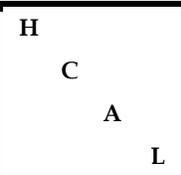




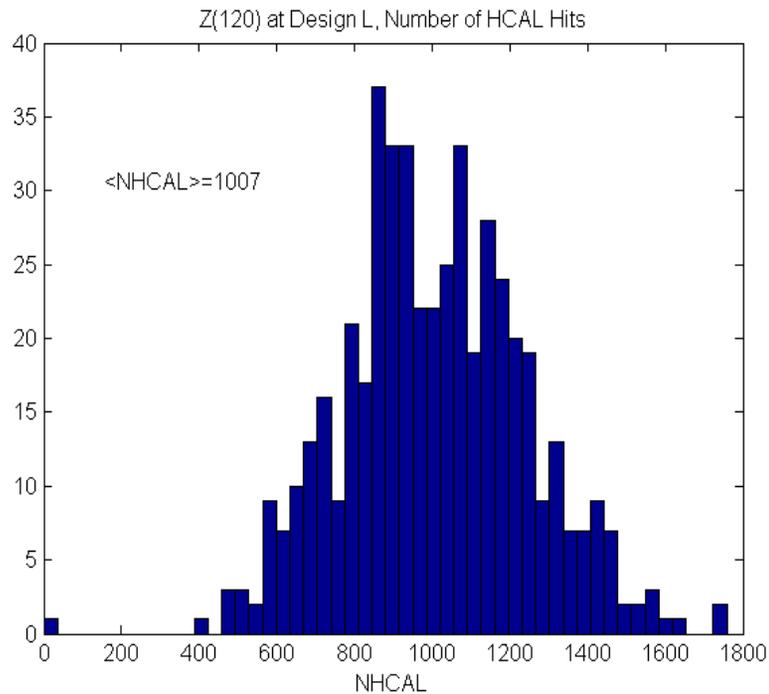
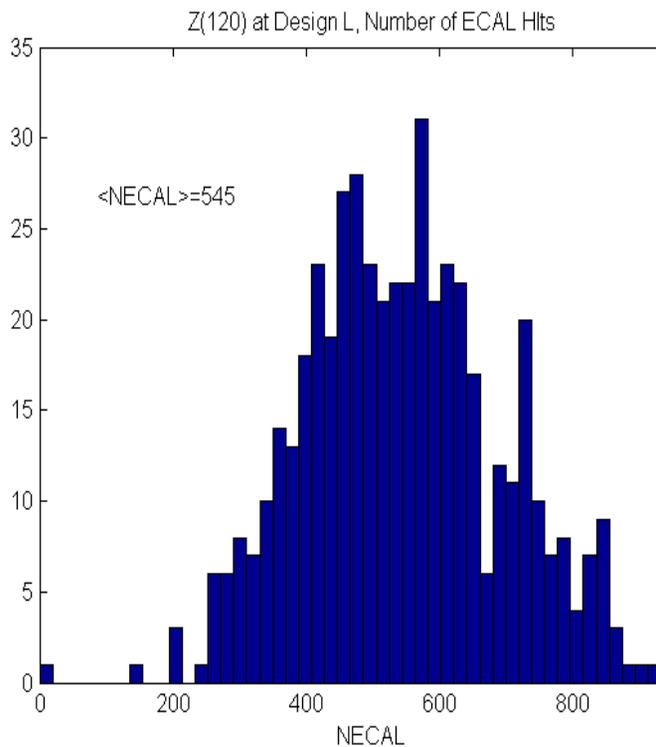
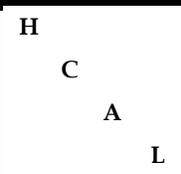
# Tracking for Missing ET



- At  $10^{34}$  luminosity there is considerable pileup energy.
- In principle, the tracker can be used to identify energy deposits from extra vertices and subtract it from the calorimeter deposits.
- In addition, the tracker has good energy resolution. Therefore, it can be used to replace matched energy deposits in the calorimetry with more accurate energy measurements from the tracker.



