DCA Calculation using the Stand Alone Tracking Algorithm

Richard Petti
Stonybrook University
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Motivation for this alternate Method

- In the past, studies were done using the Kalman filter to calculate the DCA
- The results were not ideal
  - How does the kalman filter project the track back to find the dca?
- So the idea of using the stand alone tracking algorithm to calculate the dca was put forth and is being studied currently

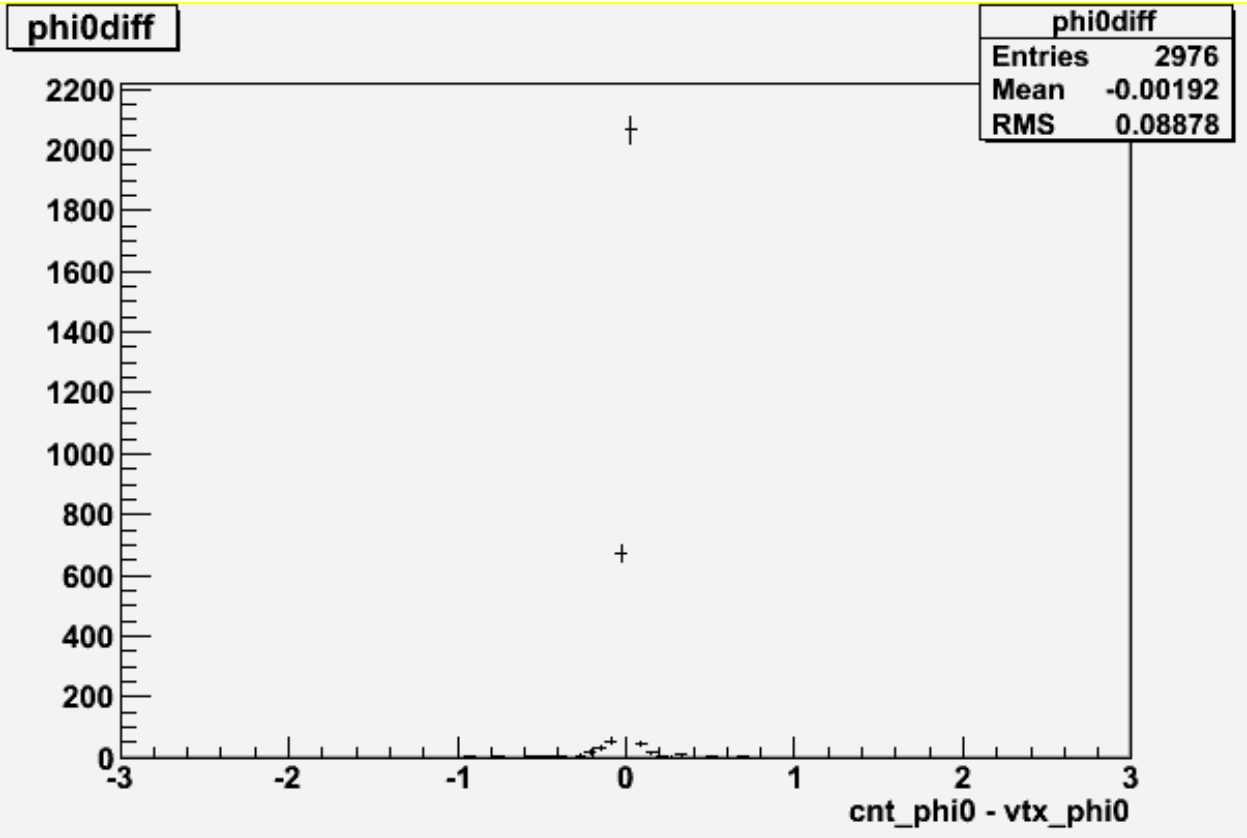
Overview of Simulation

- Events of interest are processed through PISA
- The stand alone tracking is run
- Central arm tracks are matched to stand alone tracks
    - Right now only matching in phi0 (svx_phi0 – cnt_phi0 < 0.01), but also plan to match in theta0 as well
    - Matching in this way may not be sufficient, will use the Kalman filter for track associations in the future
- The momentum found by the drift chamber is used for the track and the track is refit in the vtx layers
- The DCA (distance of closest approach) to the vertex is calculated
- Note: Currently using the exact vertex known from Monte Carlo

