The Phi_EtMiss in data & MC

Feb. 2010

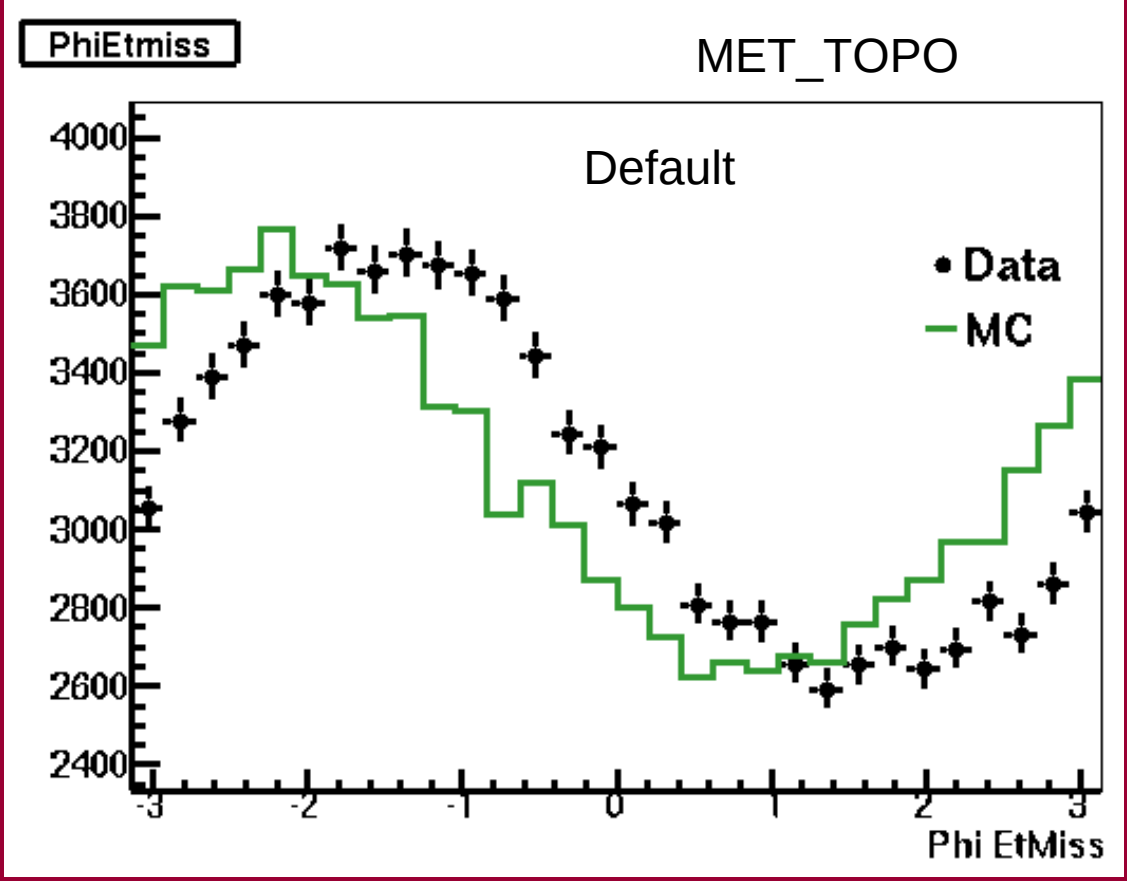
Topics:

- Beamspot Corrections
- Focus on the FCAL

By Marcel Vreeswijk (Nikhef/UvA)

Thanks:
Email-info by Pieter Krieger
Other talk on this subject:
Dag Gillberg in LaR meeting of 15 feb.

What is the problem



20% effect

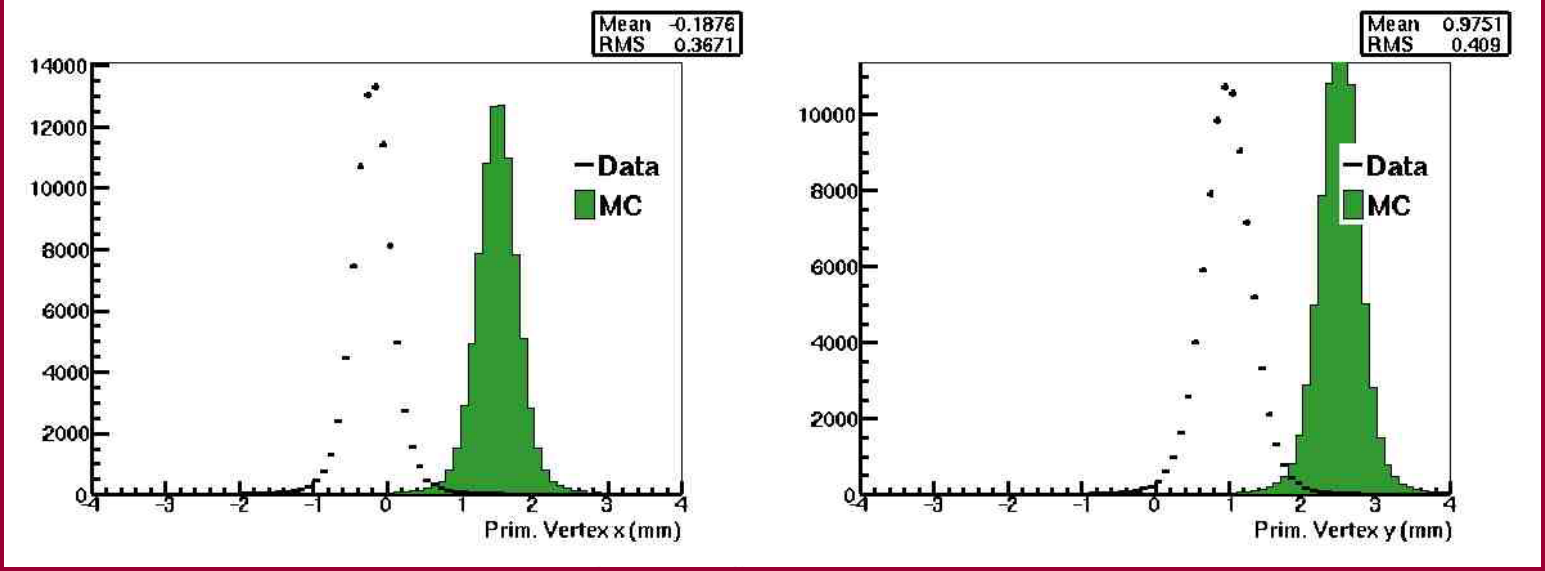
MC 900GeV (mc09_105001, Pythia minbias)

data 142193, reprocessed

Is it the beamspot?

