

Response studies for non-isolated jets

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Datasamples and Object Selection

Datasamples

mc08.105011.J2 pythia_jetjet.recon.DPD_NOSKIM.e344_s479_635.AANT

- Dijet without pileup
- low p_T (J2)
- Reconstructed root tuples with 47k events

mc08.105200.T1_McAtNlo_Jimmy.recon.DPD_NOSKIM.e357_s462_r635

- $t\bar{t}$
- Reconstructed root tuples with 99k events

Object selection

- $match(recojet, truthjet) \Leftrightarrow \Delta R(recojet, truthjet) \leq 0.3$
- $closeby(recojet, recojet) \Leftrightarrow \Delta R(recojet, recojet) \leq 1.0$
 \Rightarrow jet1 is isolated, if no closeby jet exists
- first reco jet: **j1** with $p_t > 20\text{GeV}$
- second reco jet: **j2** with $p_t > 10\text{GeV}$
- matched truth jets: **t1,t2** with $p_t > 10\text{GeV}$

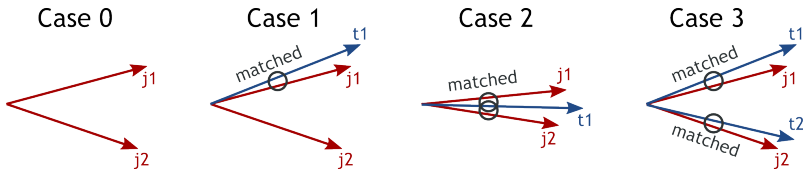
Motivation and Previous Work

Motivation

- JES correction for non-isolated jets not applicable offhand
- problems occur for split jets
- therefore: investigation of properties for non-isolated jets necessary to adjust correction
- response = $\frac{p_t^{reco}}{p_t^{truth}}$

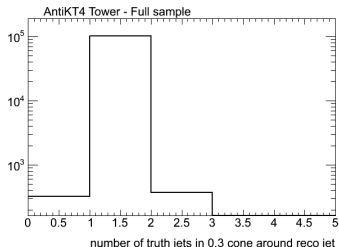
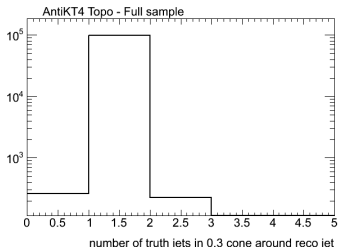
Previous Work

<http://indico.cern.ch/materialDisplay.py?contribId=3&materialId=slides&confId=48838>



Consideration of more than one truth jets

Do we require more cases where j_1 (and j_2) has 2 or more matched truth jets?

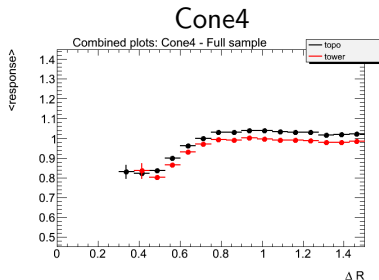
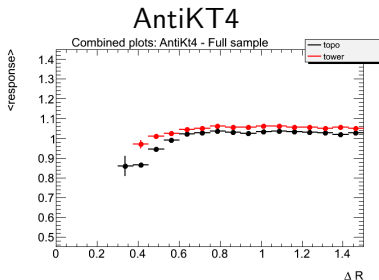


$\approx 1 - 2\%$ of all reconstructed jets have more than 1 matched truth jet

\implies Only closest truth jet is considered for classification

Differences between jet algorithms and input objects (1)

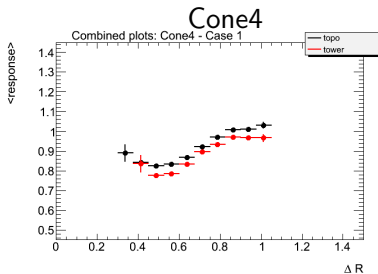
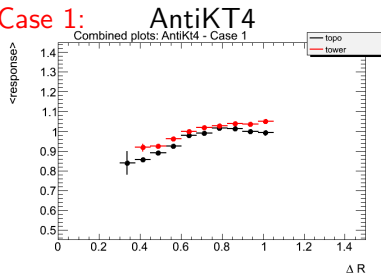
	not isolated	case 0	case 1	case 2	case 3
Antikt4 topo	16.89 %	0.11 %	40.59 %	2.74 %	55.92 %
Antikt4 tower	19.06 %	0.27 %	47.97 %	0.55 %	50.55 %
Cone4 topo	13.22 %	1.95 %	40.23 %	1.70 %	54.60 %
Cone4 tower	10.95 %	1.61 %	35.59 %	1.20 %	60.22 %