# Calorimeter Hits

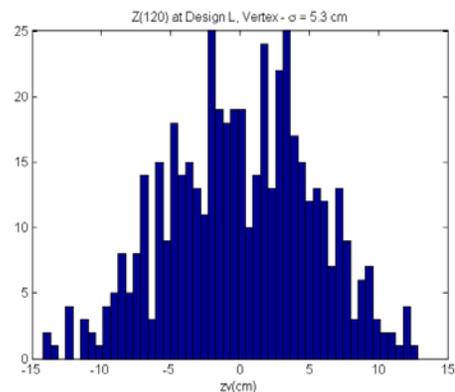
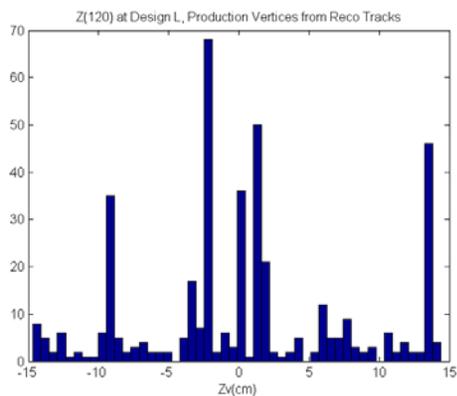
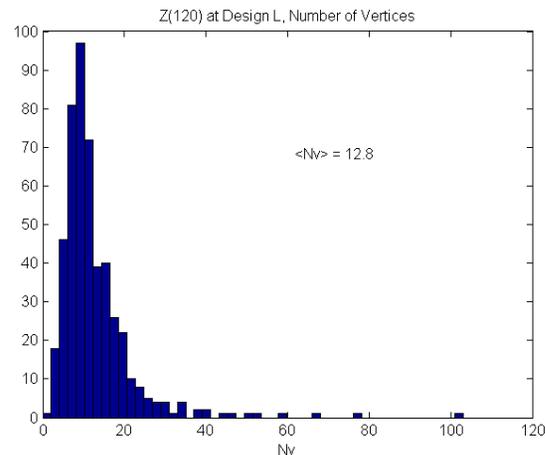
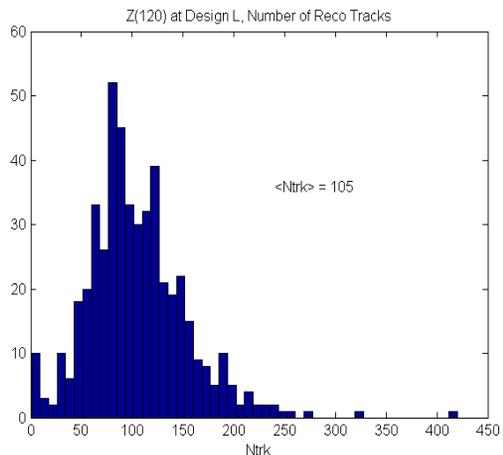


**Typically at  $10^{34}$  luminosity  
there are  $\sim 1000$  HCAL hits**



# Tracker

H  
C  
A  
L

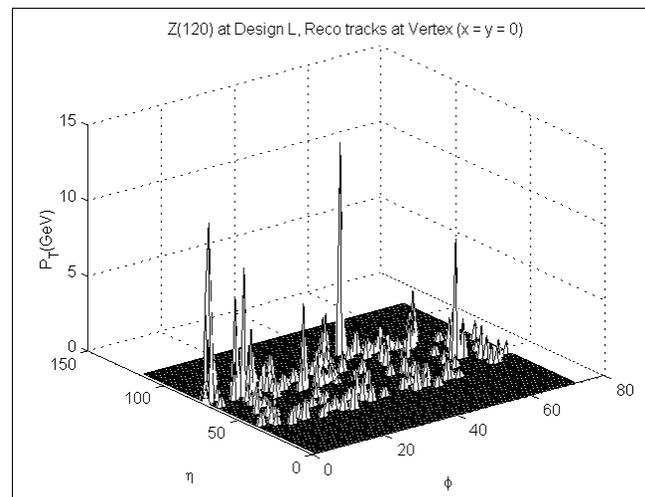
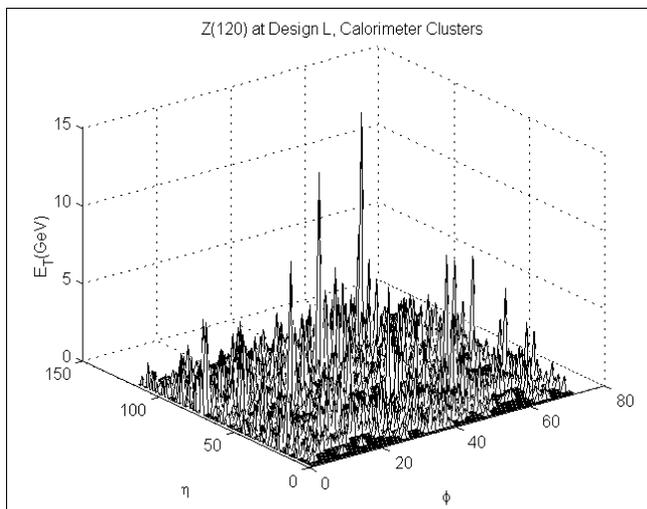


