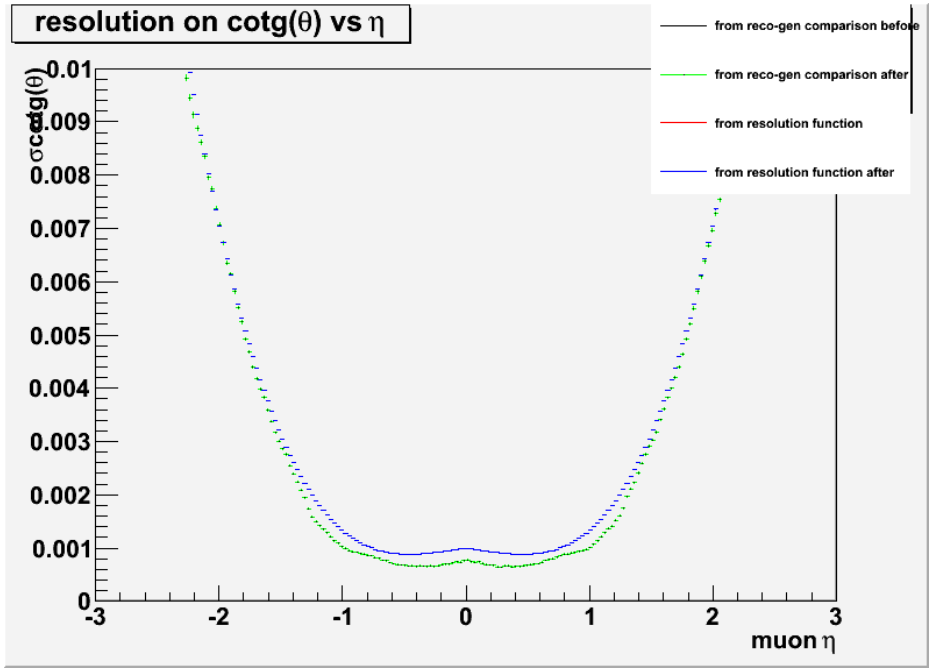
J/Psi new resolution fit

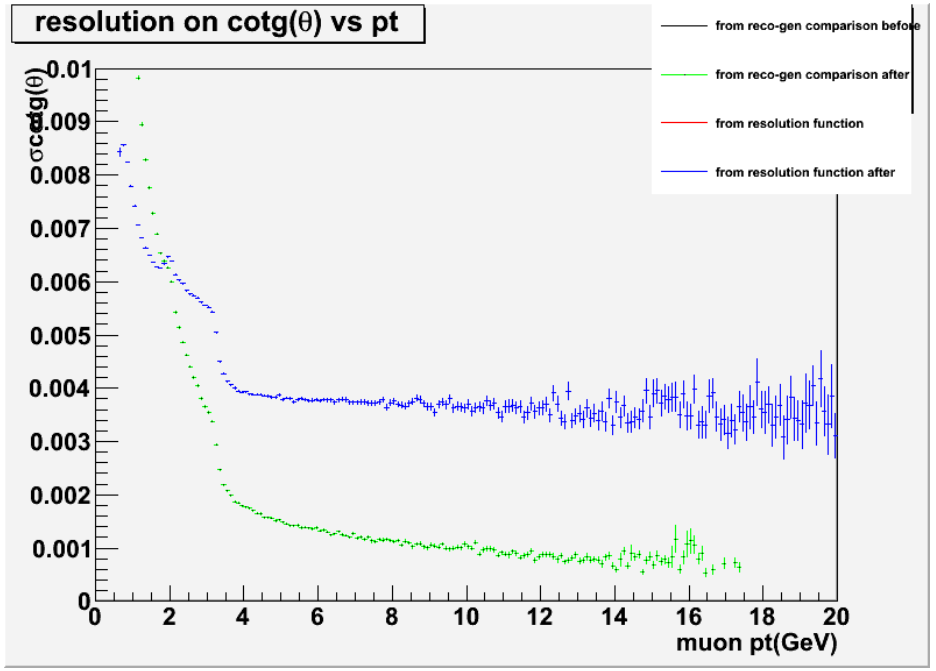
- Data: 1.3/pb
- MC: J/Psi prompt (no background)

- First look at effects in the MC
- After this I will show the results on data

Systematic error in resolution fit

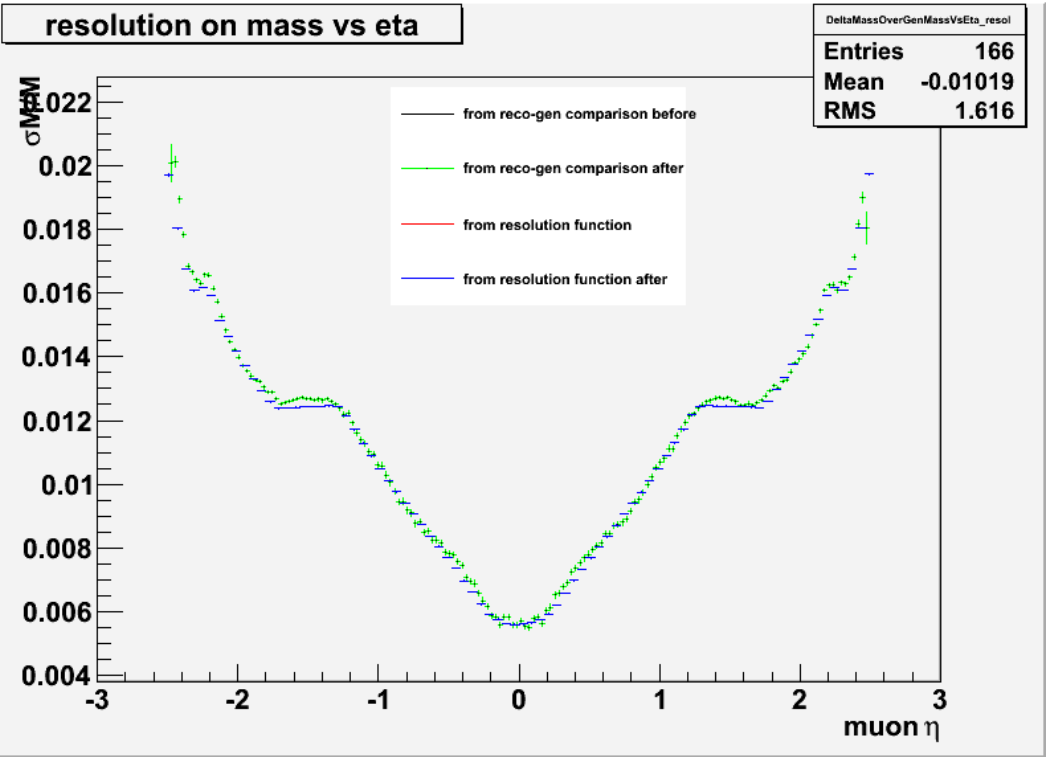
- See discrepancies in sigmaPt/Pt even if sigmaM/M fits perfectly
- Introduce a SigmaCotgTheta term taken from MC-truth

