

L1 Jet Energy Corrections

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Motivation and Method

- ◎ To compensate for various losses (p_T , η) when recording jet properties in the trigger, and ensure its performance is uniform across the detector
- ◎ Done by matching reference jets (GenJets) to L1 jets
- ◎ Use sample in particular pileup (PU) range, bin in $|\eta^{L1}|$, then plot graphs of $1/\text{response}$ against $\langle p_T^{L1} \rangle$, with $\text{response} = p_T^{L1}/p_T^{\text{ref.}}$
- ◎ Fit a function to each curve which becomes a “correction curve”
- ◎ Export the calibrations as LUTs
- ◎ Perform closure test to check calibrations

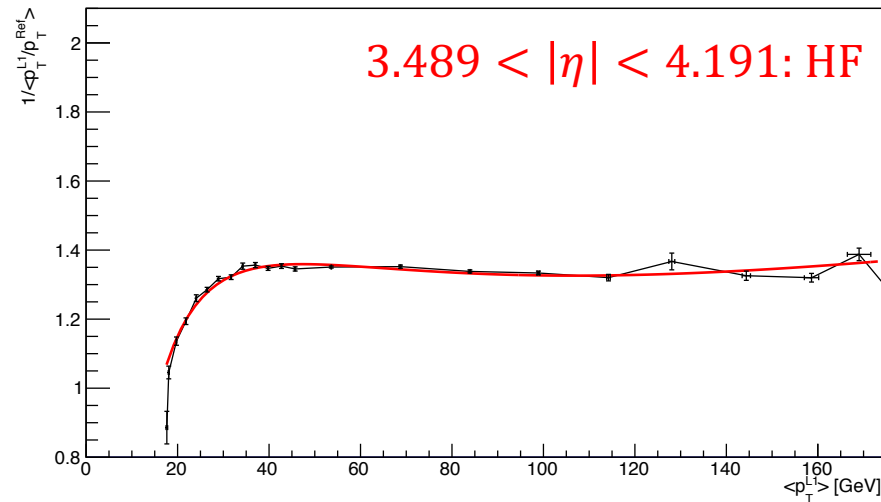
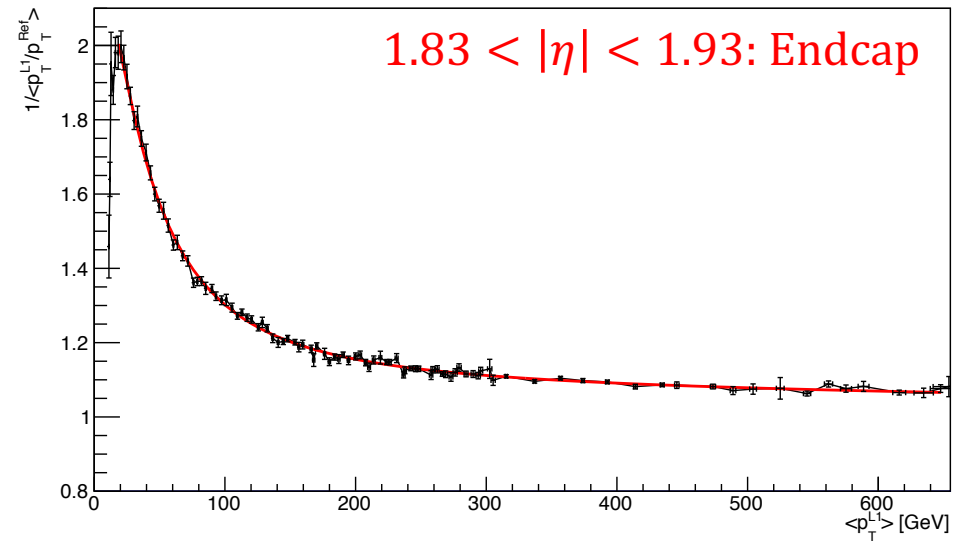
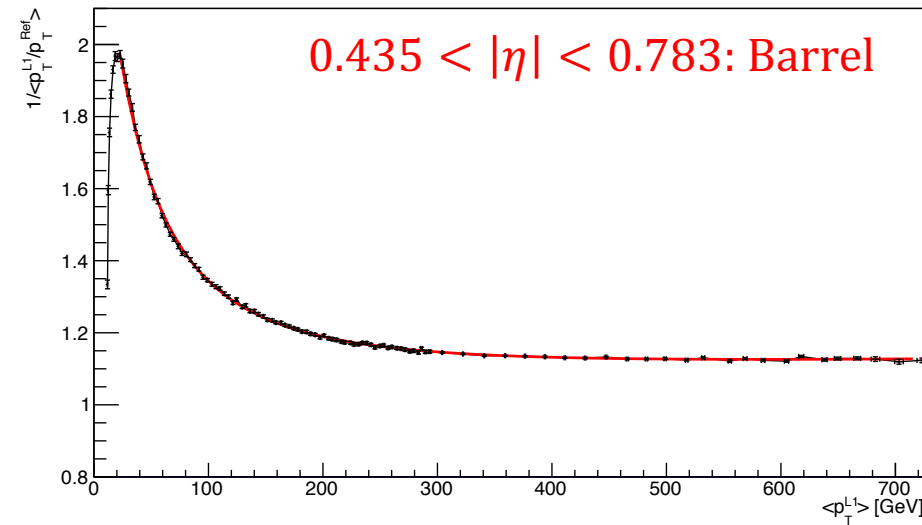
Software and datasets