**Tracker has  $\sim 100$  reco tracks spread over 13 vertices which are  $\sim$  resolved in z since z has a spread of  $\sim \pm 5$  cm.**

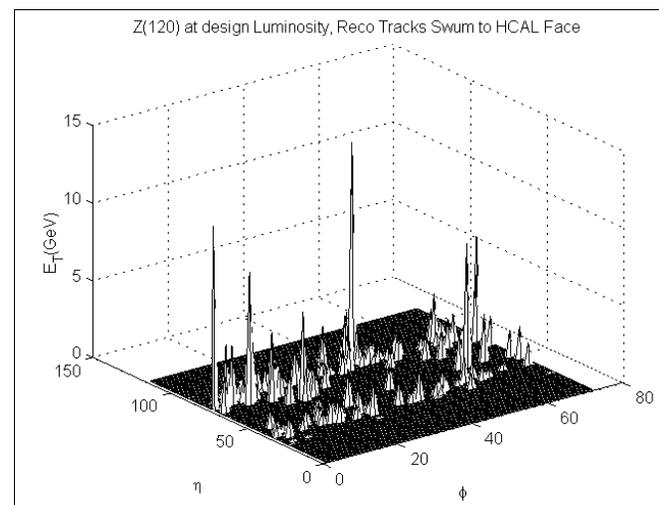


# Lego Plots

H  
C  
A  
L



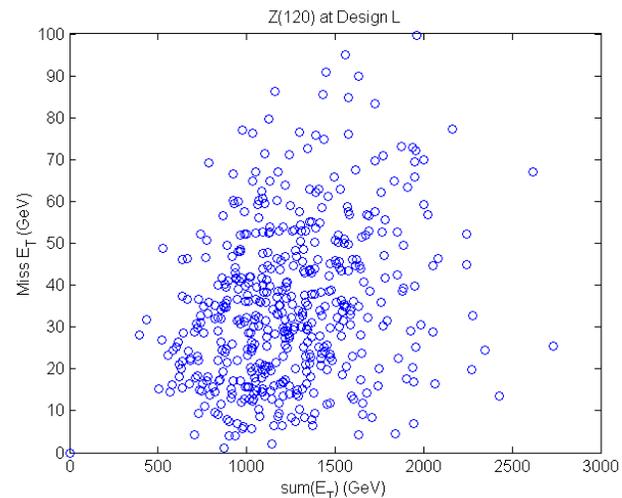
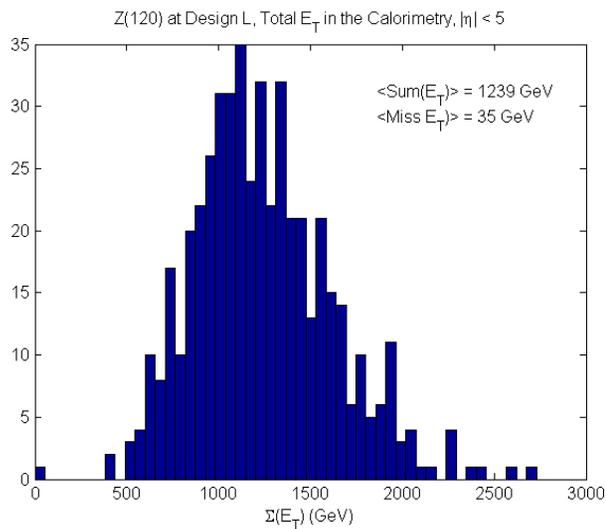
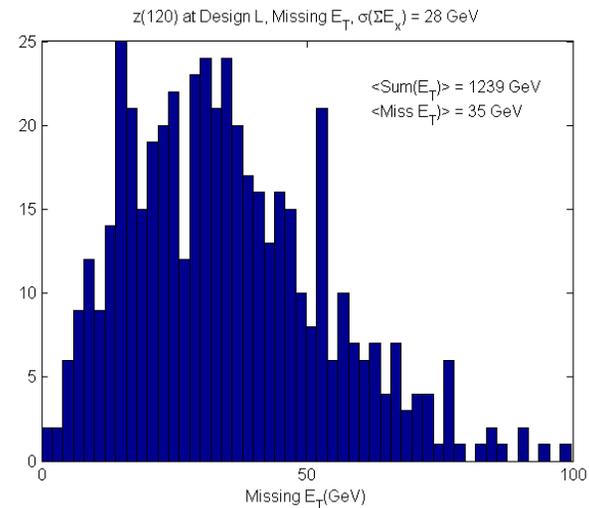
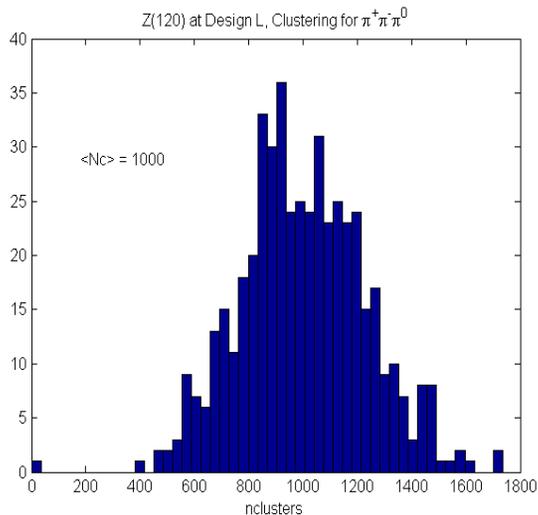
**Calor hits are clustered 3 x 3 in ECAL and HCAL. Tracks are found at the vertex and swum to the HCAL front face. Note the “sweeping” from the barrel. There are ~ 15 % of reco tracks that bend by > 180 degrees in going to HCAL.**





