First look at 7 TeV Summer09 $Z(\rightarrow e^{+}e^{-})$+jet Sample

Robert Harris

Kalanand Mishra

Fermilab

JEC, October 2, 2009

Data sample and event selection

✦Data sample

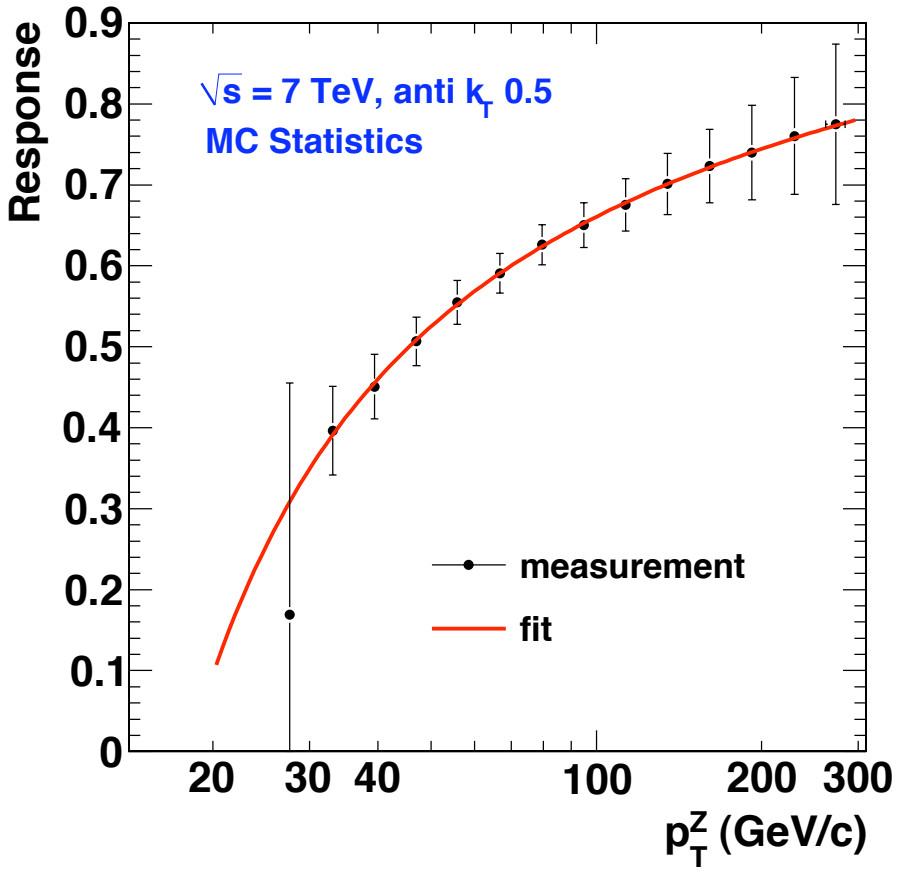
/ZeeJet_Pt*to*/Summer09-MC_31X_V3_7TeV-v1/GEN-SIM-RECO

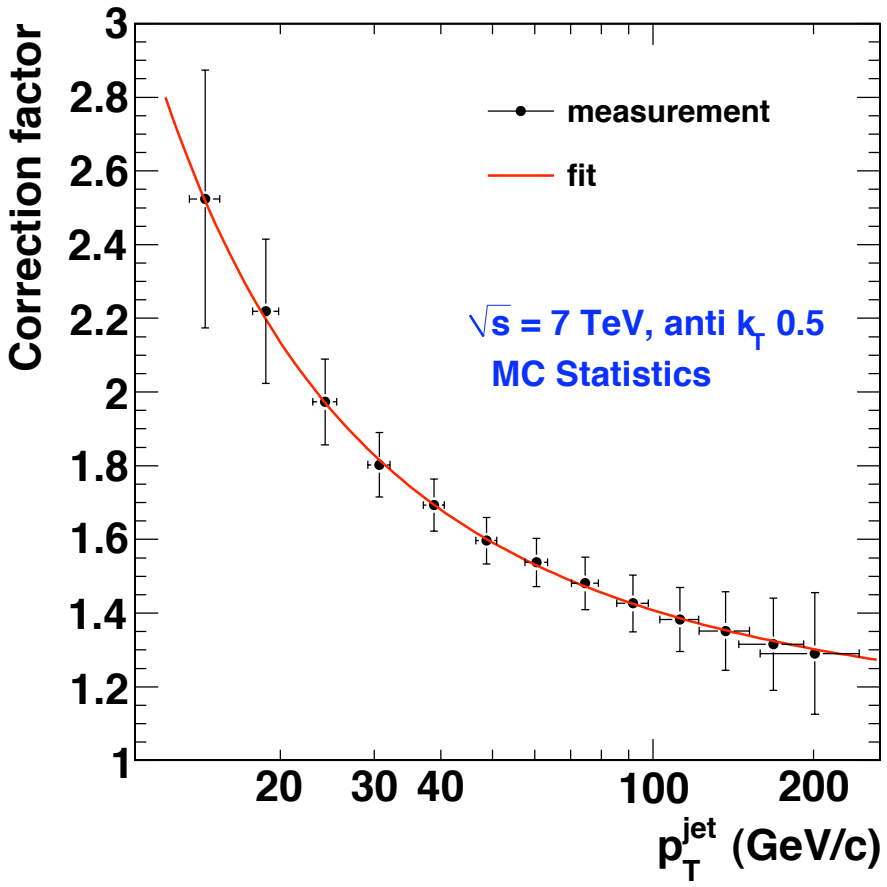
where the $\hat{p}_T$ bins are: 0−15, 15−20, 20−30, 30−50, 50−80, 80−120, 120−170, 170−230, 230−300, 300−∞.

