Jet Shapes using MidPoint

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QCD Meeting 9th April 2004 (update)

Comments (pre-blessing)

- Remove data samples with (zVertex Collection Problems)
  - No effect on results (a vertex was required….but luminosity changes)
- Show systematic uncertainties in (%)
- Define set of plots for Blessing
- Compute data/MC ratios for final measurements
- Smooth the MC predictions for plot at fixed r
- Update CDF Note

CDF-NOTE 6952 (updated 8th April)

http://www-cdf.fnal.gov/internal/physics/qcd/shapes/shapes.html

Event Selection

- Using MidPoint Algorithm (R=0.7) (merging at 75%)

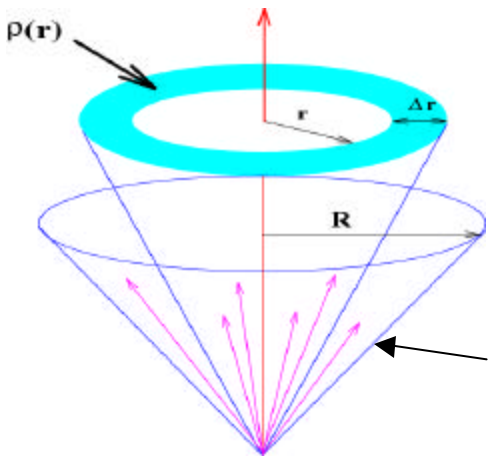
- Using all Jet Data before Shutdown (~170 pb-1)
  - J5 (for Pt > 30 GeV)
  - J20 (for Pt > 45 GeV)
  - J50 (for Pt > 70 GeV)
  - J70 (for Pt > 95 GeV)
  - J100(for Pt > 130 GeV)

  } No trigger bias

- Selection Cuts
  - Good run list 4.0 (QCD no silicon) **run < 166328**
  - At least one central jet (0.1 < |Y| < 0.7) with Pt> 30 GeV
  - MET_significance < 3.5 GeV^-1/2
  - |V_z| < 60 cm
  - N(vxt) = 1

Jet Shape Definition

Differetial Jet Shape



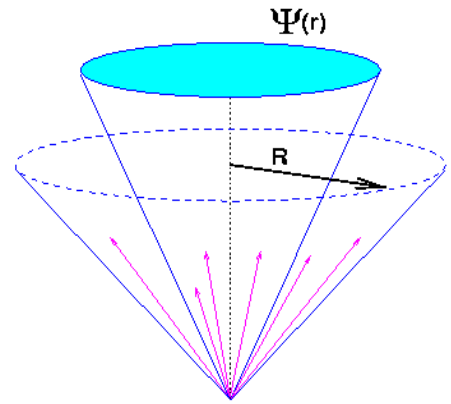
$0.5\,\mathrm{GeV} < P_T^{track} < 100\ GeV$

$|h^{track}| < 1.5$

$|z^{track} - V_z| < 2\,\mathrm{cm}$

$\Delta R(\mathrm{track - jet}) < 0.7$

Integrated Jet Shape Definition



$$r(r) = \frac{1}{\Delta r}\frac{1}{N_{jet}}\sum_{jets}\frac{P_T(r \pm \Delta r/2)}{P_T(0,R)}$$