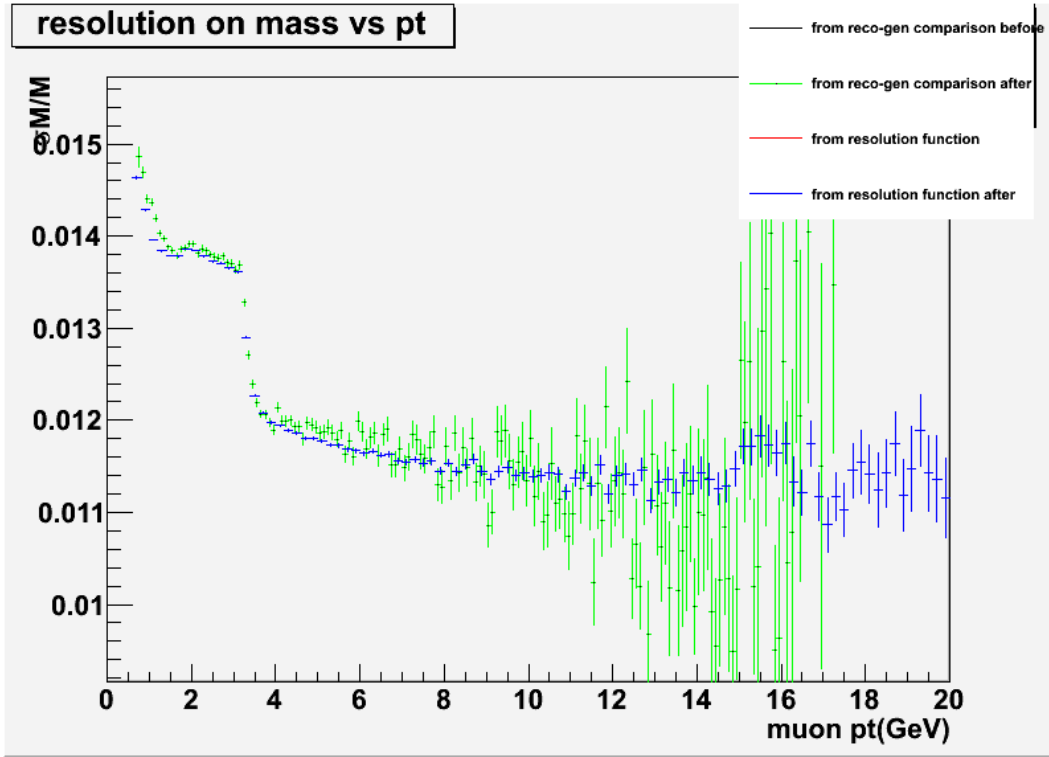




Full Fit and discrepancies

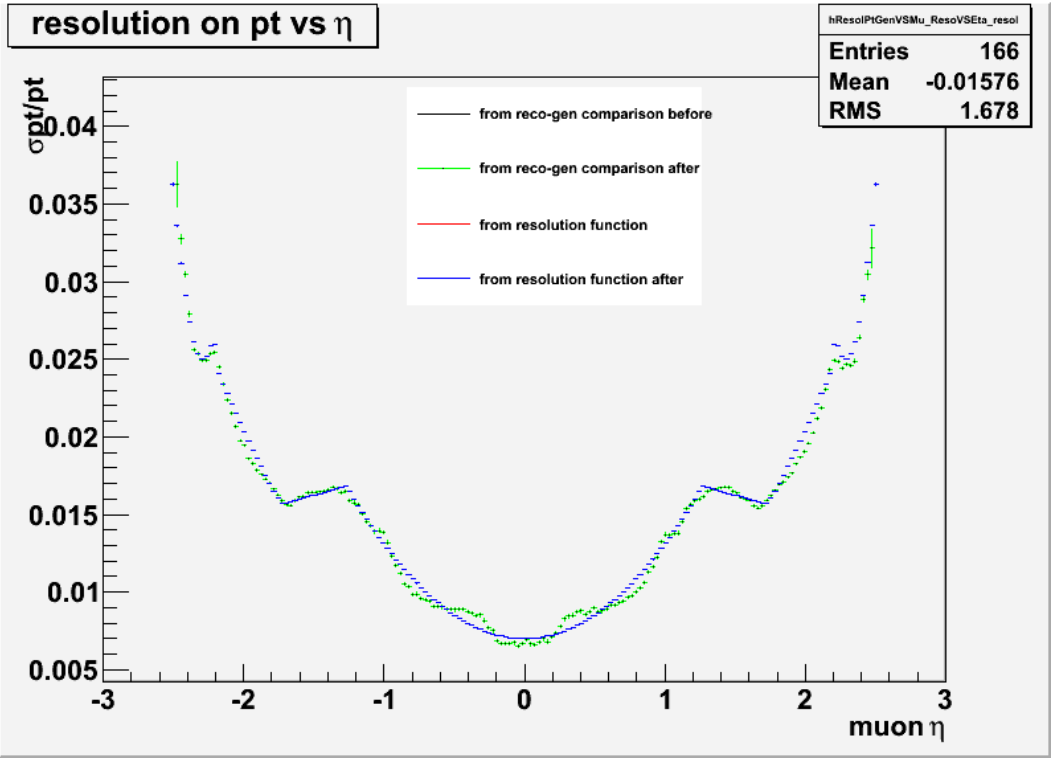
- Mass Resolution

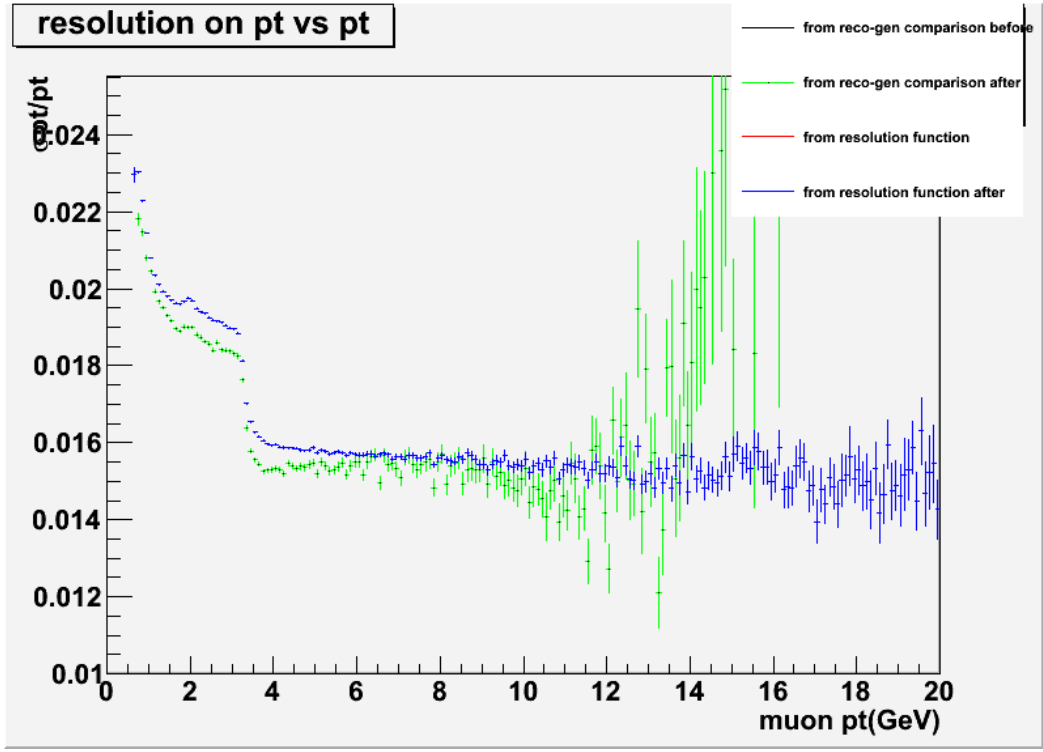