Track Matching

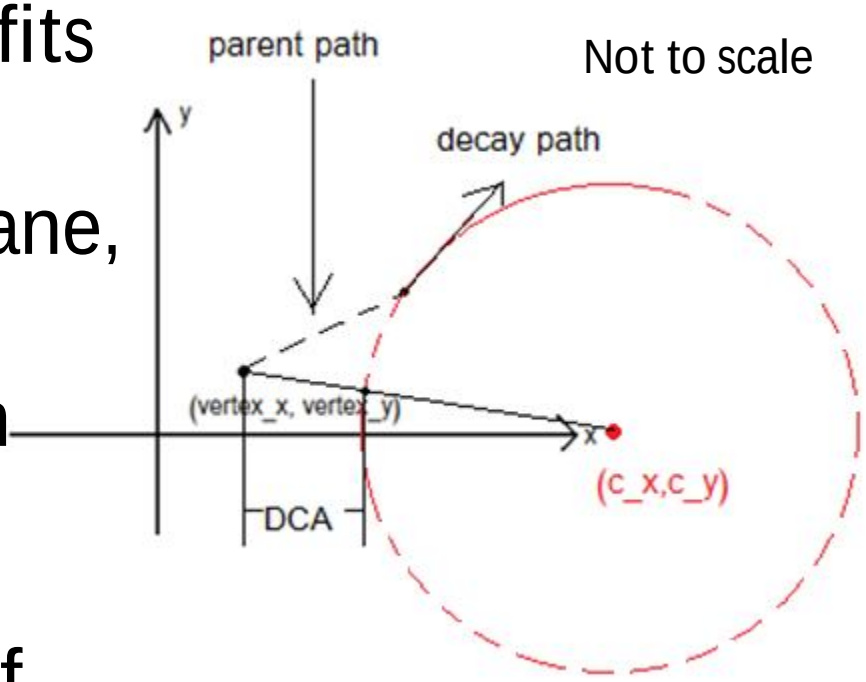
- Match the svx track and dch track to phi0, the phi angle made at the vertex
- Needs work

