Di-Jet Errors

- Di-jet errors have to stay constant when calculating a gradient to leave the scale invariant
- Errors should be calculated on the real and not the measured values
- Now errors are updated every iteration step

<u>To Do:</u>

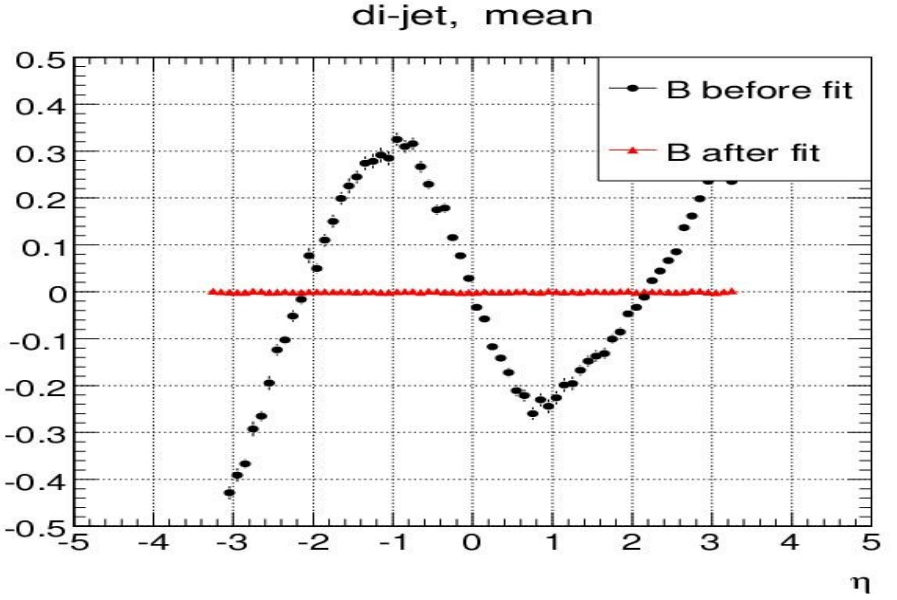
- For more than 2 Jets the scale is not correct, yet. It should be the scalar sum of all pt projected on the main axis (or easier the axis of the leading jet)

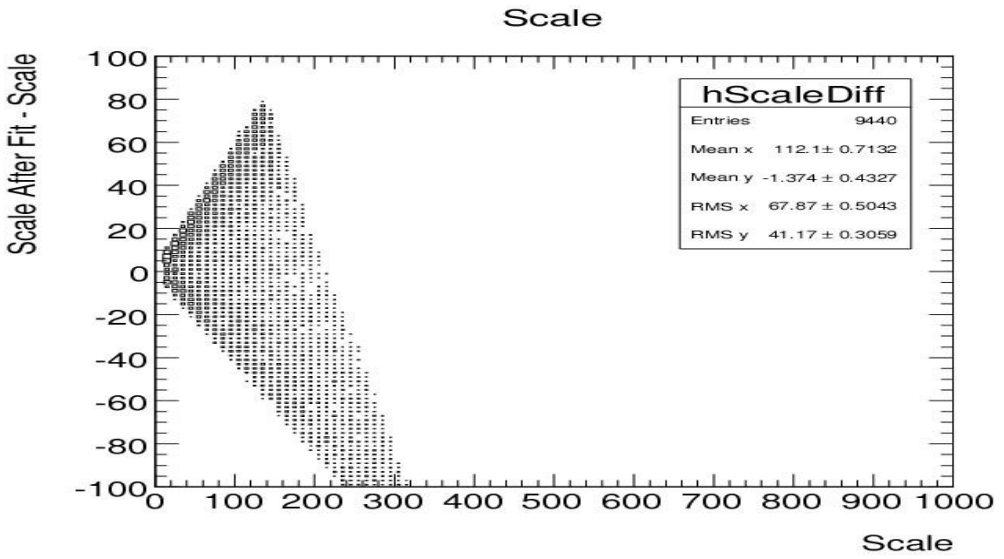
MC studies (1)

Fit can flatten a sin(eta) dependent response without changing the scale when leaving EMF and Pi0 fraction at zero

