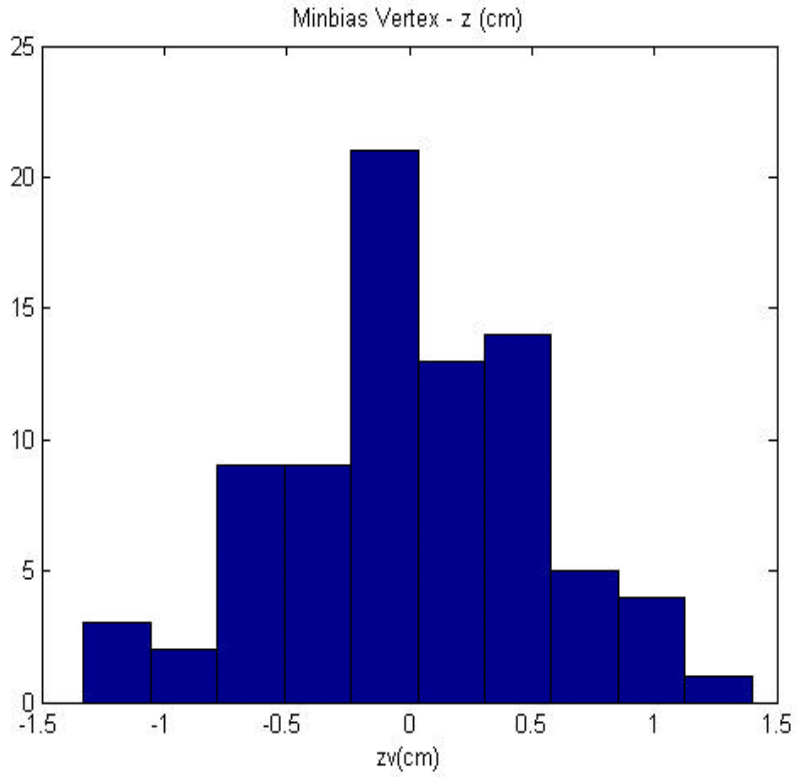
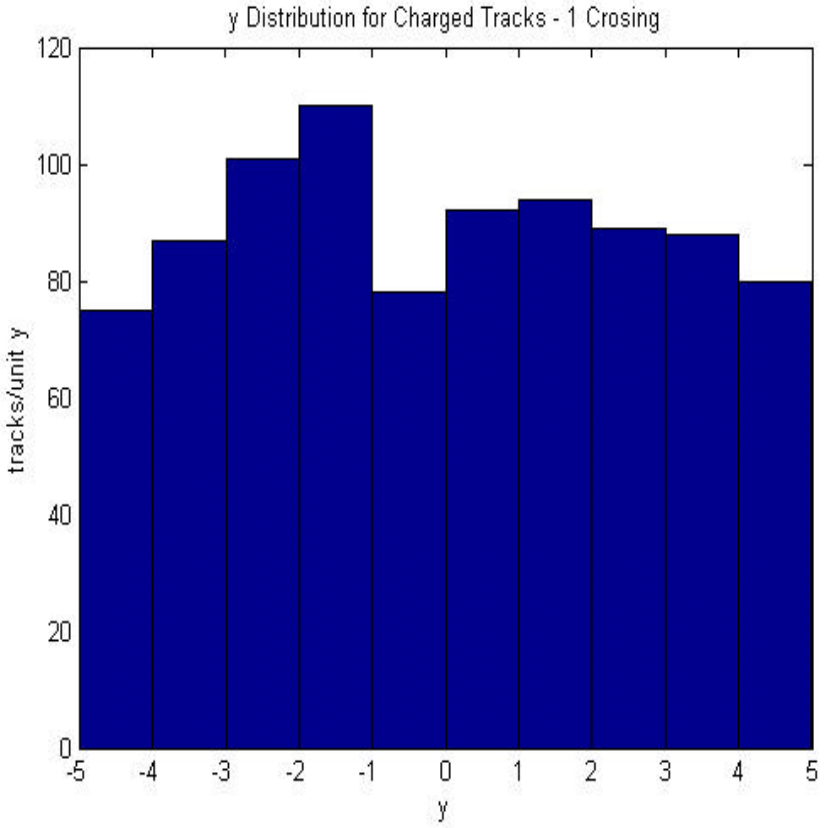
100 Minbias - Charged Tracks