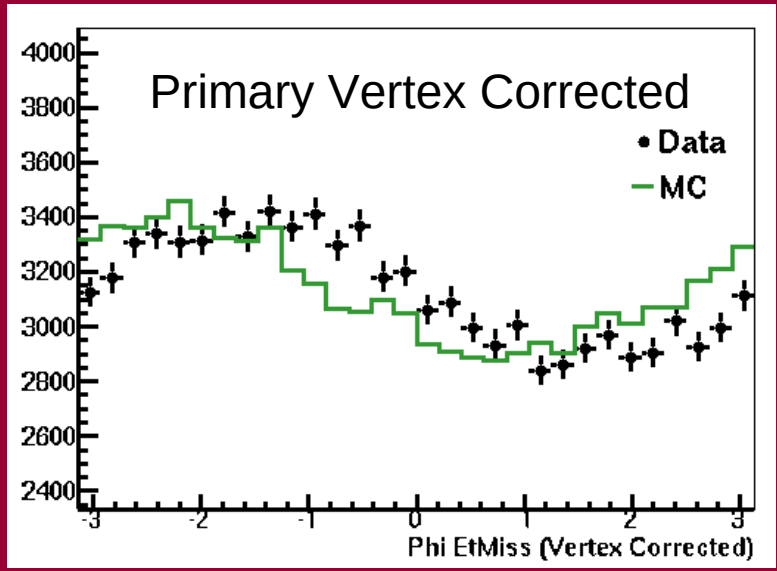
→ Apply vertex correction

Vertex correction



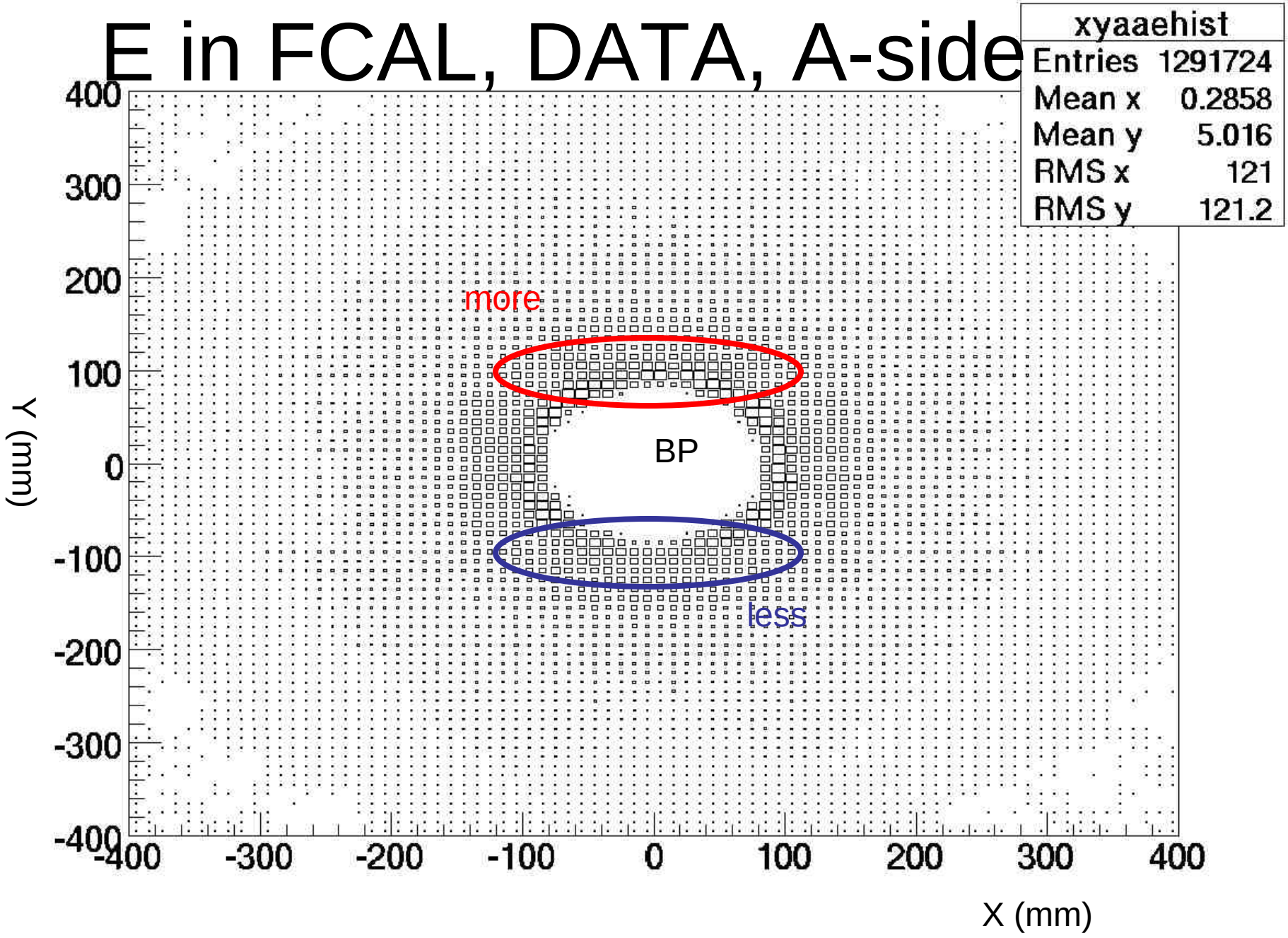
<x,y,z>data= -0.2, 1.0, -8mm
<x,y,z>MC = 1.5, 2.5, -7mm

1. Correct TopoCluster Position for Beamspot position
2. Recalculate MET_Topo →



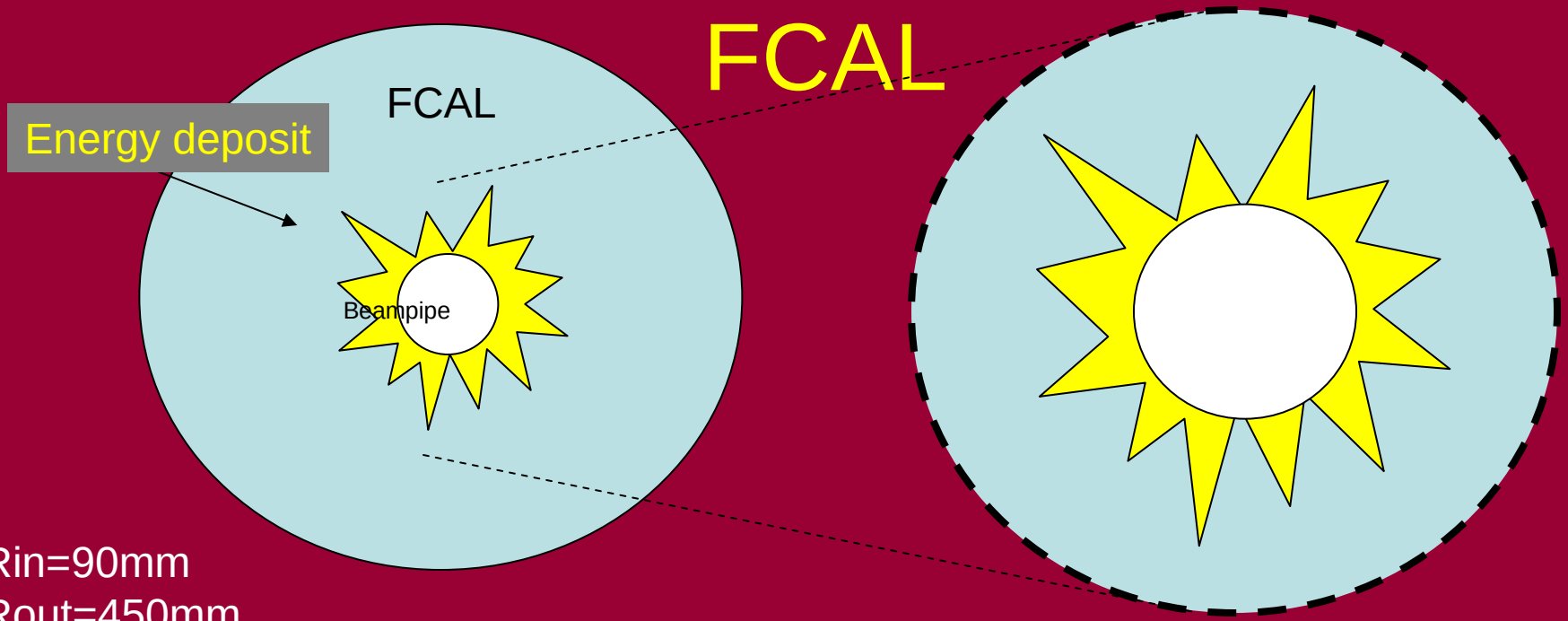
Still ~10% effect

E in FCAL, DATA, A-side



Next plots: 1Dim. profile in X and Y of this 2Dim. histo.