Tower Constant = 1.5

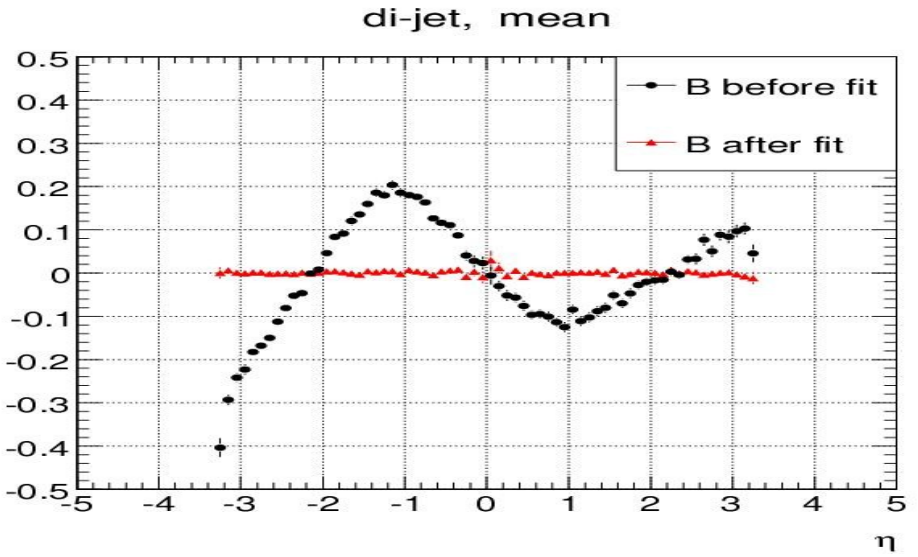
Eta of probe jet

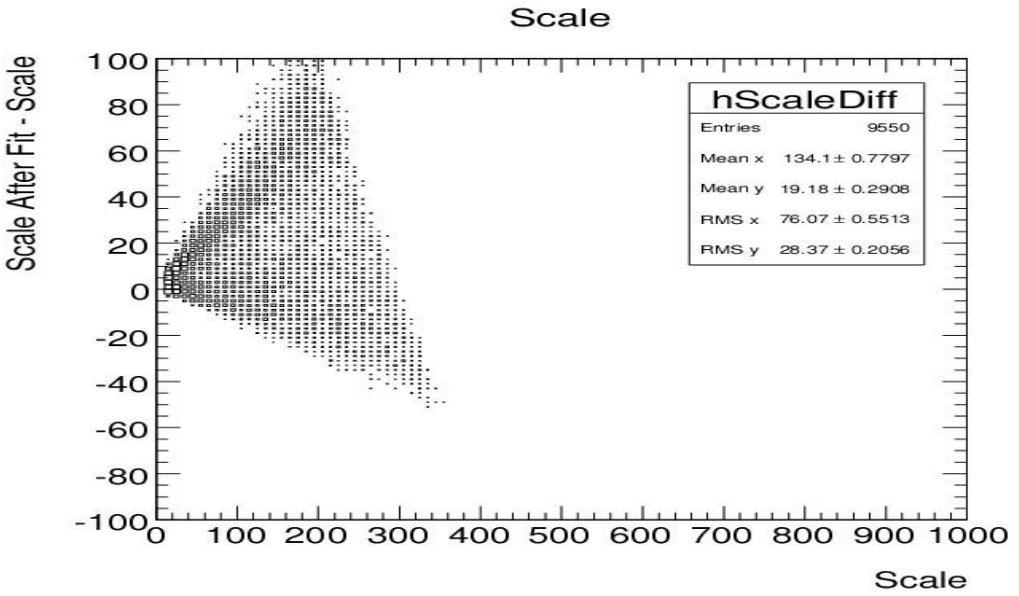




MC studies (2)