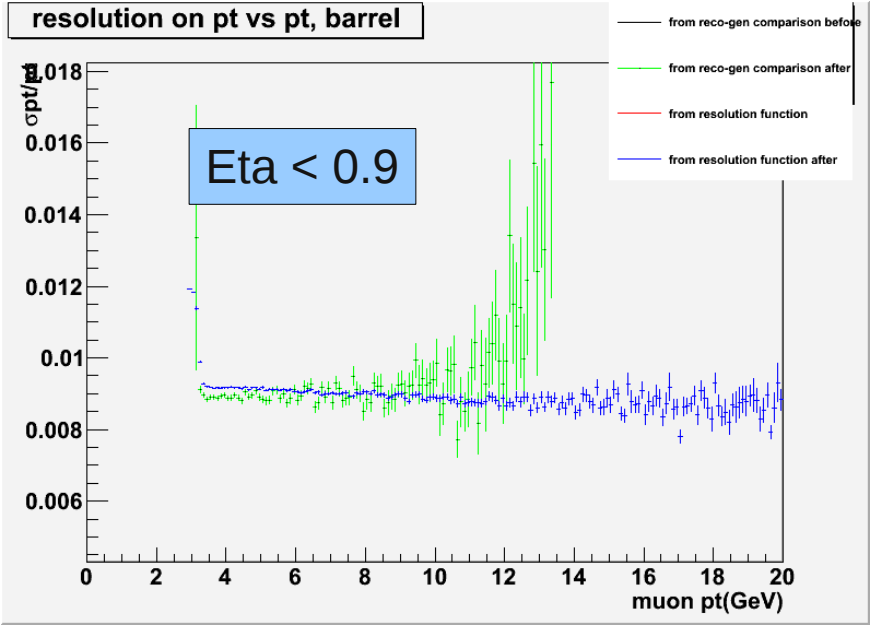


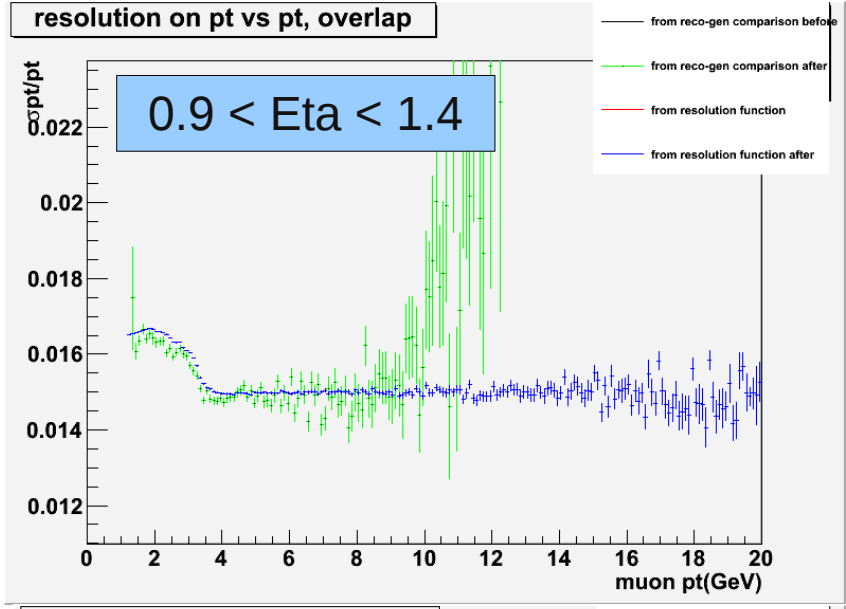
SigmaPt/Pt

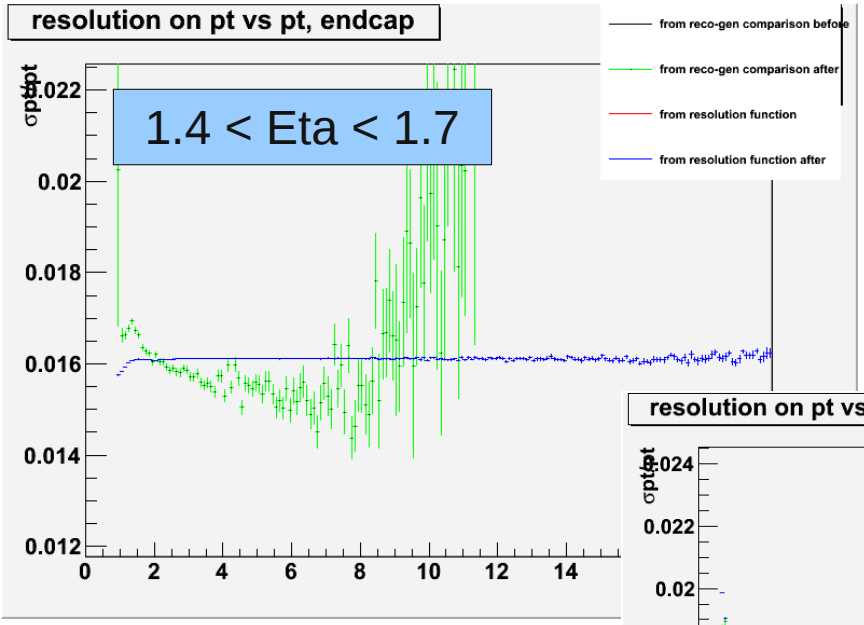
- Still discrepancies in sigmaPt/Pt (vs Pt are especially evident)