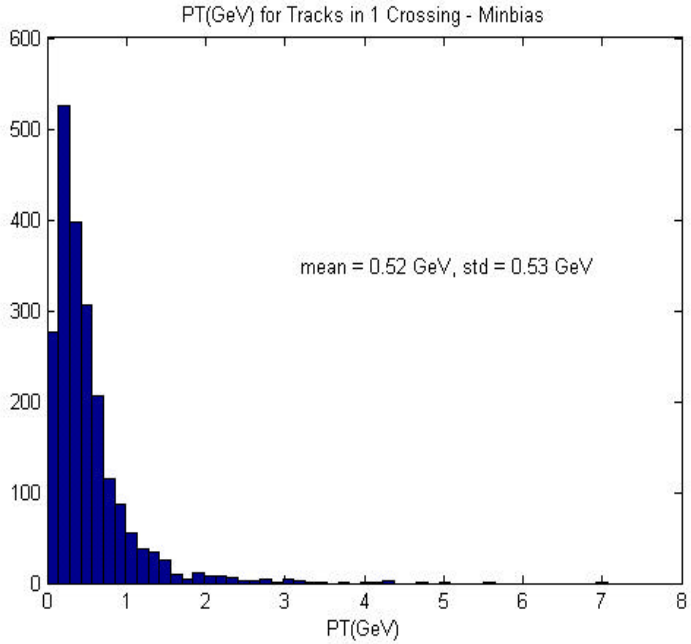
There is the vertex for the "signal" interaction in the crossing. The size of the bunch crossing is ~ 1 cm. The average number of interactions in a crossing is ~ 17.

