



Single Particle Studies

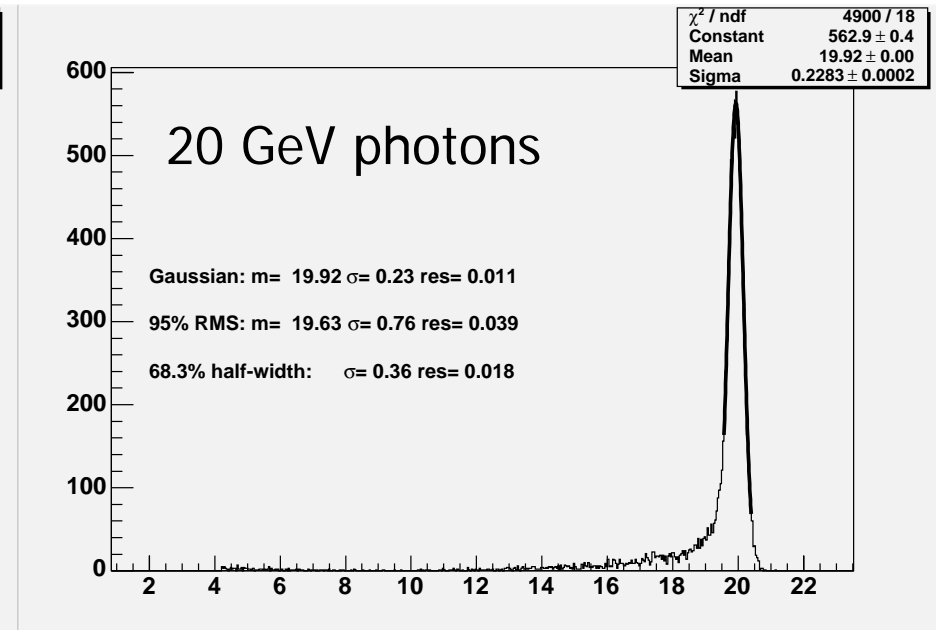
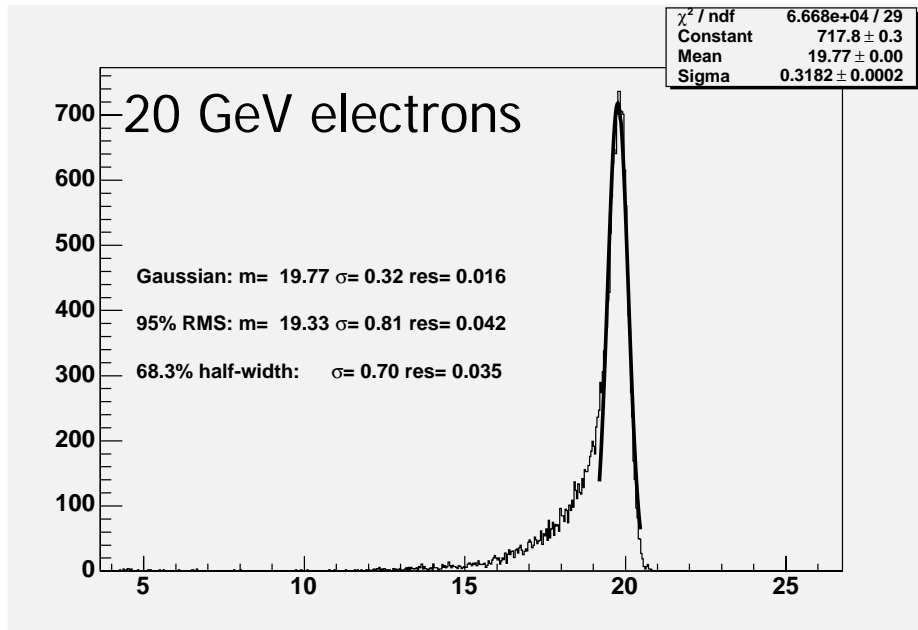
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Introduction

- Still learning the status of reconstruction / code
 - thought I'd reproduce a few studies
- Generated single e^+ , e^- and γ of 10, 20, 40, 80 and 160 GeV, 20,000 events per point
- OSCAR_3_2_2, ORCA_8_2_0
- Look at response and resolution
- Selections
 - Look at barrel EGSC, cut out basket cracks at azimuth: $\pi/18+n \pi/9$ and at eta of 0, 0.44, 0.79 and 1.14 (cut ± 0.01 around cracks)
 - correct for vertex
- Method of dealing with tails (trying to imitate TDR)
 - Fit with a Gaussian. Restrict fit region to $-1.5\sigma + 2.0\sigma$ and refit
 - Widen a symmetrical window from the mean until contain 68%
 - Widen until have 95% and calculate mean and RMS