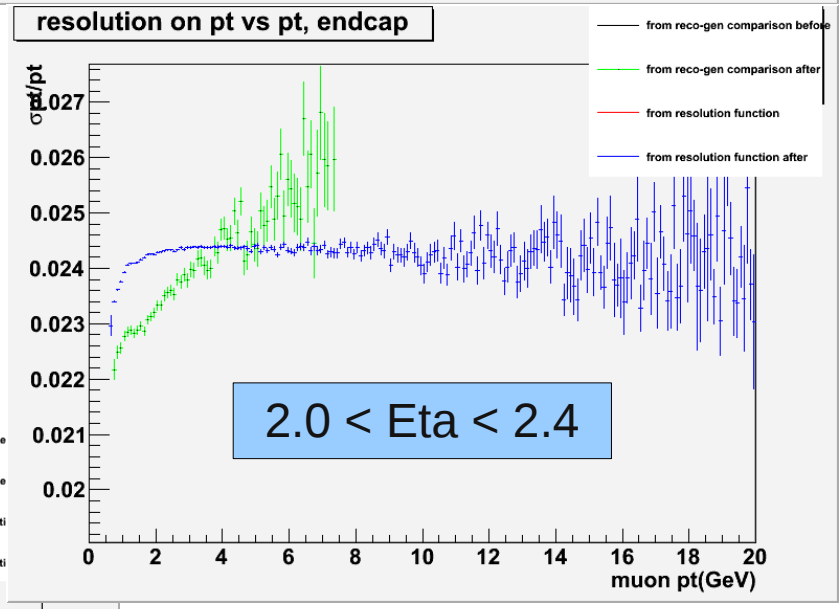


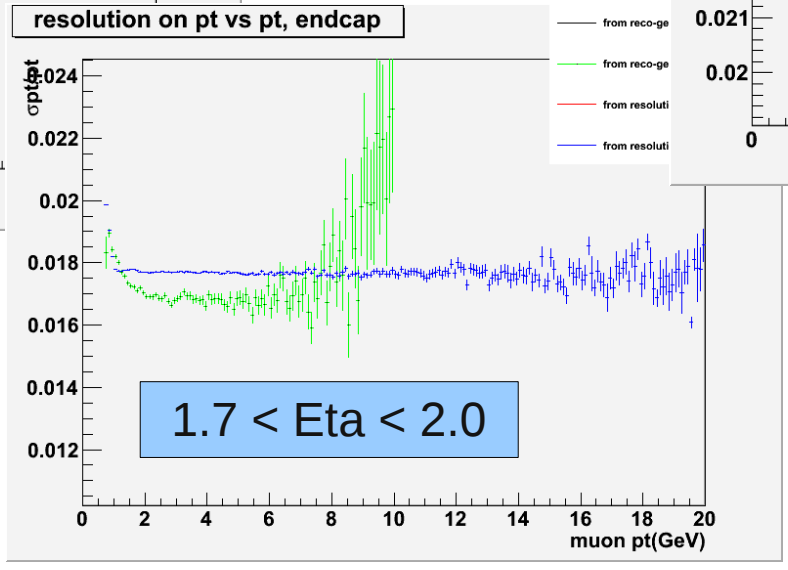






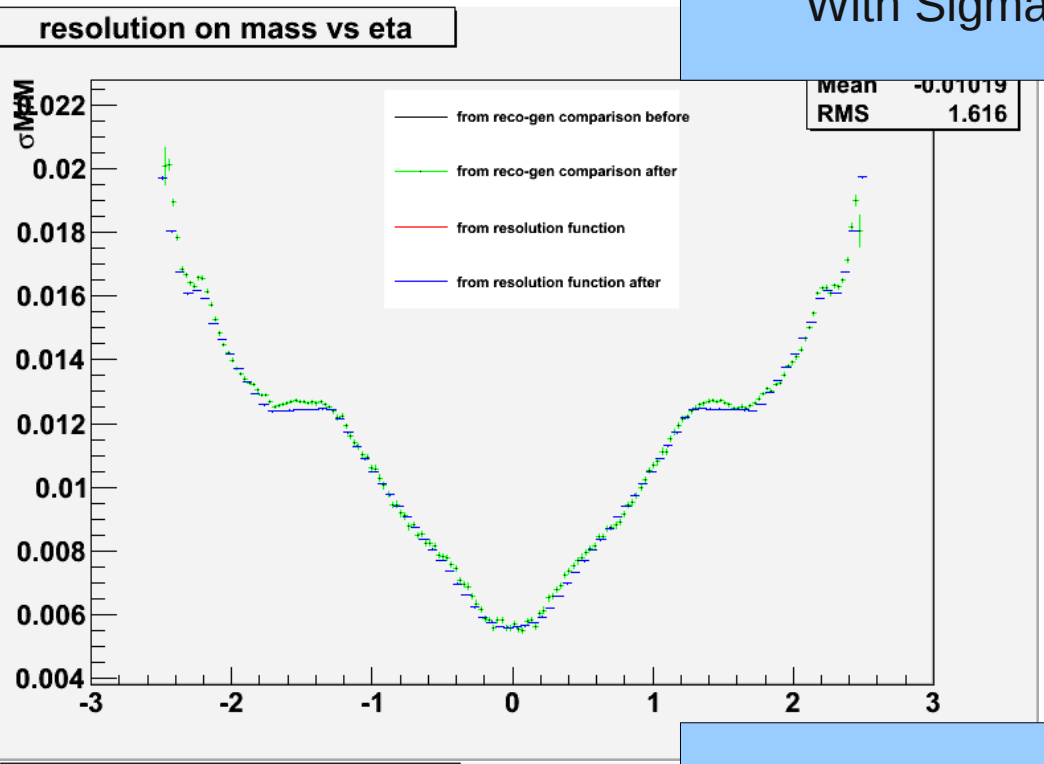


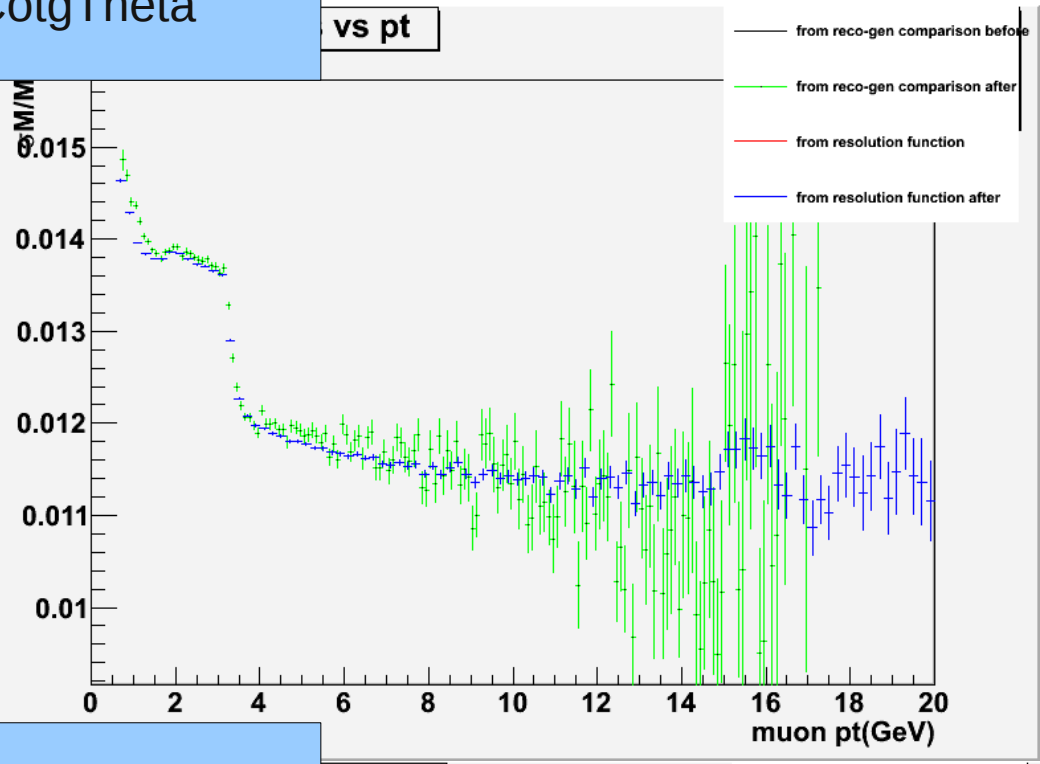




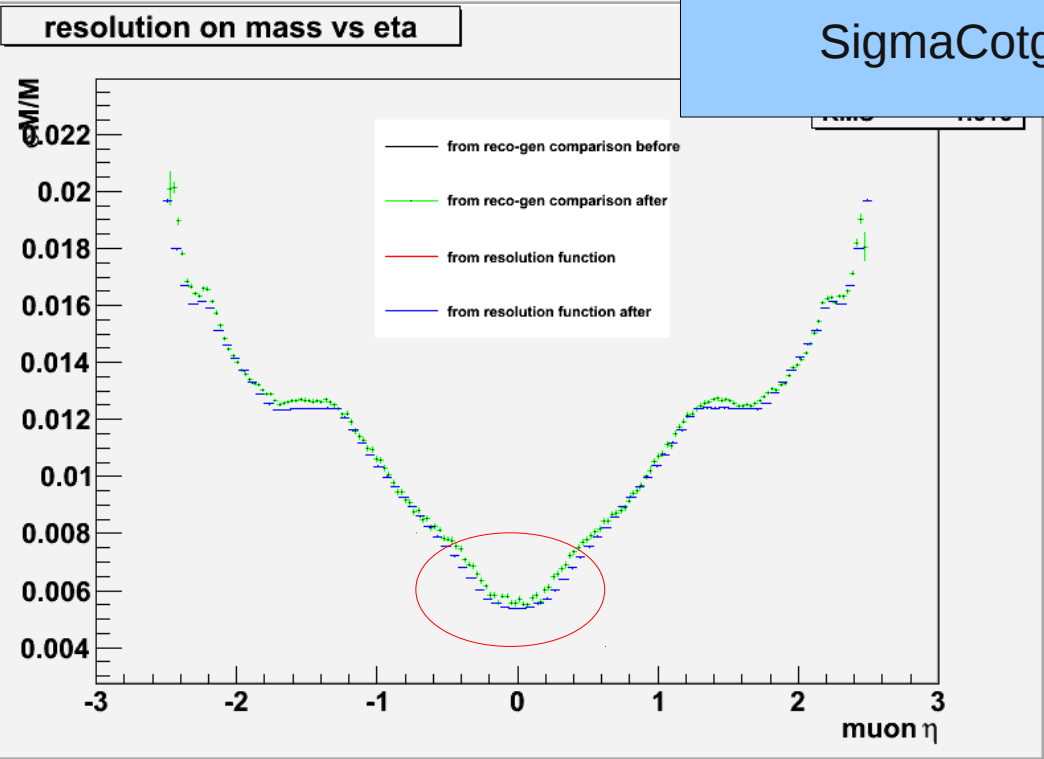
Discrepancies in the forward region

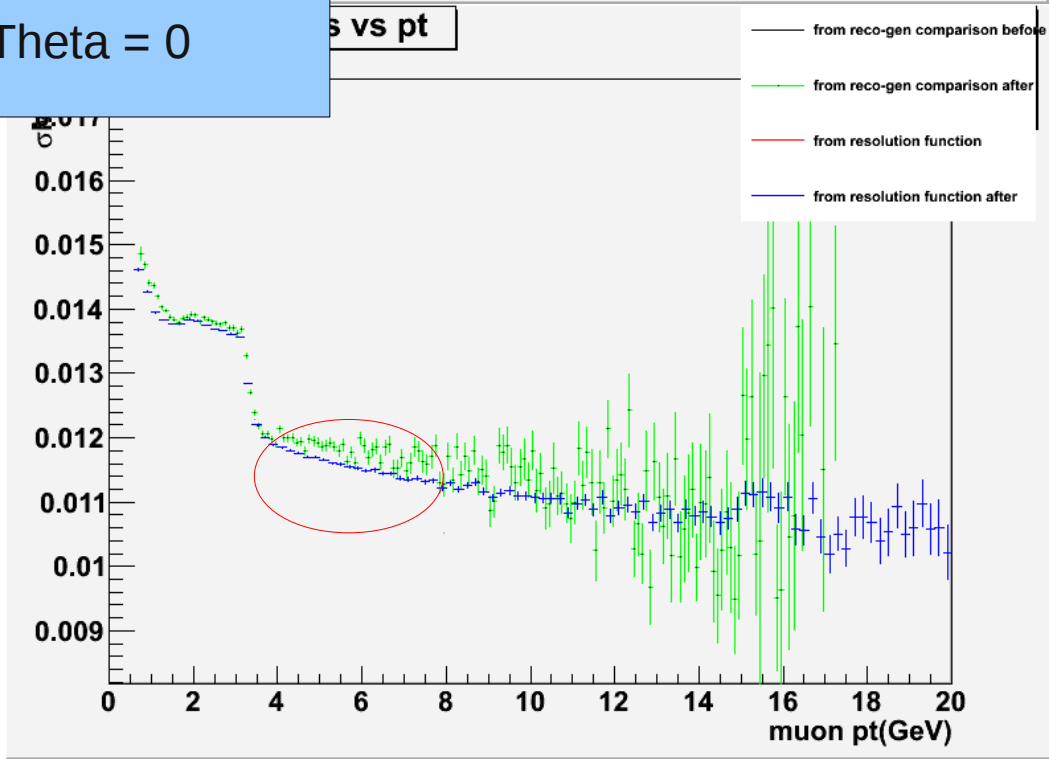
With SigmaCotgTheta





SigmaCotgTheta = 0

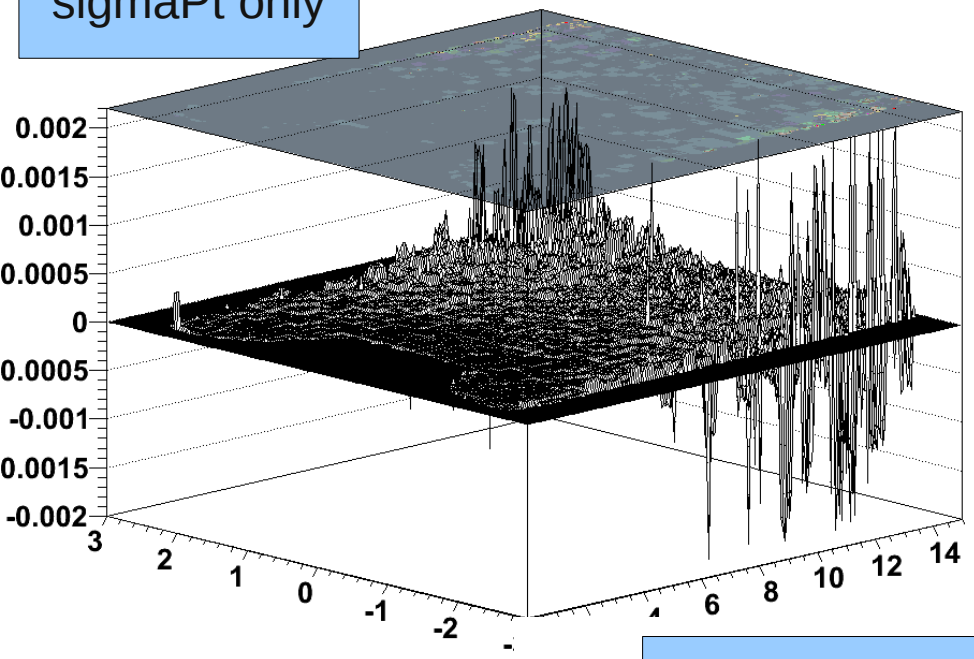




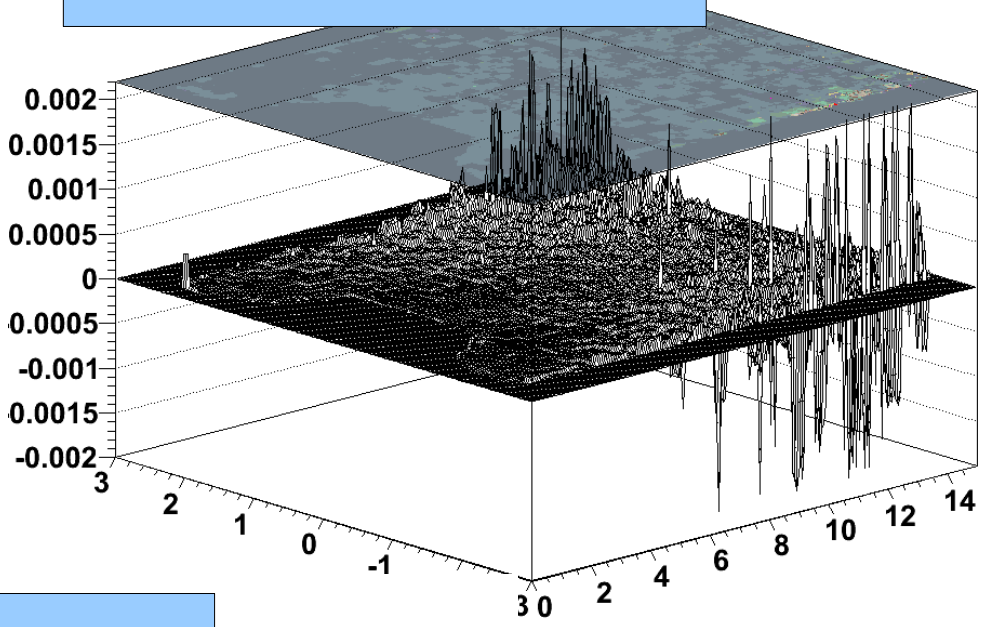
- Very small changes, concentrated in the barrel
- Trying to add Pt dependencies different for each region does not improve the sigmaPt/Pt vs Pt and vs eta (at high eta) discrepancy
- Could the difference come from some of the other terms?
- In the next slide the plots show the difference between the resolution on the mass computed with the full variance-covariance matrix and with only selected terms

Look again at the covariance terms...