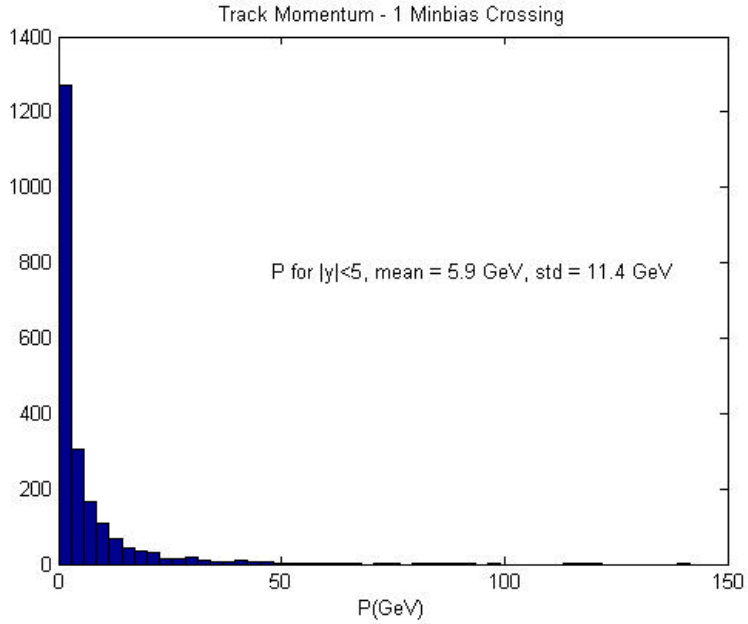
Charged Tracks



The density of charged tracks is ~ 90/17 ~ 5.3. This level is expected

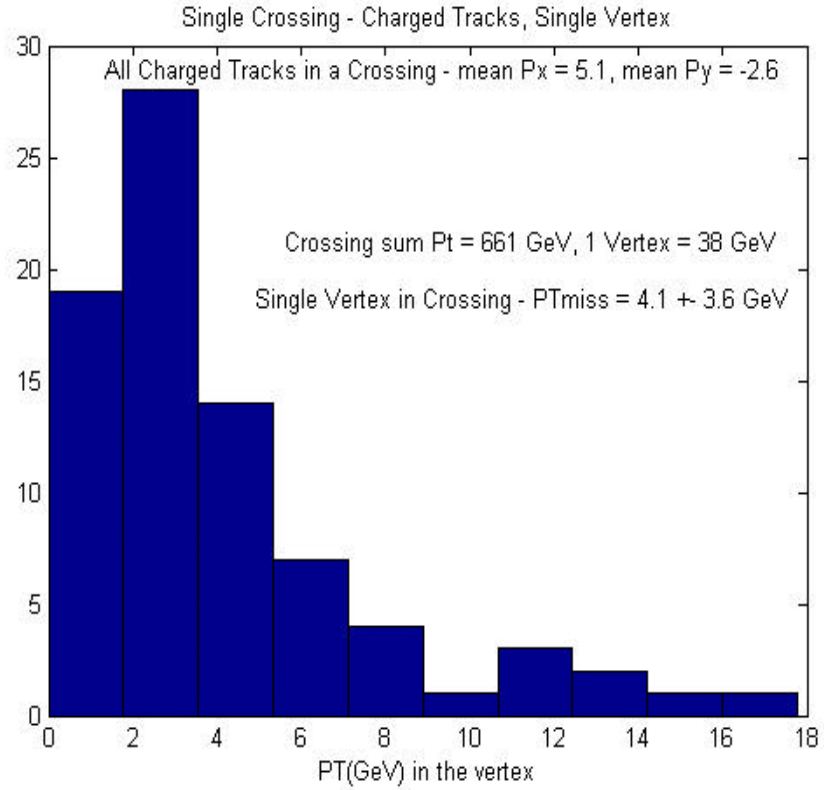
Momentum





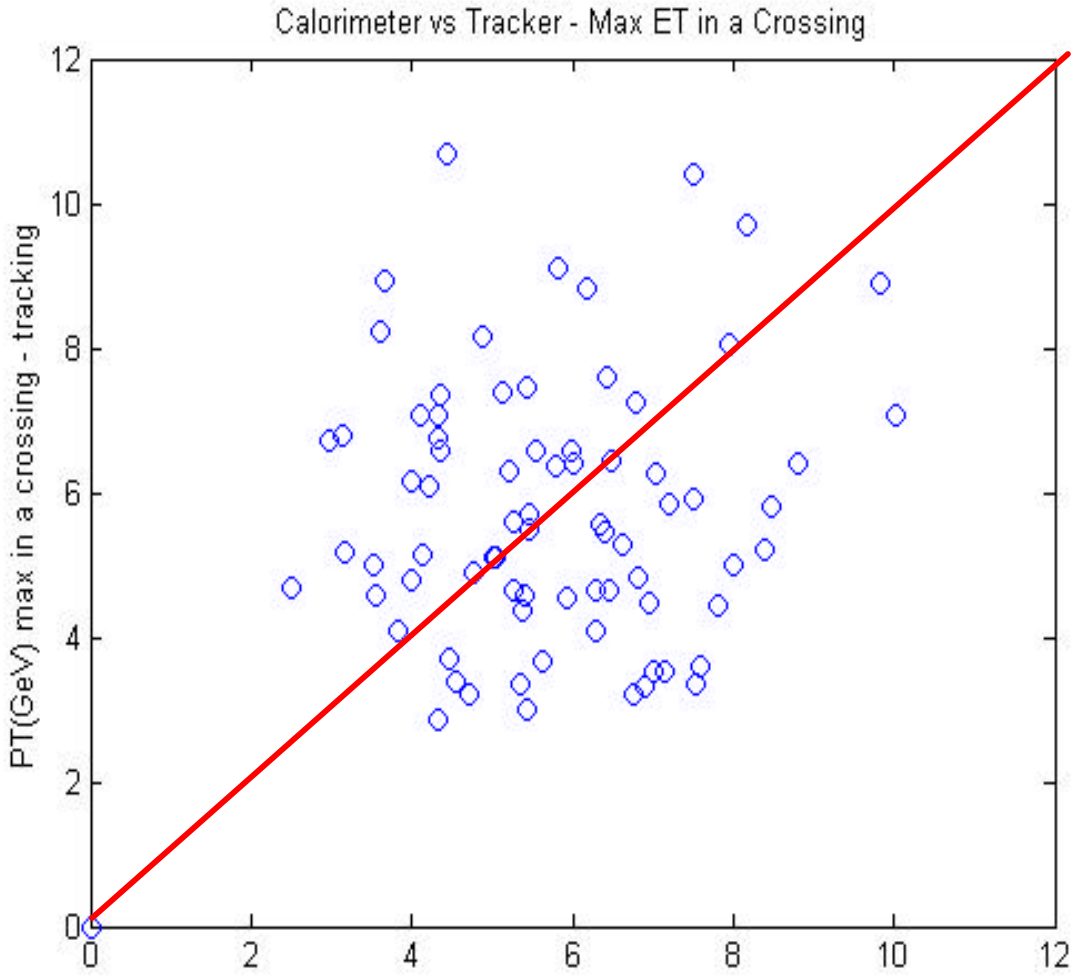
Mean transverse momentum is <PT> = 0.52 GeV.

