

Jet Corrections : Absolute Response - Extrapolation to High p_T -

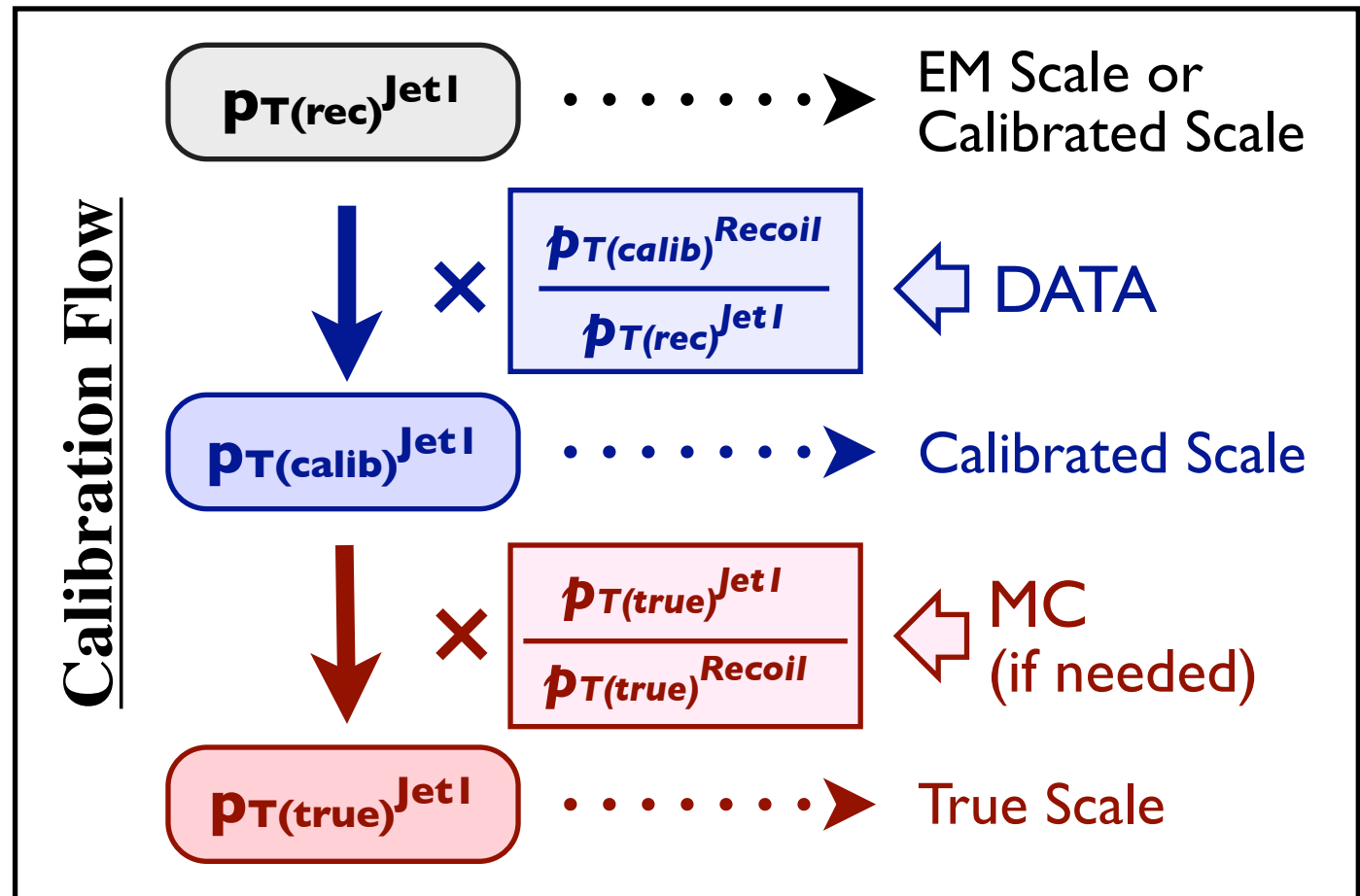
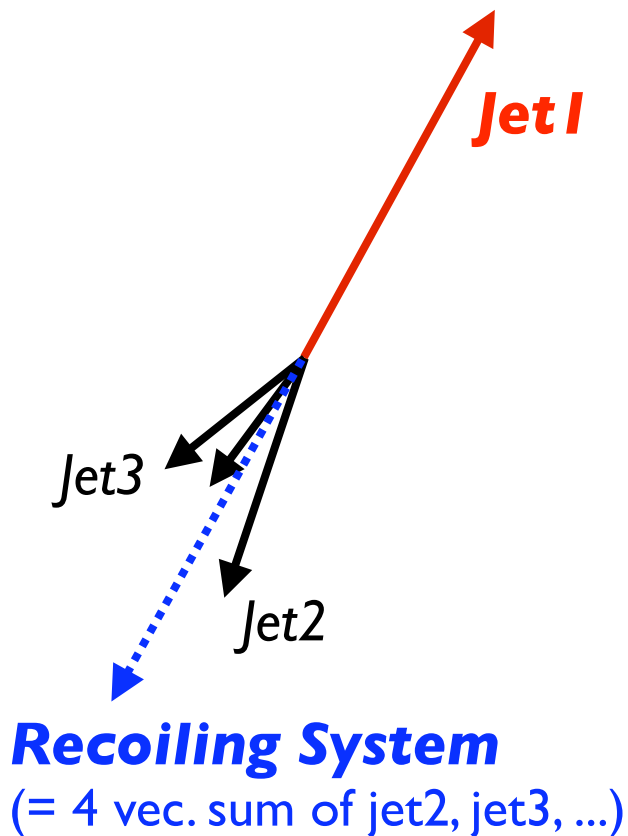
Contributions to Jet energy scale session
in Hadronic Calibration Workshop 2009

