Hough Study

- Learning method on Hough Space
- Check for pipipsip for Shandong university

Add driftDist in Conformal Transform

Why:

old conformal Transform use only mid point of axial hits

X=x/(x*x+y*y)
Y=y/(x*x+y*y)

(x,y)->(X,Y)

Actually, by adding driftdistance in Conformal transform

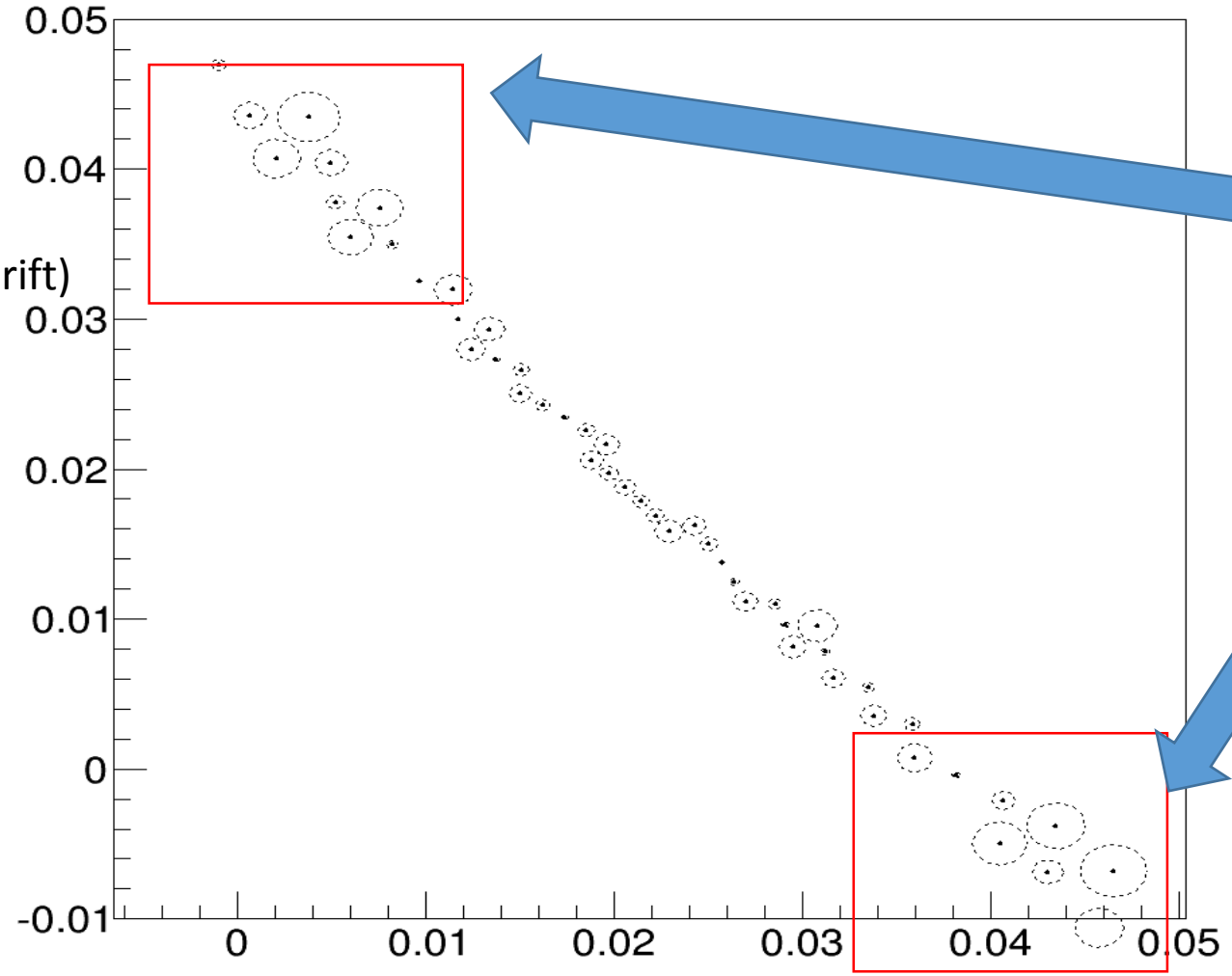
X=x/(x*x+y*y-drift*drit)
Y=y/(x*x+y*y-drift*drit)
CFdrift=drift/(x*x+y*y-drift*drit)

(x,y,drift)->(X,Y,CFdrift)

So, if we use the old conformal Transform , the error between mid Point and the real place will be enlarged at Conformal space , especially edge point .