Vertex Corrections can be tricky in FCAL

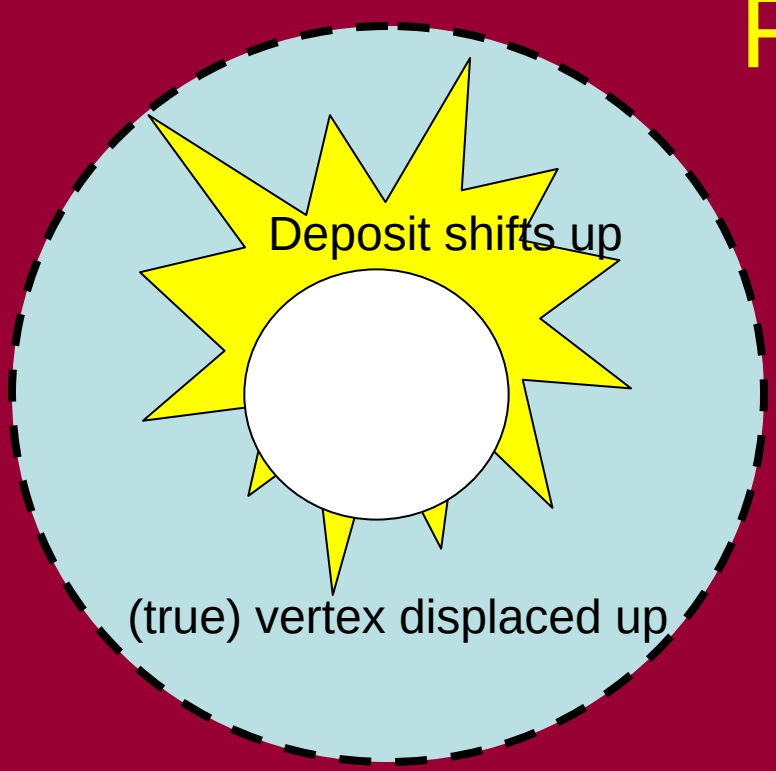


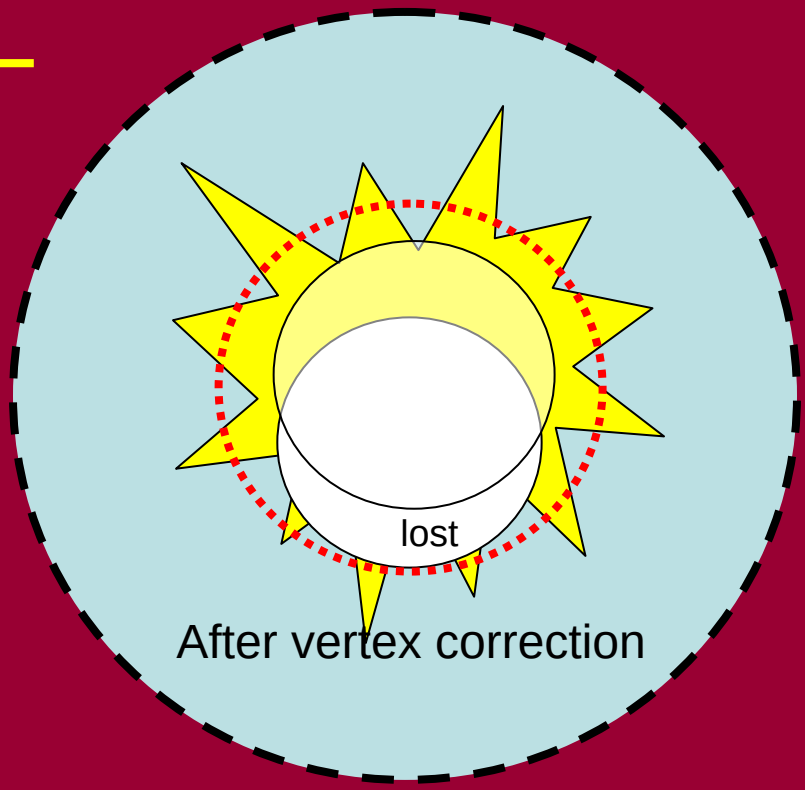
Rin=90mm
Rout=450mm

Gedankenexperiment:

- Let's focus on a nice symmetric energy splash around the Beampipe hole in FCAL.
- Next step: displace the (true) vertex upward and correct for that

