# Charged Particle Reconstruction Status Feb. 22, 2008 David Lawrence

The following plots were made from a Monte Carlo simulation of ~35 million single  $\pi^+$  events

For these events, the drift times of the CDC and FDC hits were smeared via Gaussian distributions with widths corresponding to  $150\mu m$  and  $200\mu m$  respectively.

Cathode strips were not used in the fits.

Track candidates were taken from thrown values (*i.e. track finding was not used*)

### **Momentum Resolution**

#### Feb. 22, 2008 DL $\sigma_{\!\Delta p_{tran}}'\!p_{tran}$ vs. $p_{tot}$ vs. $\theta$ Feb. 22, 2008 DL $\boldsymbol{\sigma}_{\!\!\Delta \textbf{p/p}} \, \textbf{vs.} \, \textbf{p}_{\!\! \text{tot}} \, \textbf{vs.} \, \boldsymbol{\theta}$ Candidates from THROWN values Single n<sup>+</sup> with MULS and LOSS on Single n<sup>+</sup> with MULS and LOSS on Total Momentum (GeV/c) Total Momentum (GeV/c) n θ Angle (degrees) θ Angle (degrees)

#### **Total Momentum Resolution**

#### **Transverse Momentum Resolution**

# Transverse Momentum Resolution



# Total Momentum Resolution Compared to original *HDFast*



Geant

**MCFast** 

# **Tracking Residuals**



When FDC was fit with **no** smearing, the residuals were about  $90\mu m$  which is consistent with  $220^2 = 200^2 + 90^2$ 

Drift times were smeared by an equivalent of 150µm in the CDC and 200µm in the FDC.

Multiple scattering seems to contribute about 90µm to the FDC position, but a negligible amount to the CDC

# Parametric Calculation of 90° tracks vs. *hdgeant*



Tracks perpendicular to CDC wires seem to have an effective residual, even with no explicit smearing of the drift time

#### CDC Thresholds on Total Momentum vs. $\boldsymbol{\theta}$

From tracks with at least 5 wires hit in CDC and 10 wires hit total between CDC anf FDC.



*Limit at 150µm is artificial due to histogram lower limit* 

### What's next ...

- Work on documenting "pure" tracking resolutions
- Make new resolution functions available (svn co src/programs/Simulation/HDParSim)
- Look at resolutions in the presence of background and inefficient/dead wires
- Full tracking efficiencies

### **Background Rates**