CFdrift=drift/(x*x+y*y-drift*drift)

At edge , (x,y) are small



Big error

This error of driftDist lead to error and uncertainty in HoughSpace

Old method :

Measure uncertainty in HoughSpace

bin size (θ axias): 0.5*Δθ

bin size (ρ axias): relation between Δθ and Δρ

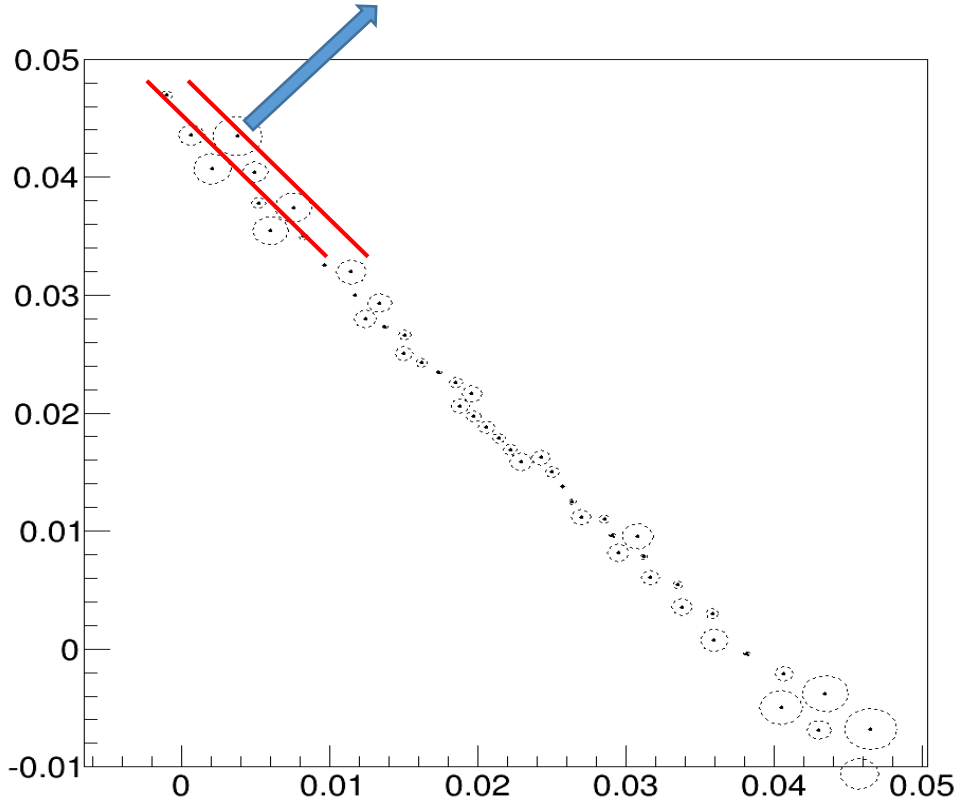
Hit error :

space resolution : 130um

error of driftDistance : dirftDist * factor(more than 0.6 cm)

- Uncertainty of drift circle make hard and uncertainty to confirm the bin in Hough Space
- In this case , tried some method of prior reasearch on pattern recognition , but see no obvious effect

At the certain θ , Δρ will be enlarge width between two lines to collect this hits