- ◎ CMSSW version – 9.2.8
- ◎ Integration tag – 11t-integration-v96.49
- ◎ Dataset – /QCD_Pt-15to3000_TuneCUETP8M1_Flat_13TeV_pythia8/RunIISummer17DRStdMix-NZSFlatPU28to62_92X_upgrade2017_realistic_v10-v1/GEN-SIM-RAW
- ◎ Layer-1 corrections in params file – L1Trigger/L1TCalorimeter/python/calostage2Params_2017_v1_10_mode_inconsistent_cfi.py

Currently also testing with “mean” to determine differences

Correction curves

PU 50-60

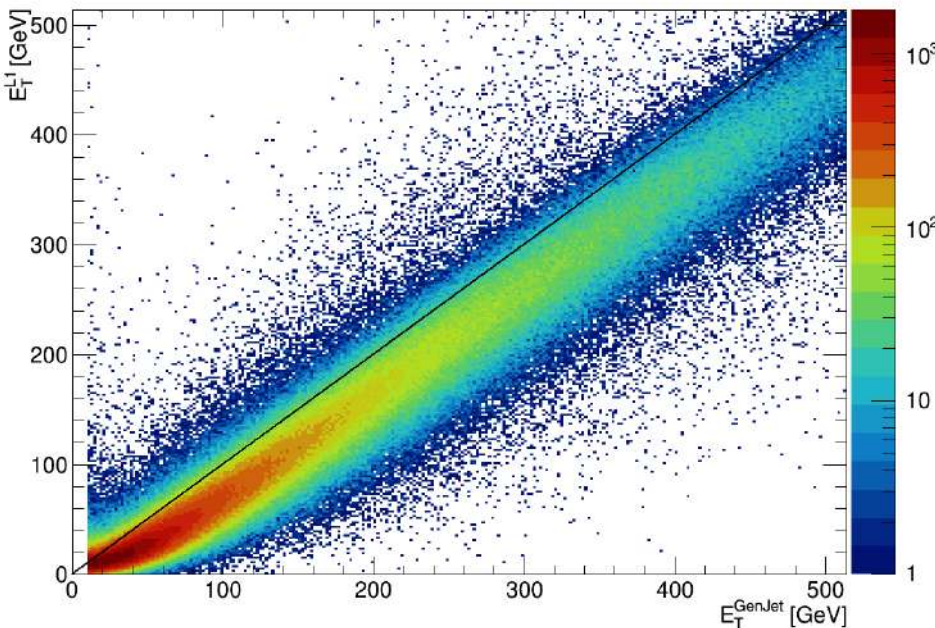


Scatter plots

PU 50-60

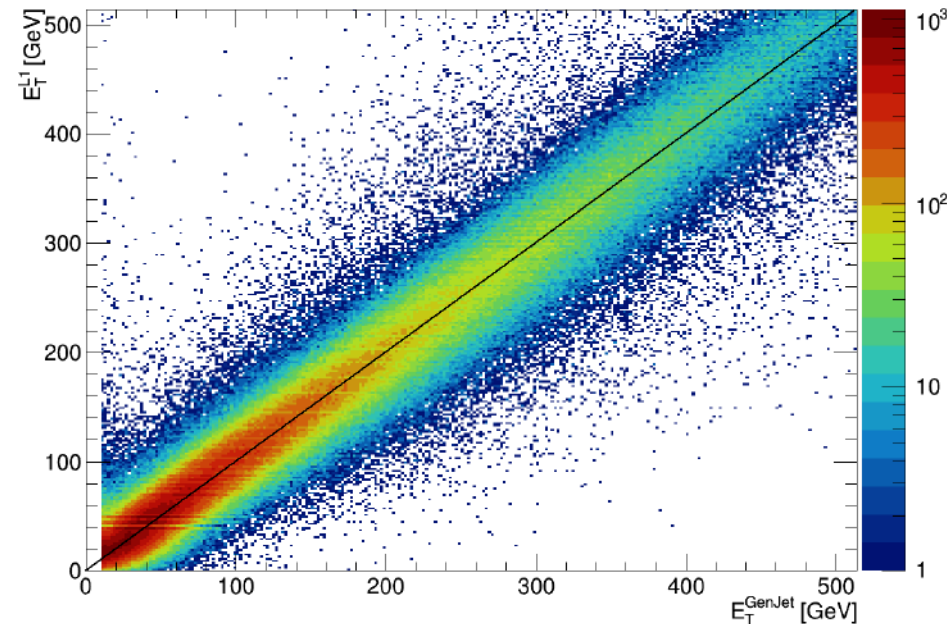
Before corrections

$|\eta^{L1}|: 0.435-0.783$



After corrections

$|\eta^{L1}|: 0.435-0.783$



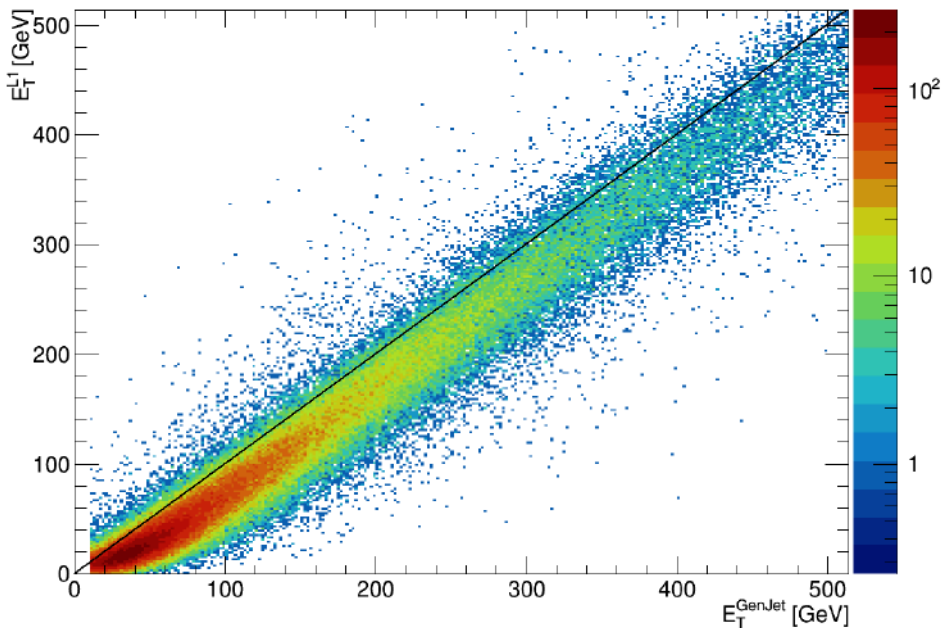
BARREL

Scatter plots

PU 50-60

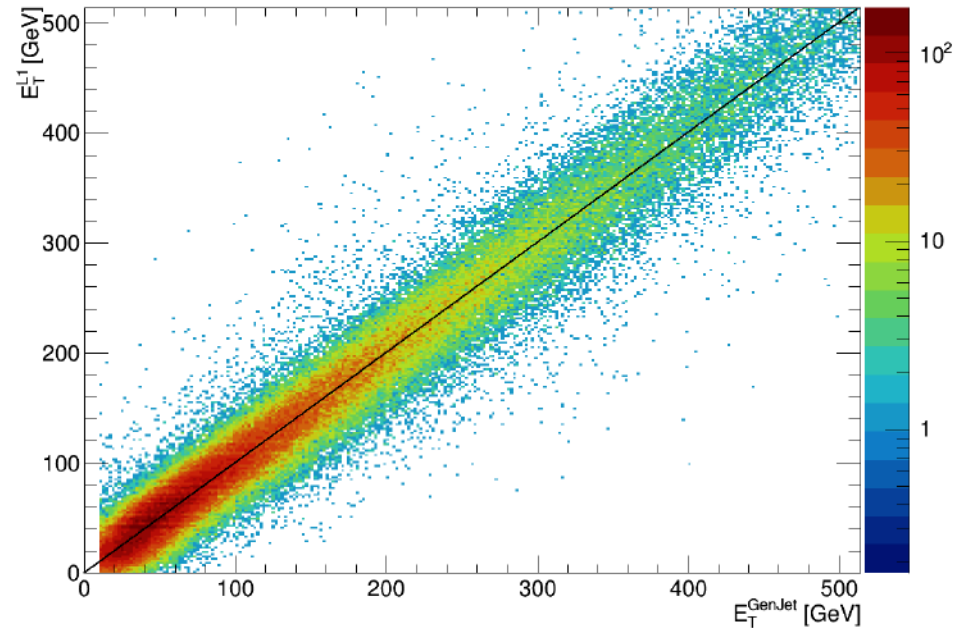