$$\Psi(r) = \frac{1}{N_{jets}}\sum_{jets}\frac{P_T(0,r)}{P_T(0,R)}$$

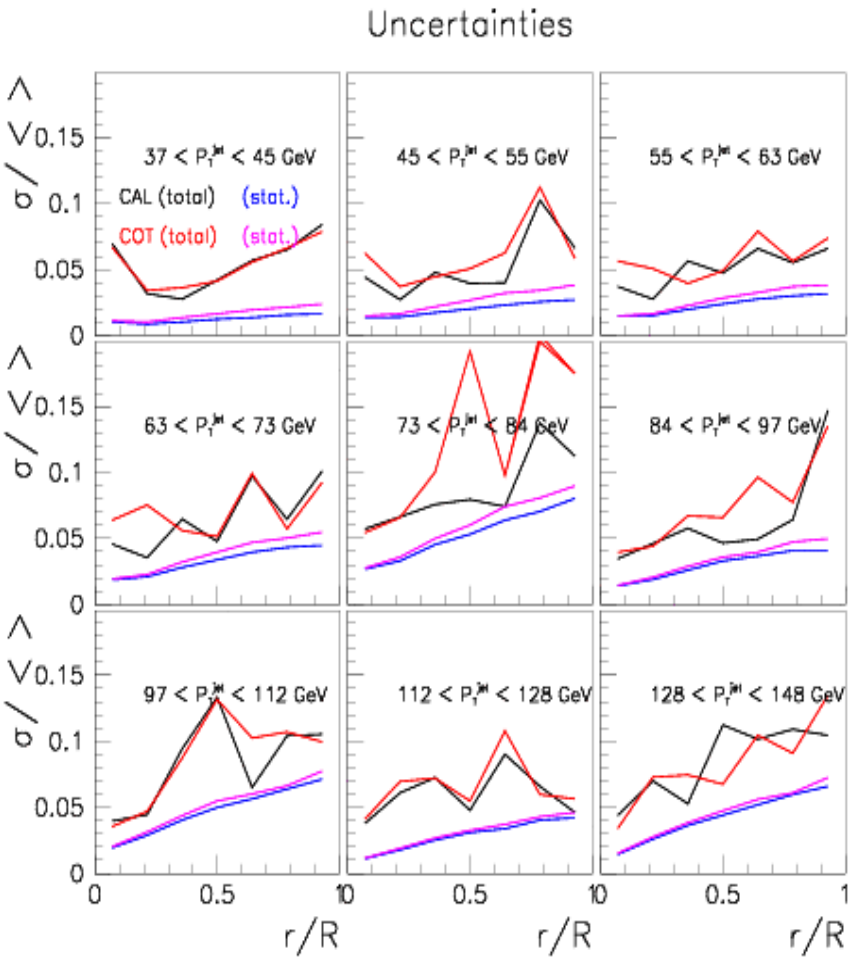
$$p(r) = \frac{1}{\Delta r}\frac{1}{N_{jet}}\sum_{jets}\frac{N^{tracks}(r \pm \Delta r/2)}{N^{tracks}(0,R)}$$