Total Event and Crossing ET



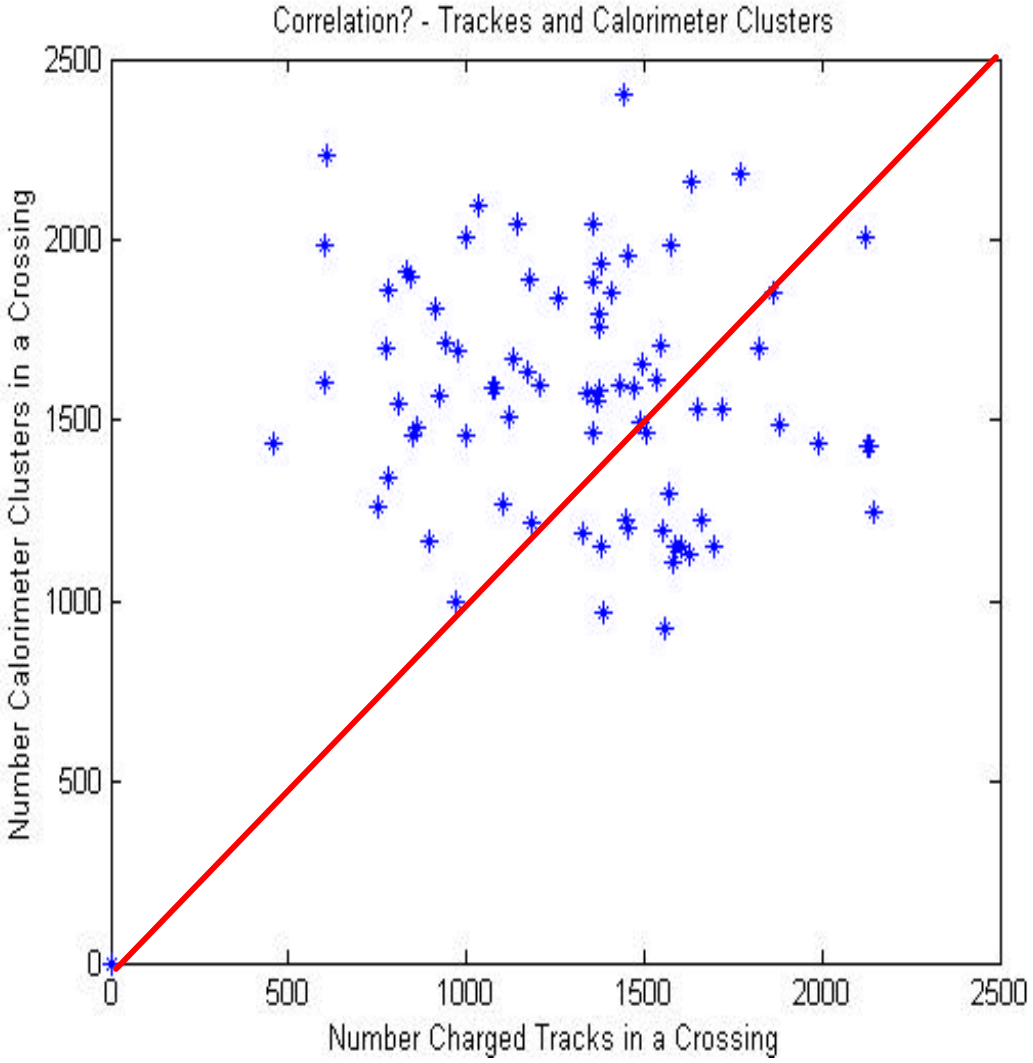
A single interaction for |y| < 5 has ~ 38 GeV ~ density 5 * dy=10 * 0.5 GeV. A crossing has ~ 17 times more energy. The fluctuations in a single interaction are less than those in a full crossing. Clearly, using only charged energy from a given interaction can reduce the missing ET found in a crossing. The full neutral energy remains, however.

