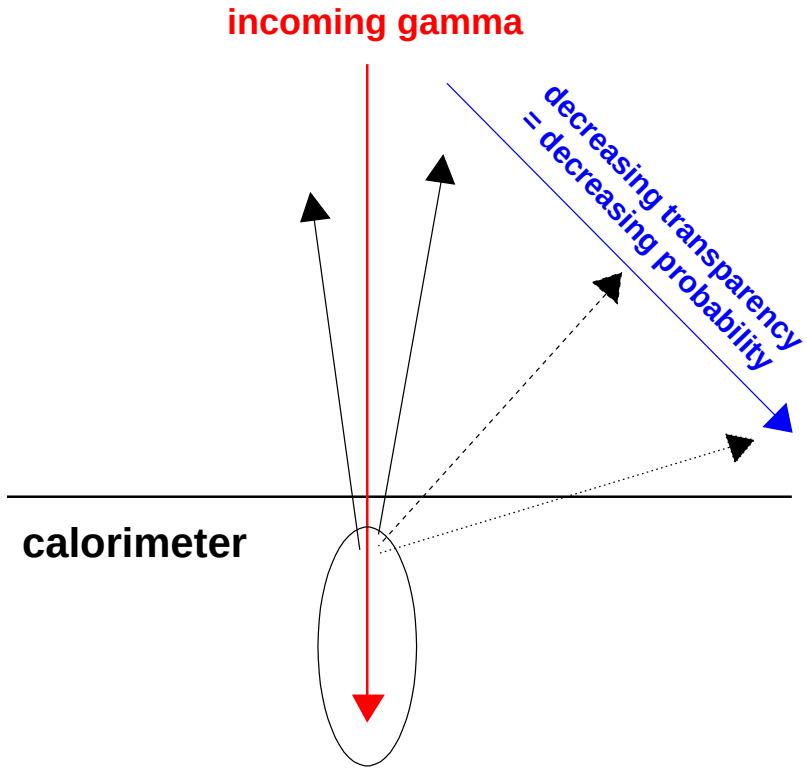
Backsplash studies at SPS

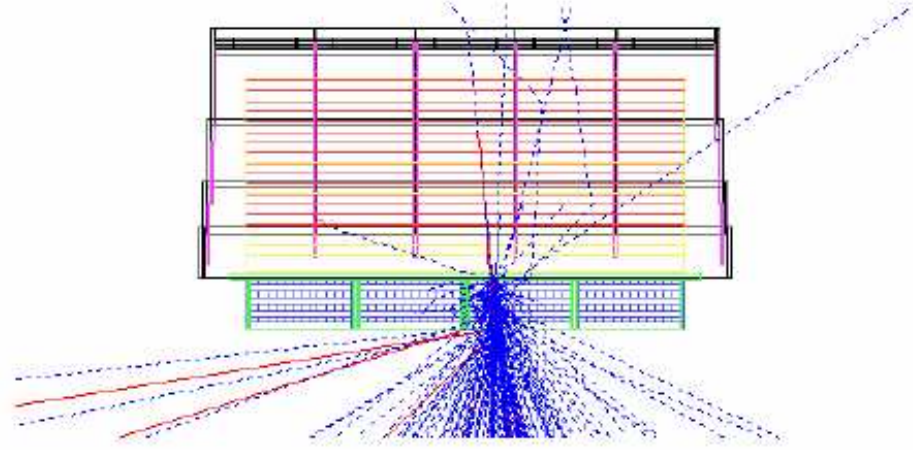
(summary of previous presentations)

- backsplash and other splashes
- backsplash measurements with LAT configuration
- ACD tiles position in the CU configuration

Pure backsplah

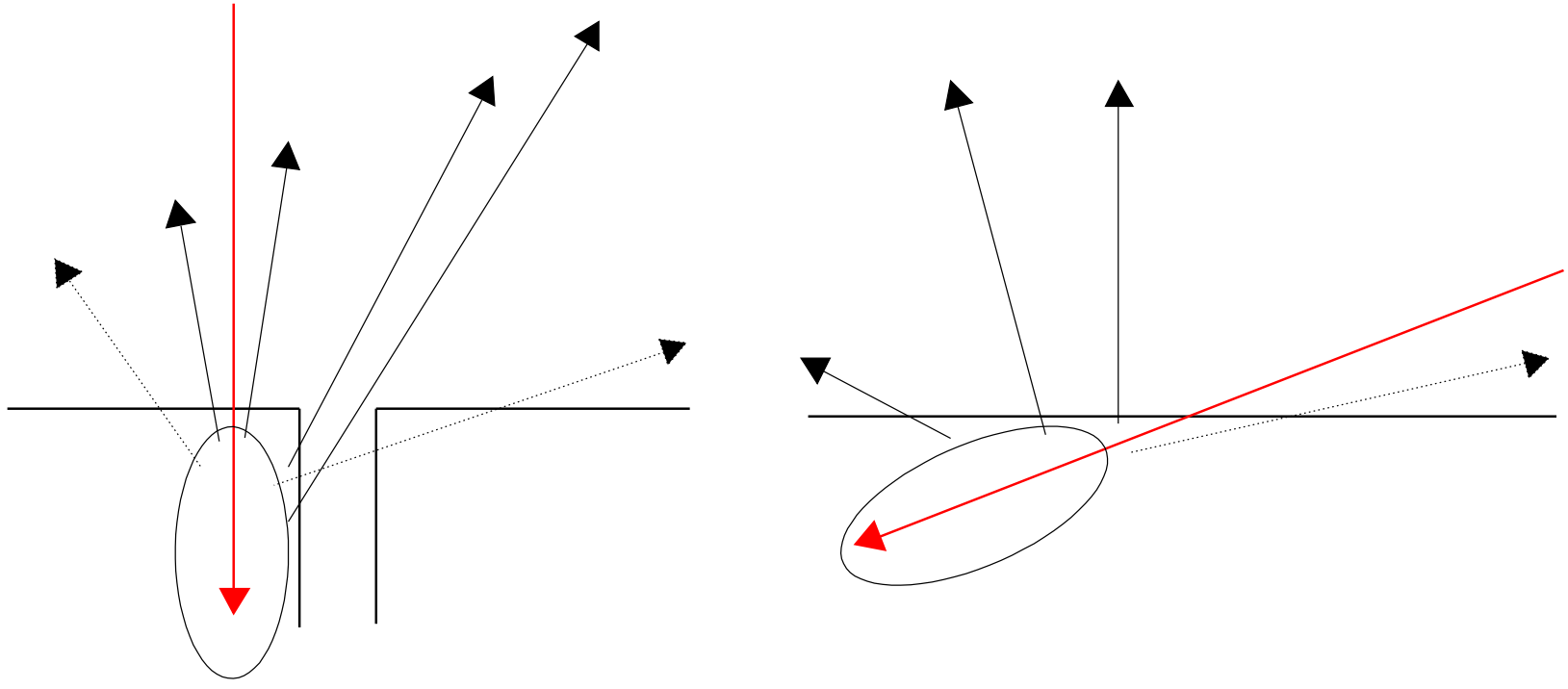
- high energy incoming gamma (> 10 GeV)
- some low energy outcoming photons (hundreds of keV)