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Calibration Flow

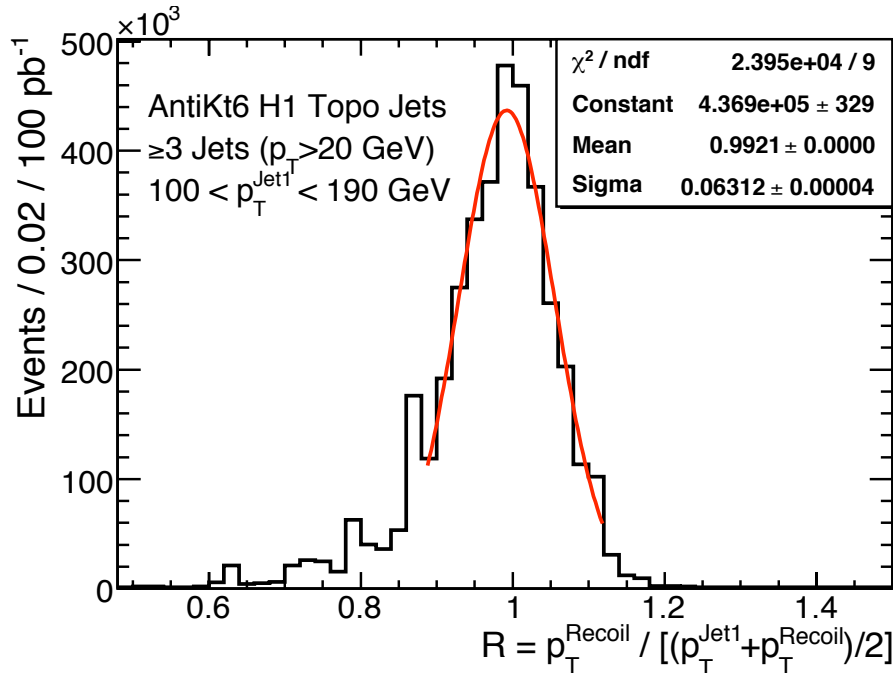


- ▶ QCD dijet no skim D2PDs used in this study
- ▶ All plots normalized to 100 pb^{-1} of luminosity
- ▶ Only plots for AntiKt6HI Topojets shown