Before corrections

$|\eta^L|: 1.83-1.93$



After corrections

$|\eta^L|: 1.83-1.93$



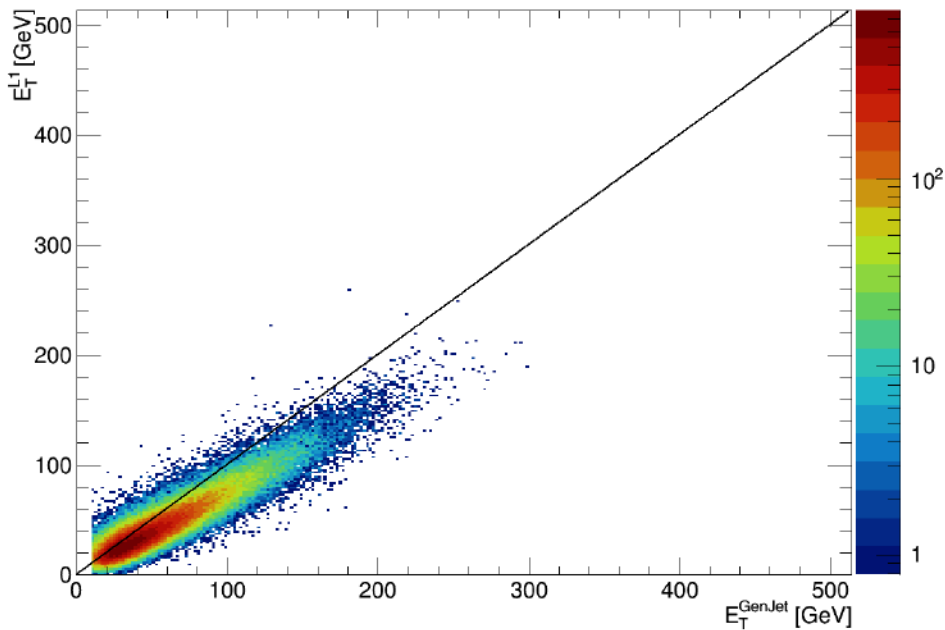
ENDCAP

Scatter plots

PU 50-60

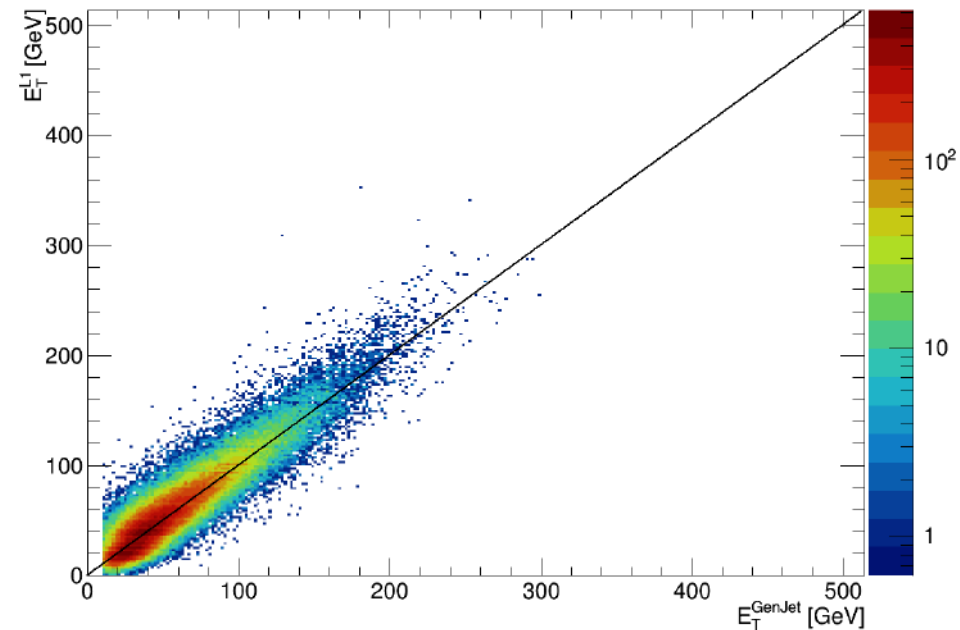
Before corrections

$|\eta^L|: 3.489-4.191$



After corrections

$|\eta^L|: 3.489-4.191$



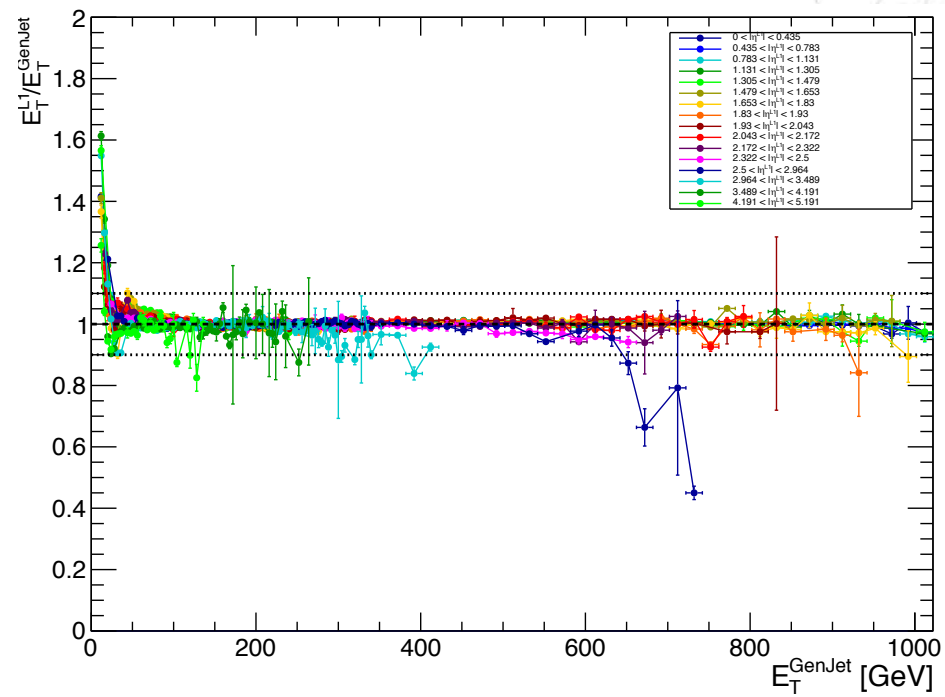
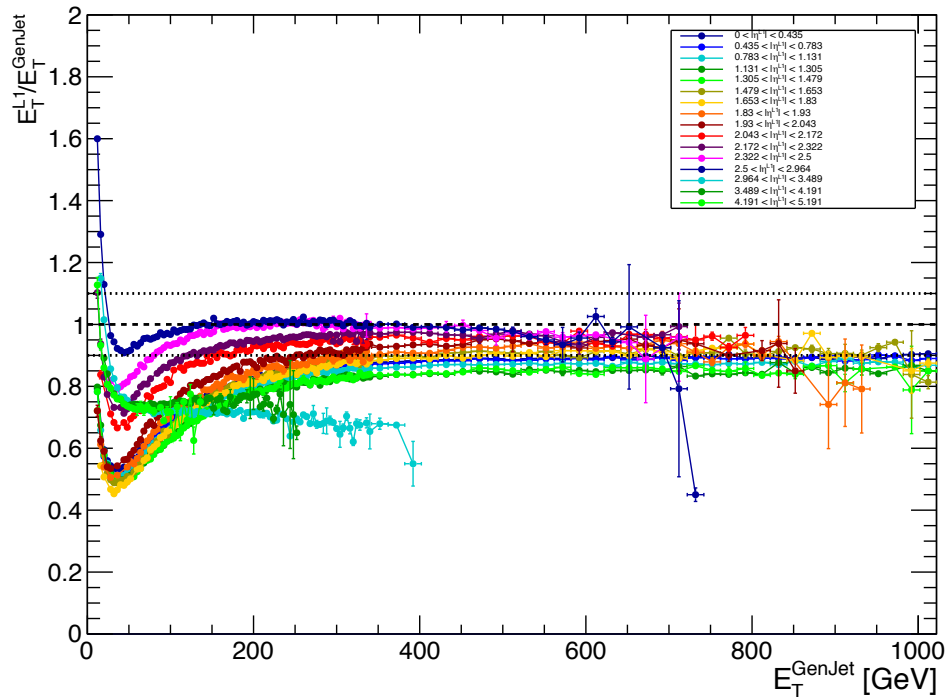
HF