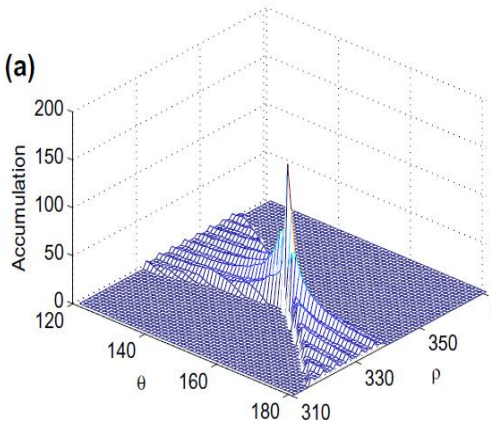
Former study on bin cut

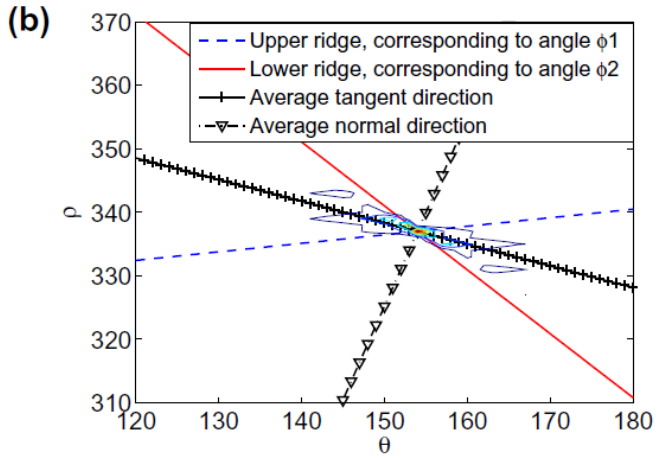
- Distribution of “gaus” in rho and theta axias
- Continuous to enlarge the bin number around local peak to confirm the peak width

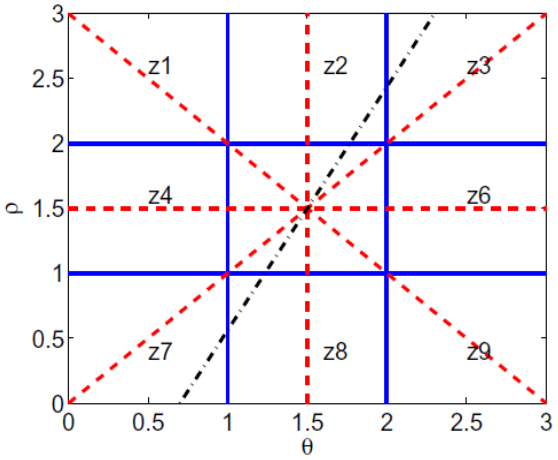
  Need salvage hits after get a initial track in HoughSpace

- Method thinking of the shape of the peak :
  - Tangent & normal act extremely different around local peak
  - Different weight around local peak