Match Tracks and HCAL?



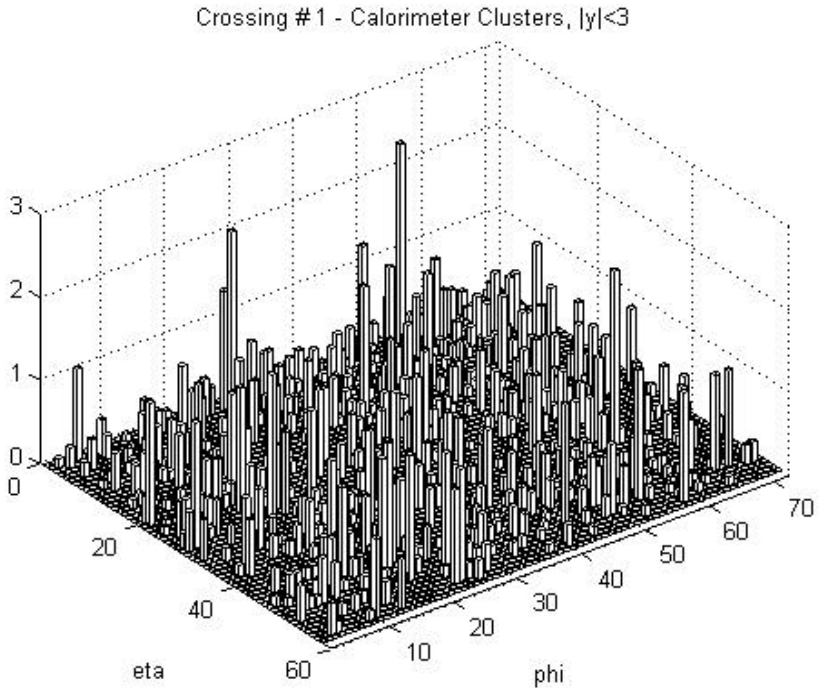
Find the maximum PT particle within a crossing for charged tracks and for calorimeter clusters. There is only a weak correlation, at best.

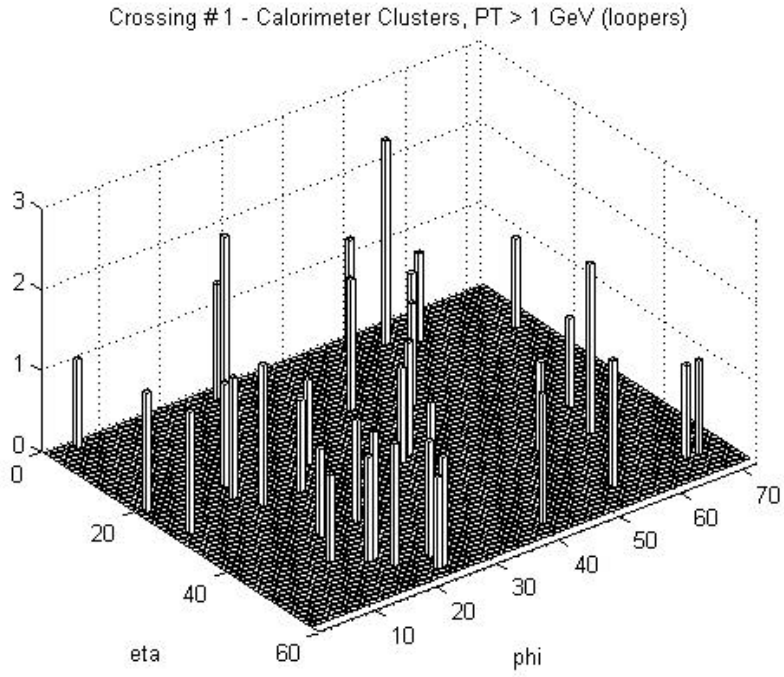
Tracks and Cal Clusters?