✦Event selection: Use p_T balance in Z+jet events

- Jet in the control region: $|\eta| < 1.3$
- Use standard Z ($\rightarrow e^+e^-$) reconstruction
- Select clean events with
  - $\Delta\phi > \pi - 0.2$,
  - extra jet $p_T < 0.1\ p_T^Z$

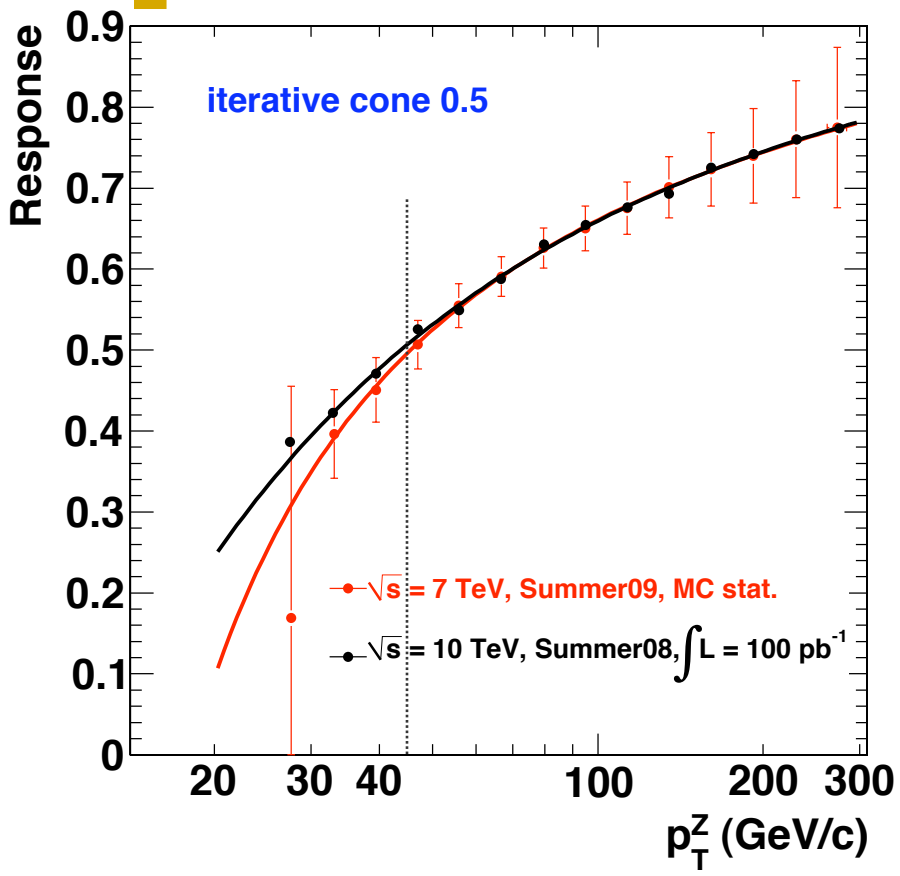
@7 TeV: Jet response & absolute correction