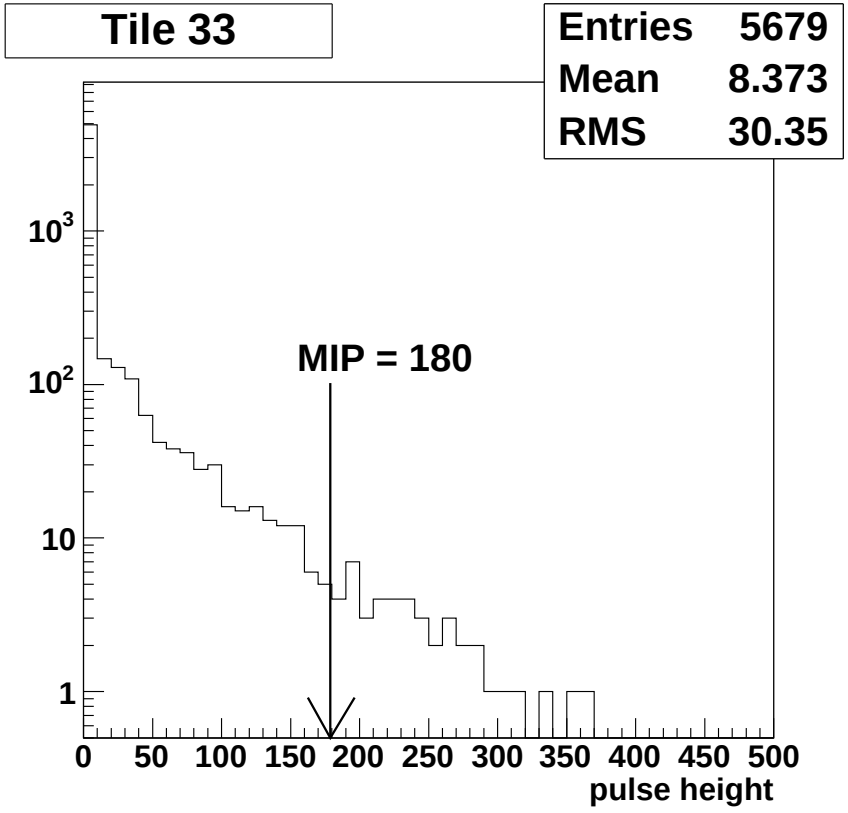
Crack-splash and side-splash

- particles of the shower escaping through cracks
- when no more on-axis, the maximum of backsplash is no more at 180 degrees
- no more only photons ...



ACD tiles signal

usual backsplash pulse height distribution in tile above impact point when on-axis



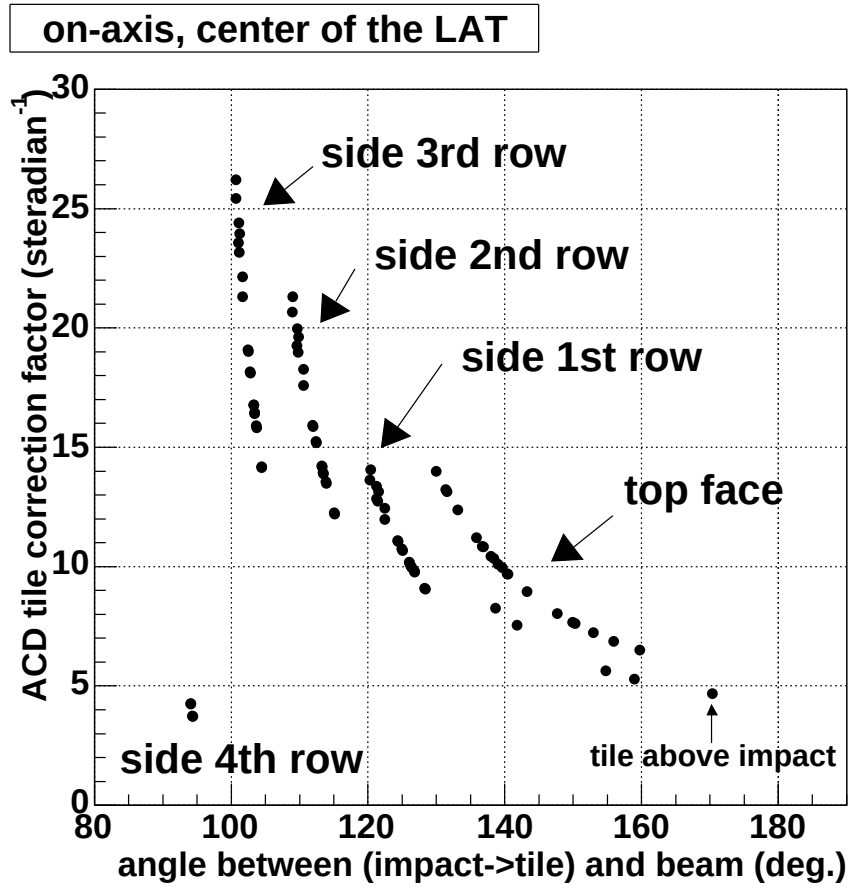
two estimators :

- pulse height average
- fraction of events above a certain fraction of MIP

Geometrical correction

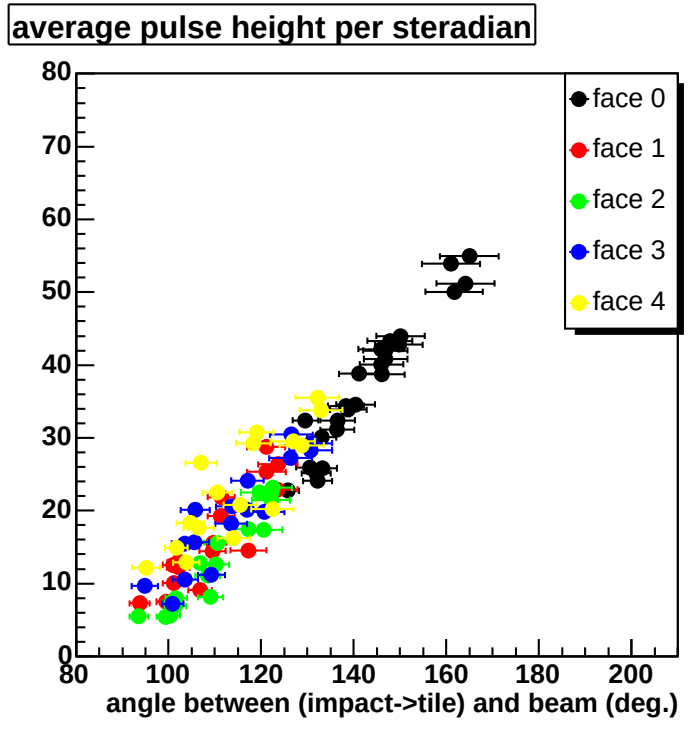
In order to compare signals of different tiles :

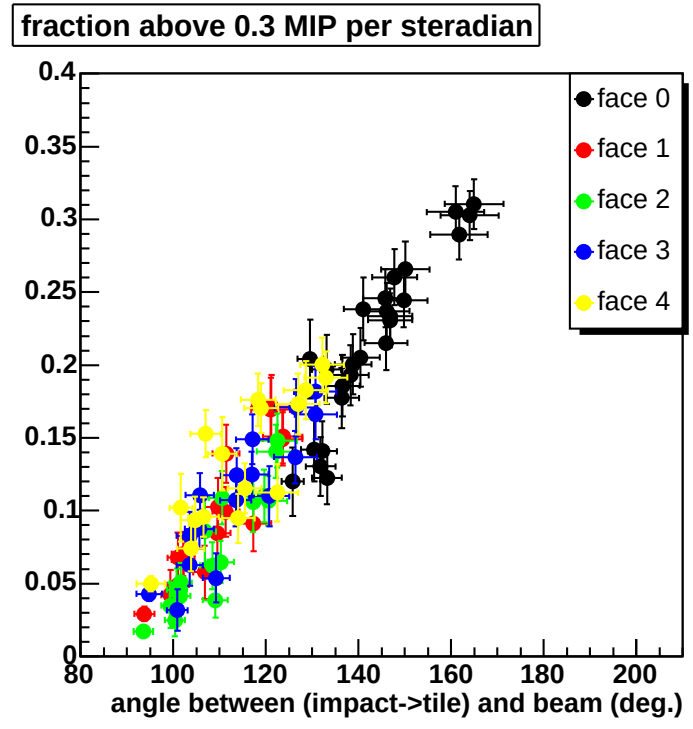
$\Rightarrow$ signal $\times$ 1/(solid angle) $\times$ 10mm/(mean path length)



