

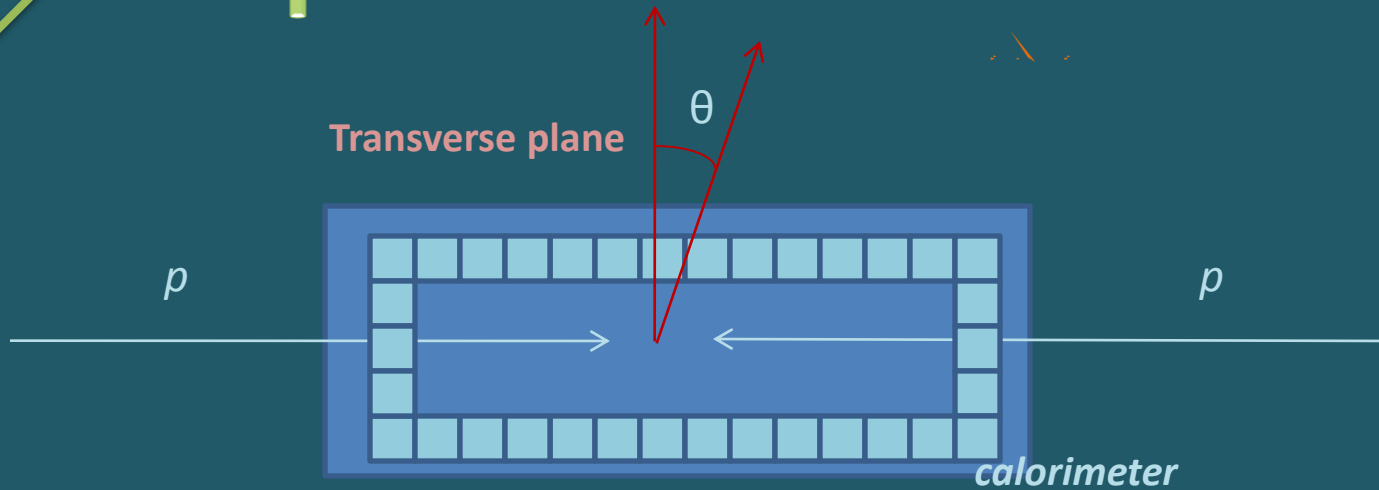
UNDERSTANDING MET IN THE FIRST ATLAS DATA



<http://atlas.ch>

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~~E_T~~ fake





- $\sqrt{s} = 7 \text{ TeV}$ – luminosity = 300 nb^{-1}
- trigger on a jet (energy 5 GeV) L1_J5 trigger
- at least one primary vertex (number of tracks > 4)
- cleaning cuts
 - remove noise bursts in forward calorimeter
 - remove poor quality electromagnetic jets
 - remove out of time jets (cosmic rays)

