



# QCD group: dataset and validation

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# MC samples for QCD-related studies

MC samples which the QCD group (and jet energy and resolution group) requested the MC group to generate for summer 2004 are:

- **QCD (inclusive) dijet samples**

(Pythia and Herwig, total 24M events generated for each with 5.3.2/3)

- **Photon+jet samples**

(Pythia and Herwig, total 11M events being generated for each with 5.3.3)

- **Alpgen  $b\bar{b}$  /  $c\bar{c}$  samples**

(total 2M events generated with 5.3.3)

- **Pythia Z Born term / Z+jets**

(1M events generated for each with 5.3.3)

# MC samples for winter

- $Z \rightarrow b\bar{b}$  1.5M
- $Z \rightarrow q\bar{q}$
- Alpgen gluon-splitting 1.5M
- QCD dijet  $P_{tmin}=12\text{GeV}$  3.0M
- $c\bar{c}$   $P_{tmin}=12\text{GeV}$  3.0M
- $b\bar{b}$   $P_{tmin}=12\text{GeV}$  3.0M
- + more higher thresholds 8-10M

Select b/c by  
HEPG filter?  
(under study)

To study b- jet energy scale, inclusive b jet cross section  
meaurement, b jet shape analysis etc

# Herwig + Jimmy

- Rick Field is working on it. He gave a nice talk in the TeV4LHC-QCD workshop yesterday.

[http://www-cdf.fnal.gov/internal/WebTalks/0412/041201\\_tev4lhc\\_qcd.html](http://www-cdf.fnal.gov/internal/WebTalks/0412/041201_tev4lhc_qcd.html)

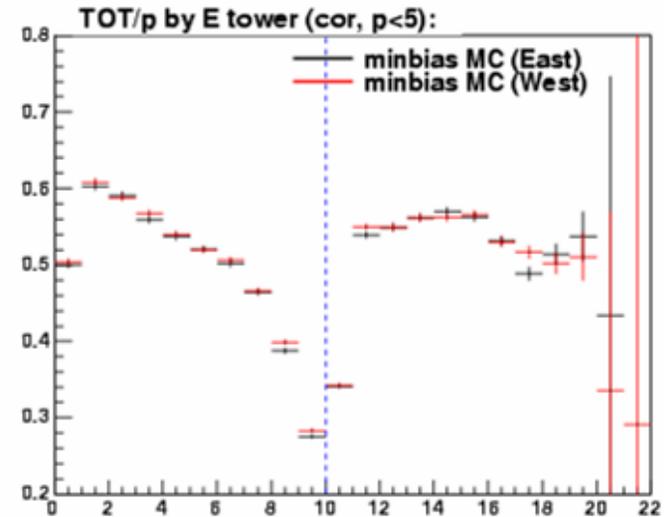
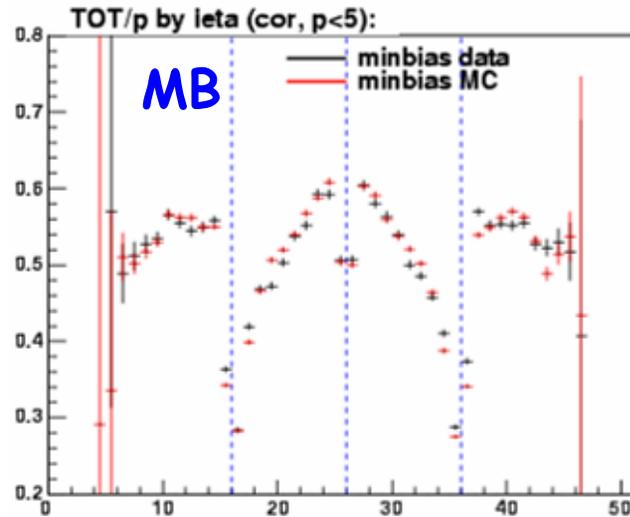
- If we get this working, it will become a powerful tool for us.