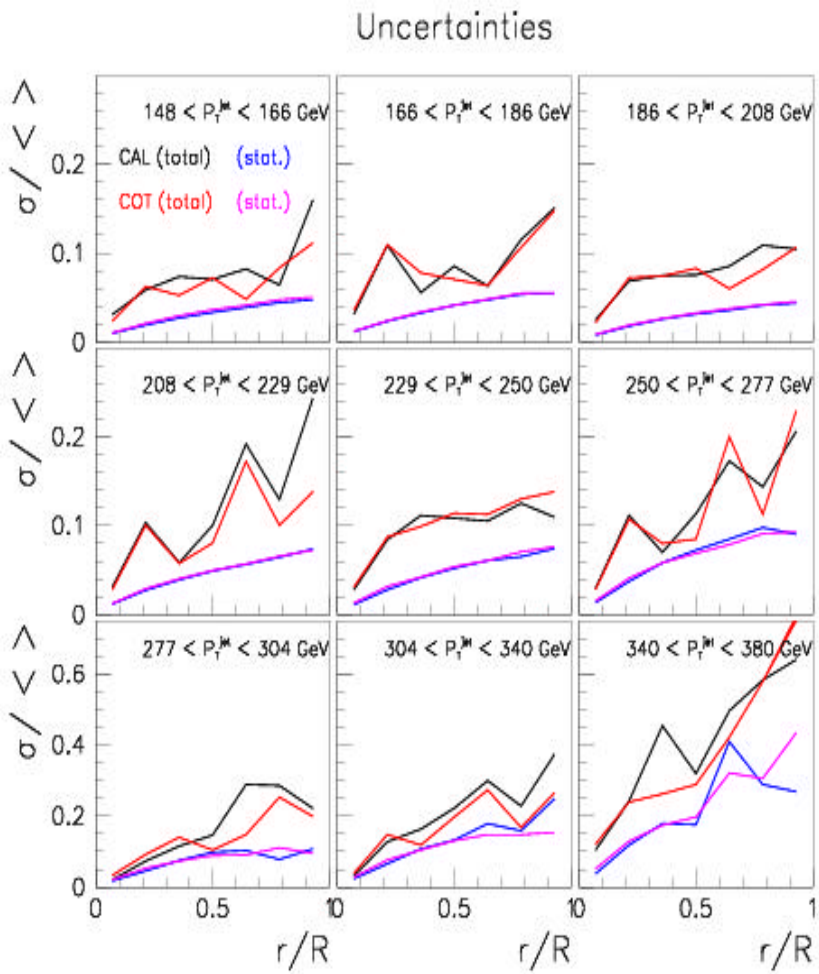
using both CAL and COT

Systematic Uncertainties

- Instantaneous Luminosity
  - Investigate possible dependence on Inst. Lumi (possible remaining effects on pile-ups ?)
- Jet Energy Scale:
  - 5% variation on measured jet energy
- Parton Shower Modeling
  - Unfolding using Herwig instead of Pythia
- CDF Simulation
  - Compute CAL/COT ratio of raw measurements and compare it with CAL/COT ratio in MC…if double ratio is not = 1 → included in systematics

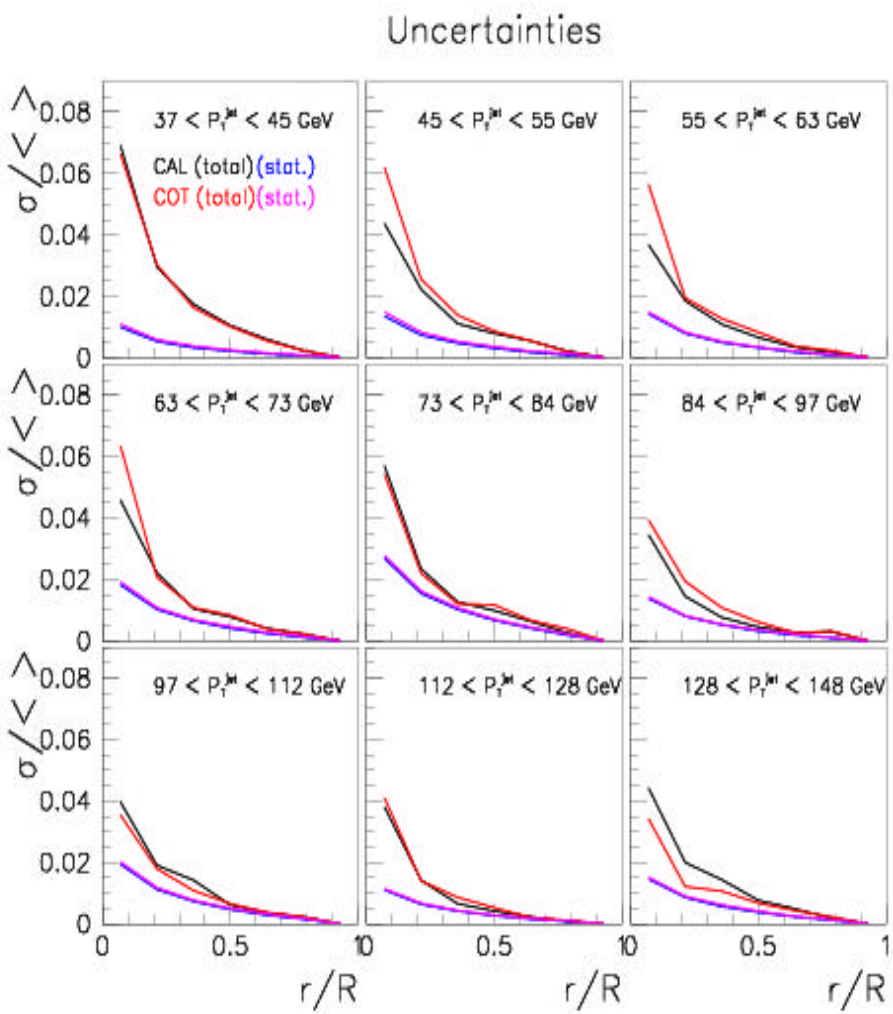
Total Uncertainty on ρ(r)