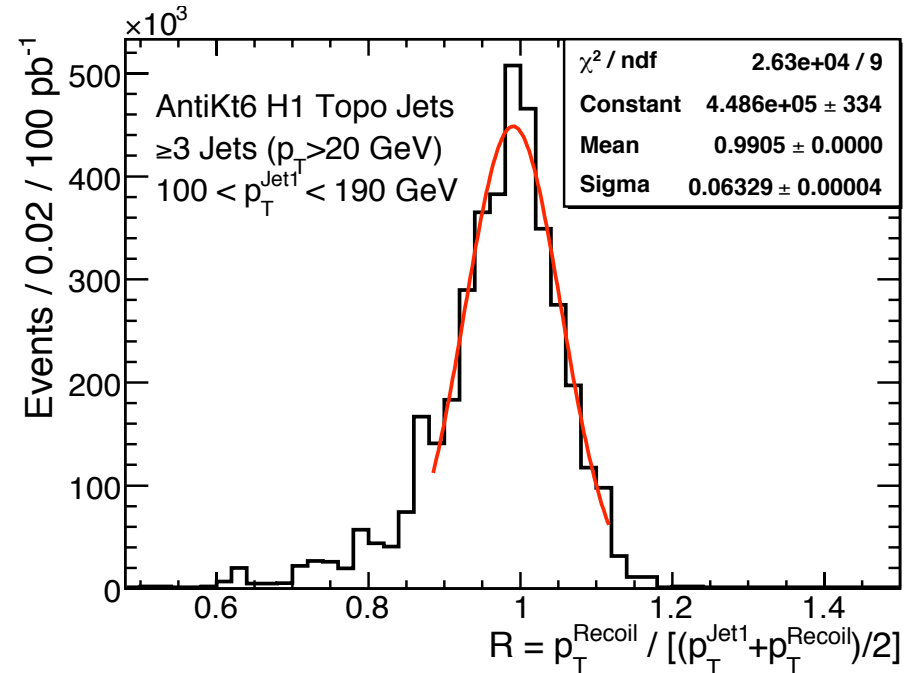
Calibration : Step I

1. Select “reference” p_T region (where jet is calibrated) $\rightarrow 100 < p_T < 190$ GeV
2. Construct p_T^{Recoil} and $p_T^{\text{Avg}} = (p_T^{\text{Recoil}} + p_T^{\text{Jet1}})/2$, and measure $R (=R_{\text{ref}}) = p_T^{\text{Recoil}}/p_T^{\text{Avg}}$ in the reference region
3. Calculate $C_{\text{ref}} = R_{\text{ref}}/(2-R_{\text{ref}})$
 \rightarrow Estimate systematic offset associated with the method

$R_{\text{ref}} = p_T^{\text{Recoil}}/p_T^{\text{Avg}}$ for AntiKt6H1 TopoJets (100 pb^{-1})



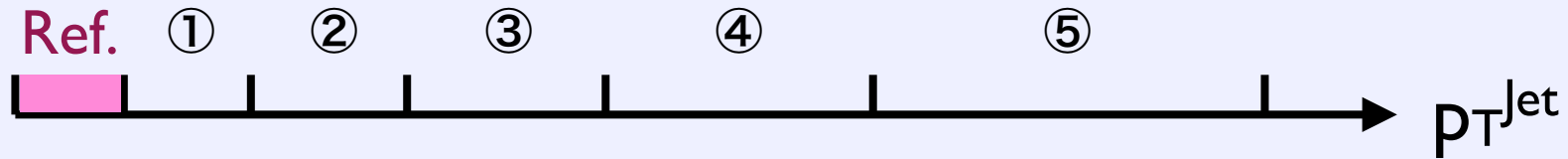
\rightarrow Default in D2PD



\rightarrow Jet energy scale artificially increased by $|+0.0001| \times p_T^{\text{Jet}}$

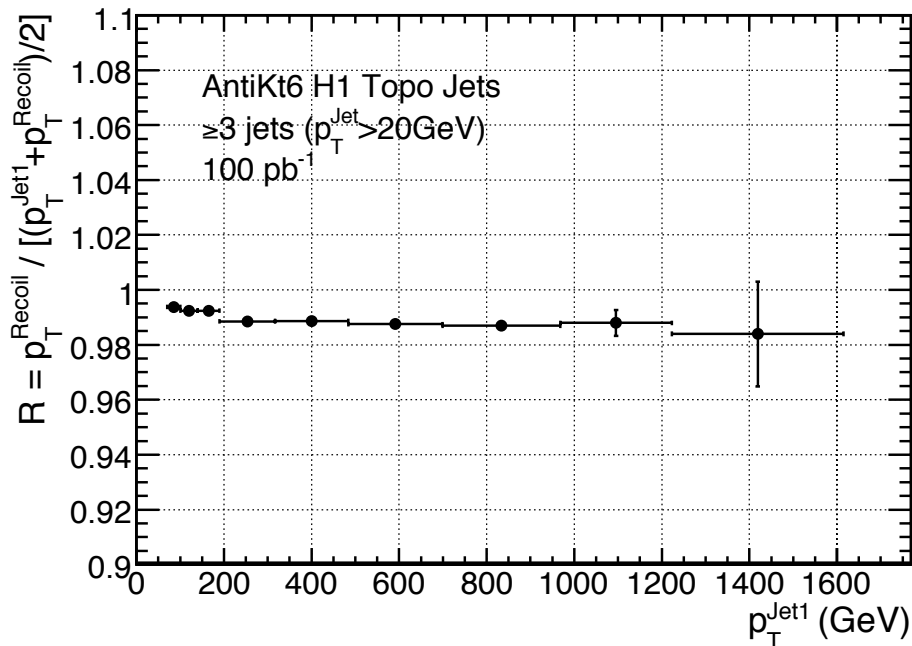
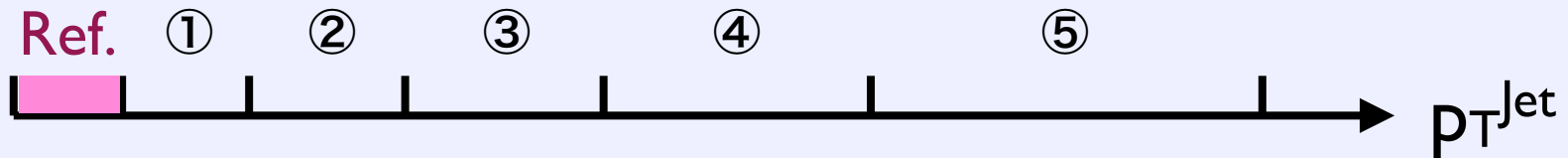
Calibration : Step 2