- **Jet Selection**

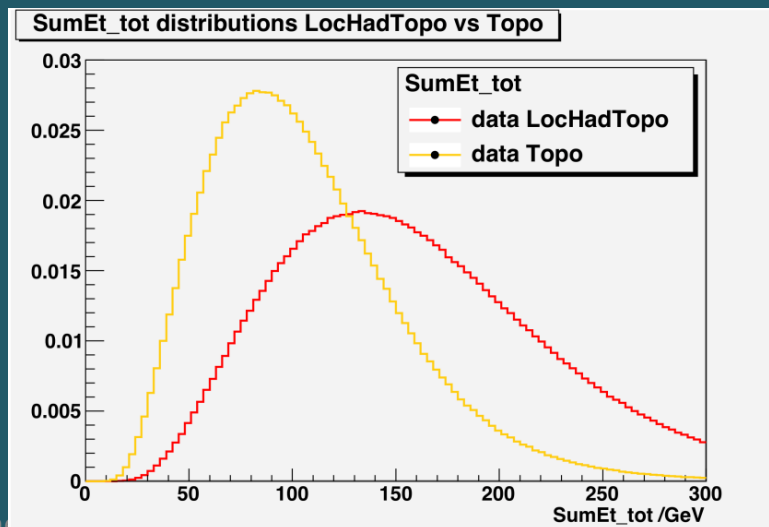
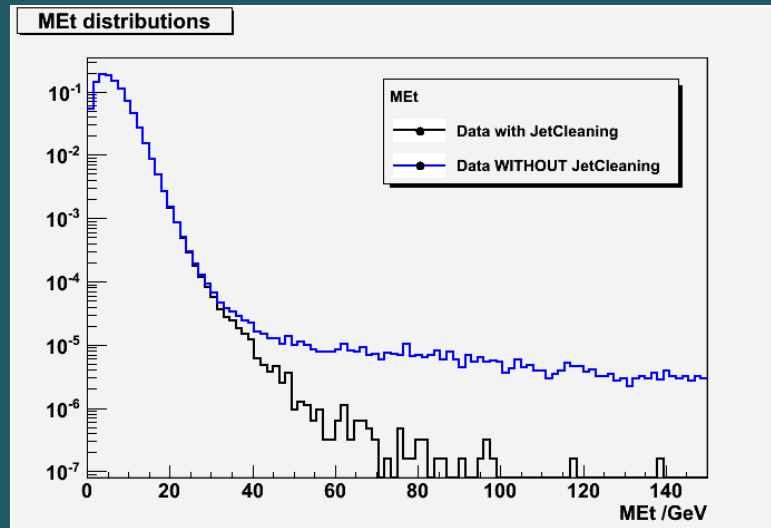
kinematic cuts : $p_T > 20 \text{ GeV}$

- **MET** selection

MET_Topo
(EM calibration)

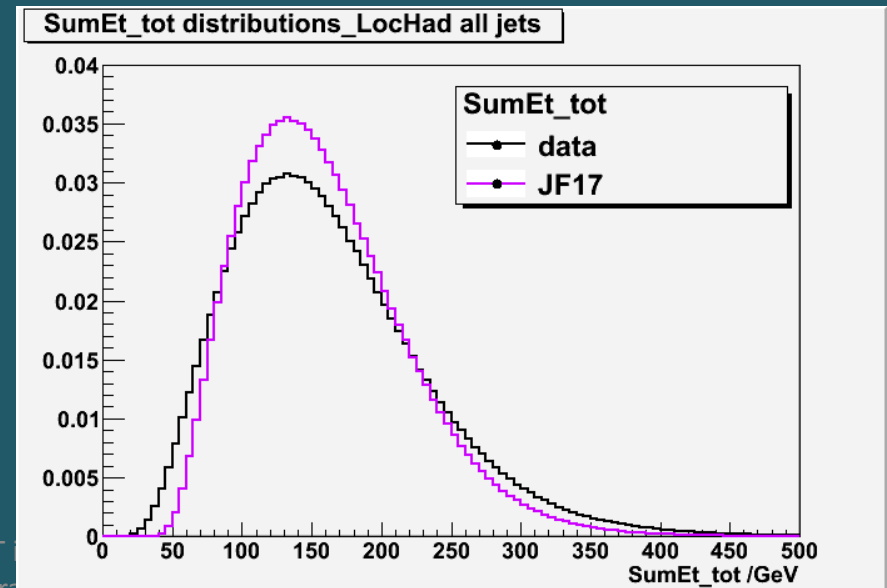
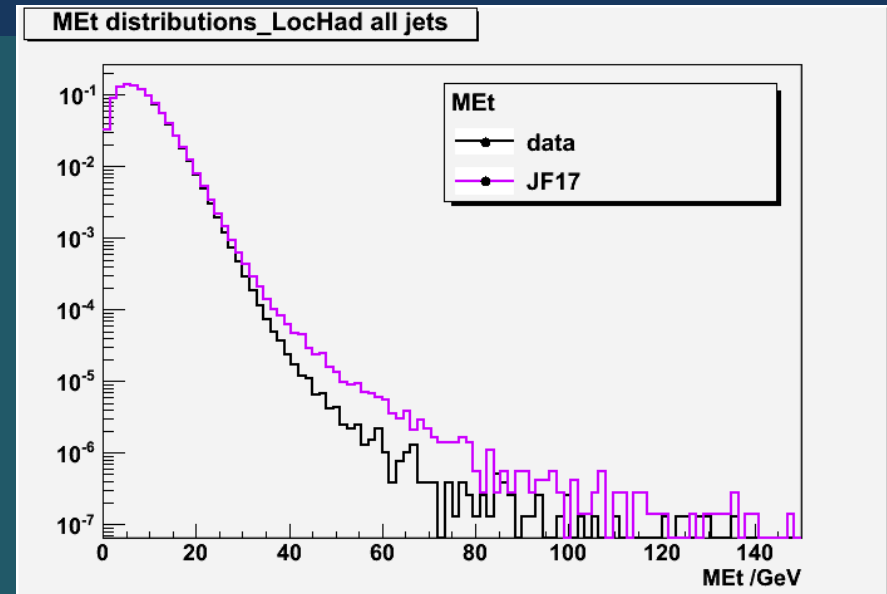
vs