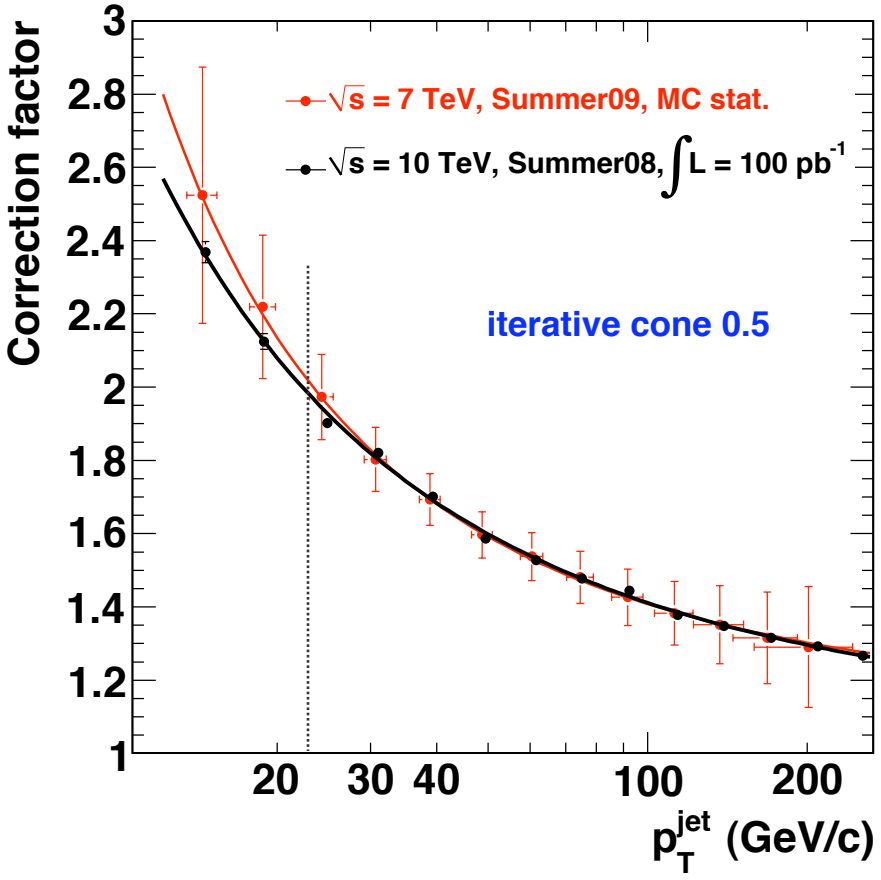




- Now moved to anti k_T algorithm.
- Errors bars correspond to MC statistics.