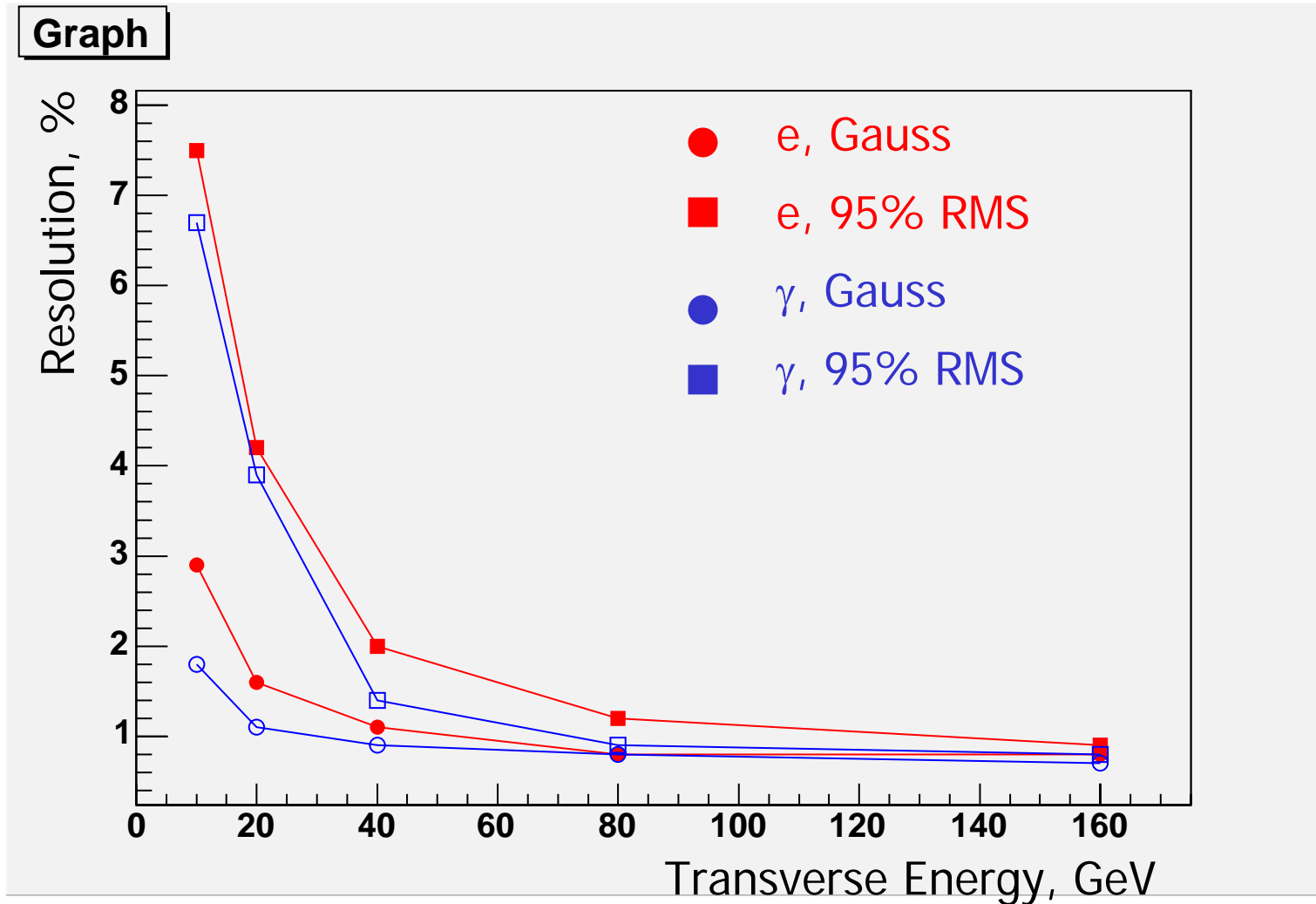
Tails

- Tails are different for electrons and photons
 - as they should be
 - note that peak positions are not exactly at 20