Vertex Corrections can be tricky in FCAL



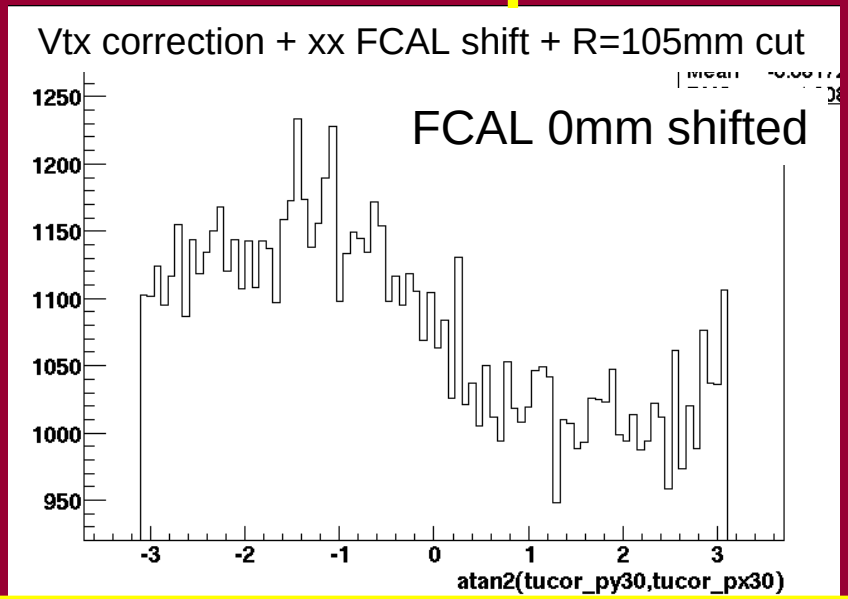


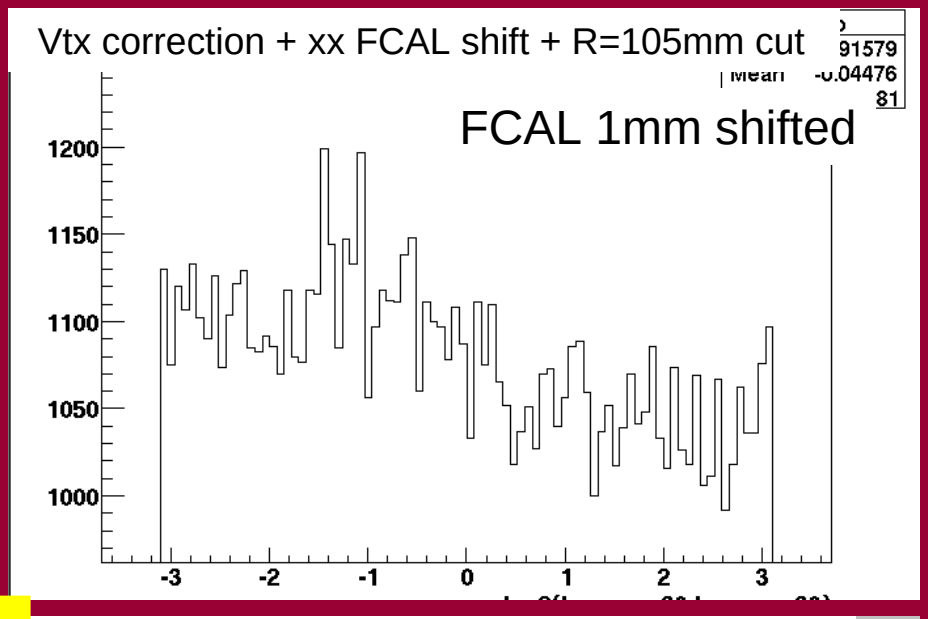
Obviously, after a vertex displacement correction, the situation remains assymetrical: What is lost, remains lost.

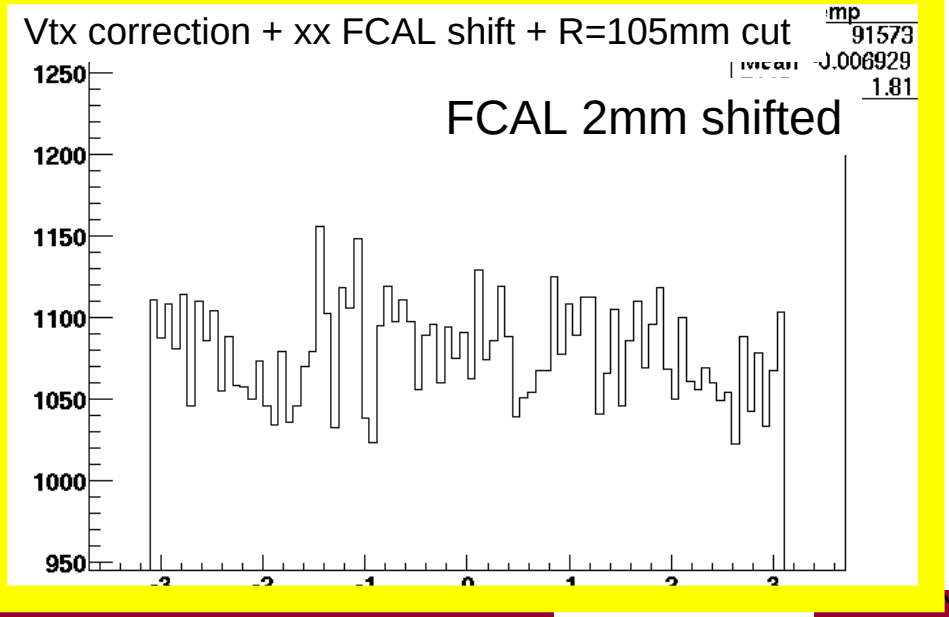
Solution: cut out the energy inside a fiducial circle (wrt corrected coordinates) that envelopes lost deposits.

→ i used R_vtx>105mm (larger values give similar results)