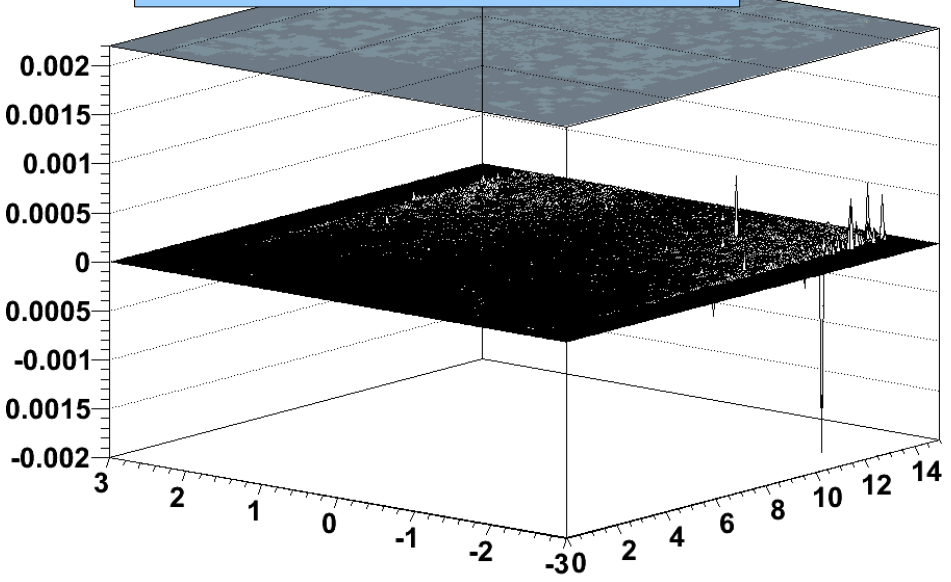
sigmaPt only



SigmaPt & sigmaCotgTheta



SigmaPt & cov(Pt1, Pt2)

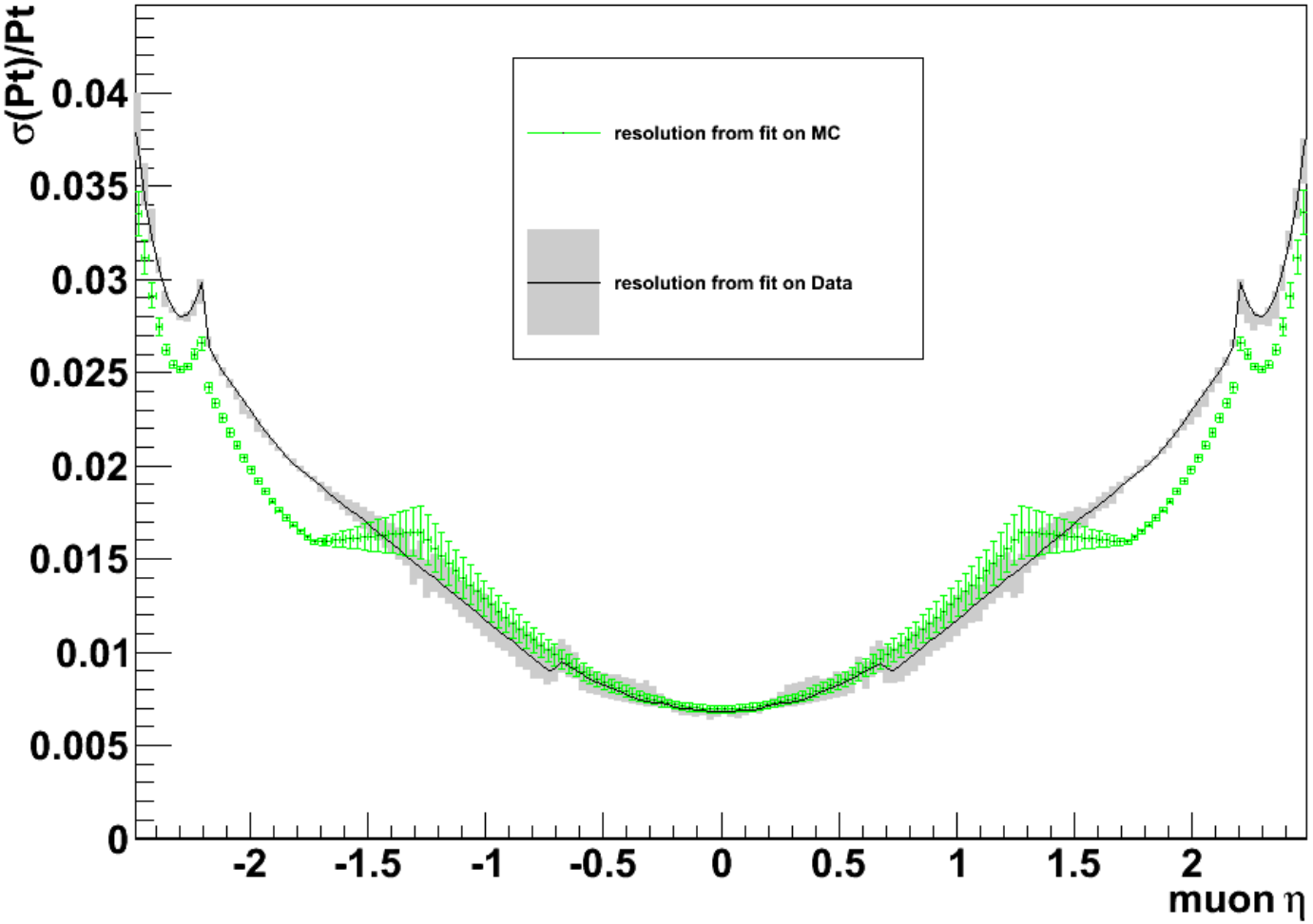


In the plots:
FullRes - TITLE

- So the sigmaCotgTheta term seems to do very little, the main contribution is from the covariance of Pt1 and Pt2.
- This is something we need to model from MC and eventually fit on data...
- For the time being ignore this term
  - Which depends on Pt1, Pt2, Eta1, Eta2 and is difficult to model (and we cannot even estimate easily a theoretical error)
- Assign the difference between MC-fit and MC-truth as systematic error to the fit on data

Fit results on Data vs MC

- Error on data are statistic + systematic



NOTE:

MC ran only on 140k events
Running now on the full statistics (~3M events), so statistical errors should be much reduced

Systematic errors

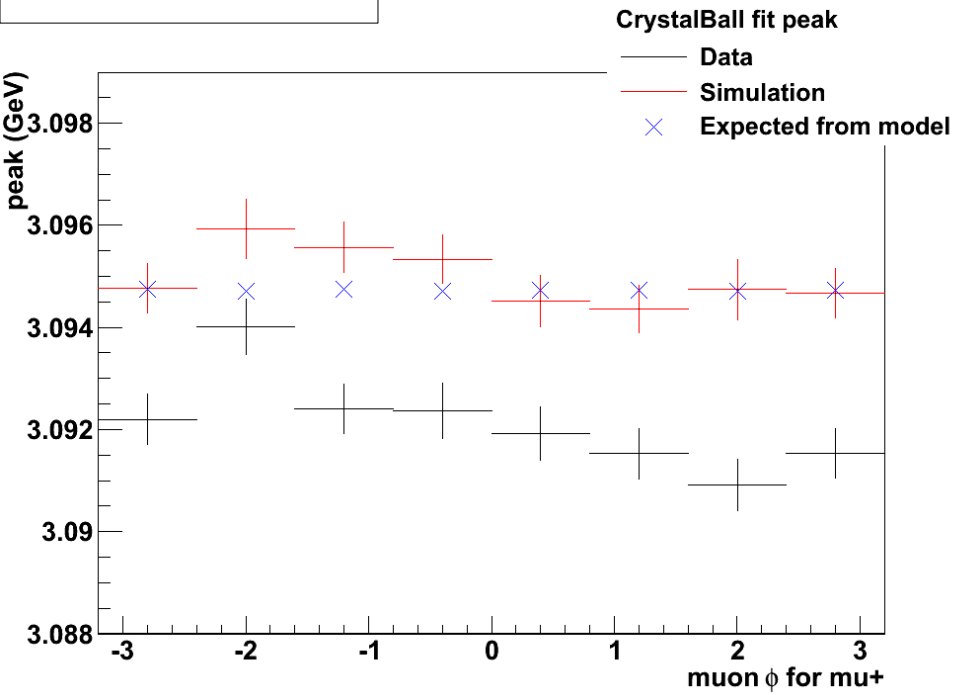
- Compute signed difference between MC-fit and MC-truth:
  - Delta = MC-fit – MC-truth
- Delta > 0 add in quadrature to negative statistical error of fit on data
- Delta < 0 to positive
- For a good estimate of systematic errors redoing the fit on MC with all statistics...

