# Update on Problems Encountered with Hall D Software

Kei Moriya (Indiana University) January 26, 2011 GlueX Offline Software Meeting

## Previous Talk on Jan. 12, 2011

- Problem #0: thread timeout issue
- Problem #1: spike of momentum at ~0.5 GeV/
   c for pi+ tracks with a proton hypothesis
- Problem #2: momentum direction reversed depending on hypothesis
- Problem #3: guards against undefined variables

## Generated Events

- very simple rho meson production
- distribution of |p| vs theta (lab)



## Problem #0

- event processing hangs every -1000 events
- restricts processing of many events
- workaround suggested by Matt works (compile DTrackCandidate\_factory\_CDC.ccusing compiler optimization -O0 instead of -O2)
- still not a final resolution
- Updated my code last week to the newest trunk version, and problem still there

Problem #1 (1/4)
pi+ events reconstructed as proton show "spike" in momentum at ~0.5 GeV/c

#### • also small bump at 8 GeV/c





# Problem #1 (2/4)

- plot magnitude of momentum for each hypothesis
- notice large gain in statistics due to workaround of Problem #0



Problem #1 (3/4)

#### • plot |p| vs. theta in lab frame



## Problem #1 (4/4)

• emails from Nathan Sparks -

I reran hd\_root using the ALT1 fitter this time, and I do get a spike near 0.5 GeV in the proton momentum distribution. If you chop off the spike then the distribution looks similar to the one obtained when using the Kalman fitter (so apparently those fits fail in the Kalman filter).

I found out how to significantly reduce the size of the spike at about 0.4 GeV in the proton momentum distribution. In GetFDCHits() of DTrackHitSelectorALT1.cc, there are two lines that apply a mass scaling factor to the errors. This factor is 1 for pions and about 7 for protons. It is suppose to help account for the fact that protons lose energy quicker than pions in the detector. I guess that this allows for a lot of flexibility in the fit momentum, and that for some reason values of momentum just above threshold are favored (possibly due to initial values).

have not looked into this in detail yet

## Problem #2

 some events have direction of momentum "reversed"



#### Problem #3

- values of variables ill-defined
- lots of updates within the last few days

# A Peak Ahead at PID...(1/4)

#### • t1 (inset shows blowup of 0-40)





# A Peak Ahead at PID...(2/4)

#### pathlength





# A Peak Ahead at PID...(3/4) Delta TOF = (measured TOF) - (calculated TOF using momentum and hypothesis mass)

- frequently used in CLAS analyses
- pi/p separation up to 2.5 GeV/c in this channel





#### A Peak Ahead at PID...(4/4) • dE/dx

pi/p separation up to only 1 GeV/c