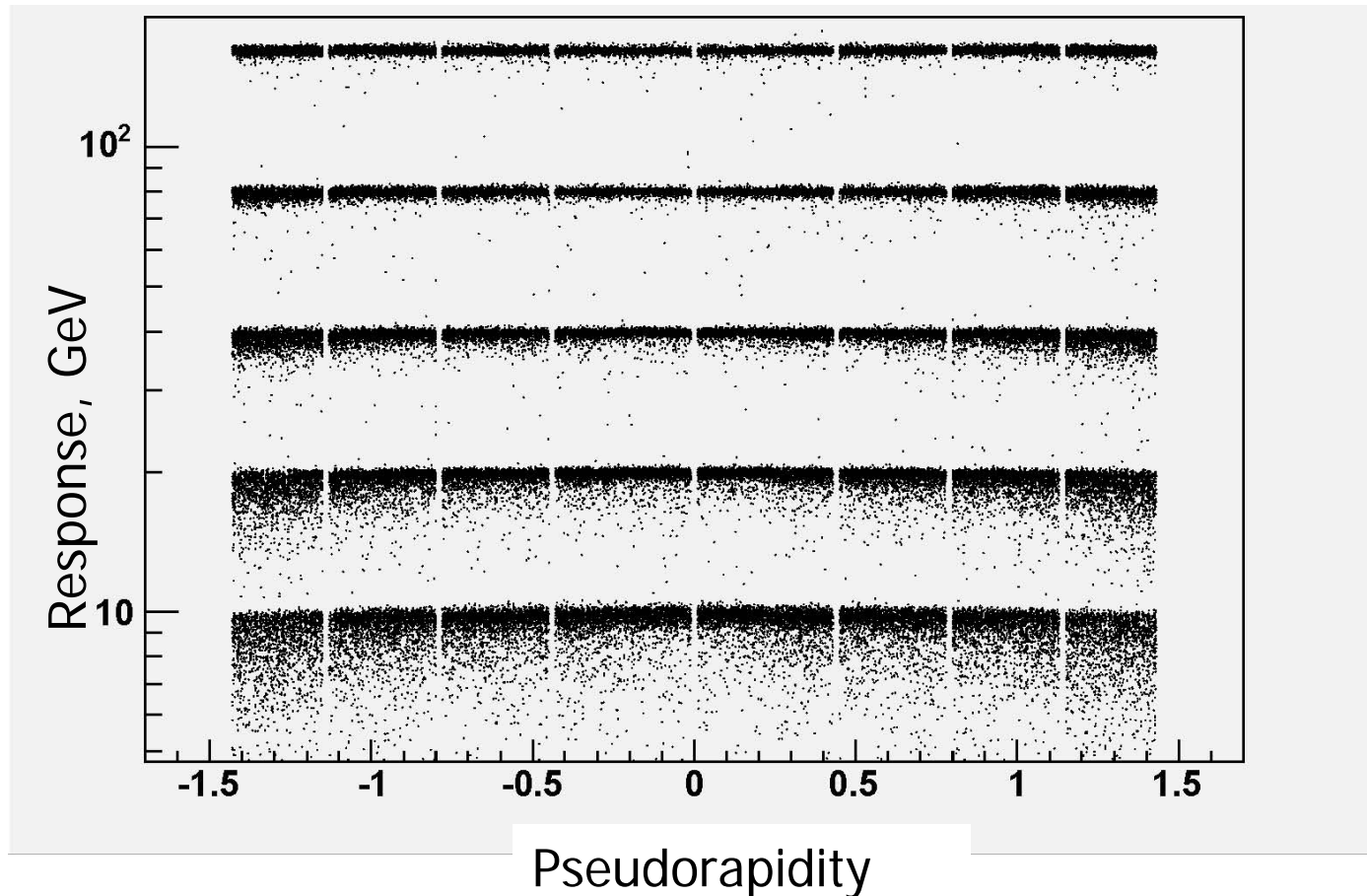
Resolutions

- Consistent with TDR numbers



Rapidity Dependence

- All electron points are plotted in the same graph
- Note (p_T dependent) variation with pseudorapidity
- Make slices in pseudorapidity and fit masses and resolutions