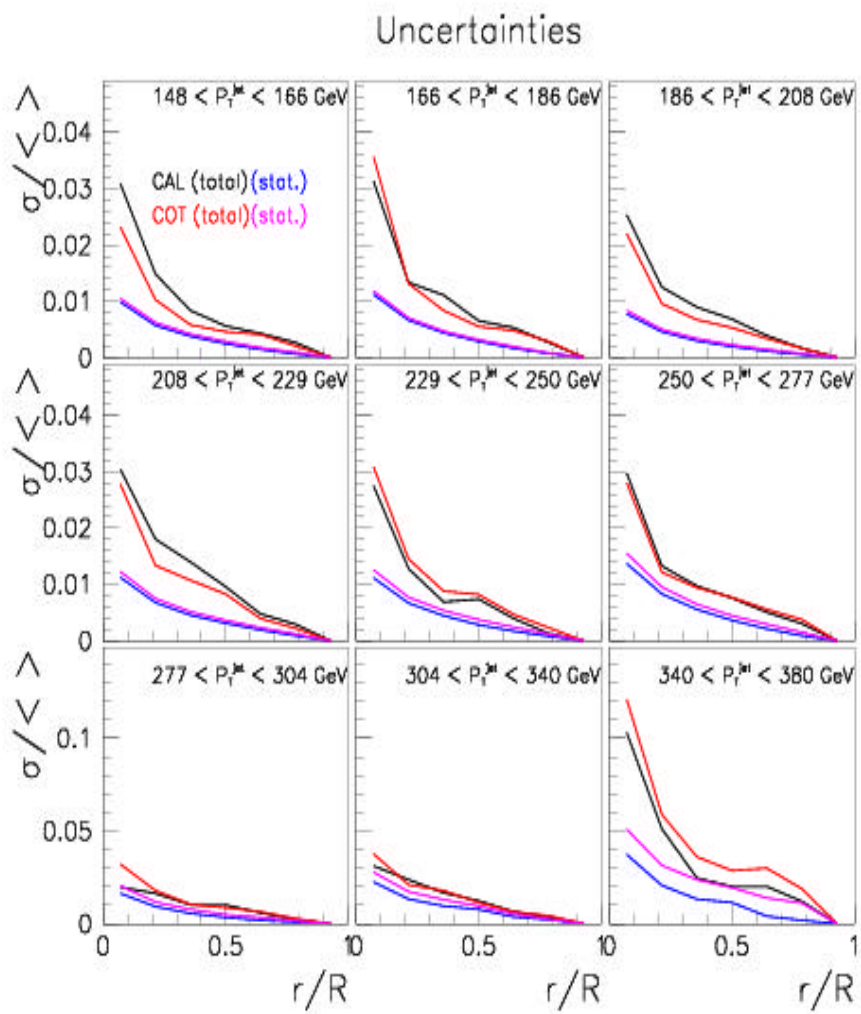




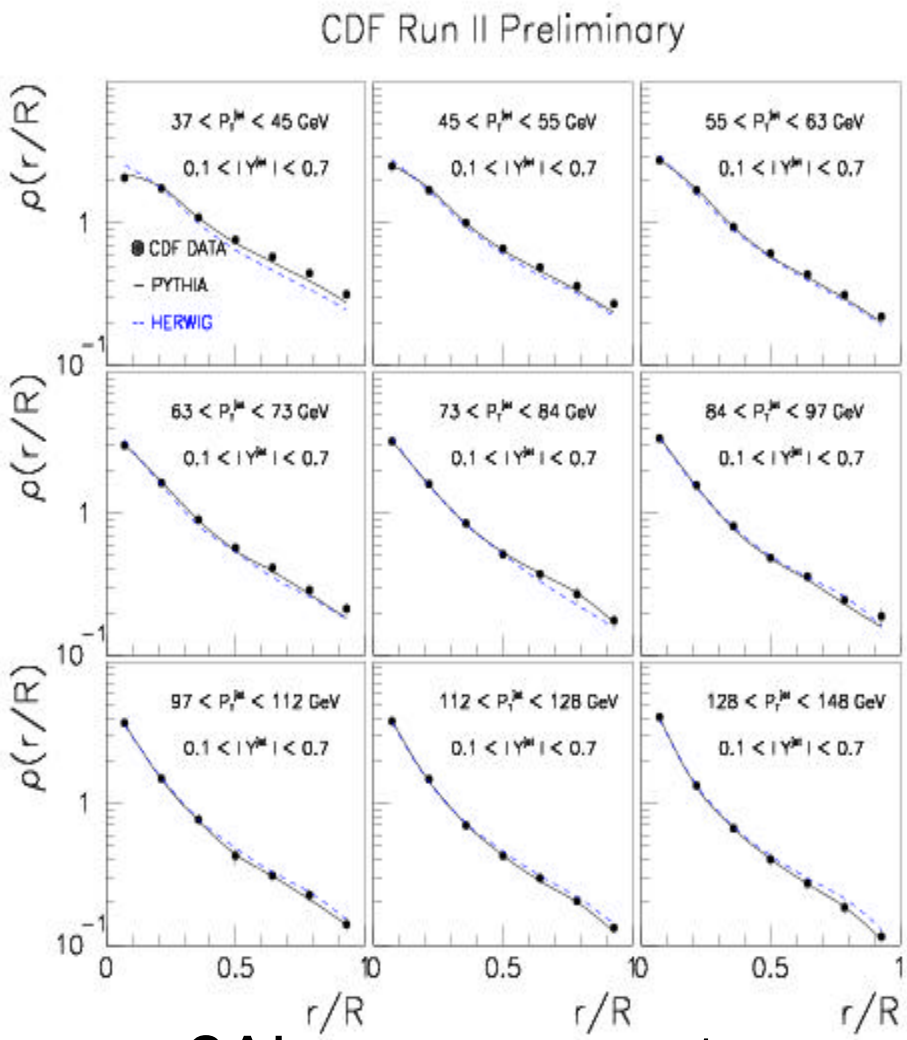
…sensitive to Herwig