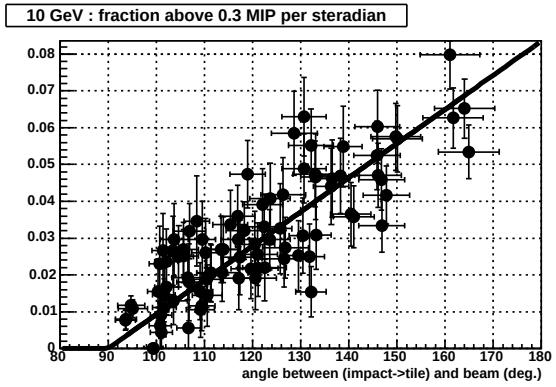
Backsplash angular distribution

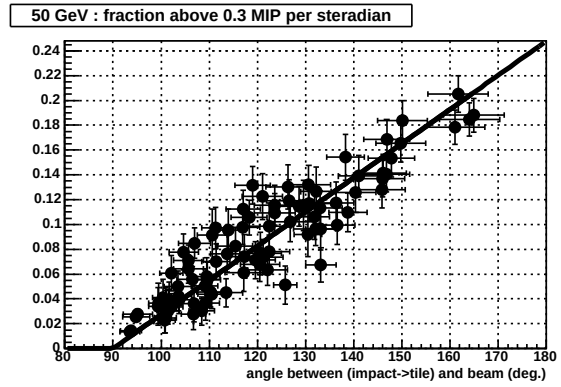
- on axis 100 GeV gamma in the center of a center tower
- the correction seems to work well
- from 0 at 90 degrees to maximum at 180 degrees