Assuming straight line track:
•Mean = -0.00192
•RMS = 0.08878



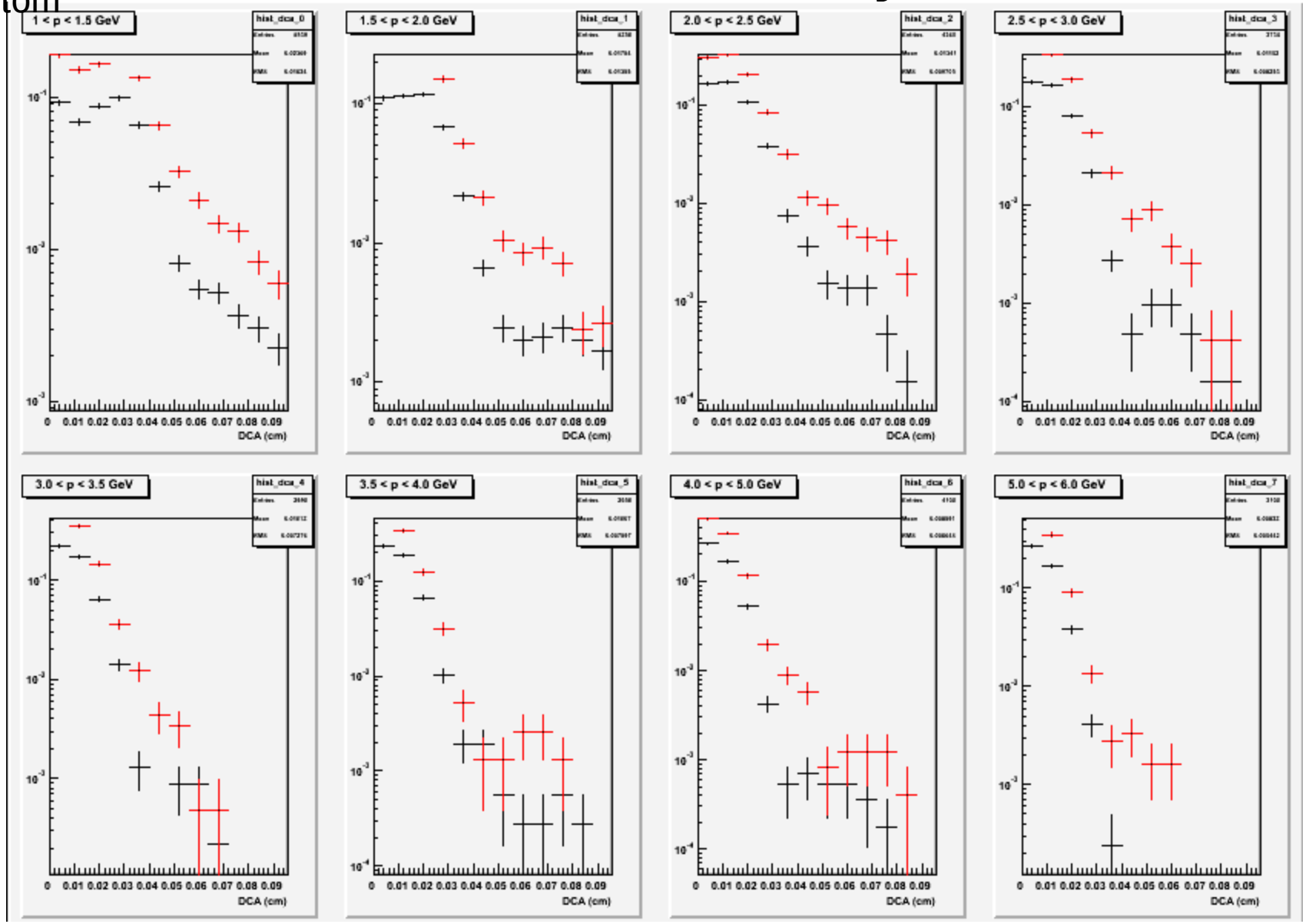
Calculating DCA

- The stand alone tracking fits the track to a helix
- Projected onto the x-y plane, this helix is a circle
- The intersection between the circle and the line connecting the vertex position and the center of the helix is the DCA in the transverse plane