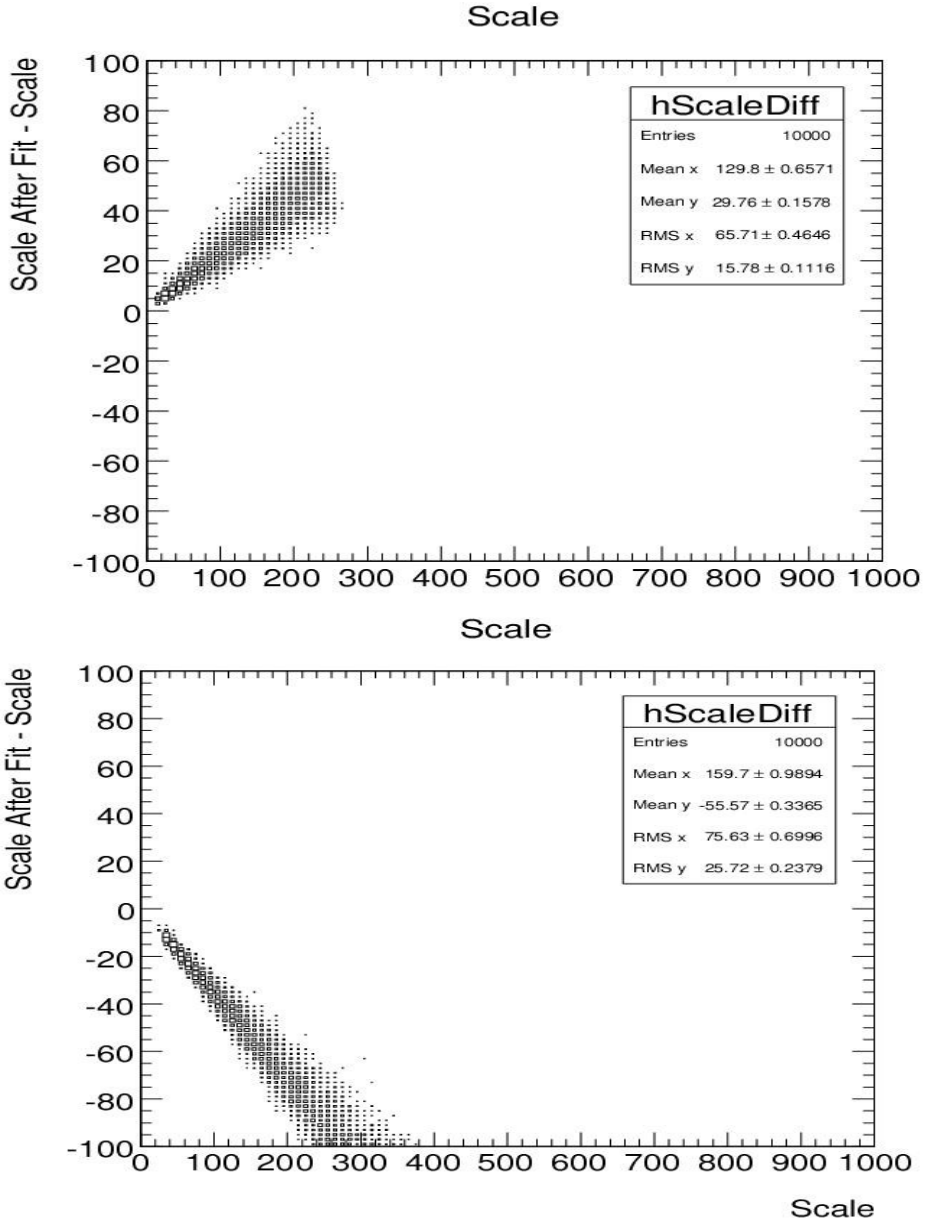
With all smearings and with random EMF and Pi0 fraction the response can still be flattened, but the scale does change





MC studies (3)

This shift of scale goes always in the right direction as it comes from a balancing of jets with two different EMF fractions. In the way the MC is made a EMF = 1 jet would correspond to a true information (same as Gamma). The upper plot shows a Tower Constant = 1.5 the lower plot TC = 0.5