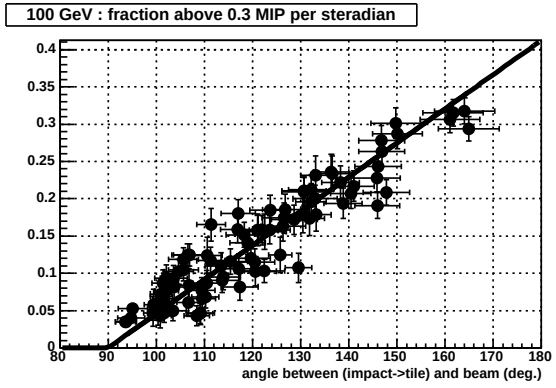


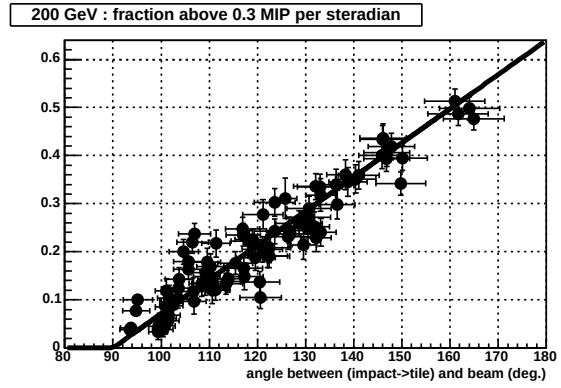


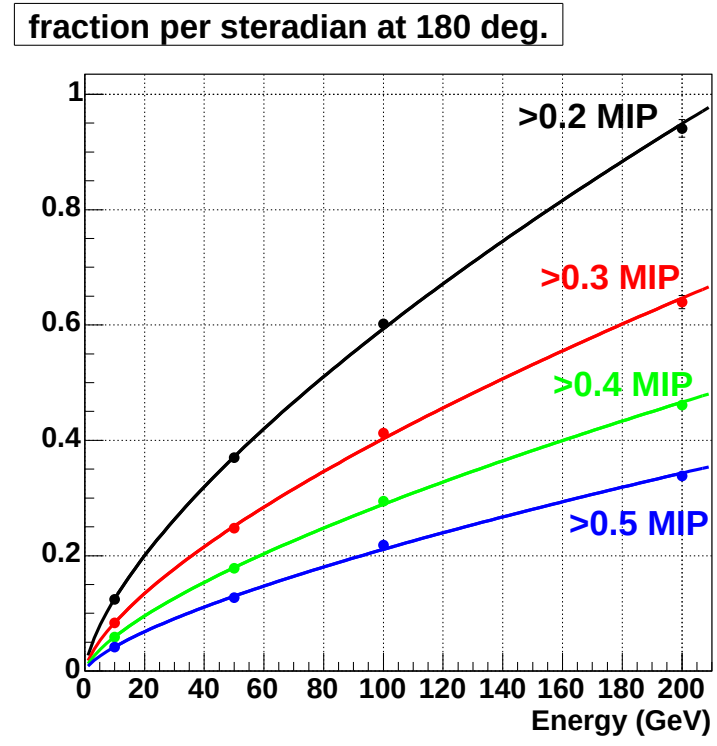
Energy dependence







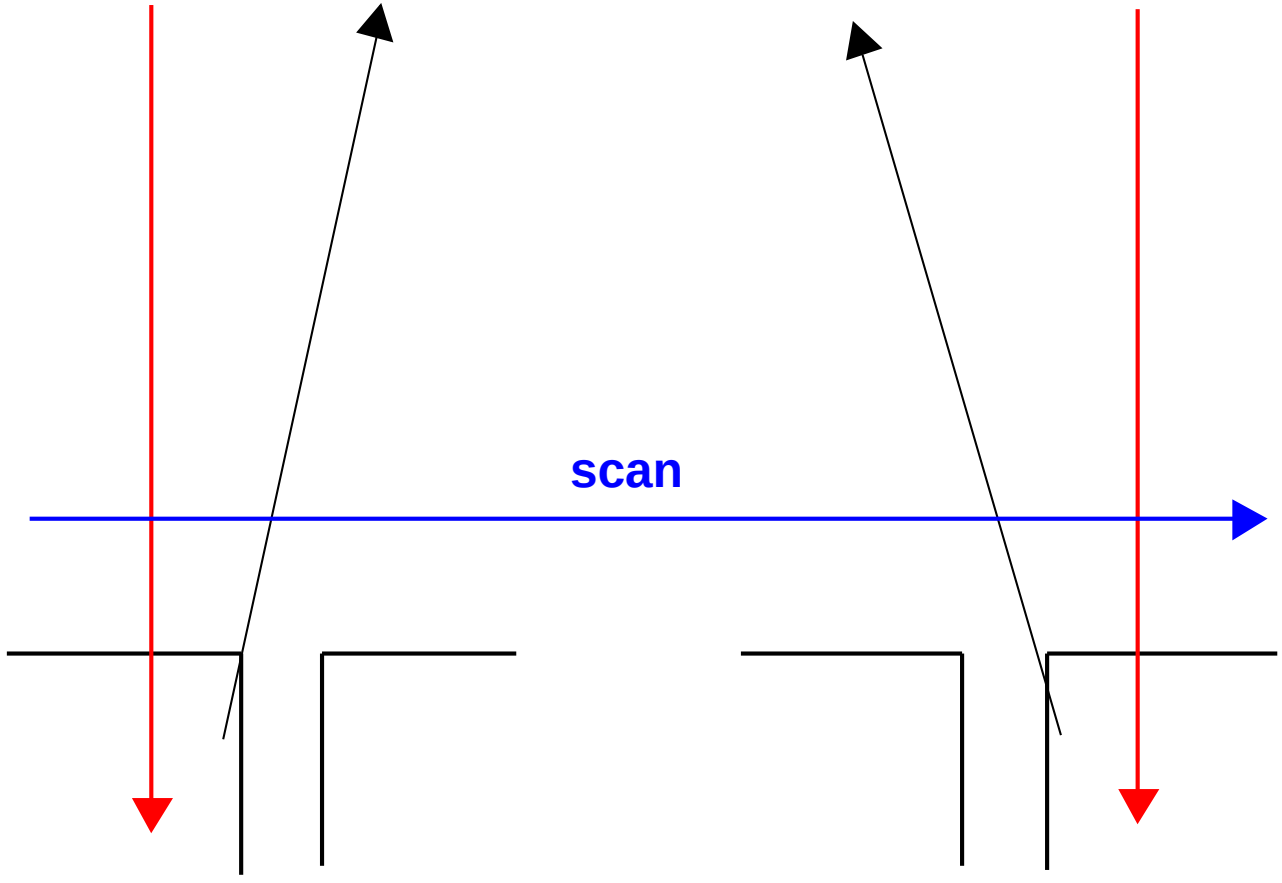




fraction per steradian at 180 deg. $\propto E^{0.7}$

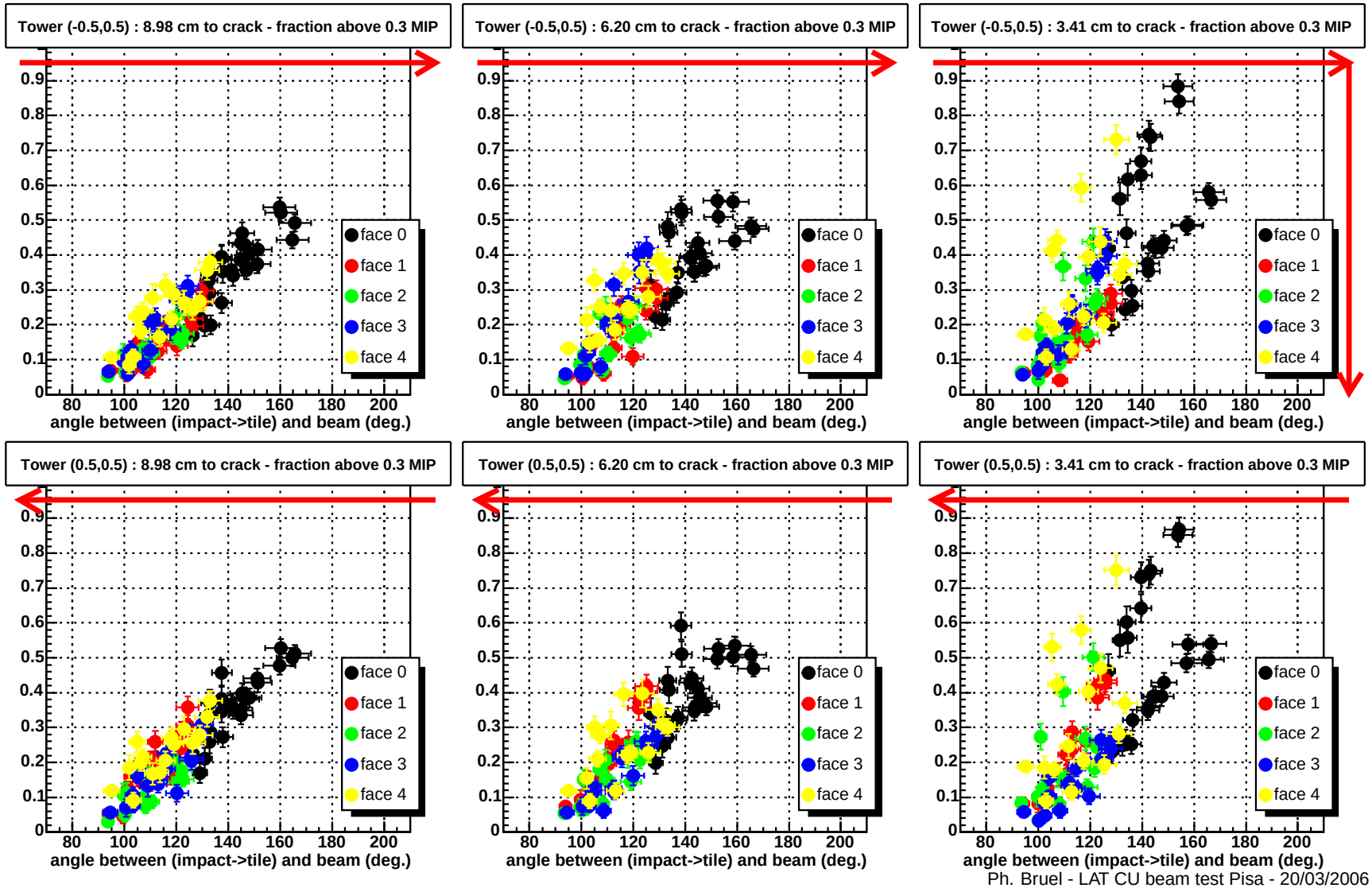
Cracksplash

the signal should be enhanced in the tiles on the opposite side of the crack



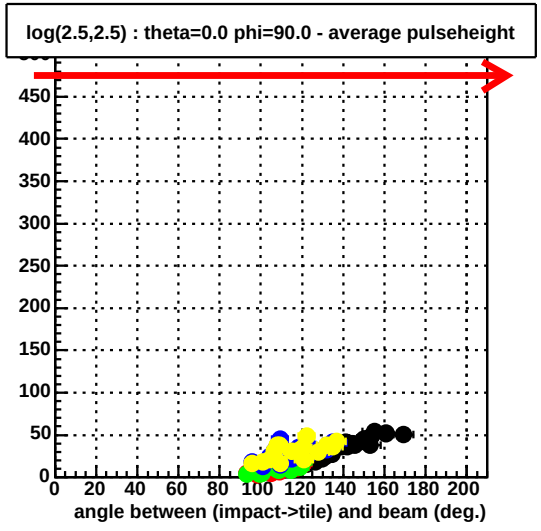
Scan close to crack (200 GeV on-axis)

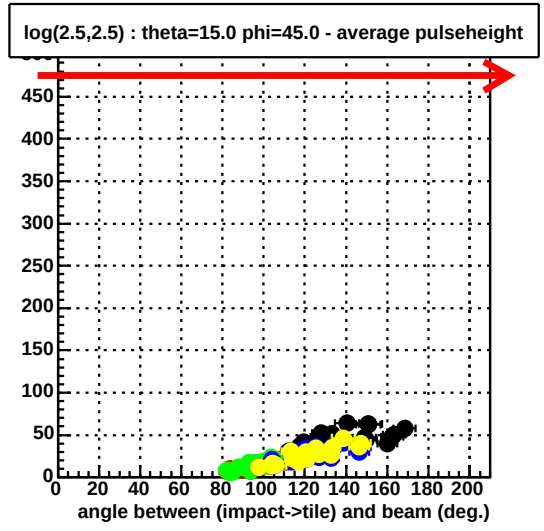
distance to crack : -9cm → -6 → -3.5 → +3.5 → +6 → +9cm

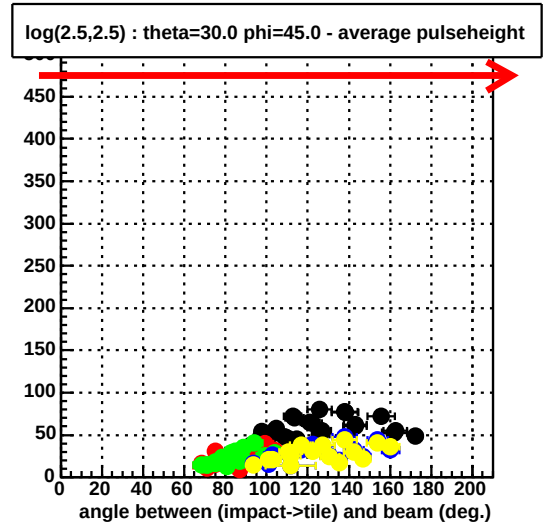


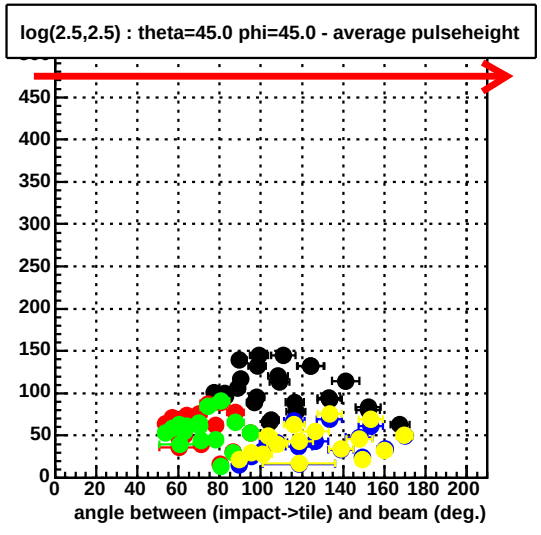
From on-axis to 60 deg (100 GeV)

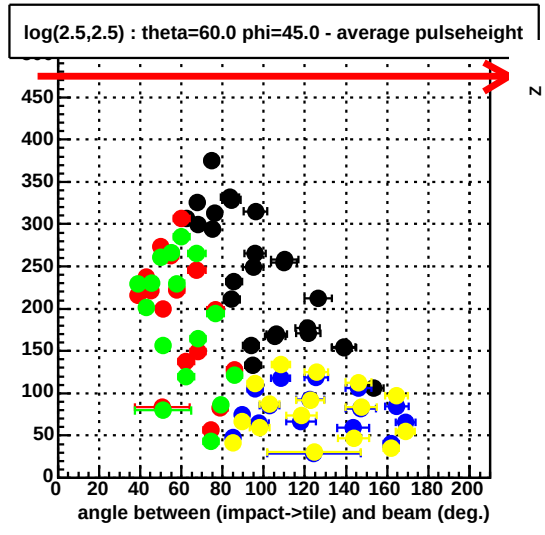
θ = 0 $\rightarrow$ 15 $\rightarrow$ 30 $\rightarrow$ 45 $\rightarrow$ 60 degrees