Closure

PU 50-60

Before corrections

After corrections

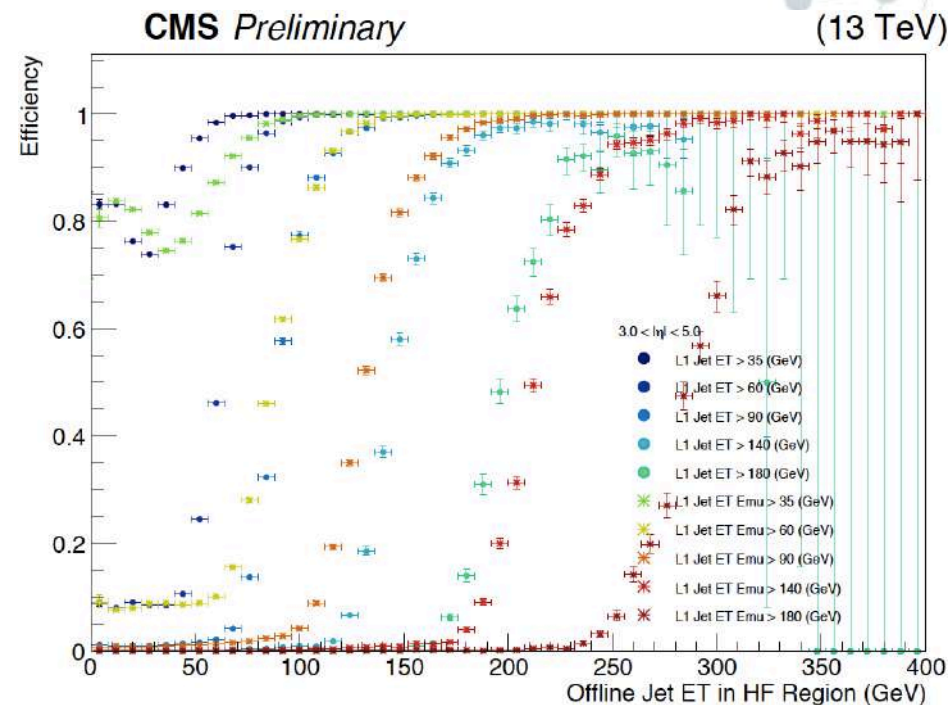
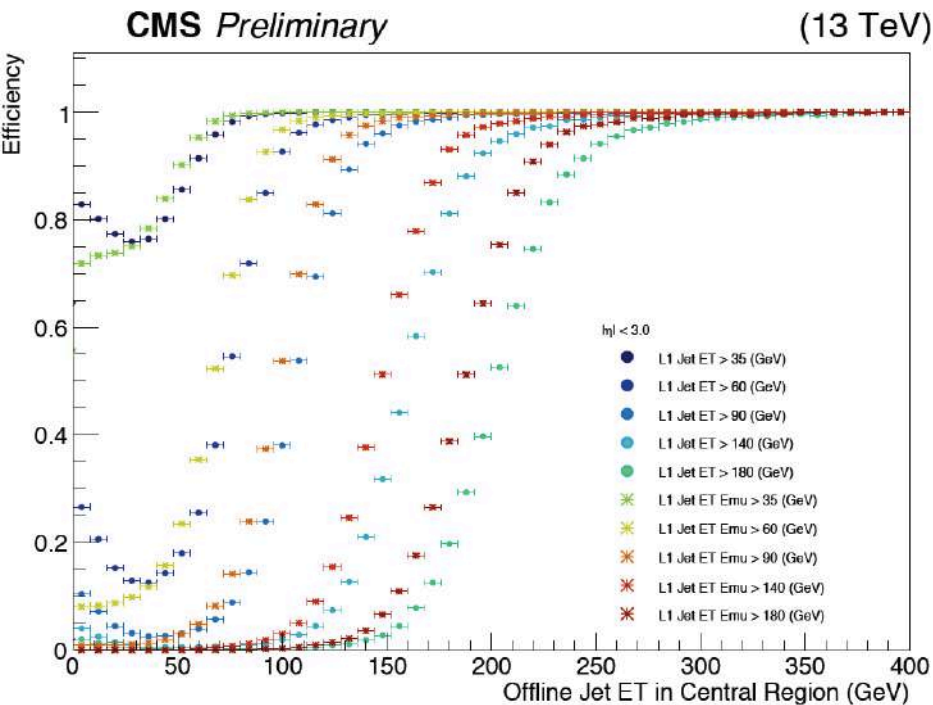