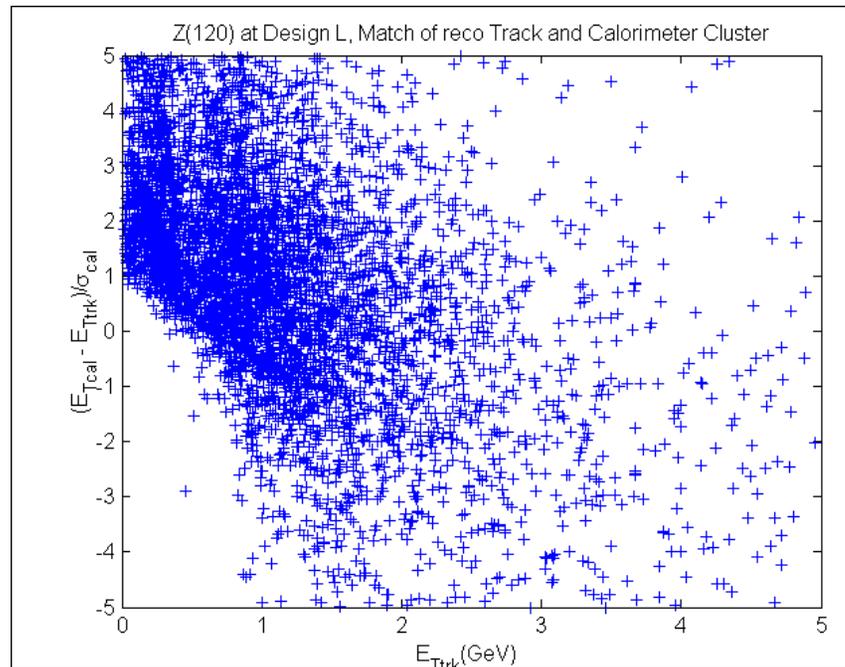
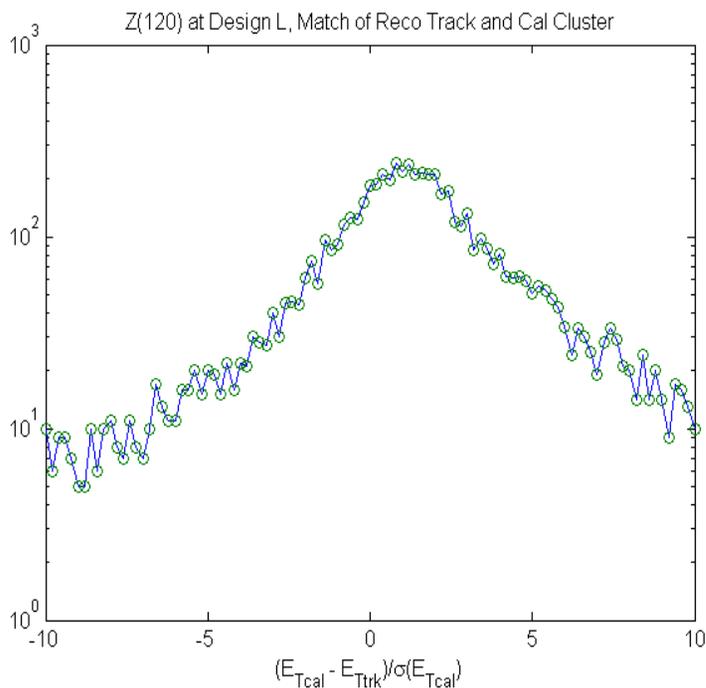
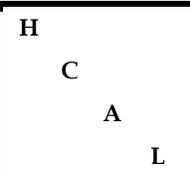
# Missing Energy - Cal