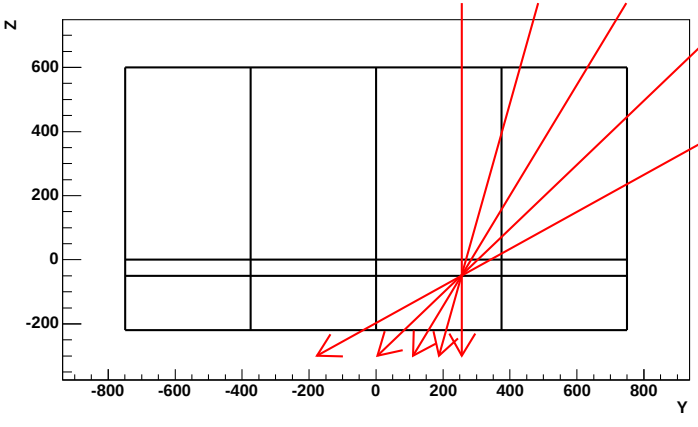






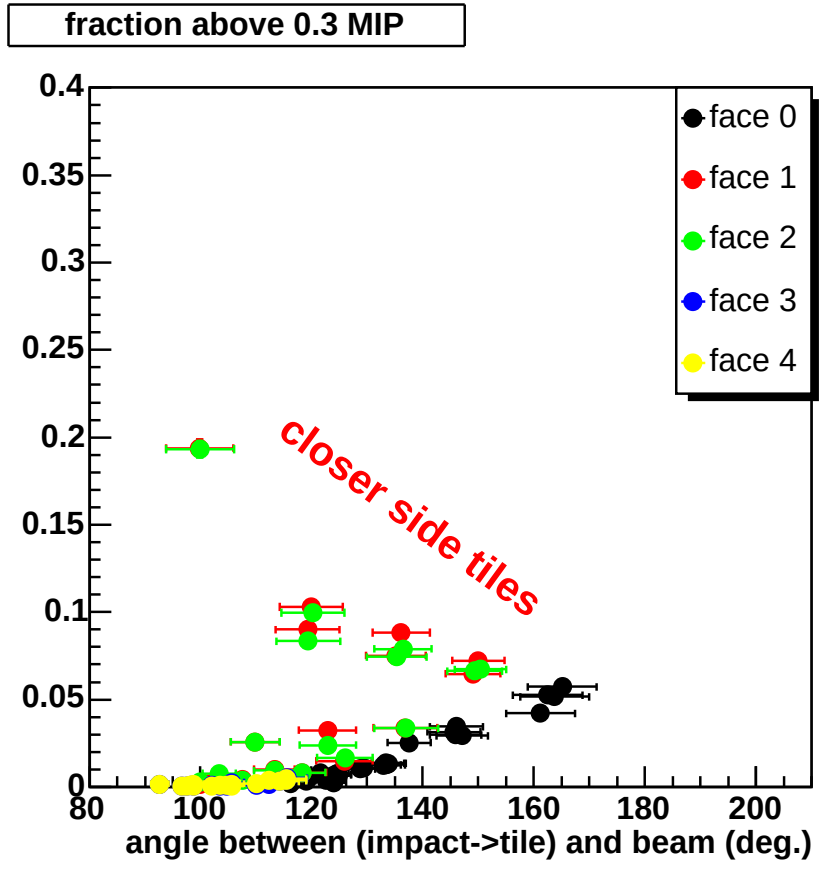


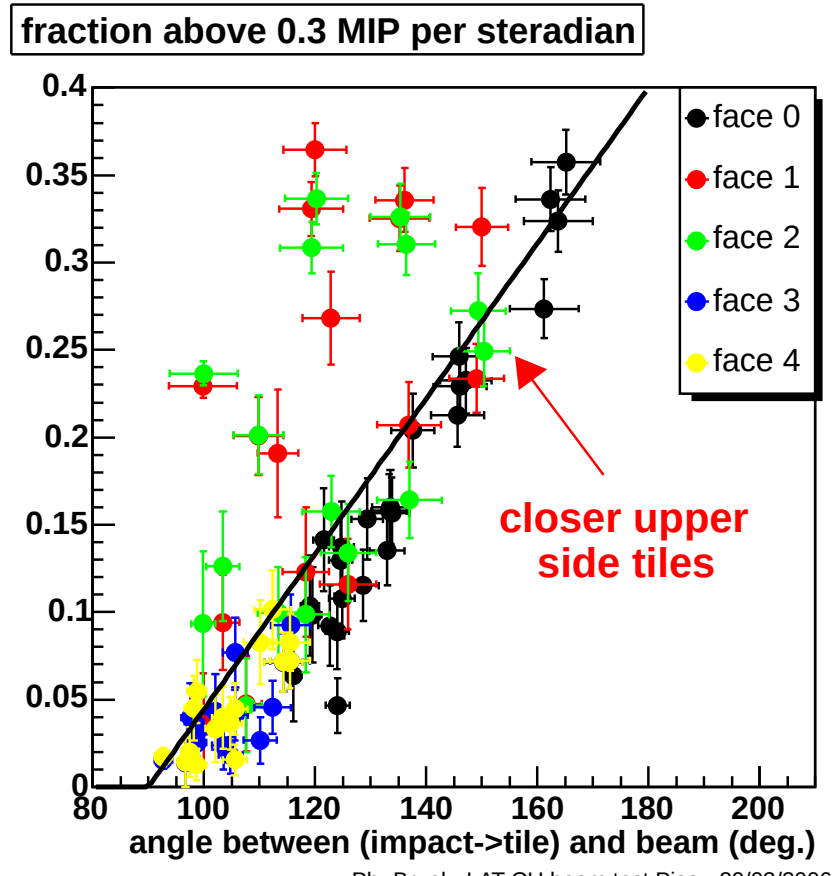




BUT : in the center of a corner tower

- the correction does not work so well...
- should the distance be taken into account ?
- direct “contamination” from the shower ?

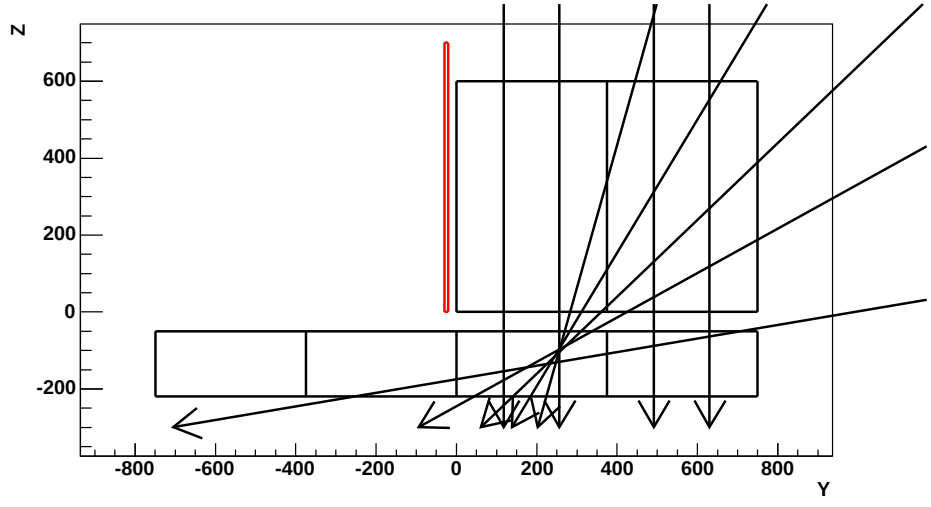


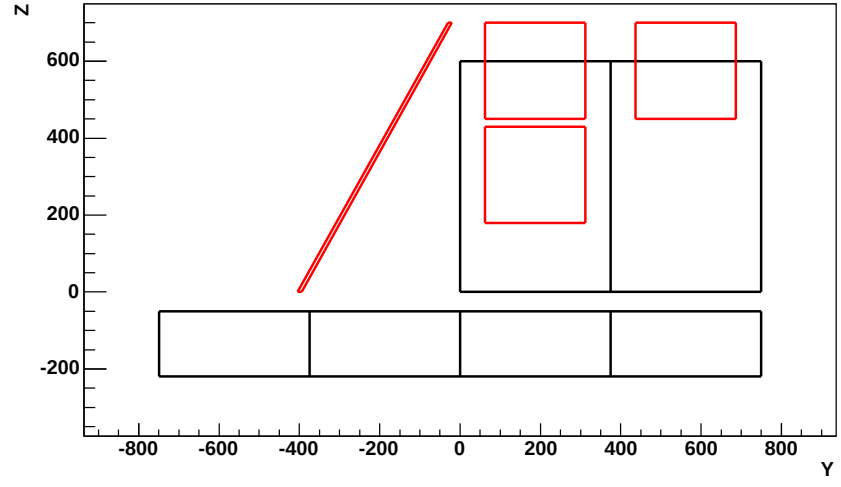


Where should we put the ACD tiles ?