The correlation of the 2 multiplicities is not strong.

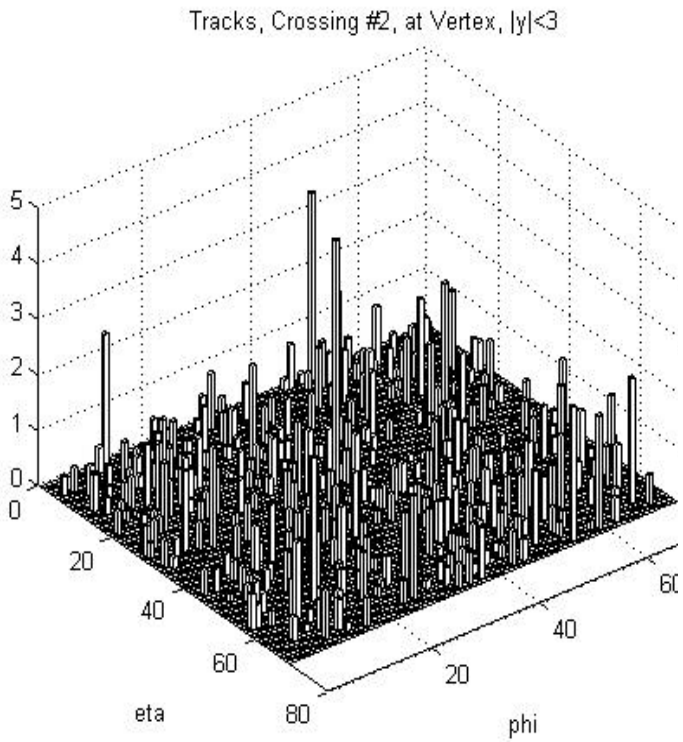
Calorimeter Clusters

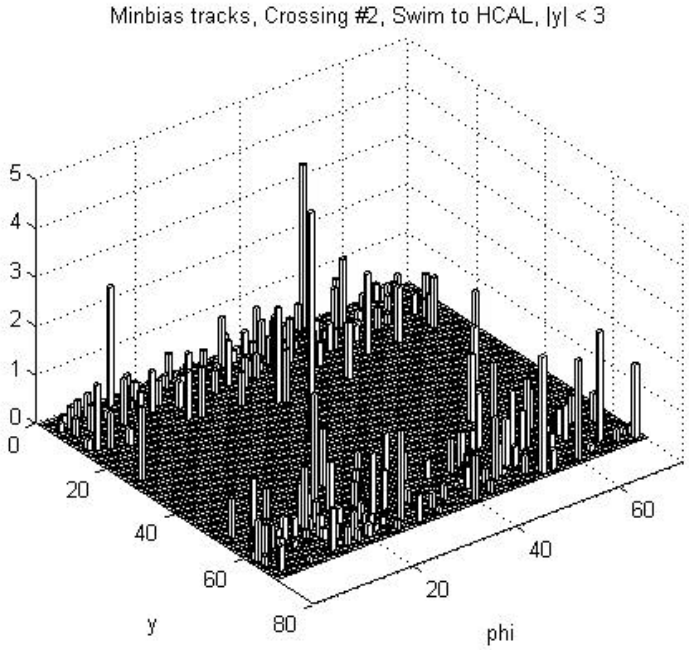




The calorimeter population is still sparse as ECAL is 25 times more finely grained than HCAL. There are very few deposits > 1 GeV - recall loopers mean that HB has PT > 1.6 GeV