MET_LocHadTopo
(hadronic calibration)



- JF17 (inclusive QCD simulation with jet filter)
- JF17_PILEUP (account for more than one interaction at one time)

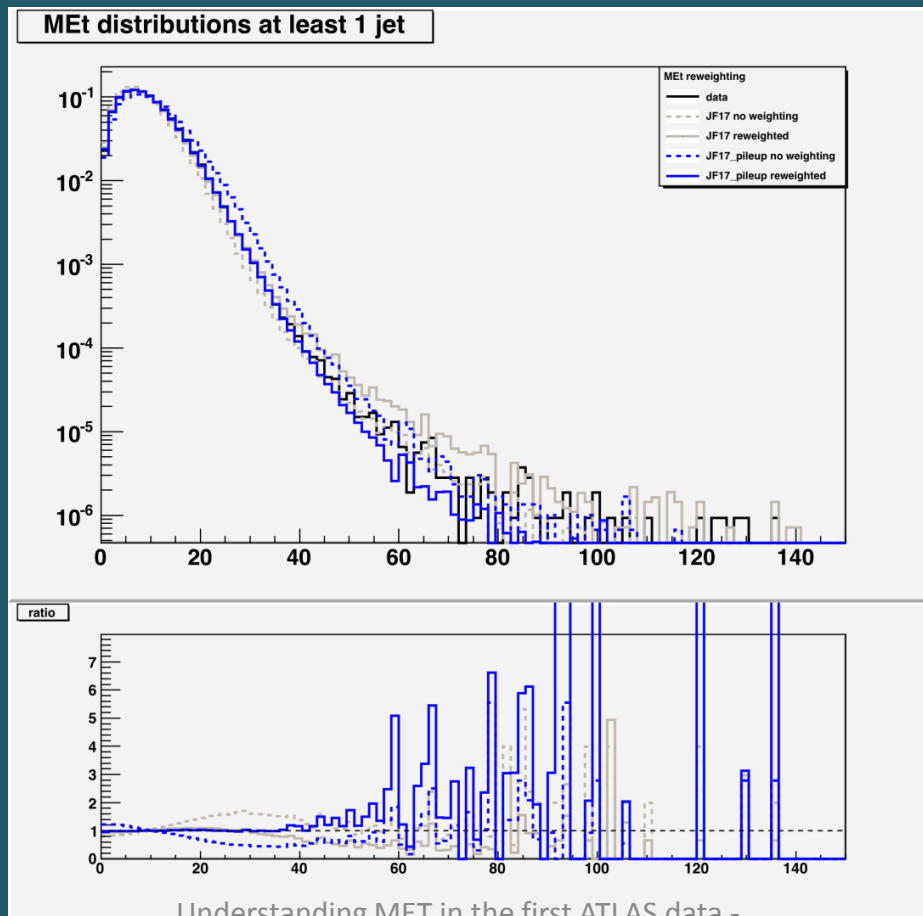
in agreement
between data and
Monte Carlo





weighting for MET_MC = (SumEt_DATA) / (SumEt_MC)