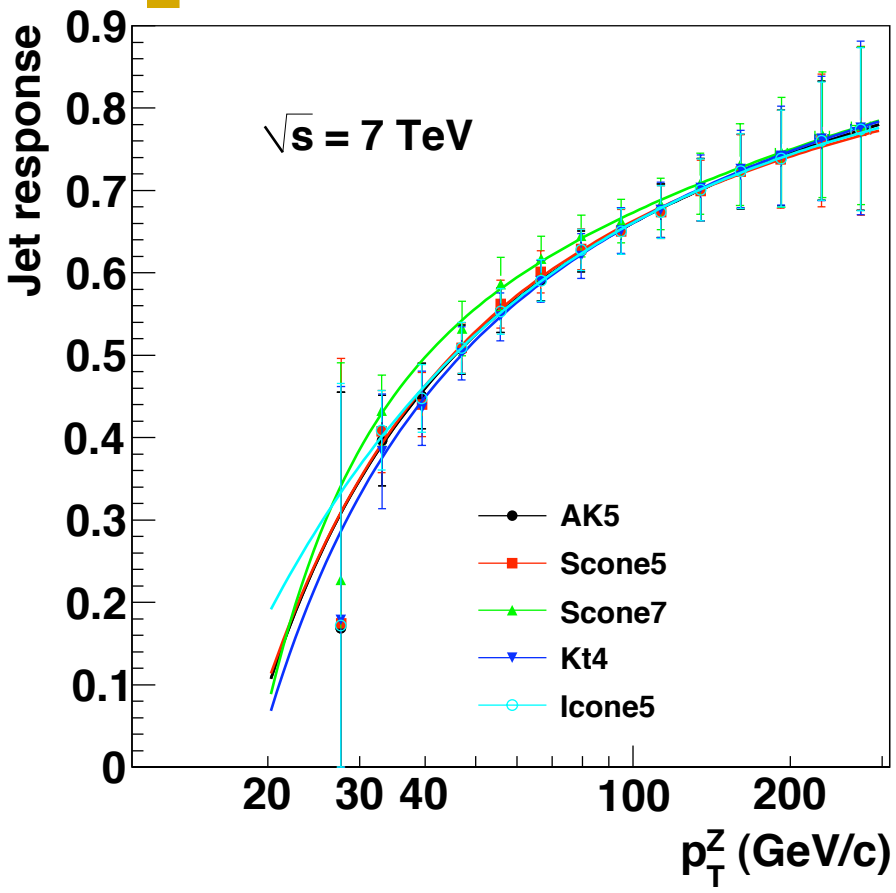
Comparison between @7 TeV and @10 TeV

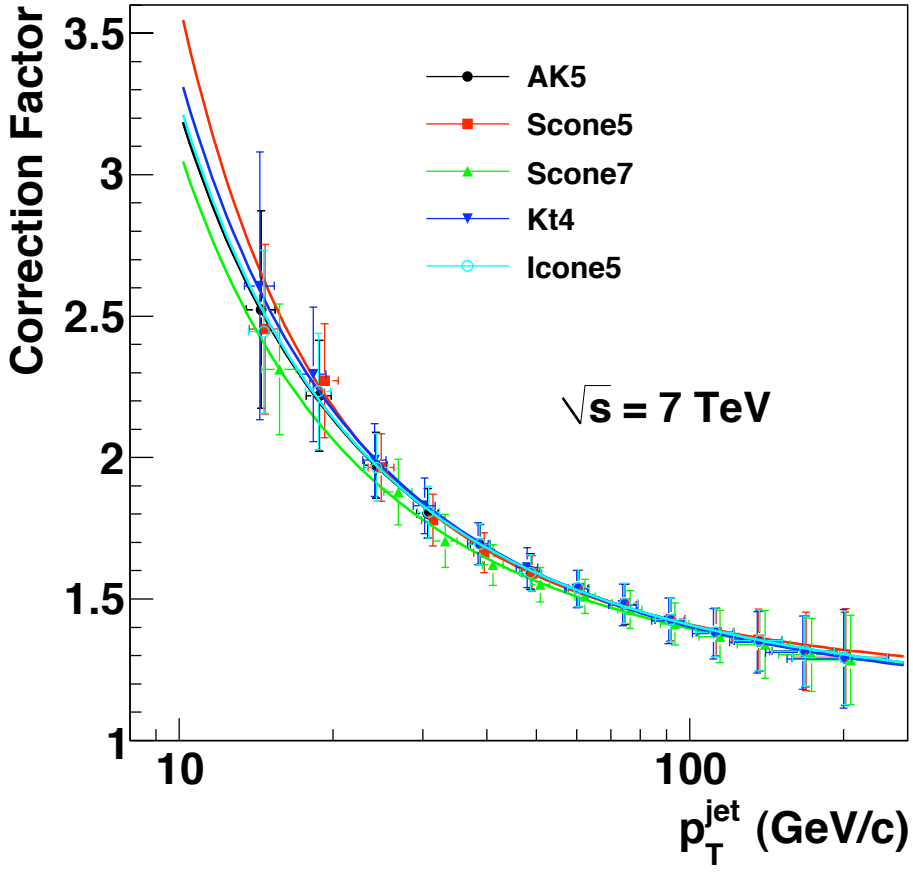




- Response at 7 TeV (Summer09, 3.1.2) and at 10 TeV (Summer08, 2.2.X) are identical above 45 (25) GeV in corrected (uncorrected) p_T.
- We plan to compare 7 TeV and 10 TeV Summer09 samples in OctX.

