be a problem, although we will need to be able to fit through them “elegantly”.

Dead or hot wires may or may not be a significant problem, depending on where they are located in the spectrometer.

Incident Muon Confusion

Noise and crosstalk can obscure the positron hits.

Space charge around sense wire from muon avalanche will produce inefficiencies.

Saturated electronics may cause inefficient channels.

The 500 ns minimum stopped muon period will minimize, but not eliminate, these problems.

Beam positrons will provide us with a laboratory to test and improve our reconstruction techniques in the presence of these problems.

Extracting the Physics

- or -

Going from $N(x, \cos\theta)$ to the Michel Parameters

Monte Carlo simulations of the physics backgrounds (energy loss, bremsstrahlung, multiple scattering, etc.) indicate that they make small and relatively easily modeled changes in the shape of the Michel spectrum.

Tracking ambiguities, especially those associated with contamination of the outgoing positron track by the incident muon track, may lead to difficult to model, localized (in energy and/or angle) distortions of the expected shape. If these prove to be a significant issue, we will need to do a full-statistics data *vs*. Monte Carlo fit to extract the final Michel parameters.

Beginning to Face the Problems
Initial Task Assignments

Building the “dirt” into the Monte Carlo
— TRIUMF + others

Pattern recognition in the presence of “dirt”
— Texas A&M

Selecting the “best” space-points amongst the possible options
— Alberta / TRIUMF

Helix fitting
— Regina

As the hardware comes together, nearly everyone will be working on these questions — but we will need preliminary answers before hand, if only to understand what the data itself is trying to teach us!