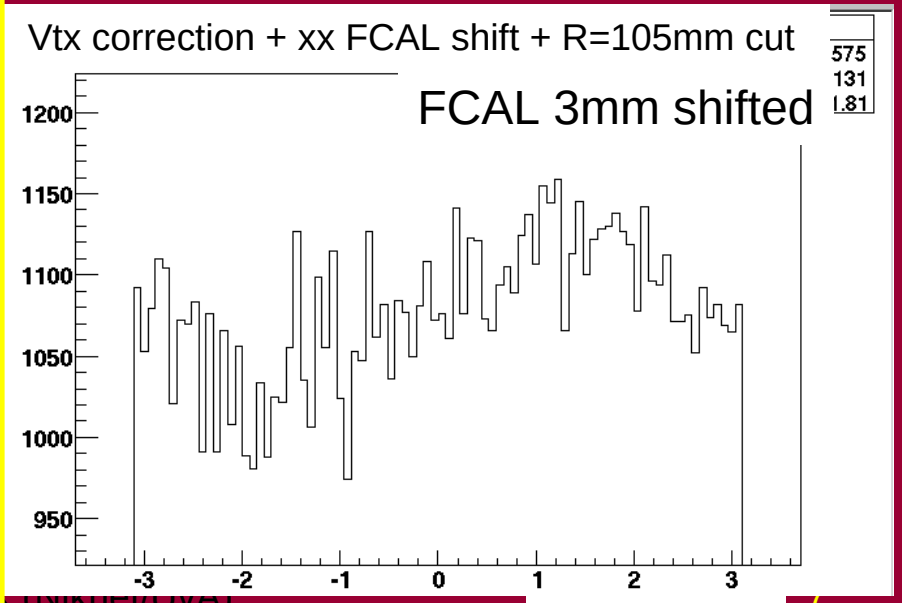
DATA – phi Etmiss- FCAL shifts





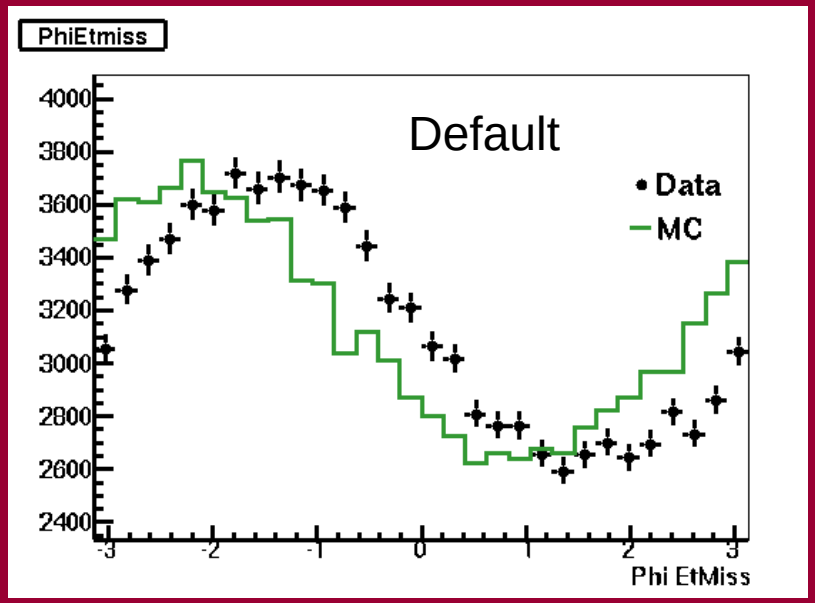


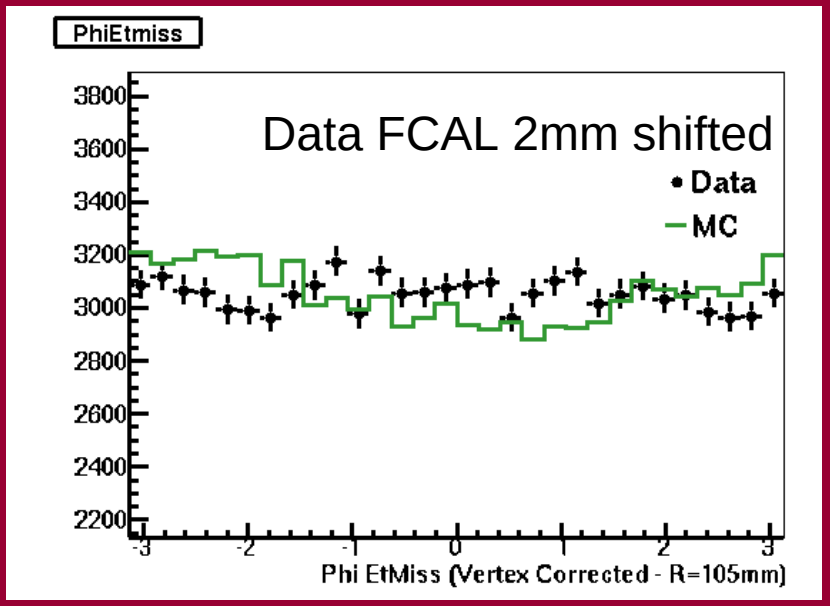
Phi etmiss



Phi etmiss

Phi EtMiss evolution





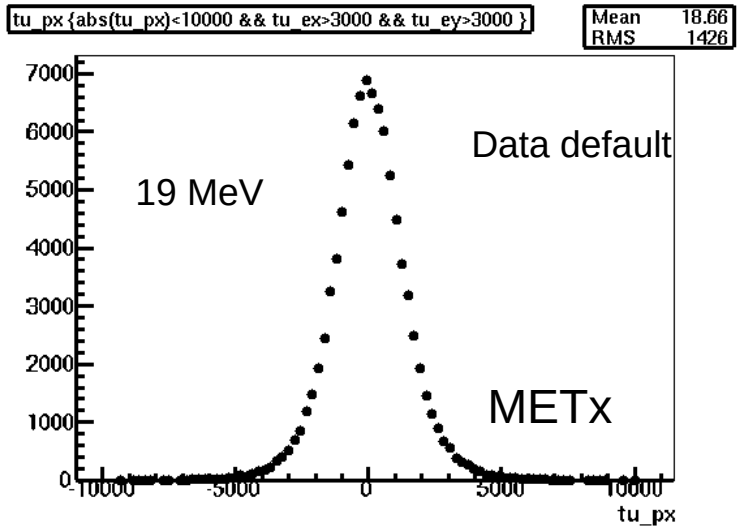
Default: +-20% effect

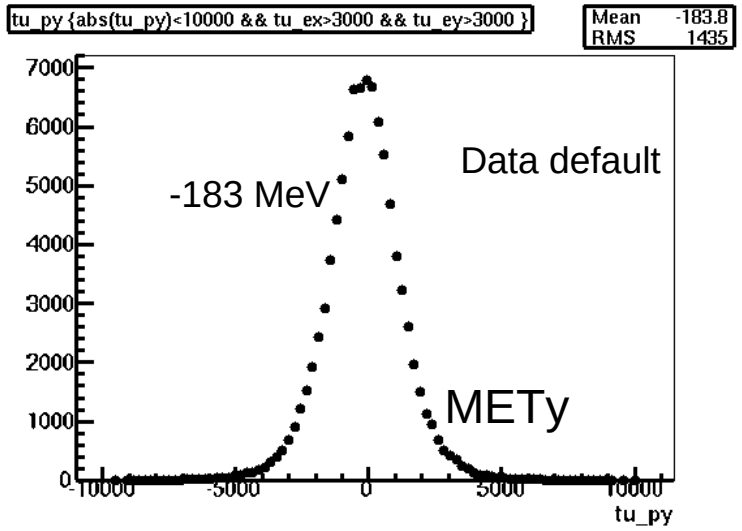
Corrected: +-3% effect

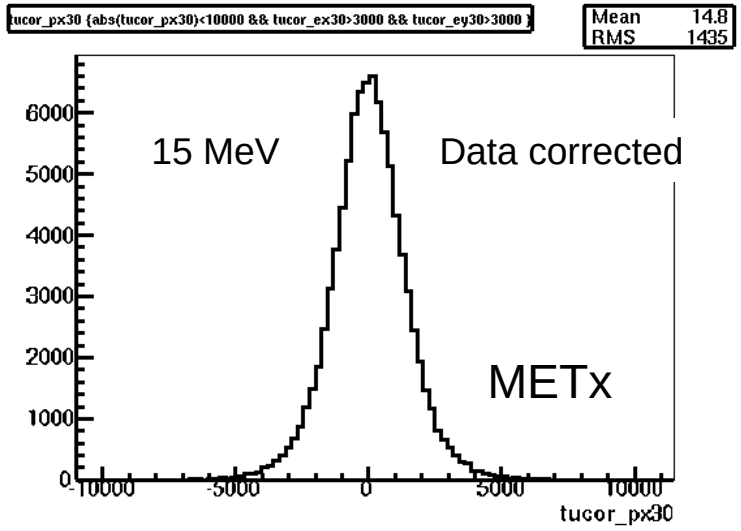
Conclusion: the data becomes flat in phi_etmiss, after:

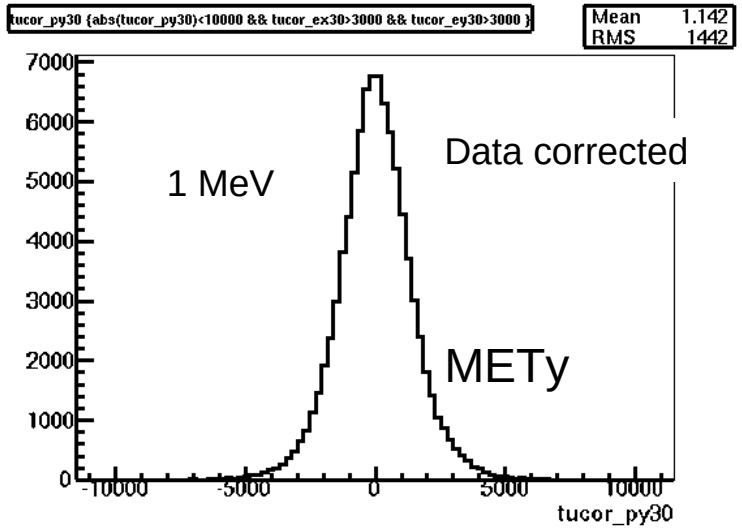
1. -Vertex Correction
2. -FCAL fiducial cut (R>105mm)
3. -FCAL shifted 2mm