Reconstructed DCA for electrons from D and B Meson Decays

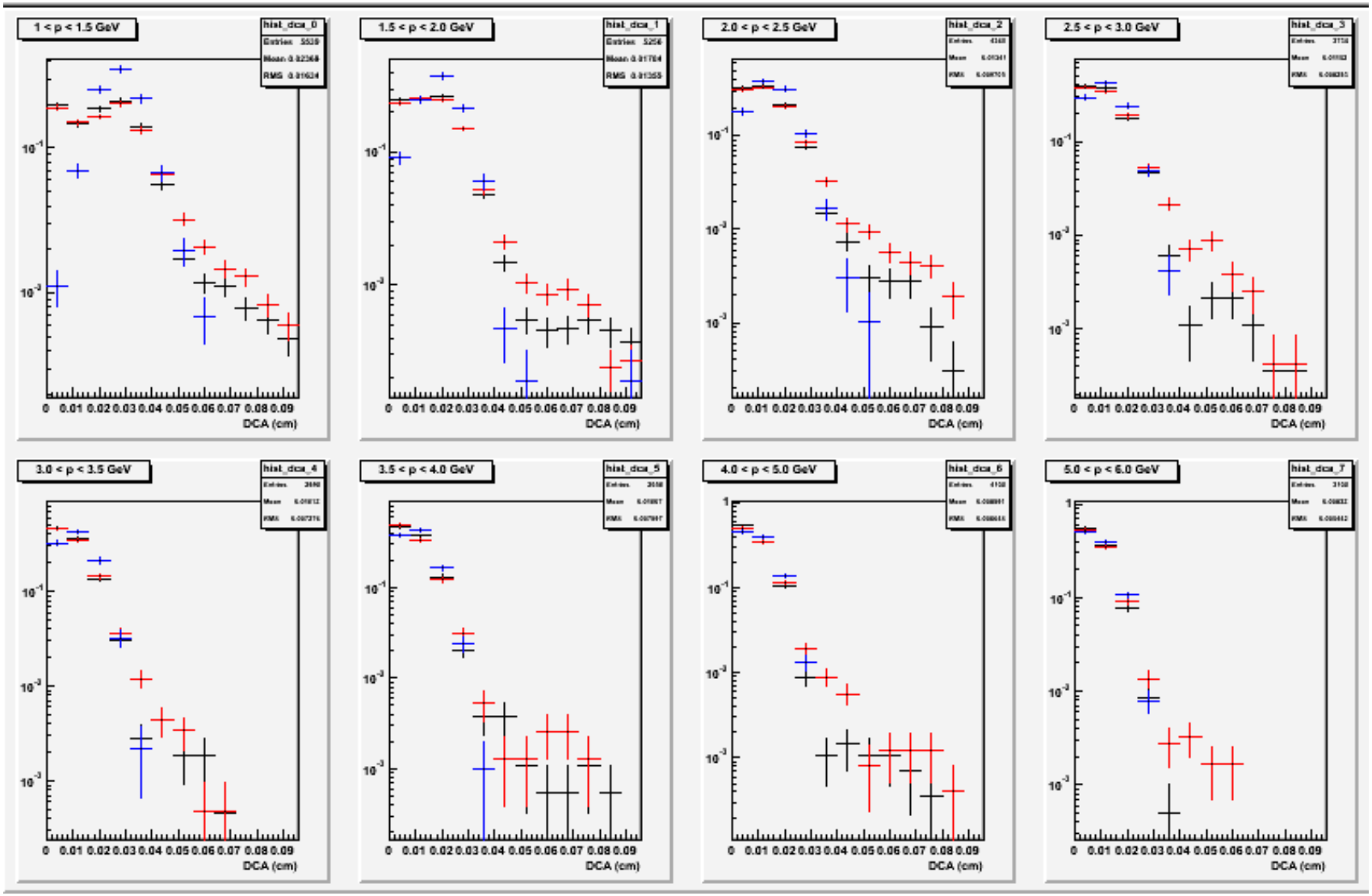
Red – charm
Black - bottom



DCA with electrons from the Vertex

Red – charm
Black – bottom
Blue – from vertex