Turn-on curves

PU 50-60

BARREL and ENDCAP

HF

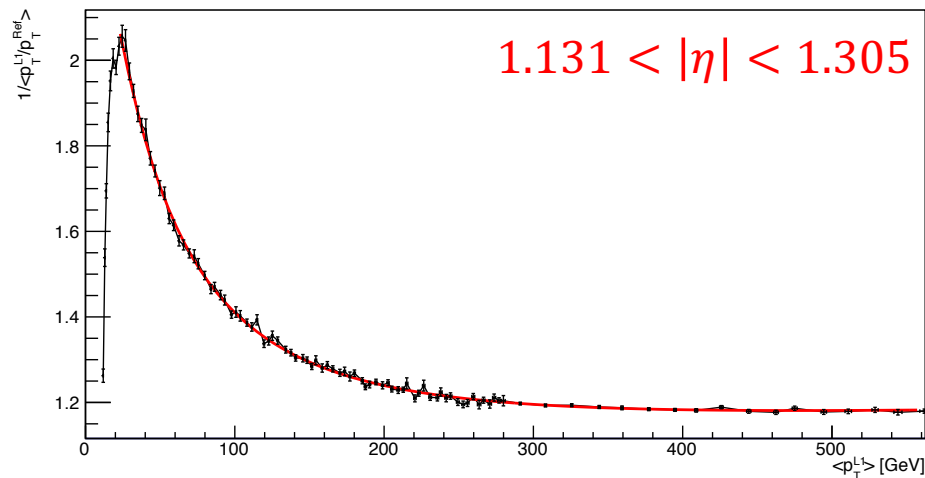
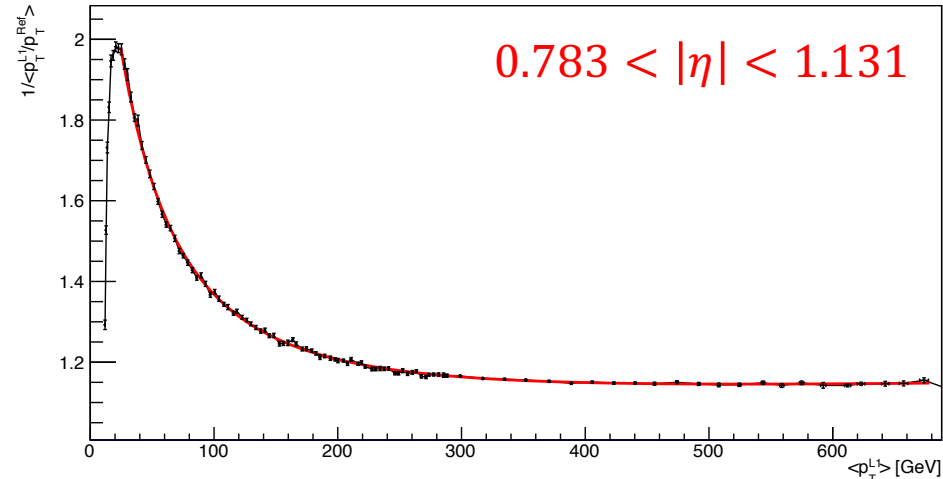
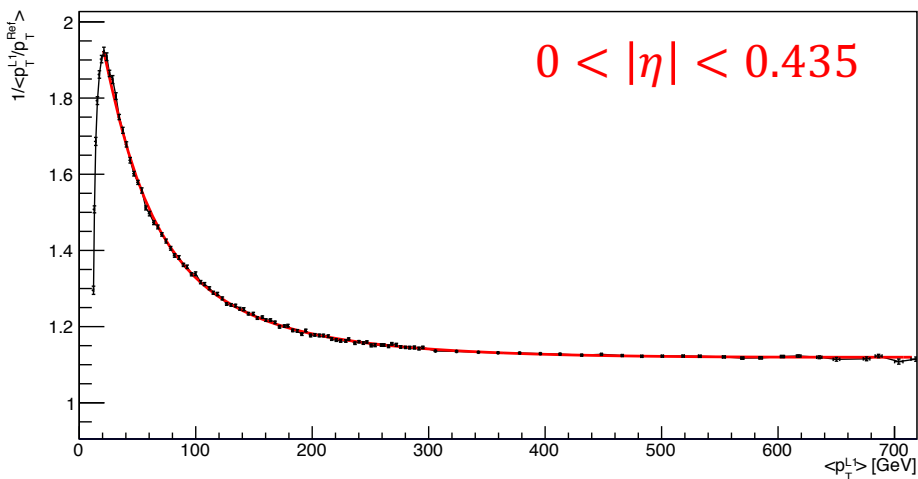