  implemented but Can’t see obvious improve of HoughSpace

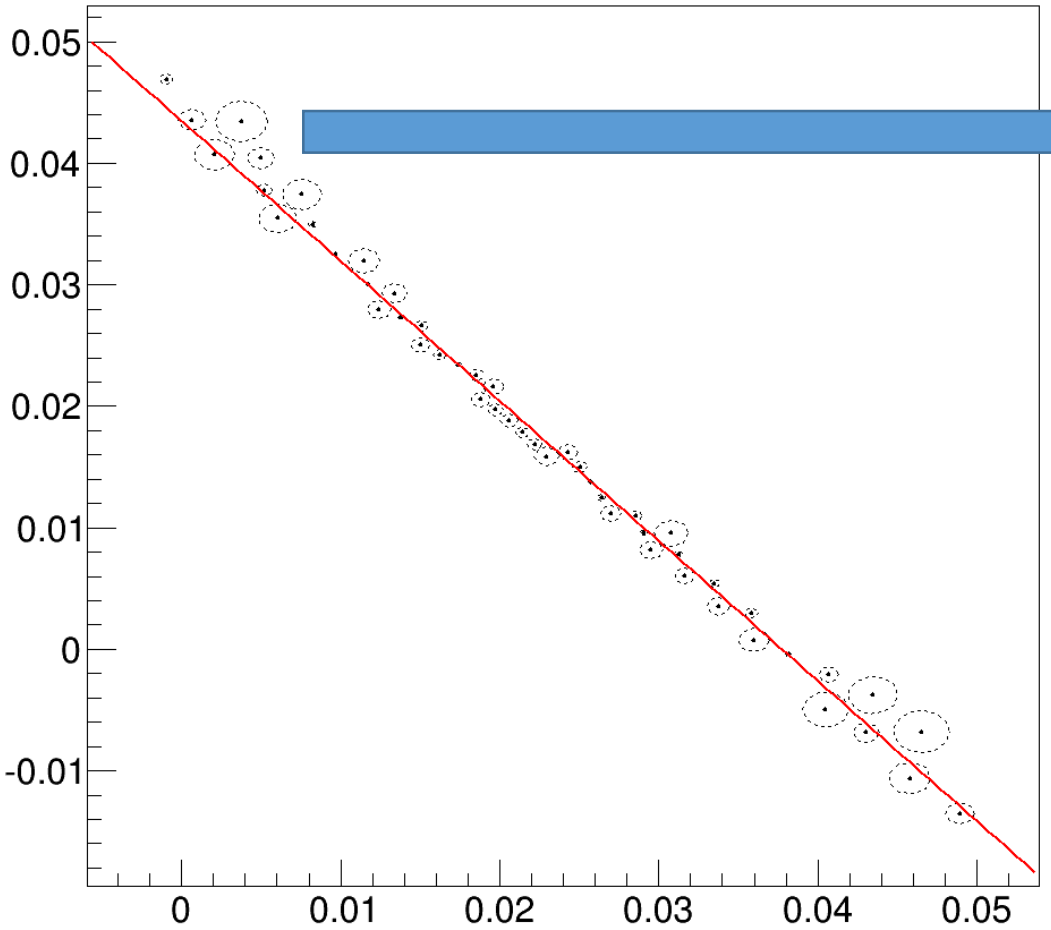






Primary realization of new Conformal and Hough Space method

Only take the maximum bin in new hough space - > the red line in Conformal space

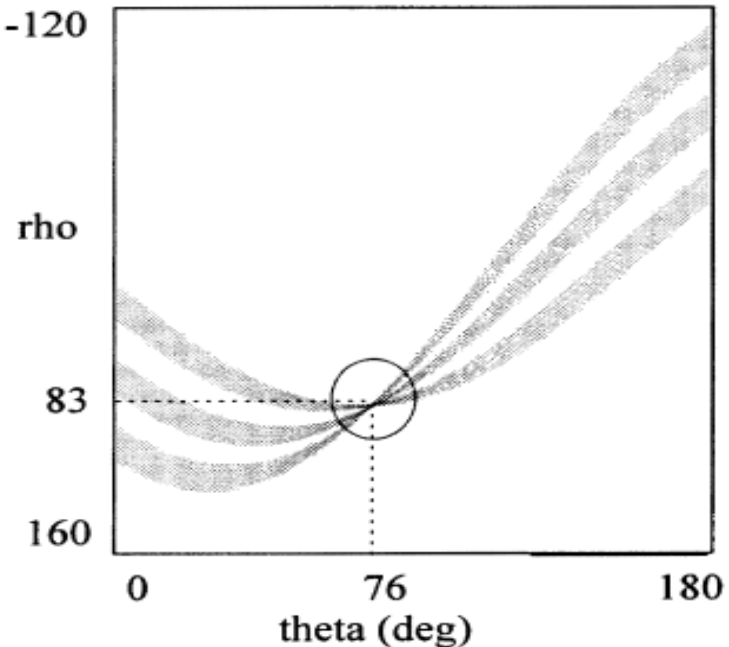


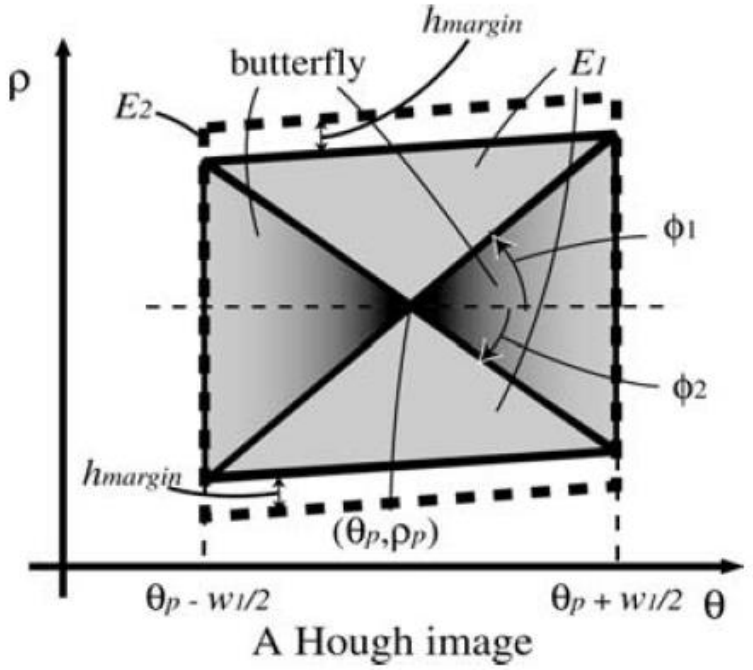
The second half circle hits

- Take 36 points of each drift circle from angle 0~360
- Fill hough space and find peak