improvement JF17_pileup → PILEUP EFFECT

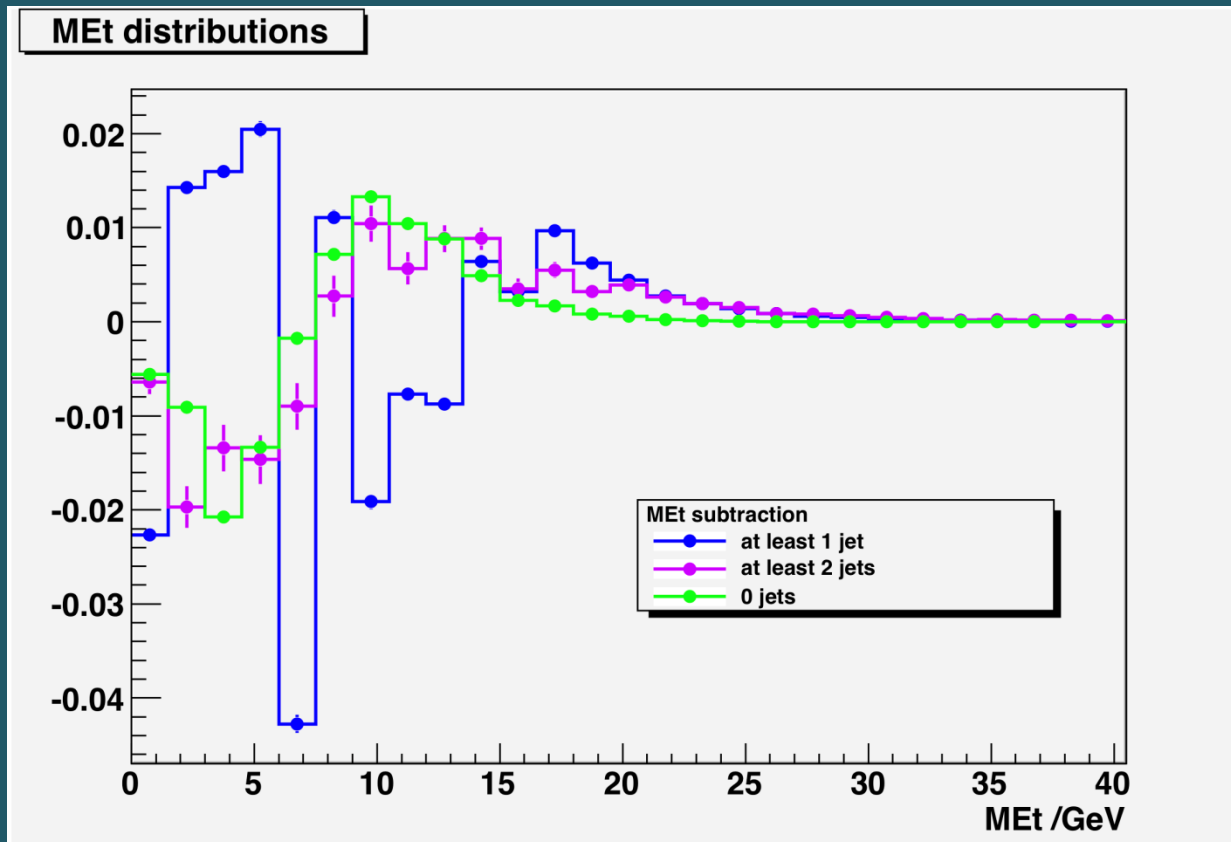


Understanding MET in the first ATLAS data -

SSP 2010 Tamara Vázquez Schröder

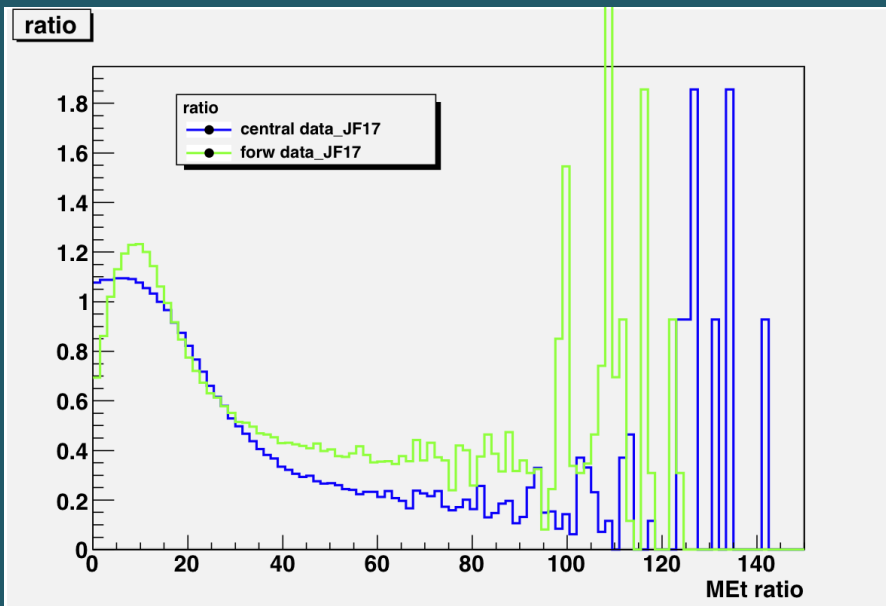
is the problem worse in events containing jets?