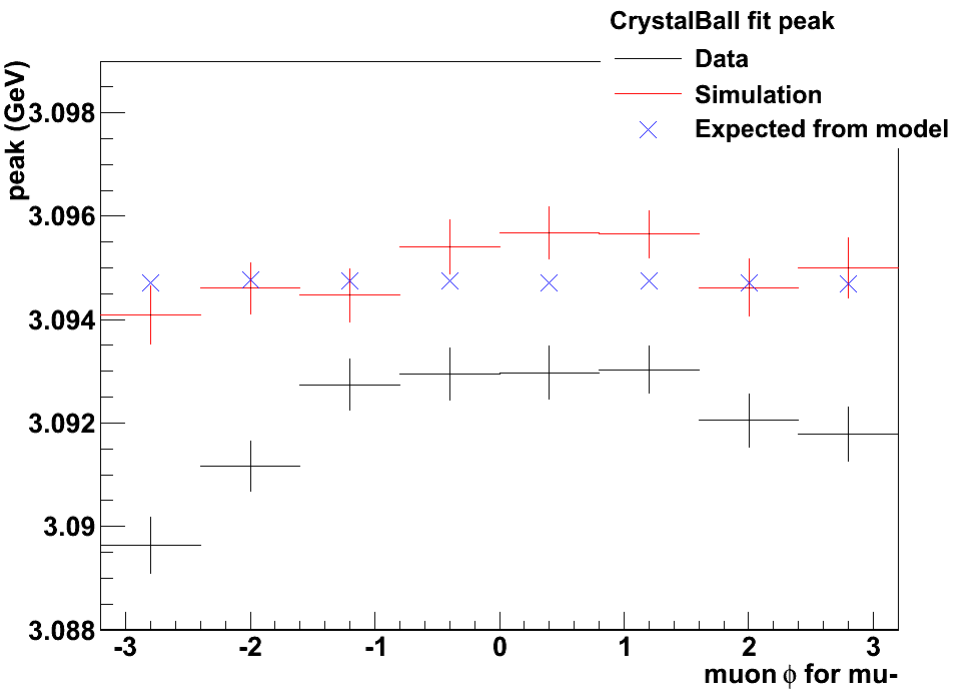
Scale correction fit

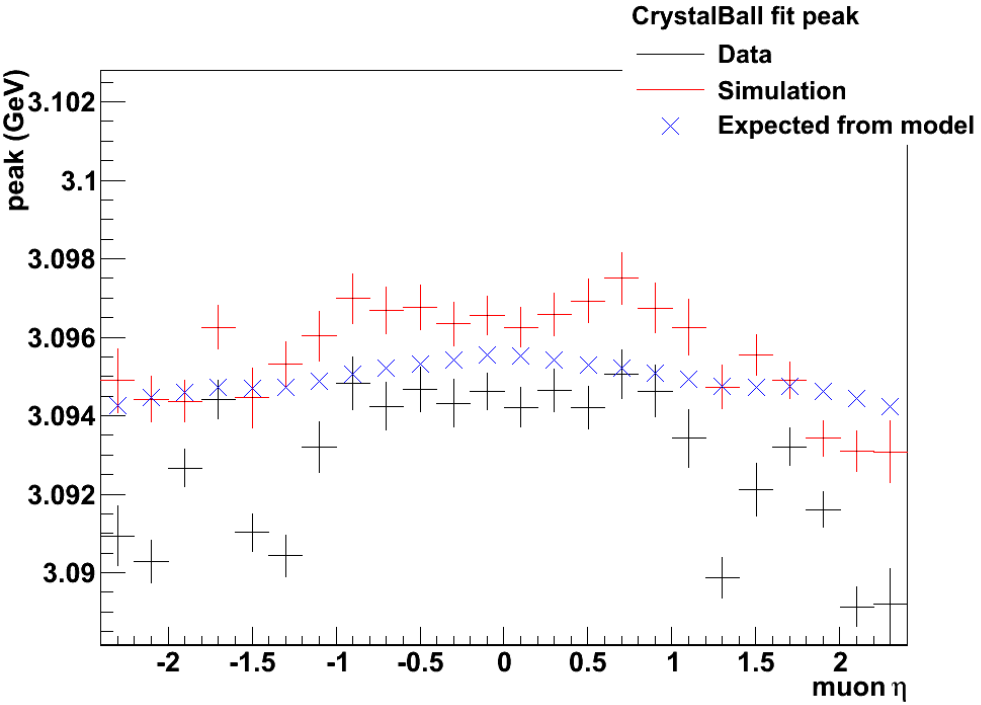
- Same function used in the PAS to correct the startup MC:
  - Eta by points + additional quadratic dependence (this last thing is new)
  - Different sinusoidal shapes for phi+ and phi- and for mu+ and mu-