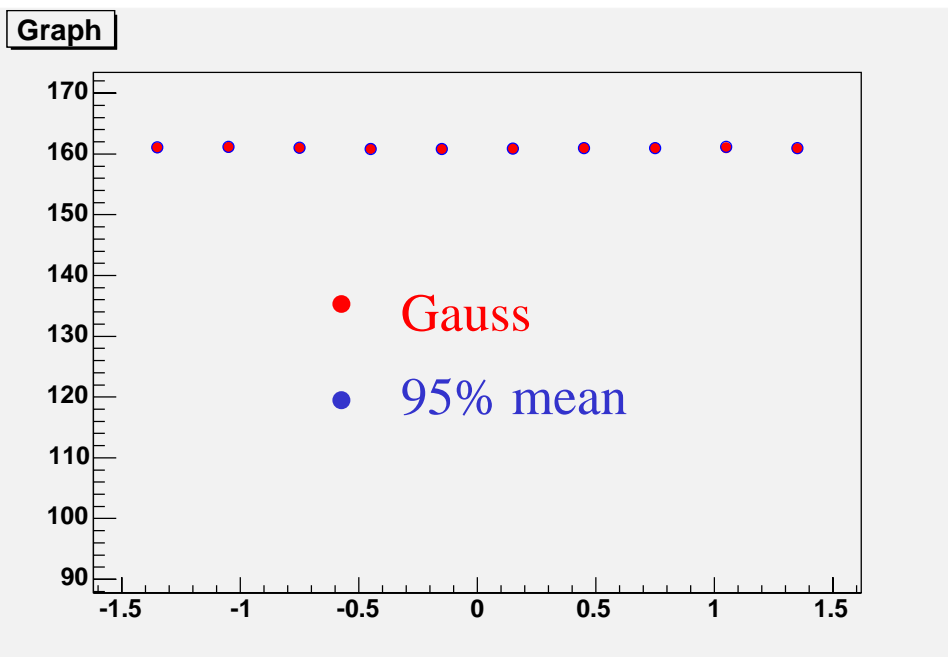


160 GeV Electrons

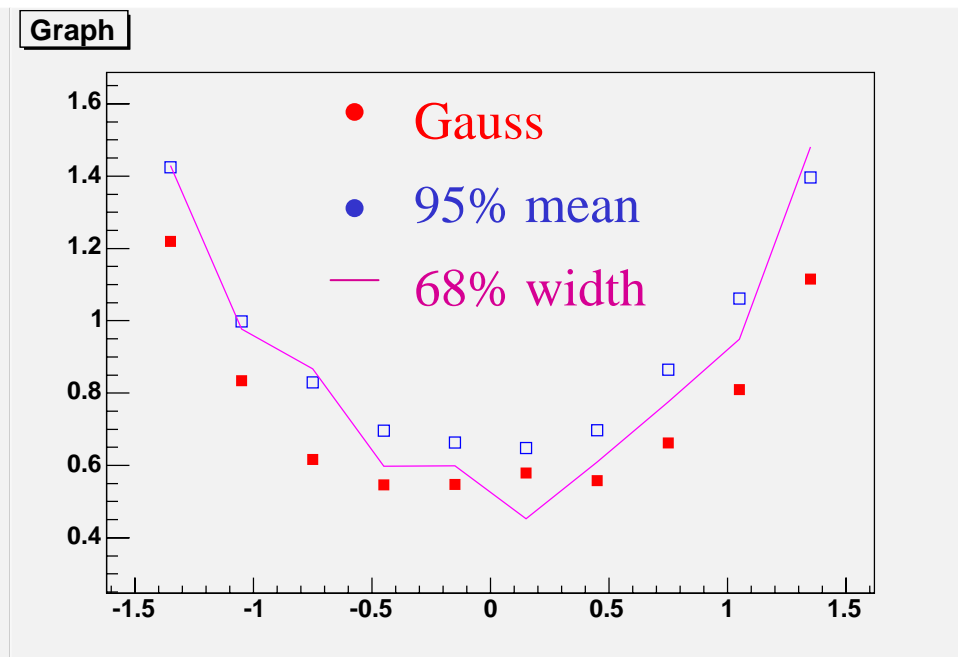


All is peachy:

- no eta dependence and response is almost Gaussian
- Worse resolution at high eta (material?)