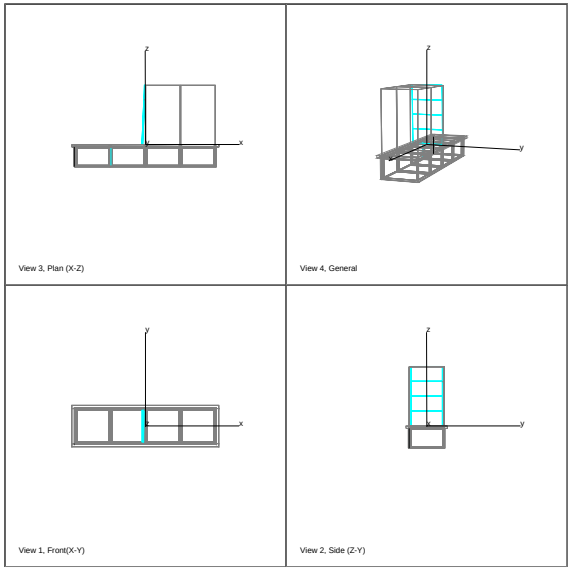
- not in the beam trajectory
  - $\Rightarrow$ not on the top of the two complete towers
  - $\Rightarrow$ not on the right hand side of CU

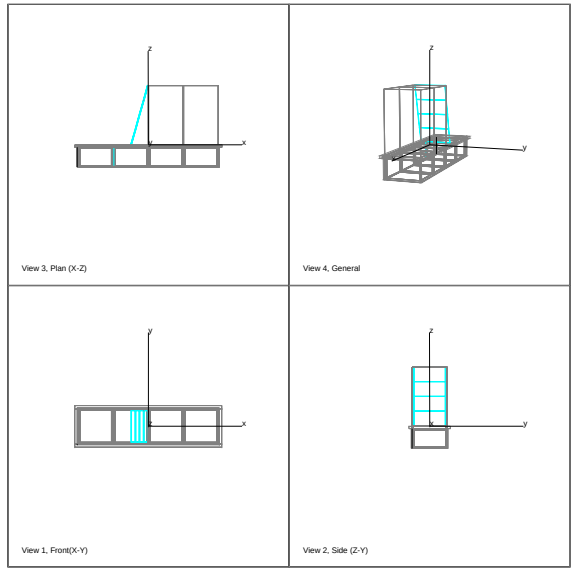
put ACD tiles on the left hand side of the first complete tower

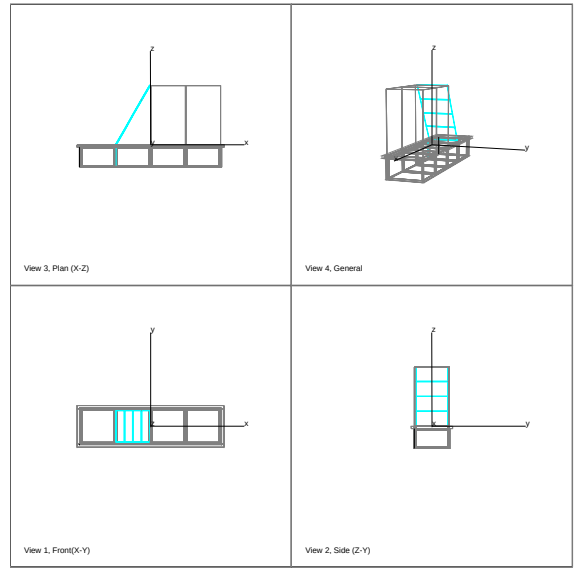




3 configurations (88 deg, 75 deg, 60 deg)