MC statistics…

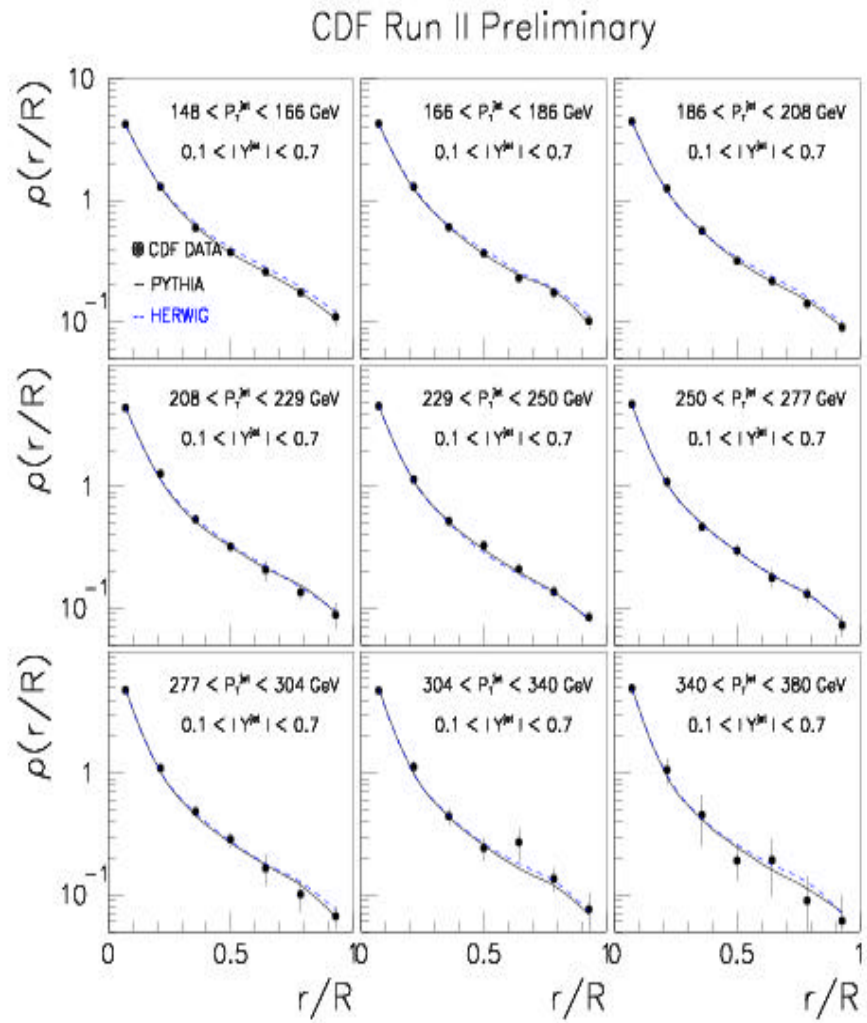
Total Uncertainty for Ψ(r)