subtraction: $\text{data} - \text{MC}$



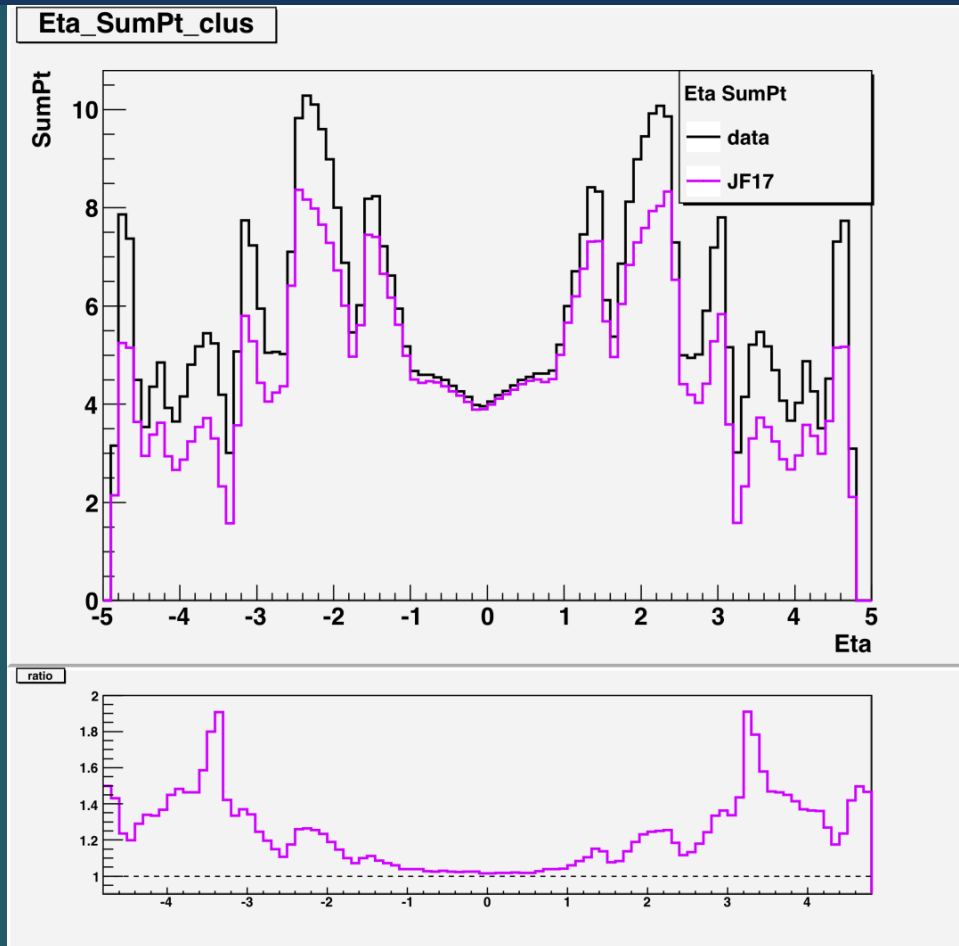
worst case scenario: at least 1 jet (mismeasured the other jet -> detector effect)
0 jets and at least 2 jets: underlying events (physics problem)

$\frac{dN}{d\eta d\eta' d\ln s} \sim \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{(\eta - \eta')^2}{2\sigma^2}\right)$