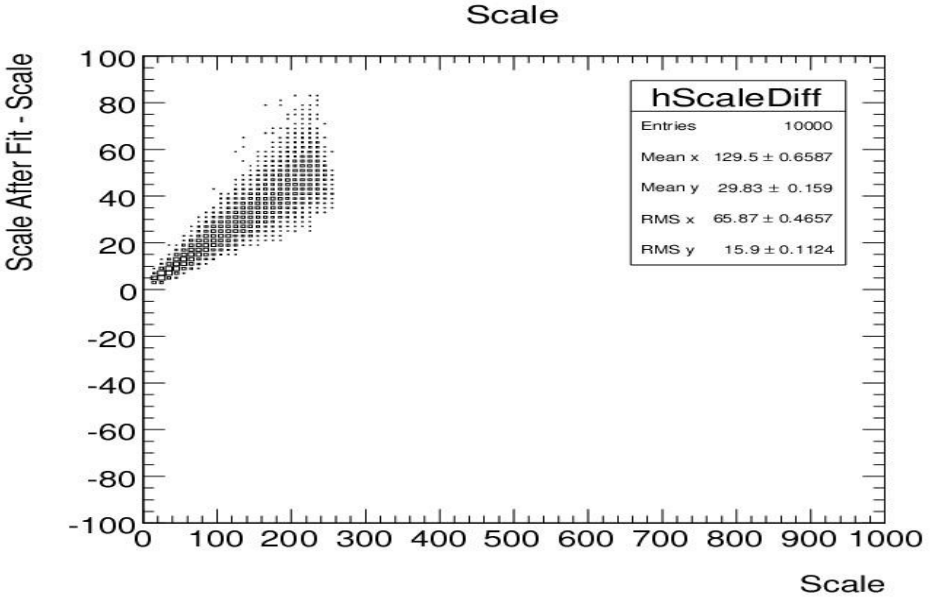
MC studies (4)

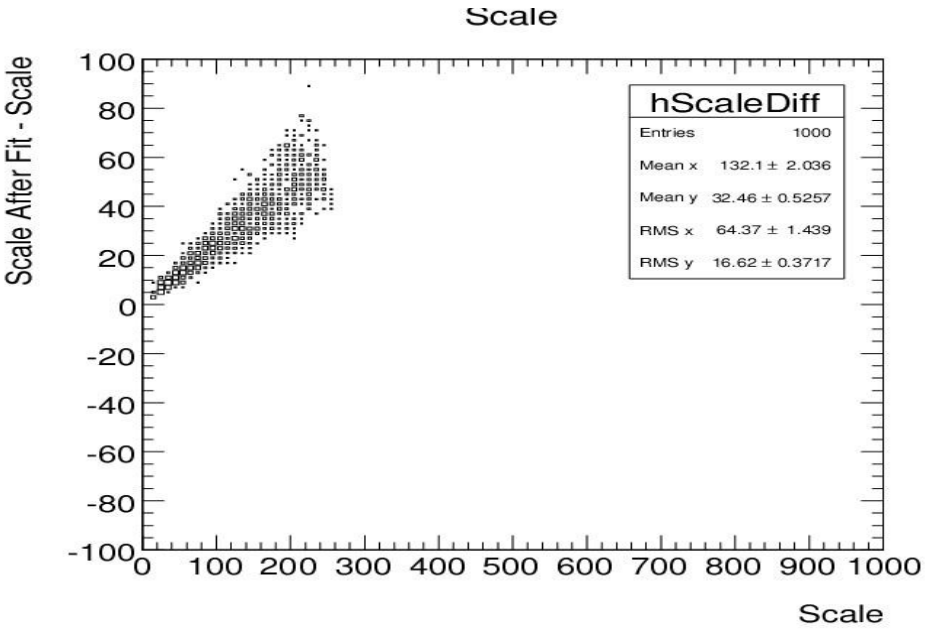
Therefore this effect does not give a bias in scale.

The plots show the scale plots for a combined fit.

The upper plot has 100x more Di-jets, the lower plot 10x more Gamma-jets.