Results for Blessing (I)



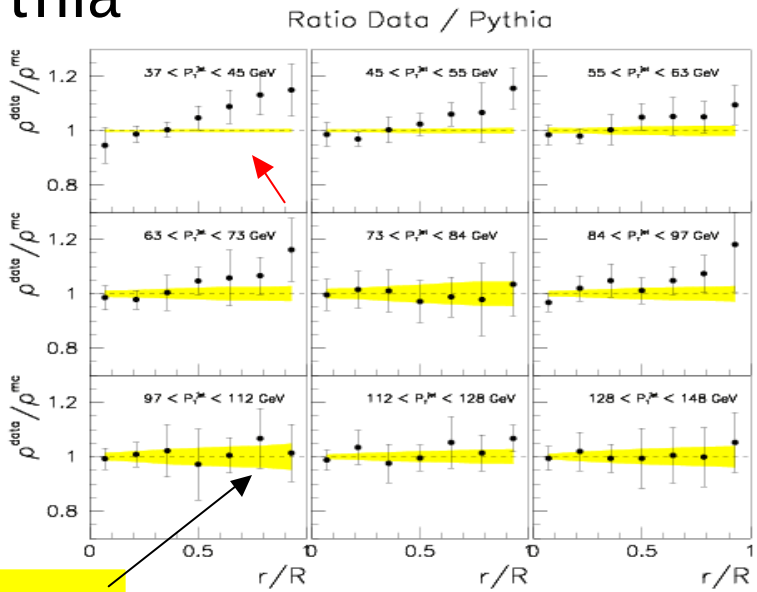


…CAL measurements presented for blessing….