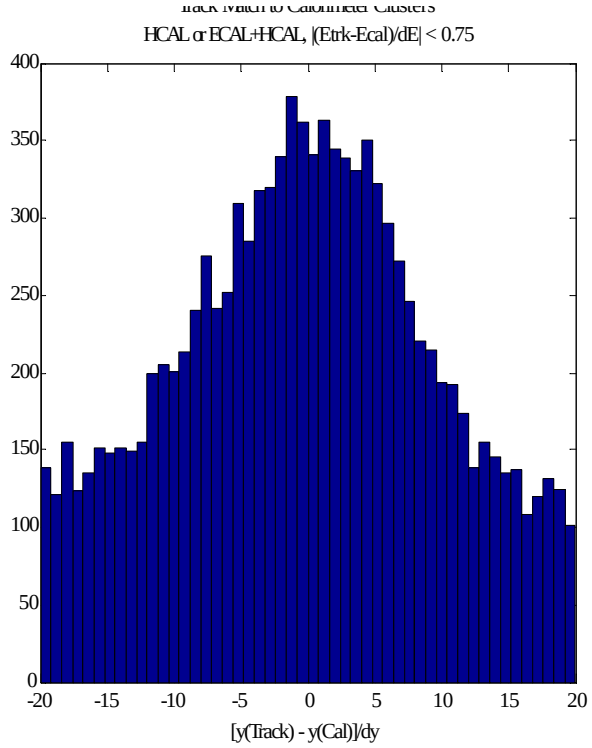
Swim Tracks to Calor

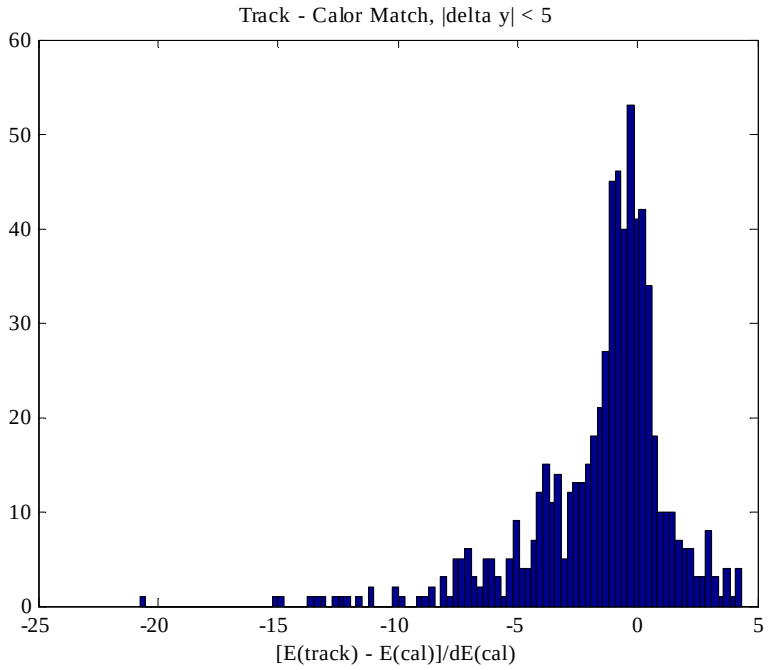




Use a homogeneous B field of 40 kG to swim charged tracks to the calorimeter cylinders