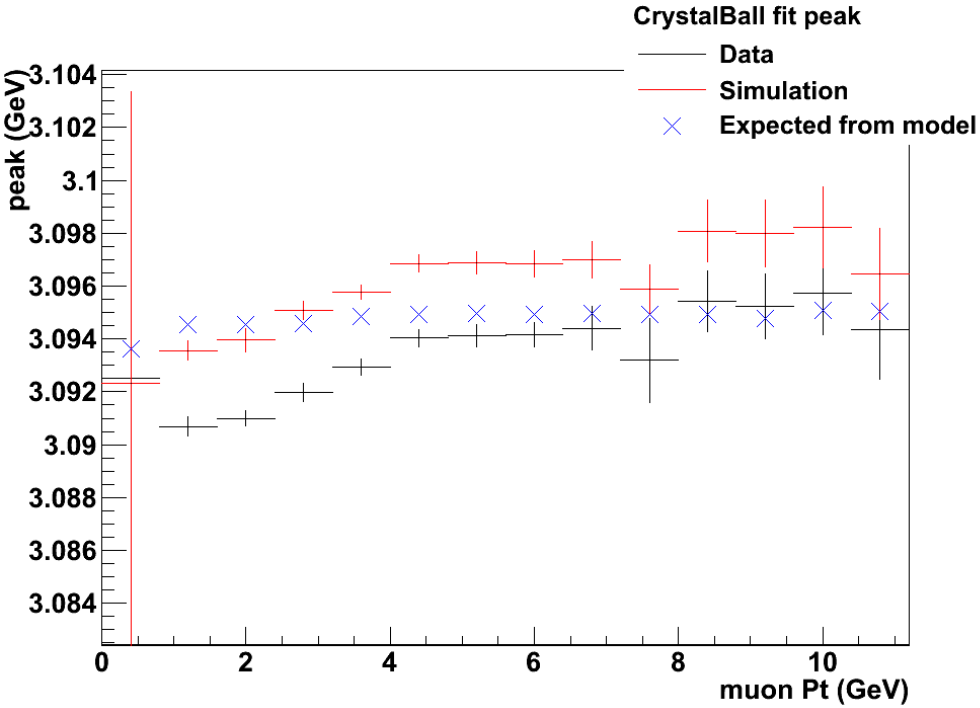
Labels are:
Black: before
Red: after

Results on Data

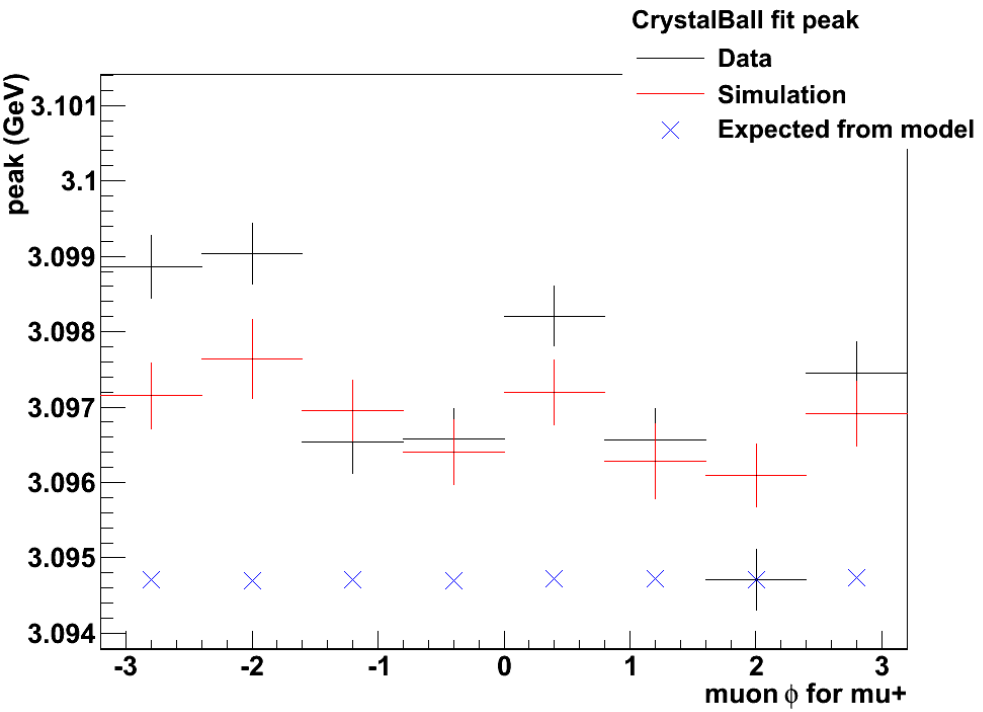




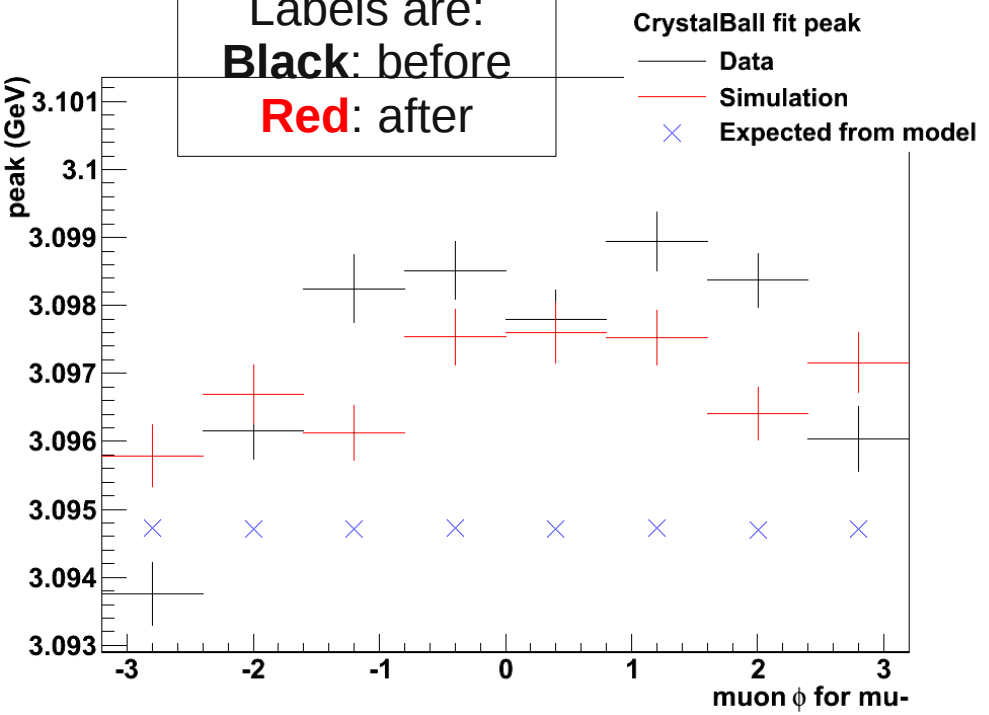


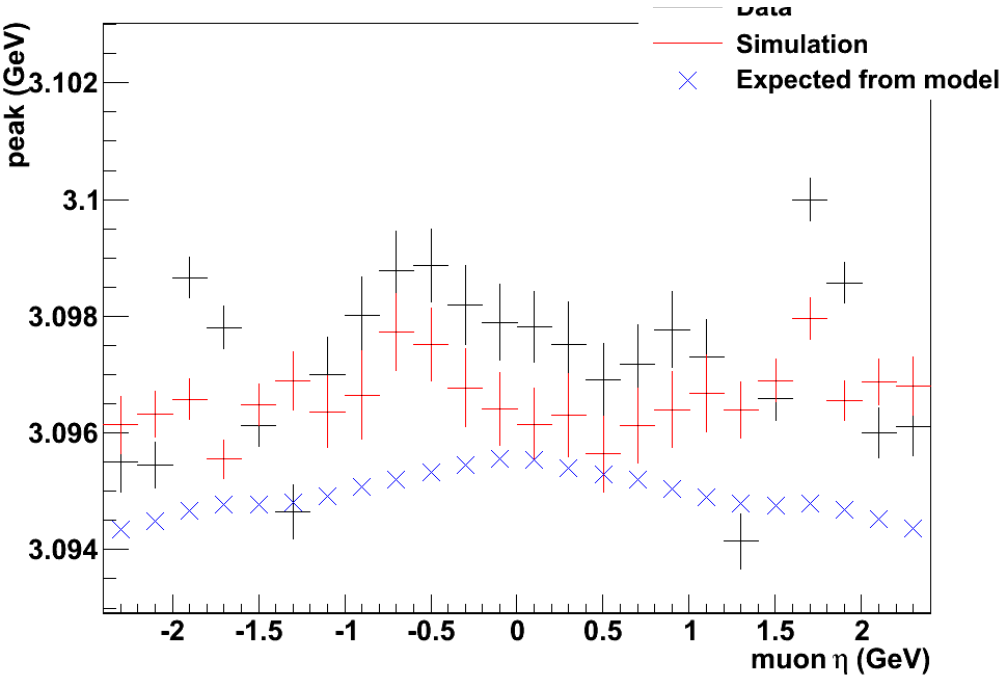


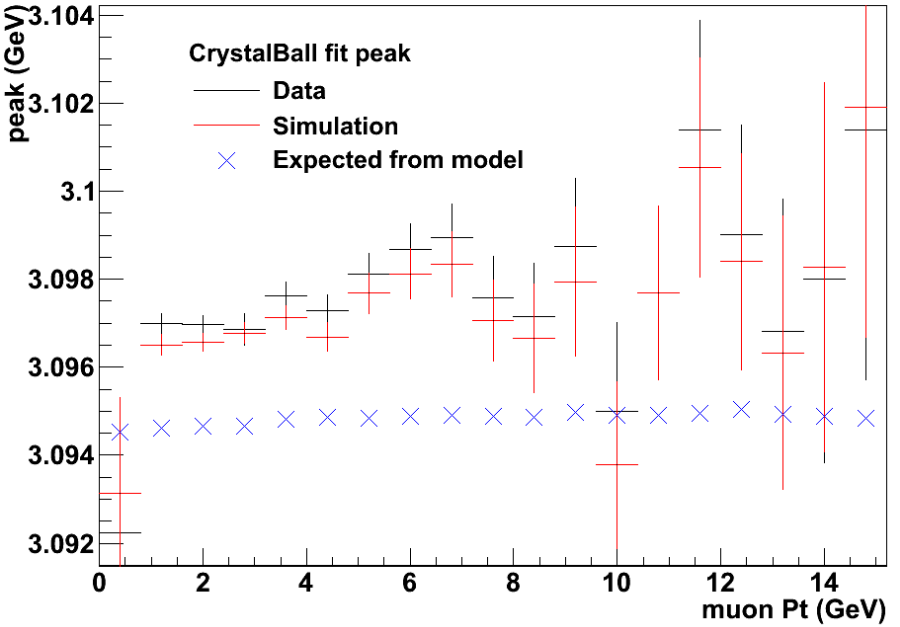
Results on MC (fit biased? No backgrond has an effect?)



Labels are:
Black: before
Red: after







Conclusions

- Results are good on data
- On MC need to understand why the expected value does not match the fit result
  - Absence of background...
  - Maybe the expected position is biased somehow...
  - ...
- After the fit on full MC statistics is done will redo the resolution plot (running now)