H  
C  
A  
L





# Cal – Track Matches

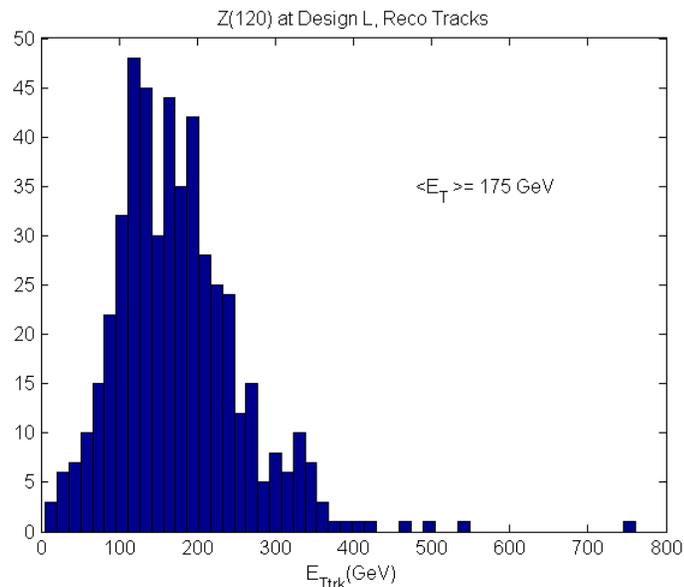
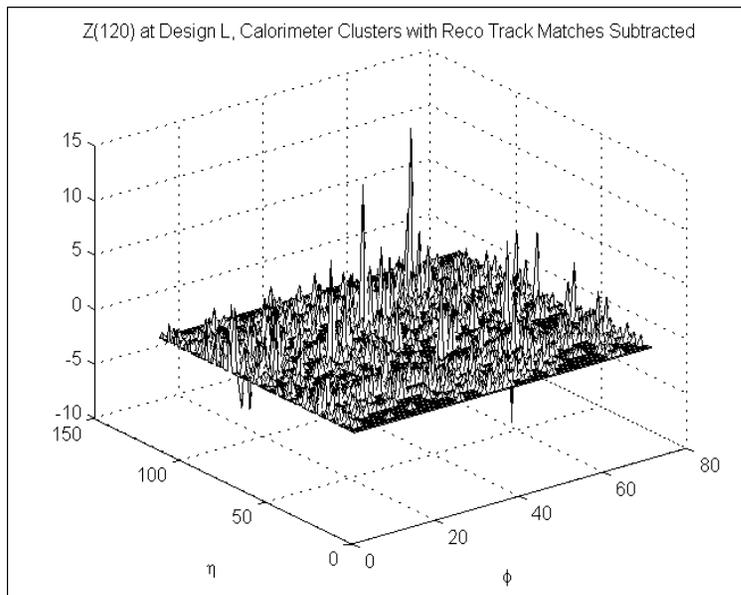


**Swim reco track to HCAL and look at 3 x 3 towers centered on swum track. Cut on  $dE/\sigma E$  from -2 to +4. Only manage to match  $\sim 44/105$  tracks and 47/175 GeV of ET.**



# Improve Missing ET?

H  
C  
A  
L



**Reco tracks comprise only 175 GeV of the total 1240 GeV in the calorimeter clusters. Of those only 47 GeV are matched. If matched track is not part of the primary vertex, subtract the calorimeter deposit - reduce pileup. If it is a primary track, replace the calorimeter deposit with the track PT at the vertex - energy flow.**