Adding driftDist in Conformal Transform and HoughSpace

- As the serious of hits obtain “ strict straight line “ in Hough Space “
- We can give a resoluted bin cut condition and peak taking method
  - “butterfly “
  - From formal study , we can resolve and fit the peak

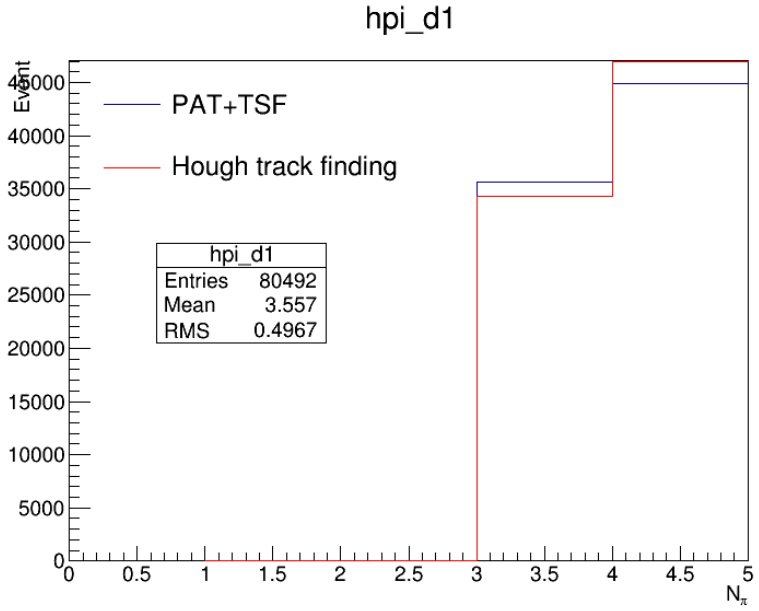




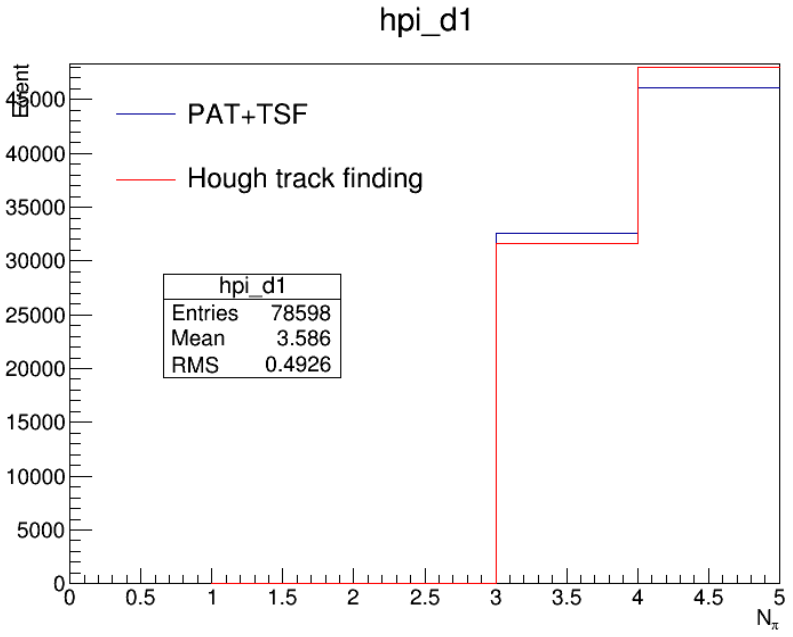
Check for pipipsip

Data : the reaserching method has to be fixed

MC : for MC in 4230 & 4260 (low pt track appears)



Full reconstruction Eff:N4/(N3+N4)



Full reconstruction Eff:N4/(N3+N4)

About 10% full reconstruction improvement