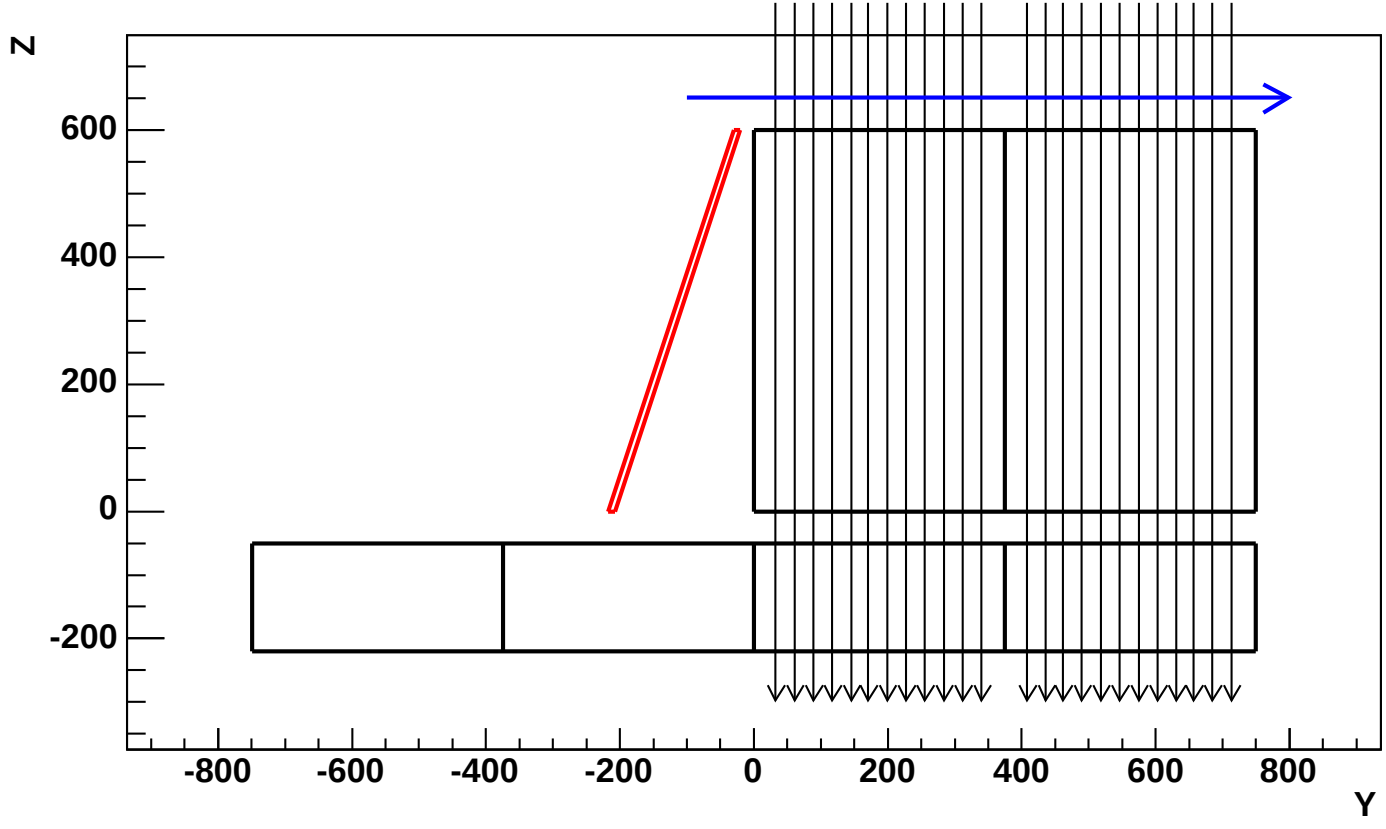






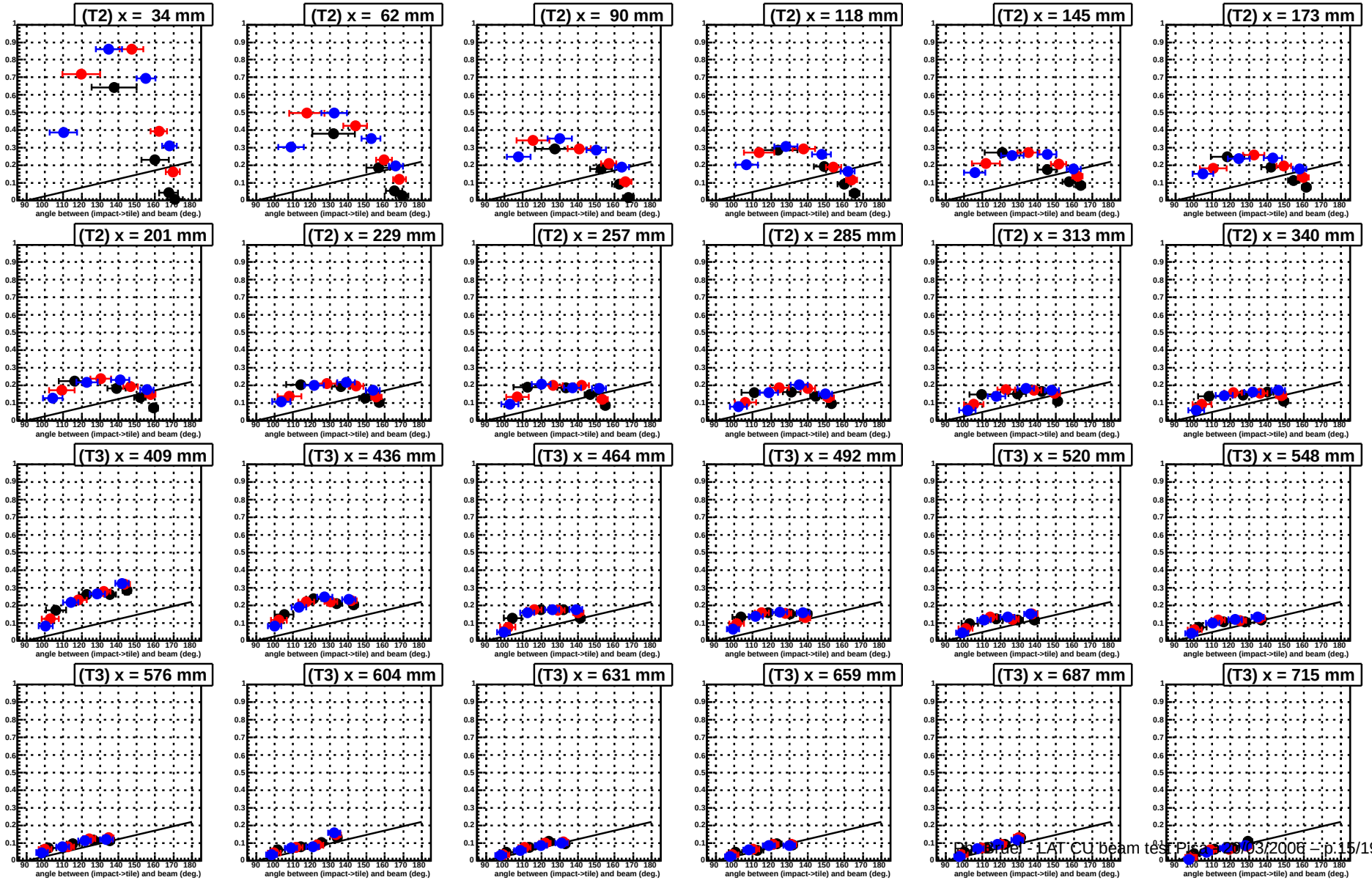
Scan in x with 100 GeV electrons

12 positions per tower (in the middle of CsI logs)



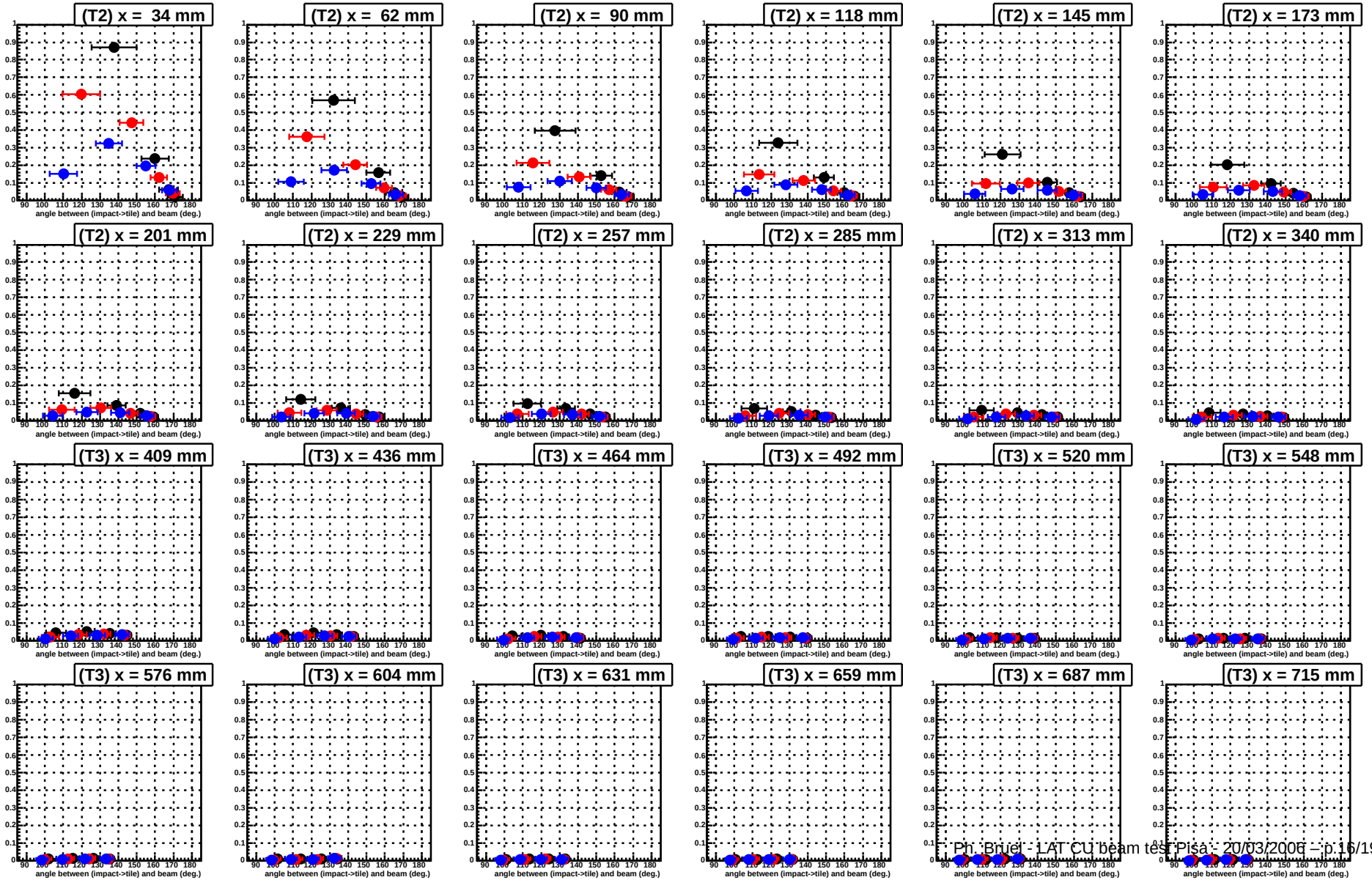
Corrected fraction above 0.5 mip

black (88 deg), red (75 deg), blue (60 deg)