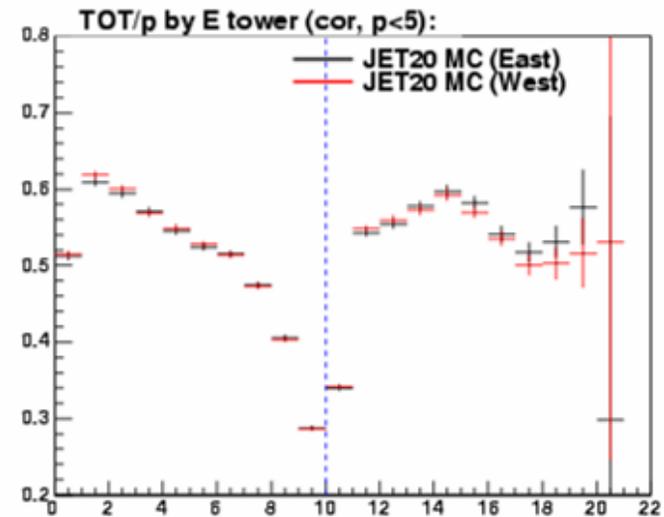
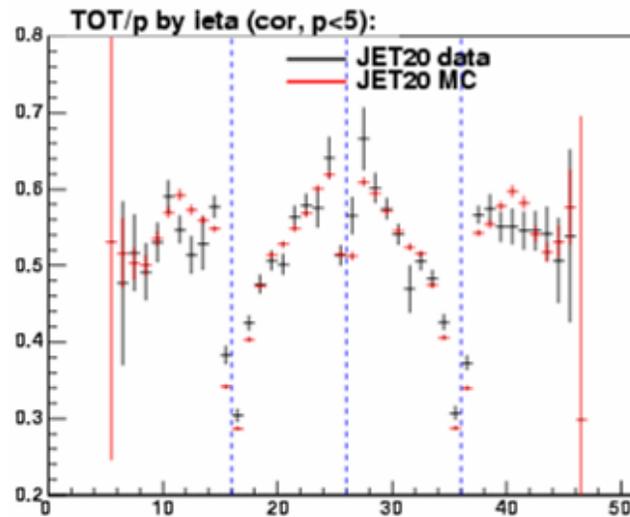
# Backup