A decorative network diagram in the top-left corner of the slide. It features a complex web of interconnected nodes and lines. The nodes are represented by small circles, some of which are highlighted with a blue outline. The lines are thin and gray, creating a mesh-like structure. The overall aesthetic is clean and modern, typical of a professional presentation.

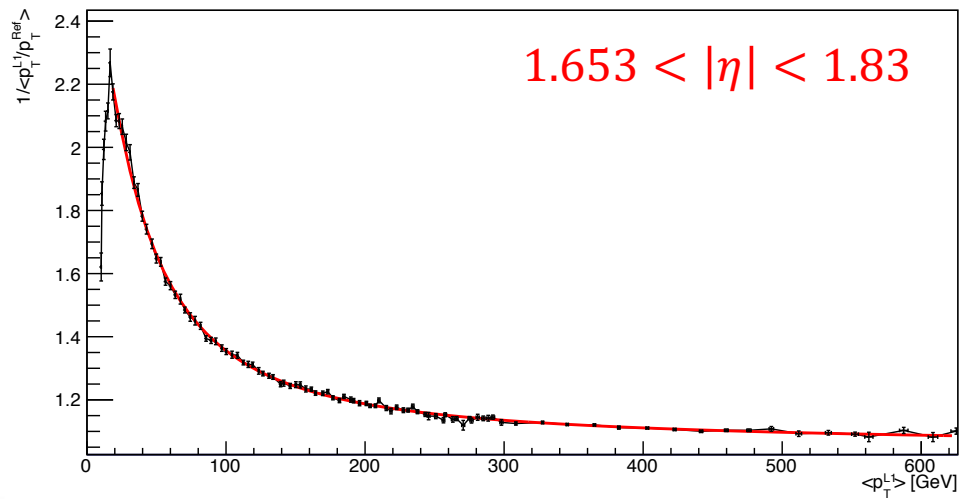
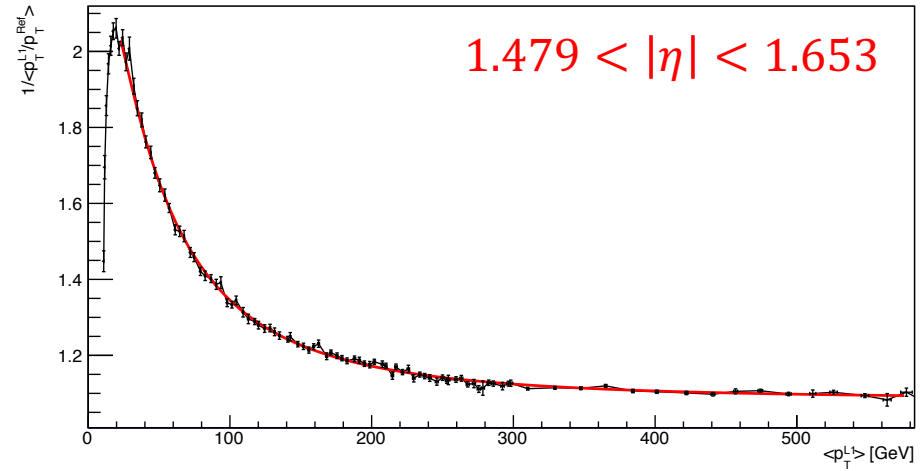
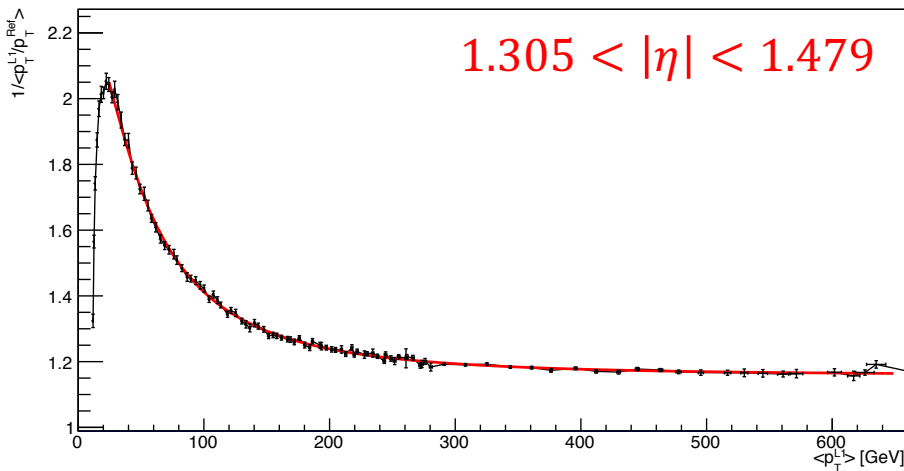
Backup

A decorative network diagram in the bottom-right corner of the slide. It features a complex web of interconnected nodes and lines. The nodes are represented by small circles, some of which are highlighted with a blue outline. The lines are thin and gray, creating a mesh-like structure. The overall aesthetic is clean and modern, typical of a professional presentation.