DATA - METx,y







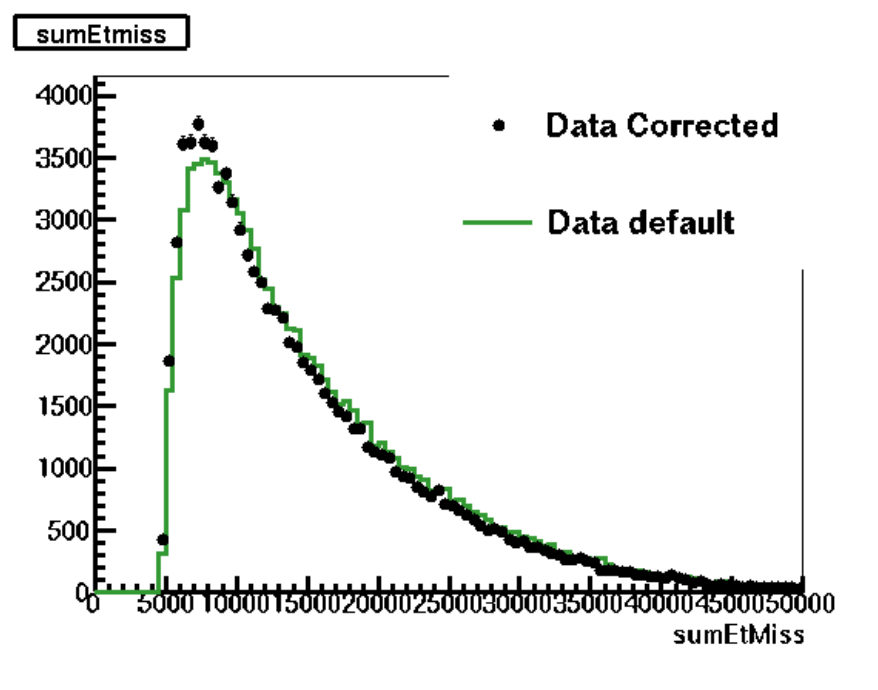


DATA corrected = Vtx correction + 2mm FCAL shift + R=105mm cut

→Correction reduces METy offset from -183MeV to 1MeV

(Note: an offset of METy=-183 MeV leads to default phi modulation)

SumET evolution

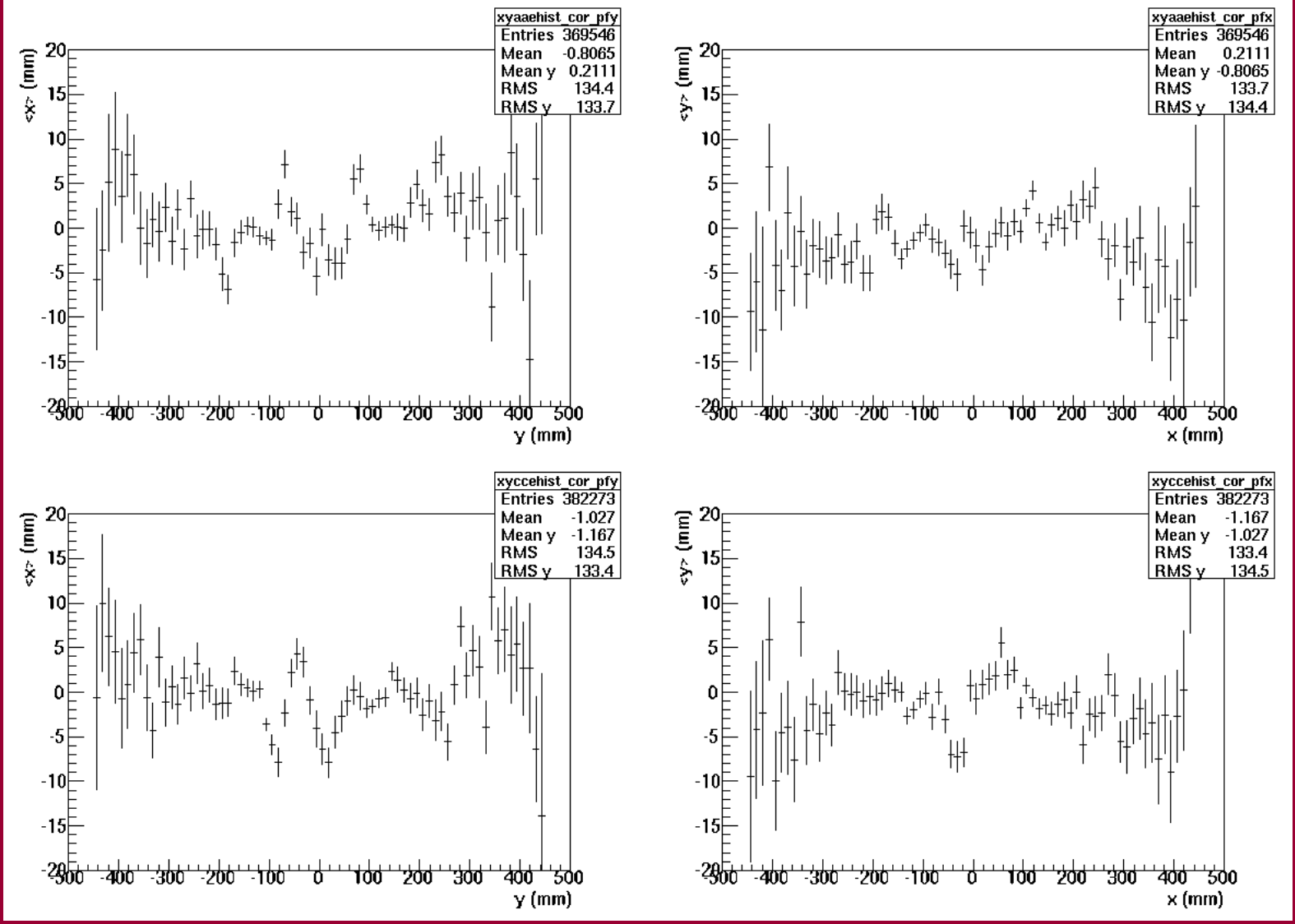


Data Corrected= Vtx correction + 2mm FCAL shift + R=105mm cut

DATA FCAL projections $\langle x \rangle = \Sigma (E_i \cdot x_i) / \Sigma E_j$

Data Corrected= Vtx correction + 2mm FCAL shift + R=105mm cut

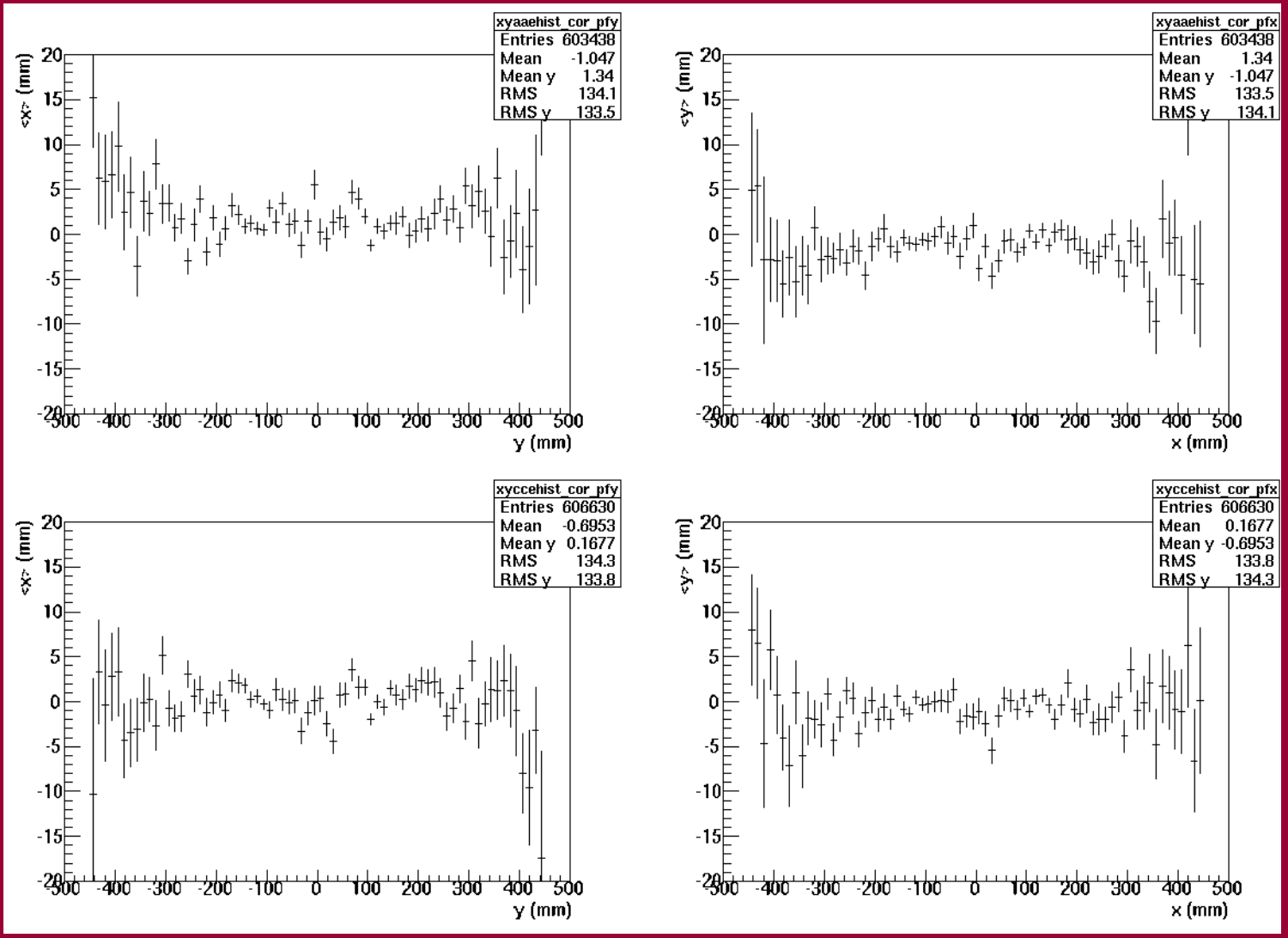
→ Not understood (by me): many structures ~5 mm.