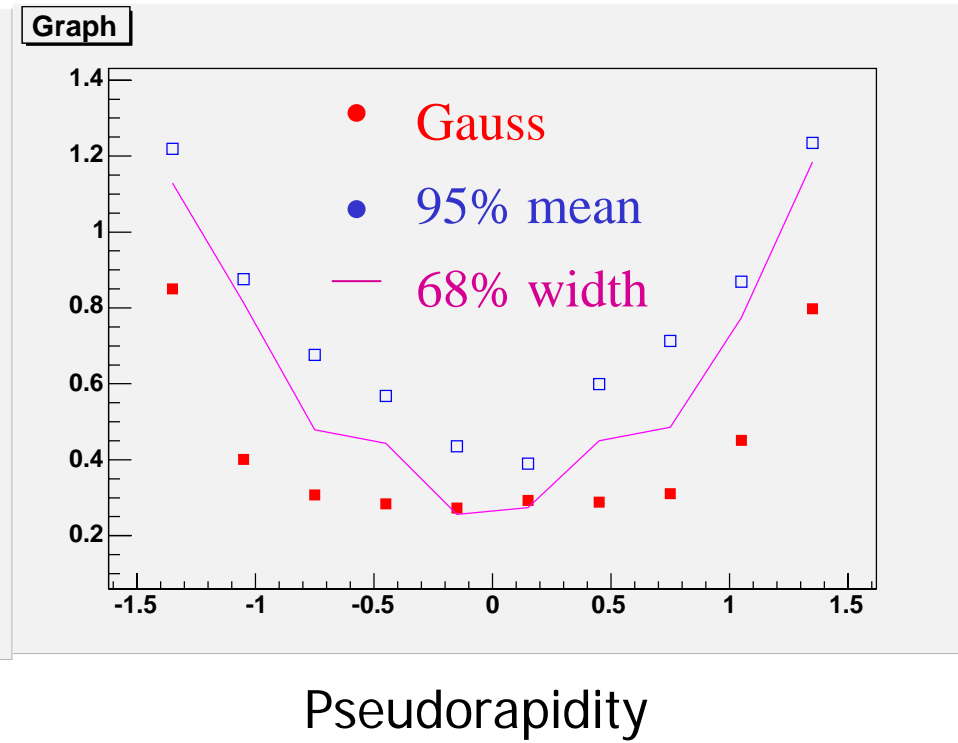
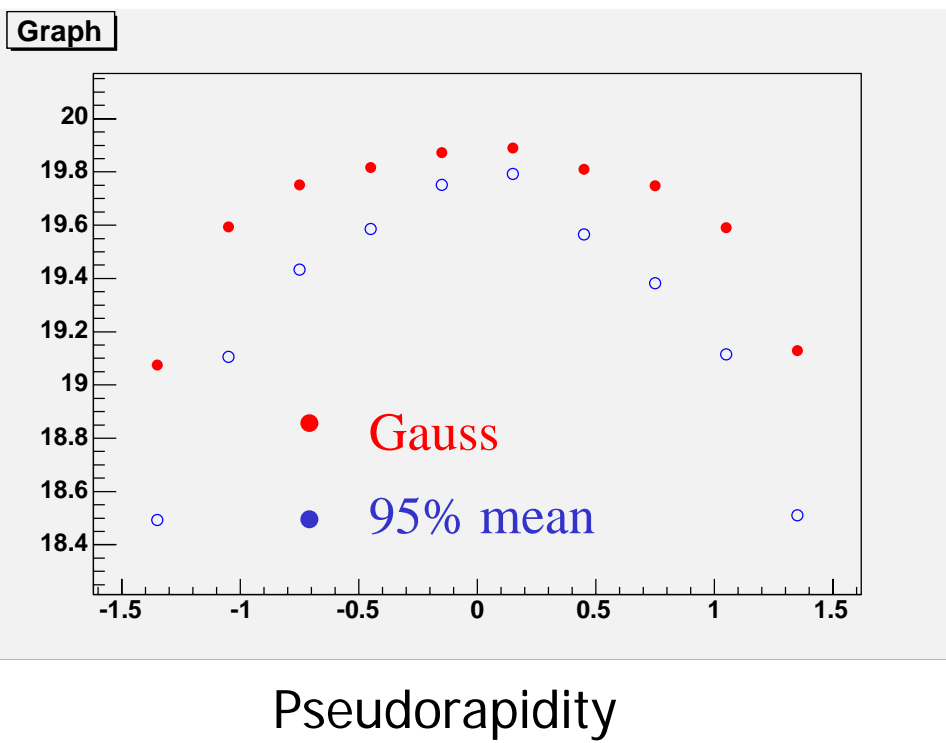
Pseudorapidity