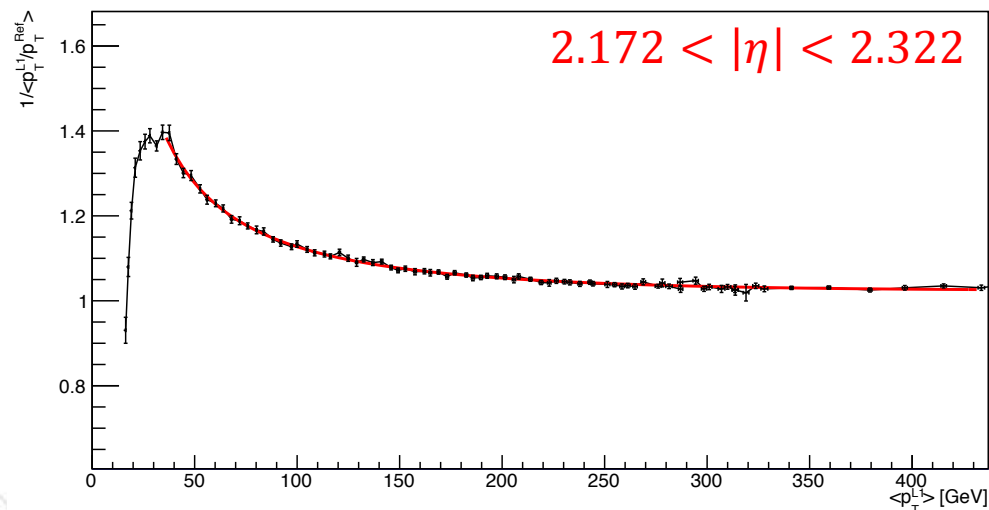
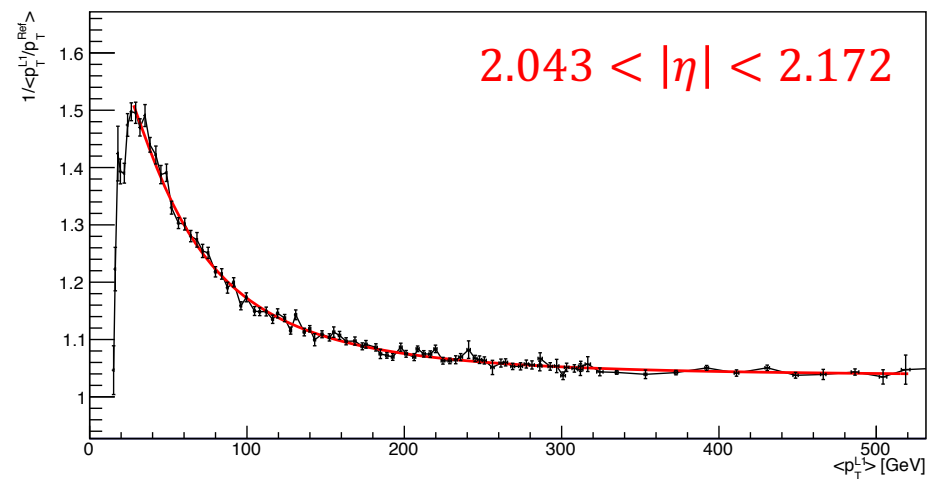
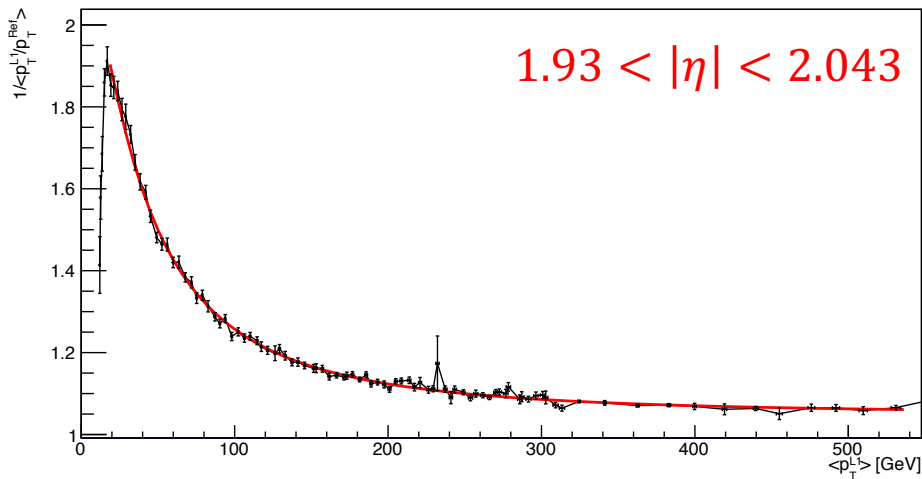
Correction curves for other $|\eta|$ bins PU 50-60



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