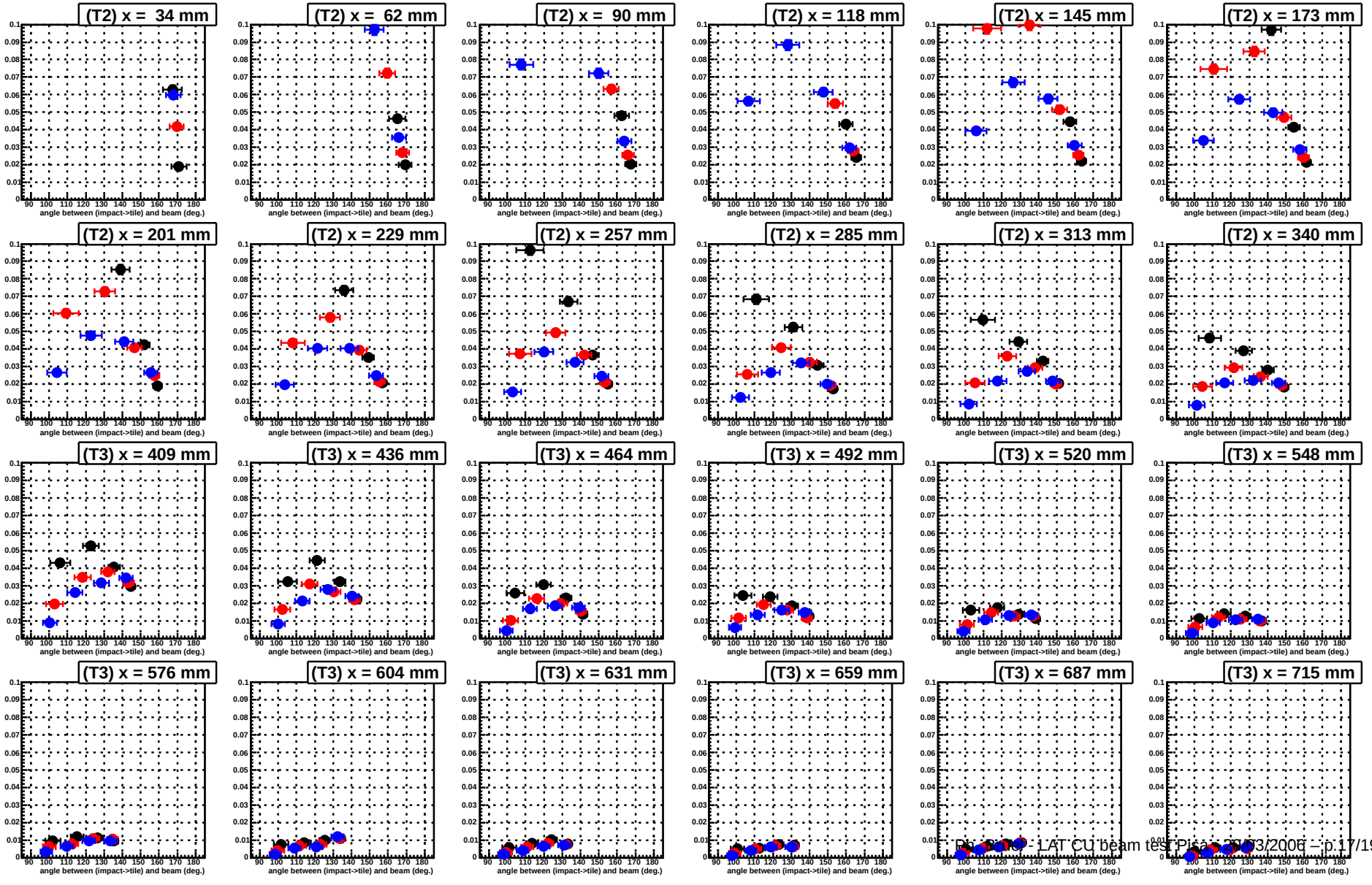
Raw fraction above 0.5 mip

histogram y scale from 0 to 1

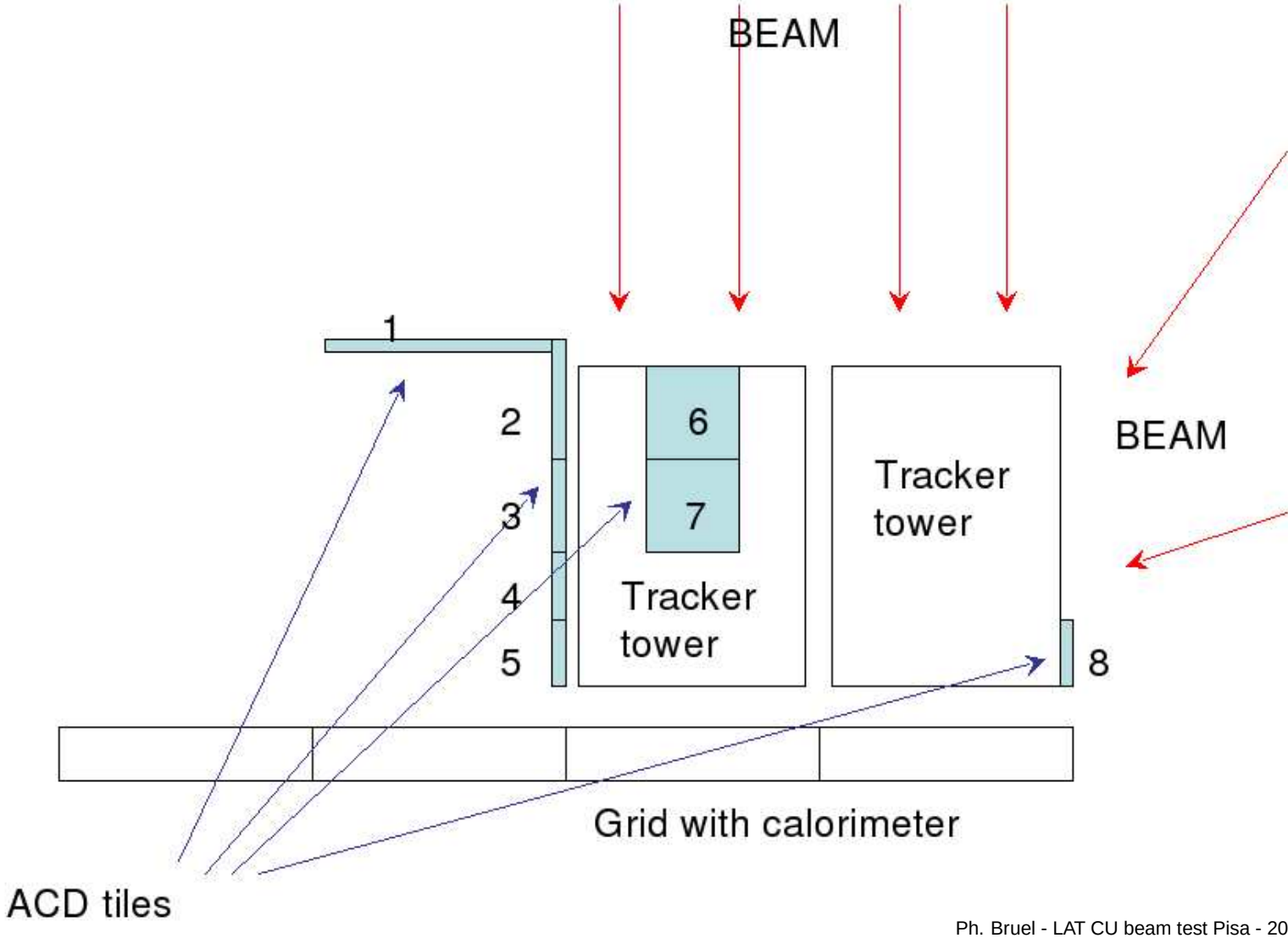


Raw fraction above 0.5 mip

histogram y scale from 0 to 0.1



Alex's suggestion



Conclusions

- we want to check backsplash, crack and large angle effect
- rather sticking to the ACD LAT configuration (than slanting)
- the tiles are out of the inner shipping container $\longrightarrow$ flexibility
- estimating the statistics : not done yet but signal is usually weak ($\sim$ 1% at 180 deg)
- we have to take into account beam conditions