# Single track analysis

E/p: data vs MC



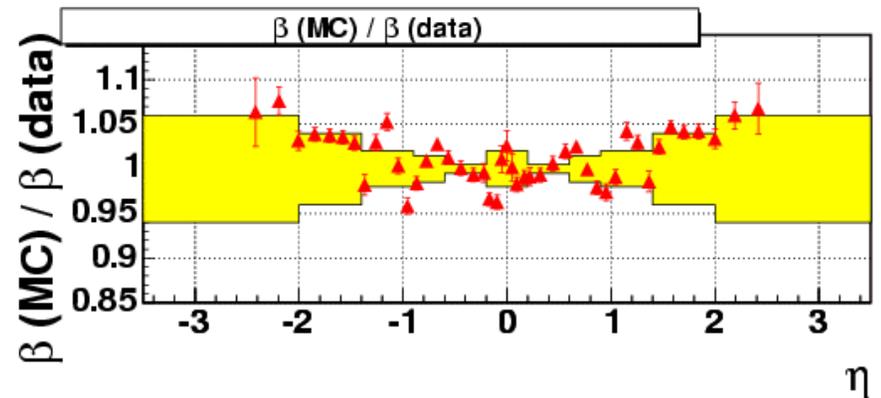
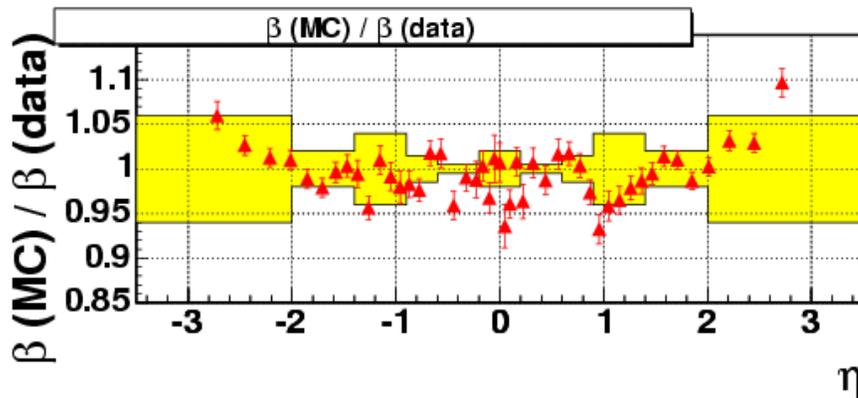
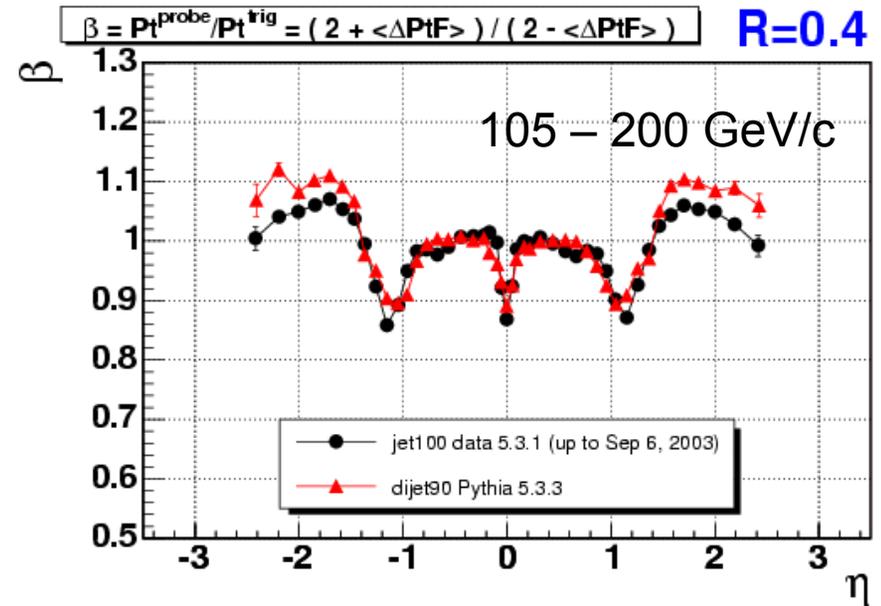
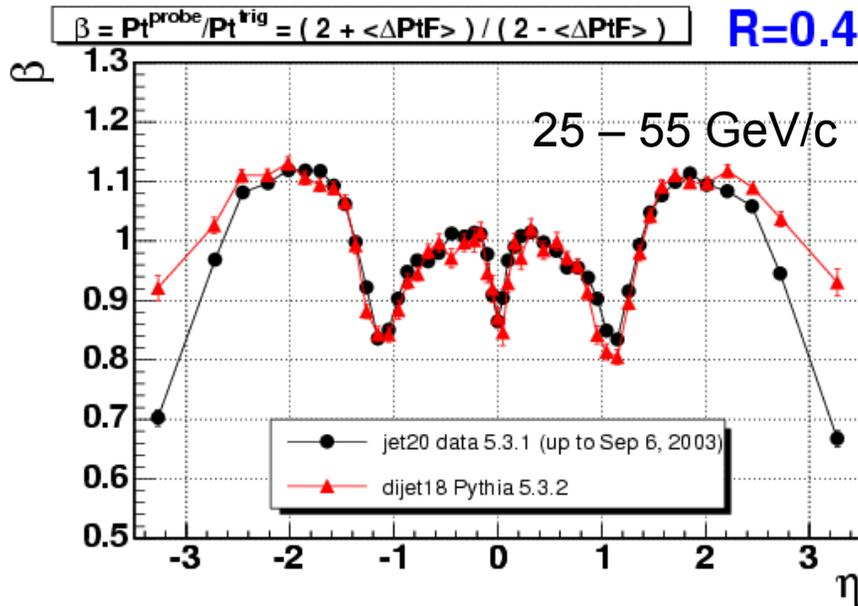
Except for the MB data, only 1 million events are used in these plots.