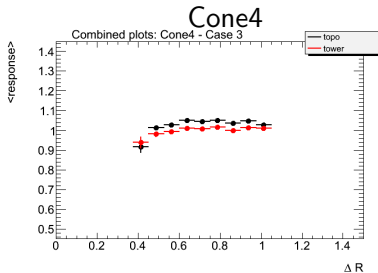
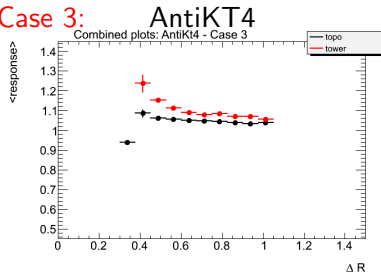
⇒ **response correction necessary** for non-isolated jets

Differences between jet algorithms and input objects (2)

Case 1:

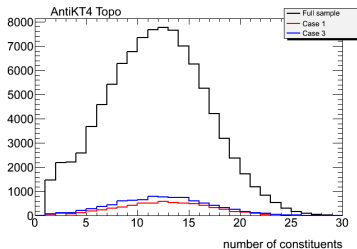
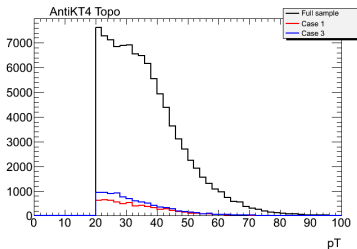


Case 3:



Search for discriminating variables (1)

- Transverse momentum p_T of j1
- Number of constituents

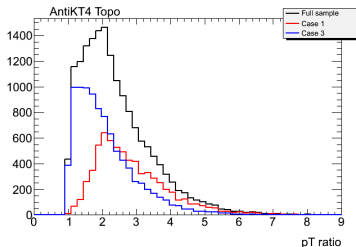
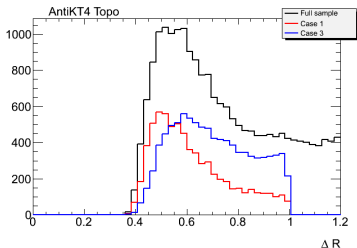


⇒ distributions for case 1 and case 3 are quite similar

Search for discriminating variables (2)

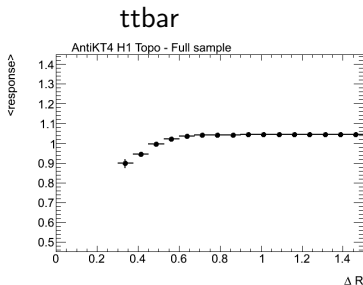
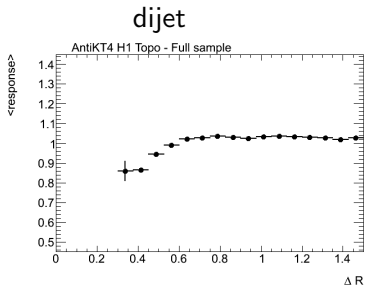
- ΔR

- Momentum ratio $p_T^{ratio} = \frac{p_T^{j1}}{p_T^{j2}}$



⇒ distributions show separation for case 1 and case 3

Compare dijet and ttbar sample (1)



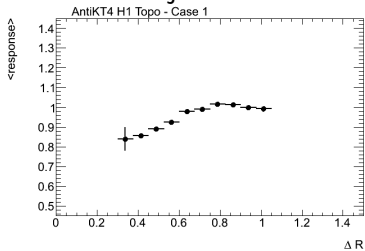
⇒ decrease for $t\bar{t}$ not so strong

⇒ $t\bar{t}$ shows same effect

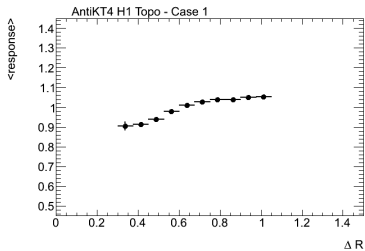
Compare dijet and ttbar sample (2)

Case 1:

dijet

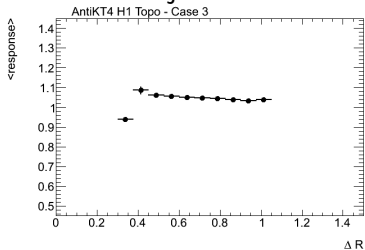


ttbar

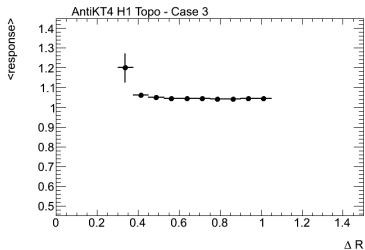


Case 3:

dijet



ttbar



Future plans

- study different η and p_t regions
- find more discriminating variables, candidates are isolation and jet shape
- create likelihood
- study the effect for cell weighting, local calibration and EM scale calibrations
- study the effects on $t\bar{t}$ -sample in more detail

Backup slides

η distribution