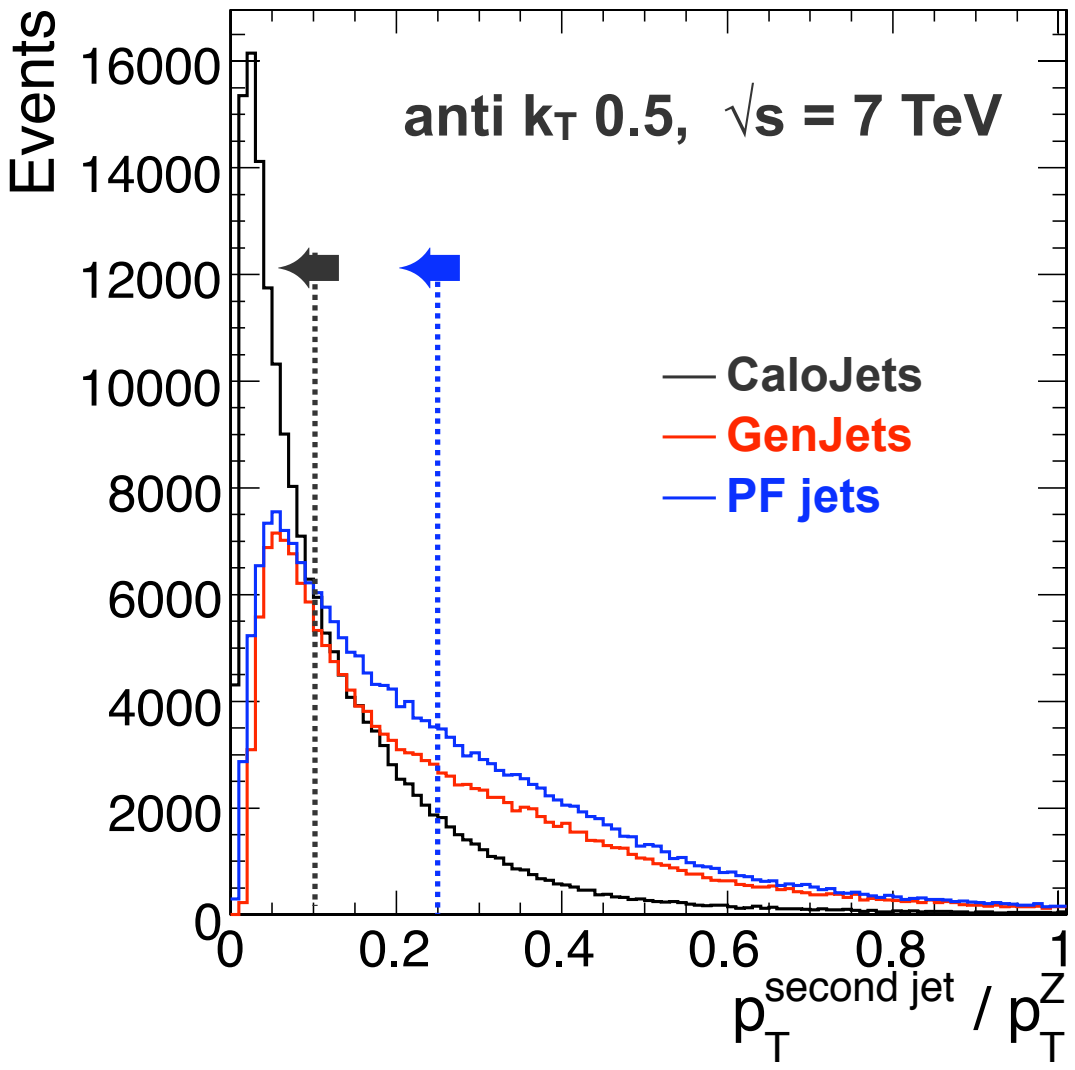
@7 TeV: Comparison of jet response by algorithm





- All cone 5 algorithms have essentially the same response.
- Cone 7 jets have slightly higher response, as expected.

Starting to take a look at Particle Flow jets



- In case of PF jets, the 2nd jet p_T is peaked at higher value and has longer tail.
- To derive CaloJet response from γ/Z+jet events, we require $p_T^{\text{second jet}} / p_T^{\gamma/Z} < 0.1$.
- Clearly, we need to loosen this cut for PF jets. Where should we cut: 0.2, 0.3, 0.4 ?
- It seems that there will be a larger systematic effect due to this cut.

Summary

- ✓A first look at jet response in Z(→e+e−)+jet events from Summer09 7 TeV sample.
  - Response and correction are similar to those @10 TeV.
  - Will analyze Summer09 10 TeV sample as part of the October exercise next week.

- ✓We have started work on data-driven jet energy correction for PF jets using $Z(\rightarrow e^+e^-)$+jet events.
  - PF jets are a little different from CaloJets ➡ may need to treat them somewhat differently (*e.g.*, 2nd jet p_T cut etc.).
  - Hopefully I will present analysis with PF jets in the next JEC meeting.