Jet20 data / dijet18 MC

# Data vs MC

- JES lower in Pythia at 30° cracks at low Pt
- JES higher in Pythia in plug at high Pt
- ⇒ Separate set of corrections for MC is necessary

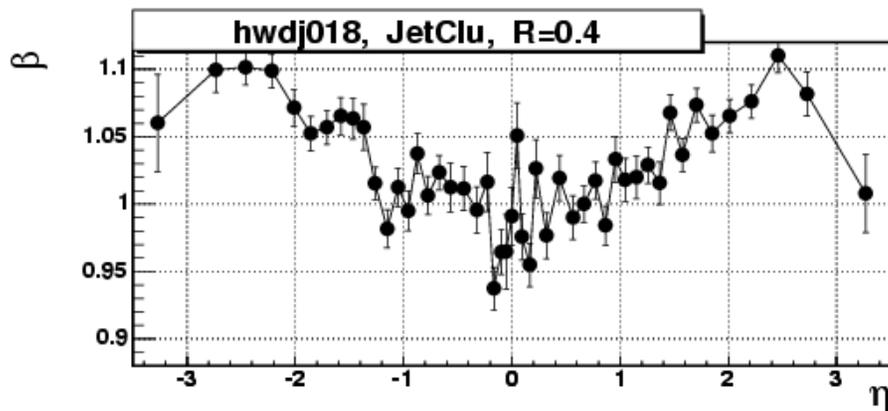


# Pythia vs Herwig

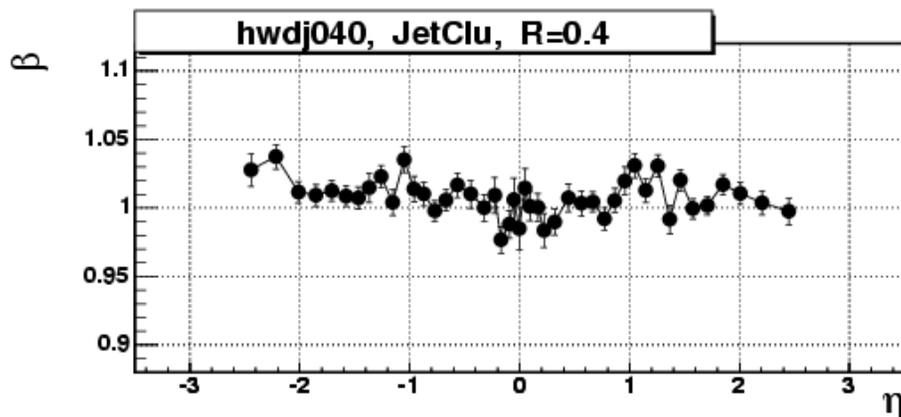
Dijet balancing in Herwig dijet samples after corrections from Pythia are applied:  
deviation of  $\beta$  from 1

→ Pythia – Herwig difference

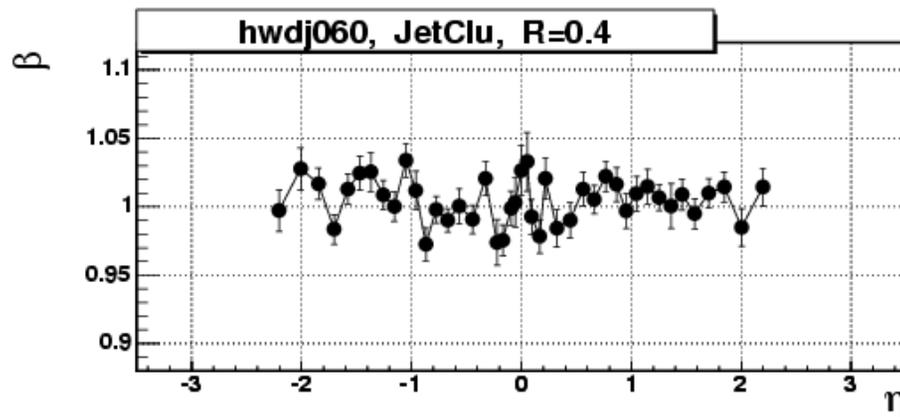
$25 < p_T^{ave}(jet_{1,2}) < 55 \text{ GeV}/c$



$55 < p_T^{ave}(jet_{1,2}) < 75 \text{ GeV}/c$



$75 < p_T^{ave}(jet_{1,2}) < 105 \text{ GeV}/c$



- Preliminary relative corrections for MC are obtained from Pythia dijet MC
- Large difference is found between Pythia and Herwig at low jet Pt: need to be understood