MC FCAL projections $\langle x \rangle = \Sigma (E_i \cdot x_i) / \Sigma E_j$

MC Corrected= Vtx correction + R=105mm cut

→ Not understood (by me): <x,y> ~ 1mm.



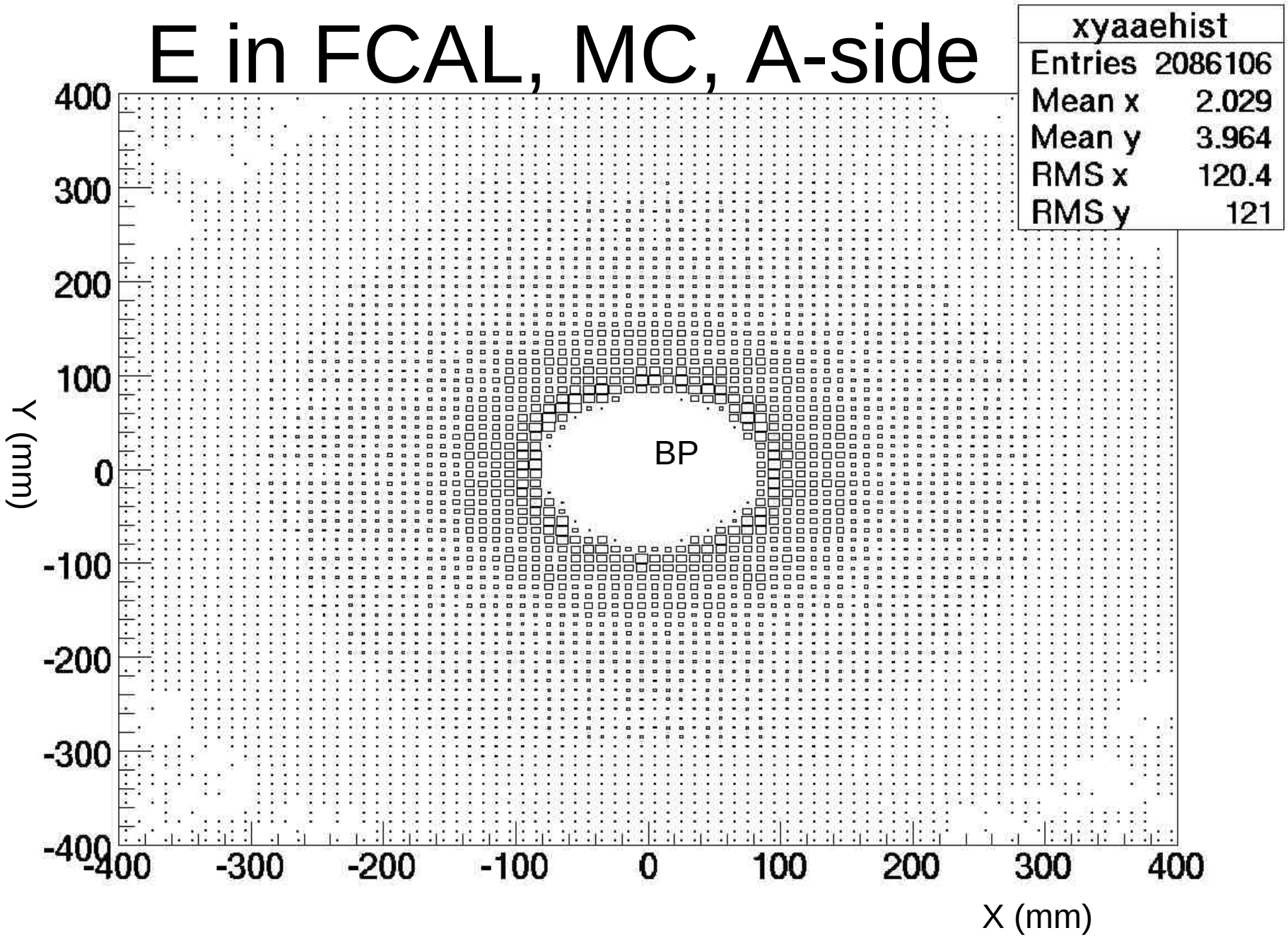
Also see the work presented by Dag Gillberg et al. in Lar meeting →
Confirms FCAL behavior by position measurements. The data also suggests that the MC behaves too ‘smooth’

Conclusions

- Phi modulation appears consistent with a FCAL shift of dy=-2mm.
- Position measurement by FCAL shows structures ~5mm (there is not much documentation on position measurement in testbeam – difficult to place this into context.).