Pseudorapidity

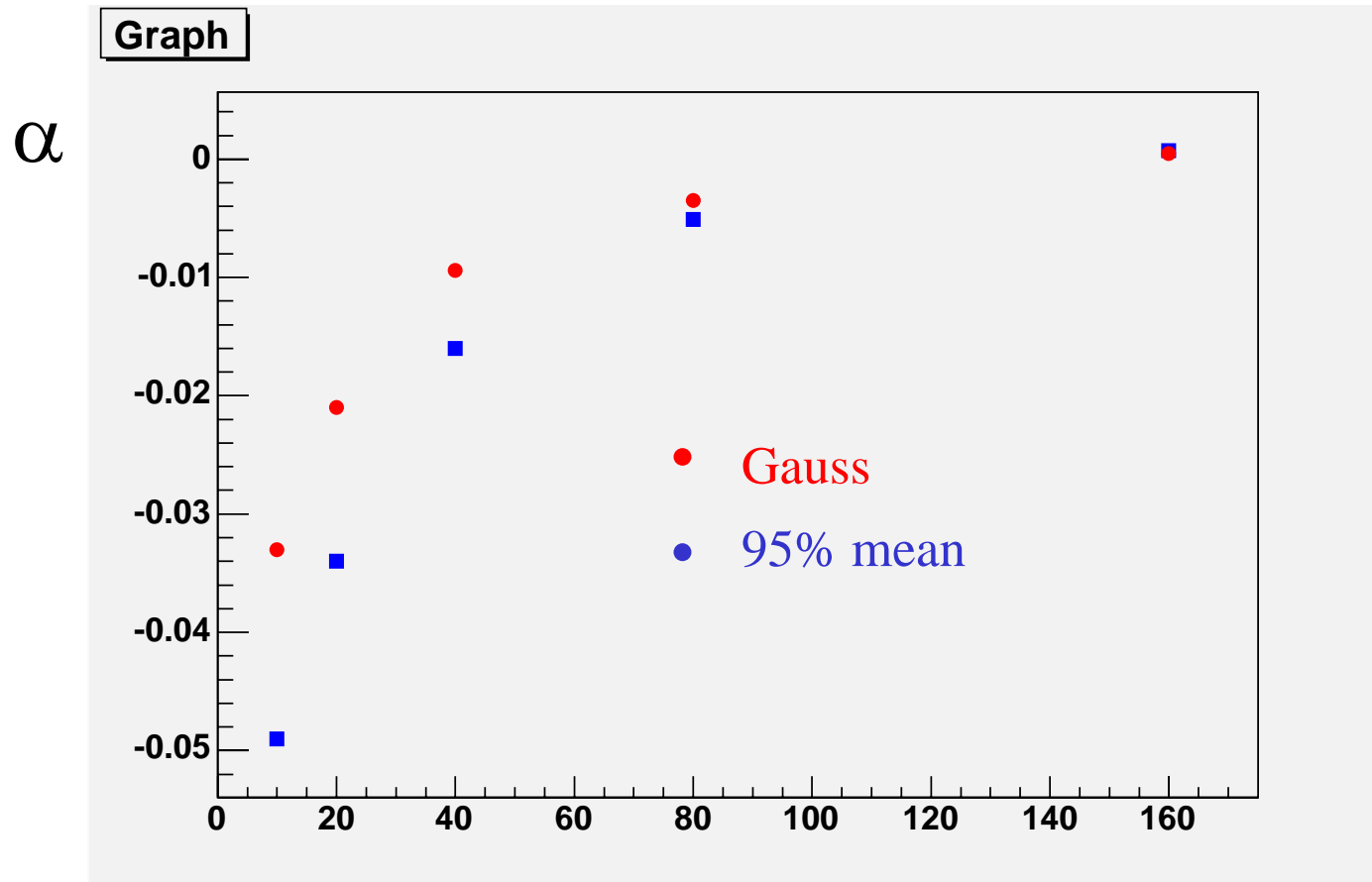
20 GeV Electrons

- About 7% variation with rapidity
- Signals becoming very non-Gaussian
- 95% mean shows more variation - i.e. response has larger tail at higher rapidity (material?)



E_T Dependence

- Fit response v.s. eta to parabola $f(\eta)=M\cdot(1+\alpha\cdot\eta^2)$
- Very substantial effect...



Summary

- Learning to make meaningful plots
- See p_T dependent variations of response v.s. pseudorapidity
 - what is it?
- Trying to write documentation which ties Ntuple variables and to the code which produces them and to algorithms that are described in technical notes
 - <http://www-d0.fnal.gov/~gerstein/cms/eghelp.txt>
 - please point out errors and make comments!