1. Binning jet p_T based on expected jet energy resolutions
→ very wide bins used conservatively in this study
2. Measure $R(=R_{\textcircled{1}})$ when jet I in $\textcircled{1}$ and recoil jets in the reference region
3. Calculate calibration factor $C_{\textcircled{1}} = R_{\textcircled{1}}/(2-R_{\textcircled{1}})$
4. Obtain relative calibration factor $C_{\textcircled{1}}' = C_{\textcircled{1}}/C_{\text{ref}}$

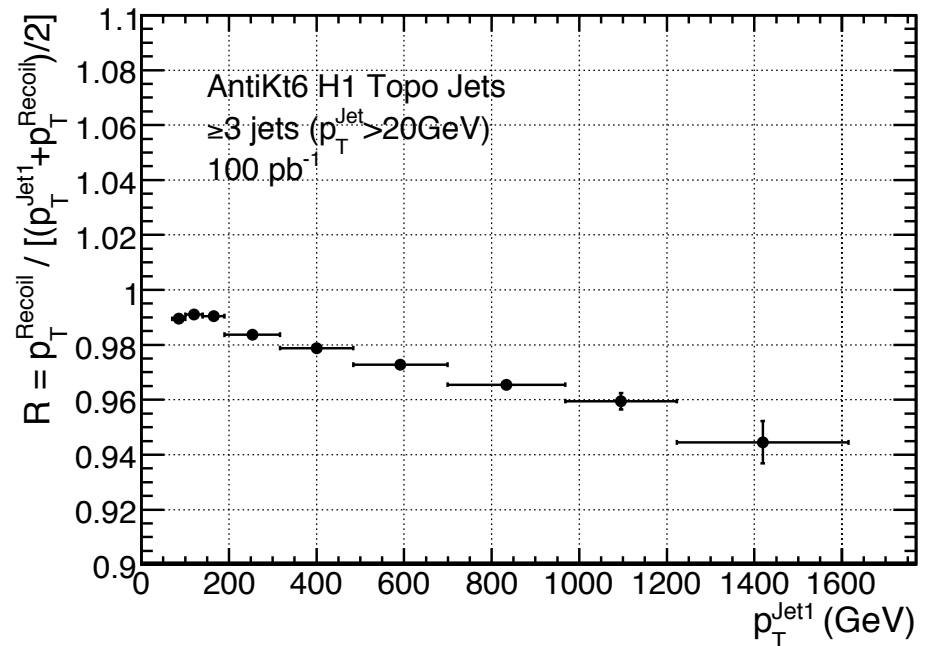


Calibration : Step 3

1. Measure $R(=R_{\textcircled{2}})$ when jet1 in $\textcircled{2}$ and recoil jets in $\textcircled{1}$ or ref. region
 \rightarrow Recoil jets in $\textcircled{1}$ are corrected by $C_{\textcircled{1}}$ before calculating $R_{\textcircled{2}}$
2. Obtain relative calibration factor $C_{\textcircled{2}}' = C_{\textcircled{2}}/C_{\text{ref}}$
3. Repeat the procedure while the statistics allows