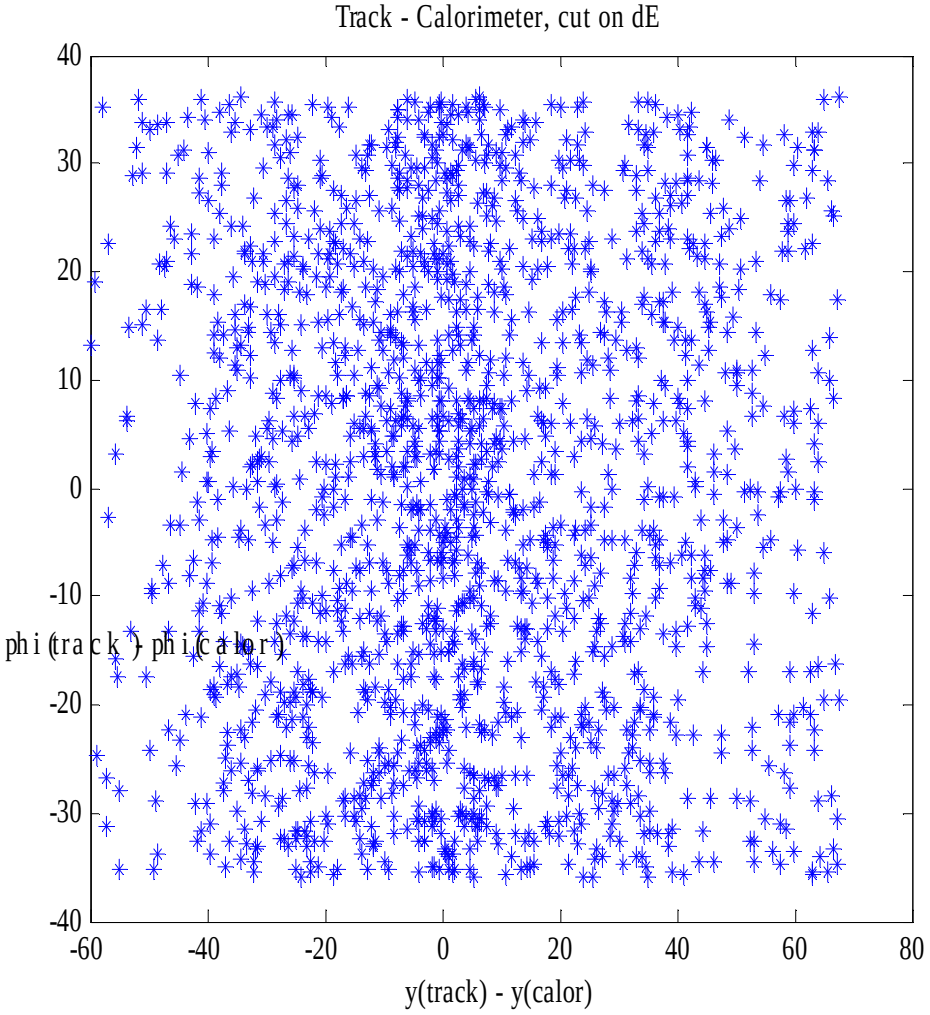
Track and Cal Match - y and E





Match tracks to HCAL or HCAL+ECAL clusters in y, phi, and energy. Work in units of 100%/sqrt(E), or towers in (y, phi). Need a correction of 1.4/[Fo+(1-Fo)/(e/h)] with Fo > 1/3 and Fo = 1 - (0.96/E) ^ 0.18., e/h = 1.7

(y -Phi) Match, cut on dE



Phi match is not very sharp - due to B field sweeping and steeply decreasing Pt spectrum

Missing ET

- We want to reduce pileup missing ET
- Low E calibration is ~ 2x wrong
- All charged tracks in a crossing with |y| < 3 have <Et> ~ 16.7 GeV (truncation and pileup).
- All charged tracks in a vertex with |y| < 3 have <Et> = 3.8 GeV (truncation but no E error and no B sweeping).
- The calorimeter with ECAL clusters only for |y| < 5 has <Et> = 10.3 GeV for a crossing.
- Adding tracks in a single vertex to calorimeter clusters for a single crossing yields <Et> = 11.3 GeV
- The full calorimeter energy for a crossing with B sweeping and charged and neutral pion pileup and energy mismeasurement and angular truncation is 16.6 GeV in <Et>
- We can use tracking to remove charged pileup, B sweeping, and energy mismeasurement for charged tracks with |y| < 3. Angular truncation and neutral pileup remains.