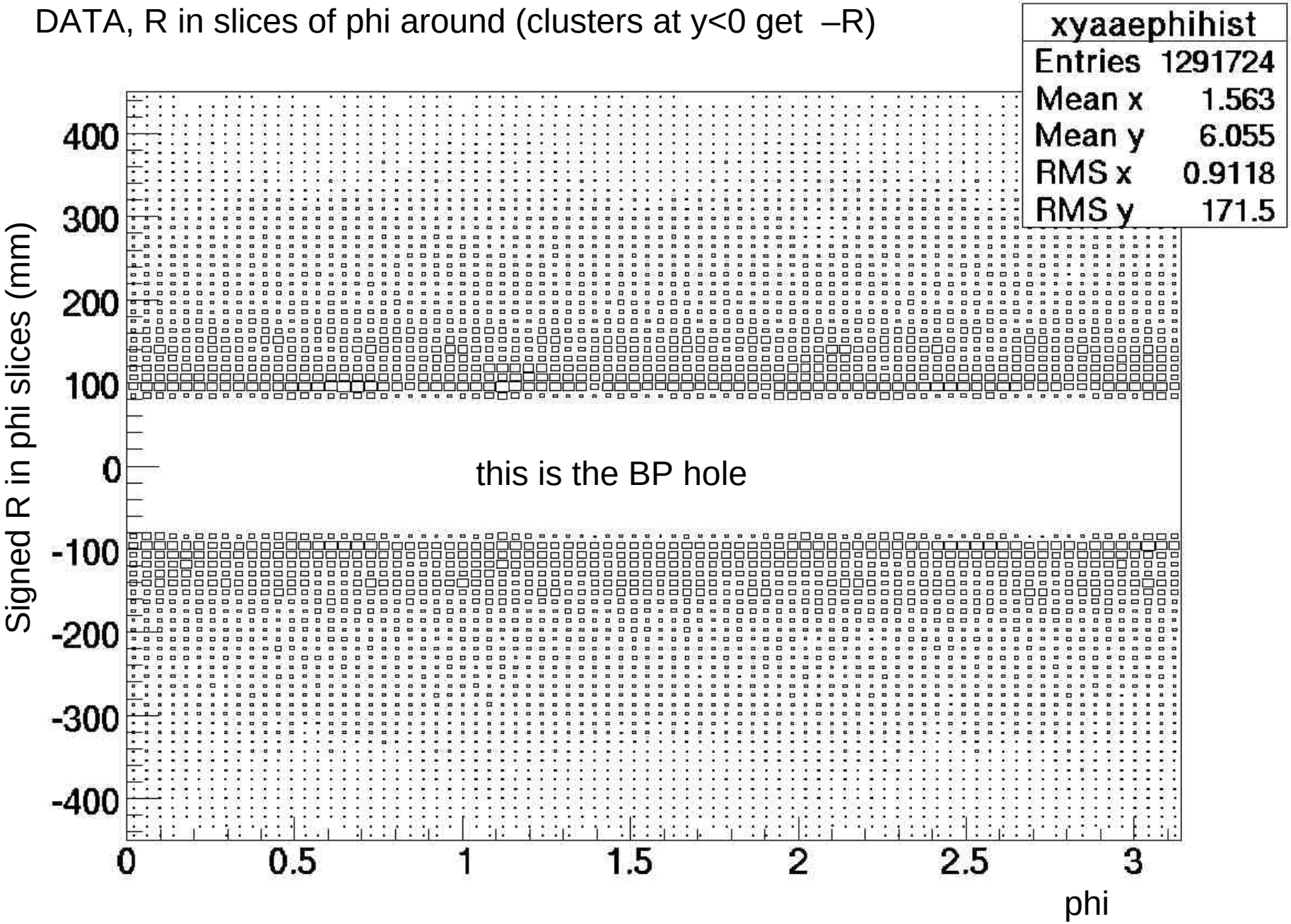
Back up

E in FCAL, MC, A-side

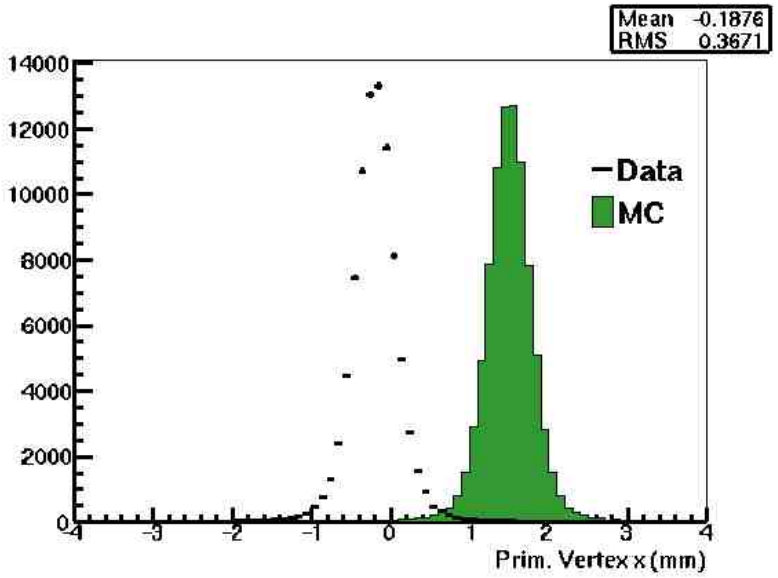


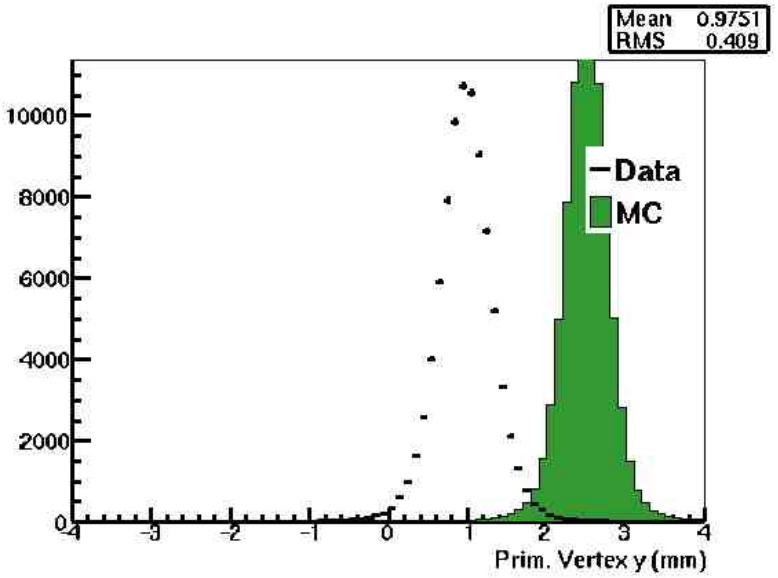
Next plots: 1Dim. profile in X and Y of this 2Dim. histo.

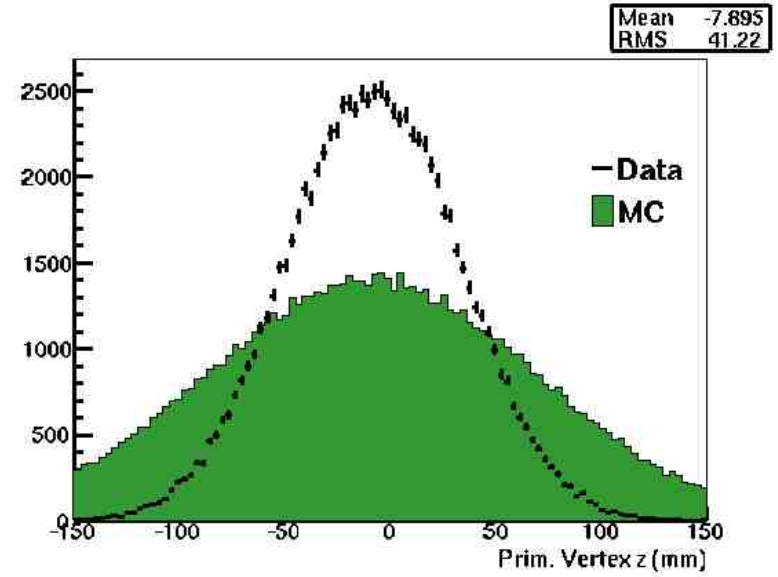
DATA, R in slices of phi around (clusters at y<0 get –R)



Vertex in Data & MC







<x,y,z>data= -0.2, 1, -8)
<x,y,z>MC= 1.5, 2.5, -7

Note: data Z vertex close to nominal for this run (142193)