$|\eta| < 3.2$: central

$|\eta| > 3.2$: forward



Underlying events particularly bad modelled
in forward regions

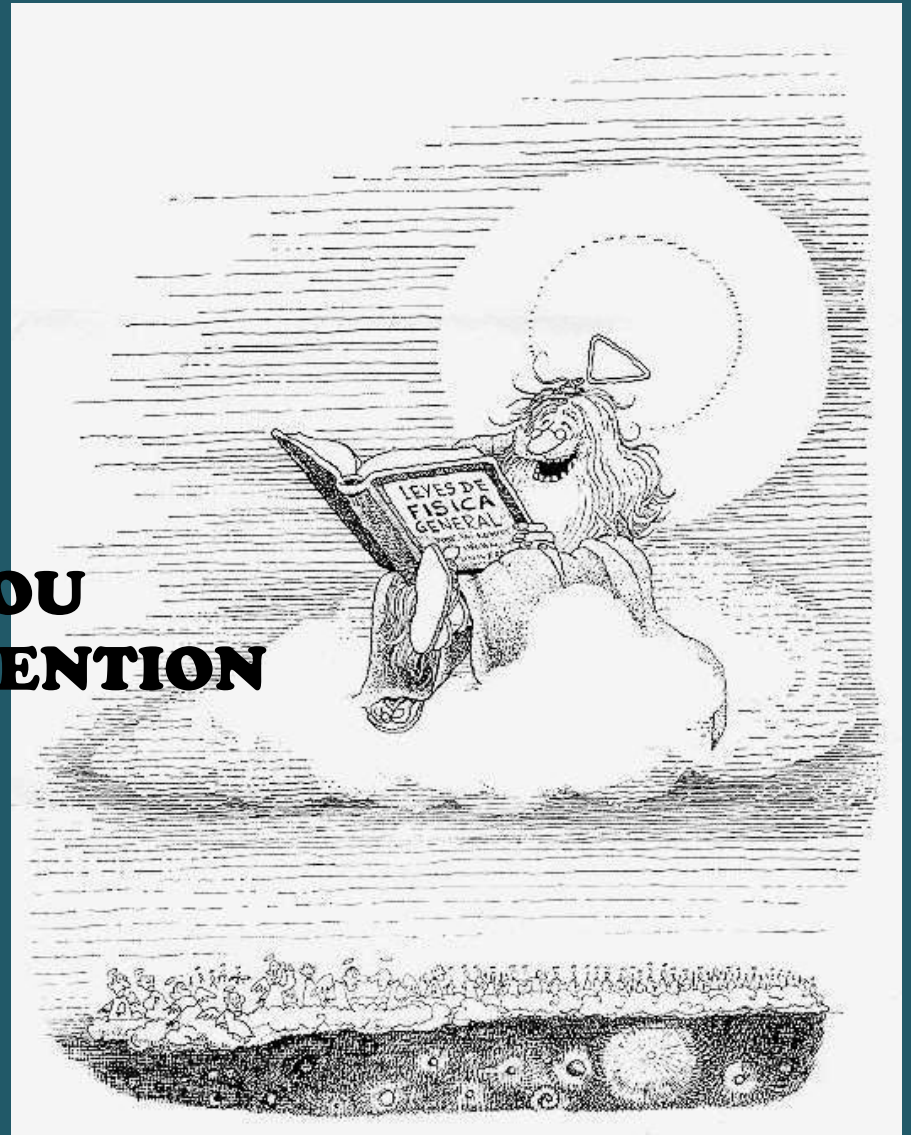


- ❖ The Monte Carlo simulation is found to describe the data well, but there is still a disagreement: Problem in SumEt and MET
- ❖ SumEt and MET are correlated (specially when we include pileup in simulation)
- ❖ At least 1 jet: detector effect not well modelled in MC
- ❖ Same level of disagreement in 0 jets and at least 2 jets: underlying events
- ❖ Underlying events particularly bad modelled in forward regions

NEXT STEPS

- ❖ Look at different underlying events (UE) tunes
- ❖ What is going wrong when we ask for 1 jet?

**THANK YOU
FOR YOUR ATTENTION**



(*Leyes de Física General=General Physics Laws)

QUINO