\rightarrow Default in D2PD

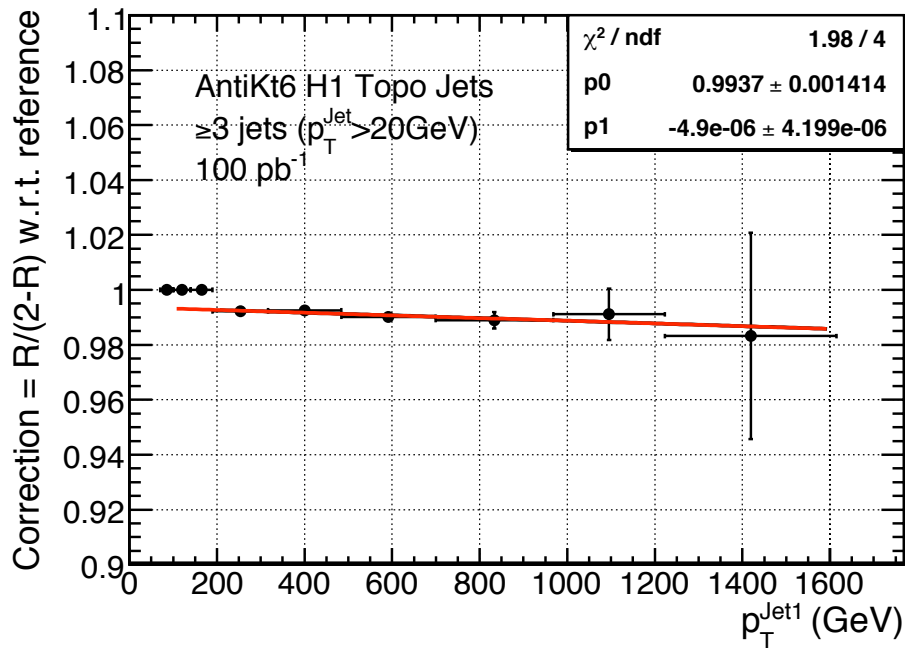


\rightarrow Jet energy scale artificially
 increased by $|+0.000| \times p_T^{\text{Jet}}$