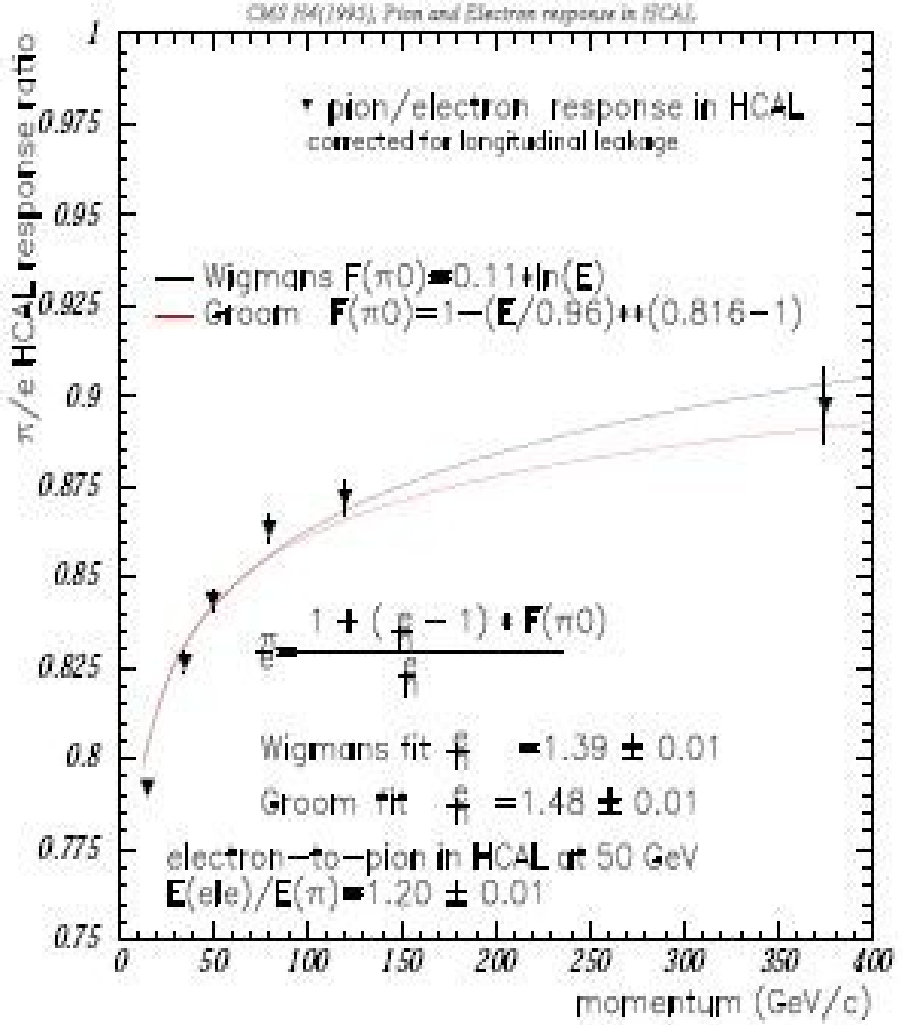
TC = 1.5





Physical Parametrization

One major effect affecting resolution and scale of the calorimeter is the lack of compensation (e/h = 1.4; 5 for HF). All work and test beam results are for single pions.



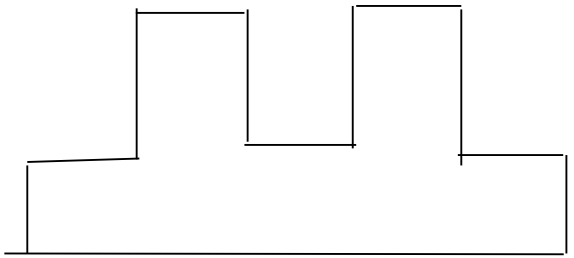
Usage of Tracks

- To make use of such work and get closer to a physical approach, more information – namely tracks – is needed
- The HCAL has by design a poor resolution, whereas the tracker gives much more detailed information
- All discoveries will probably use jets with as many information as possible (JPT & PFLOW). It is therefore good to start thinking in this direction, too.
- Using tracks or even more information would lead us away from a pure calorimeter calibration and would impose some further difficulties

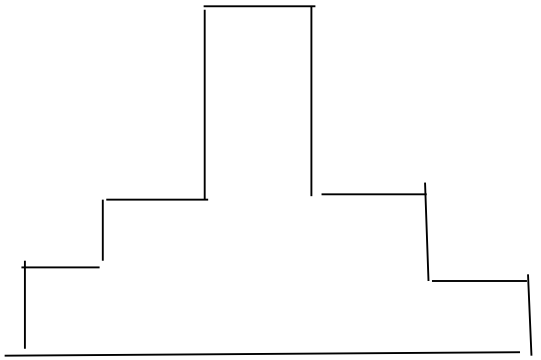
Bias in Toy StepEnergy? (1)

- When using a step function in energy for toyMC, small towers have a TC > 1 and high energetic towers have a TC < 1.
- The effect is 10% when smearing the towers gaussian with a sigma of 130% and 1% with a sigma of 50%
- All corrections are applied to measured quantities
- Effects should always be studied on basis of the real value
- There is always a cutoff in calibration when negative jets are not considered

Bias in Toy StepEnergy? (2)



Leading tower smeared heavily down



Leading tower smeared heavily up

Measured small towers have a higher probability to come from a jet, which is in total smeared downwards as there is a cutoff at zero energy. When there is a upper Pt cutoff as in the toyMC, the opposite holds true for high towers