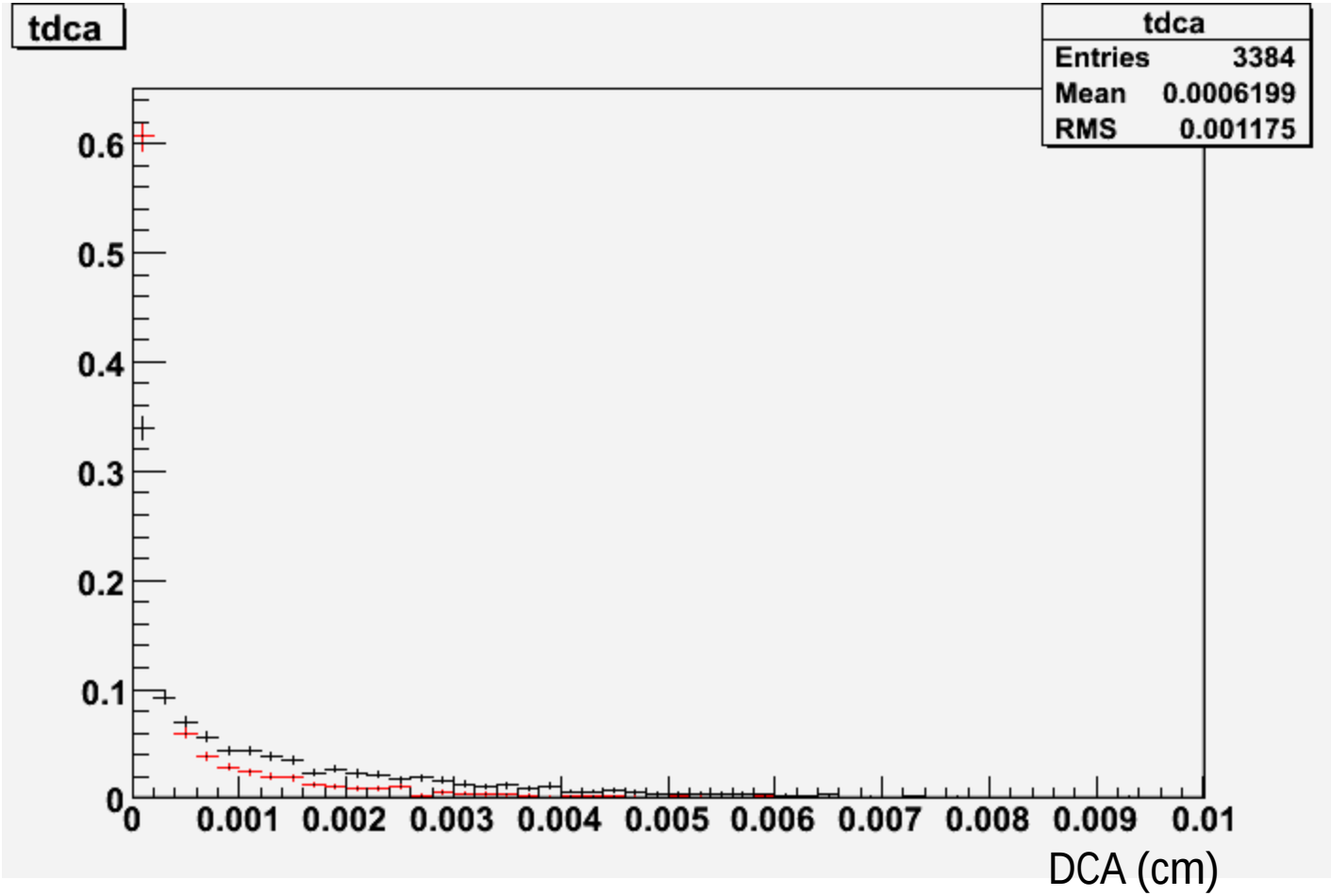
All distributions normalized to 1



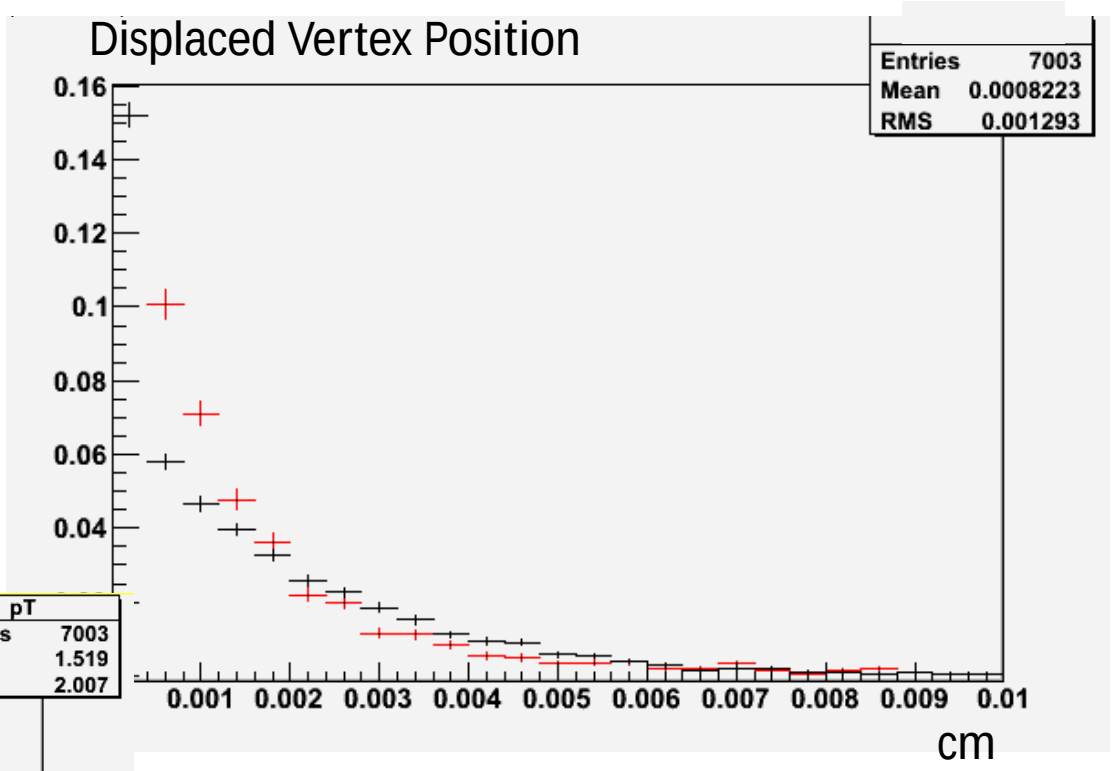
True DCA

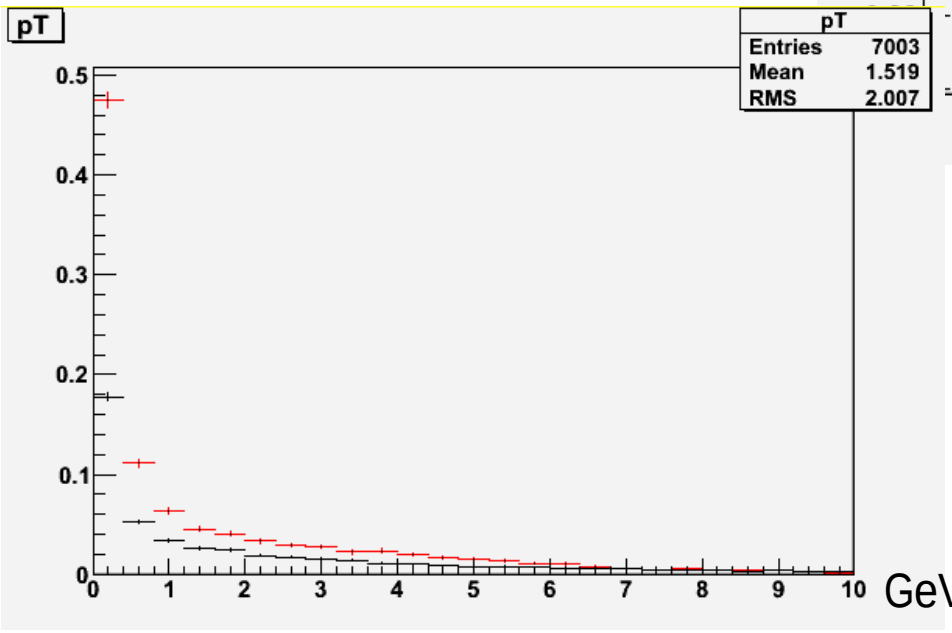
Red – charm
Black - bottom

cτ for:
B0 462 um
B+ 502um
D0 123 um
D+ 317 um



Monte Carlo Information





cτ for:
B0 462 um
B+ 502um
D0 123 um
D+ 317 um

To Do List

- Calculate the true DCA and an idealized DCA
- Smear the known vertex
- Use the kalman filter for the track cluster identifications