Calibration : Step 4

Make a fit to the obtained relative calibration factors

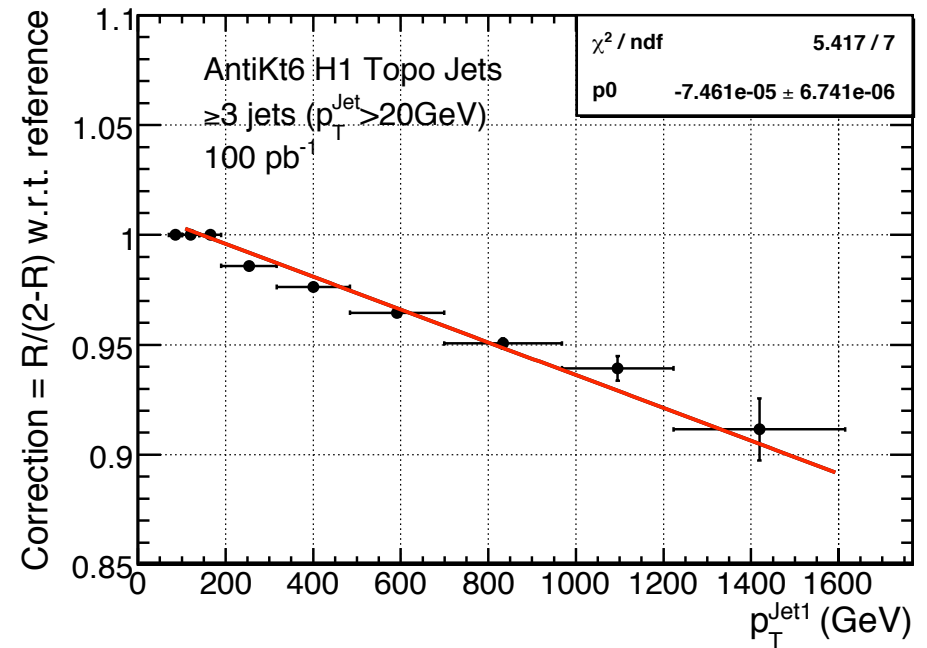
Linear fit



→ Default in D2PD

Linear fit

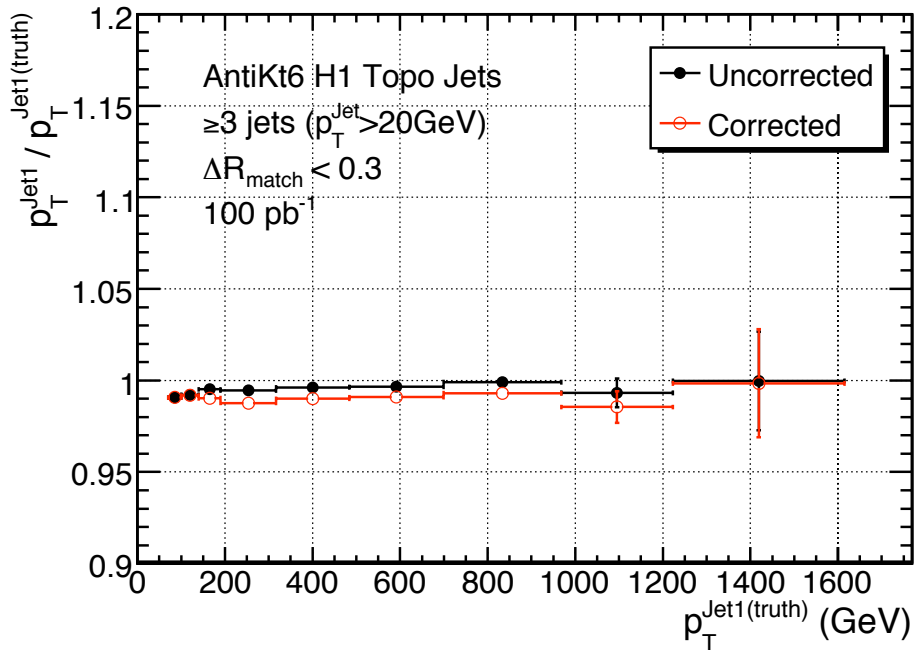
(Corr. = 1 in $100 < p_T < 190 \text{ GeV}$)



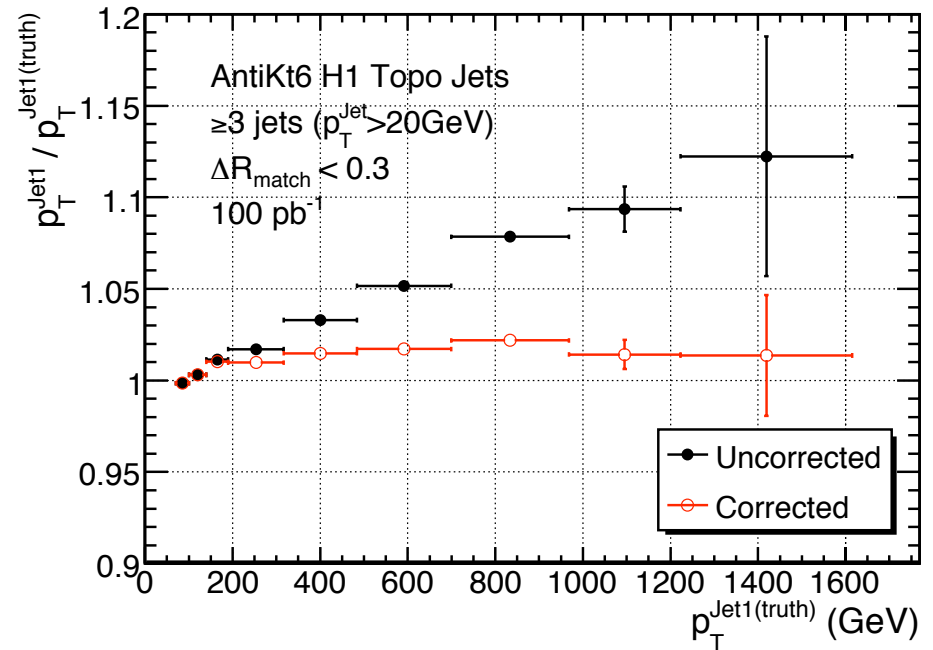
→ Jet energy scale artificially increased by $1 + 0.0001 \times p_T^{\text{Jet}}$

Calibration : Closure Test

Apply calibration factor (from fit) to jets and compare with truth jets



→ Default in D2PD



→ Jet energy scale artificially increased by $|+0.000| \times p_T^{jet}$

(Preliminary) Estimate of JES uncertainty at $|200 < p_T^{jet} < 1600 \text{ GeV}$

Statistical	Offset	Abs. JES in reference
3.0%	~1.0%	→ γ +jet, MPF, ...

10 TeV
100 pb⁻¹