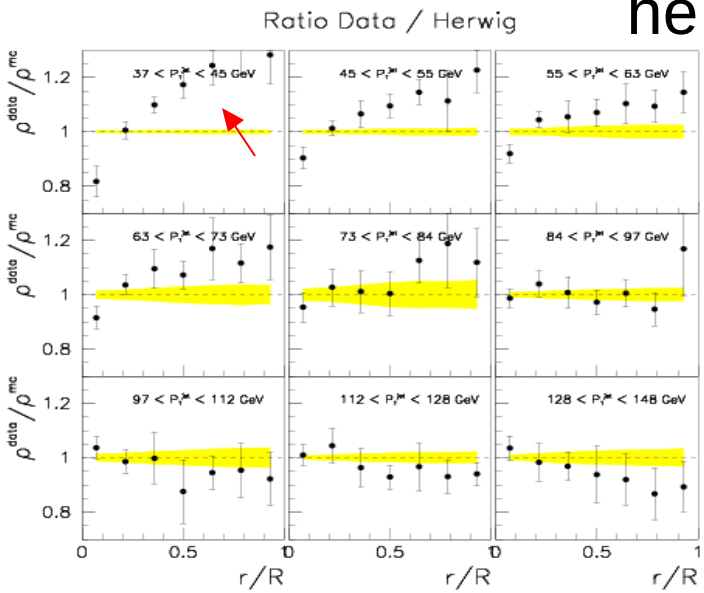
DATA/MC plots

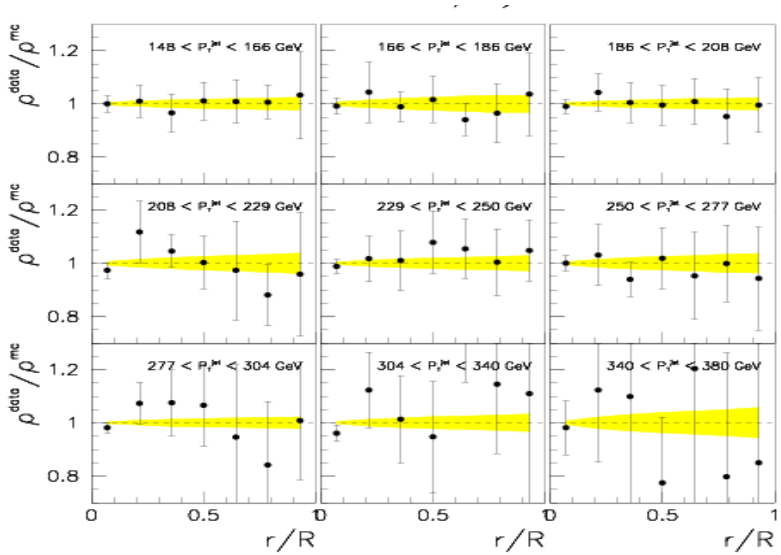
pythia

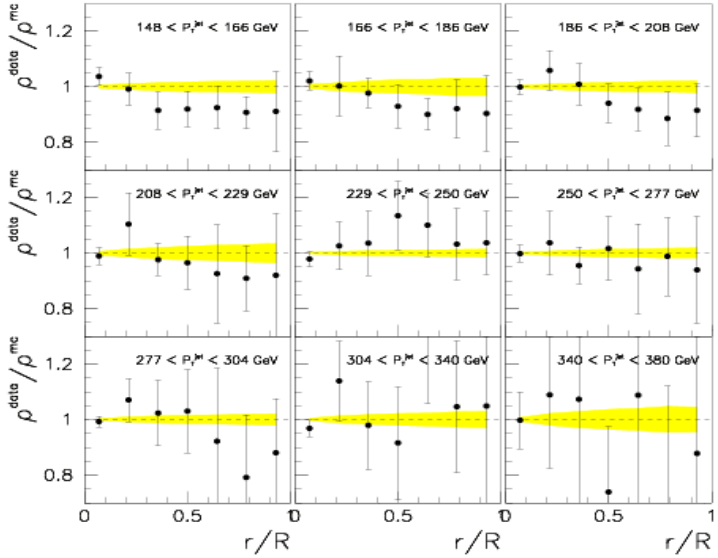
herwig



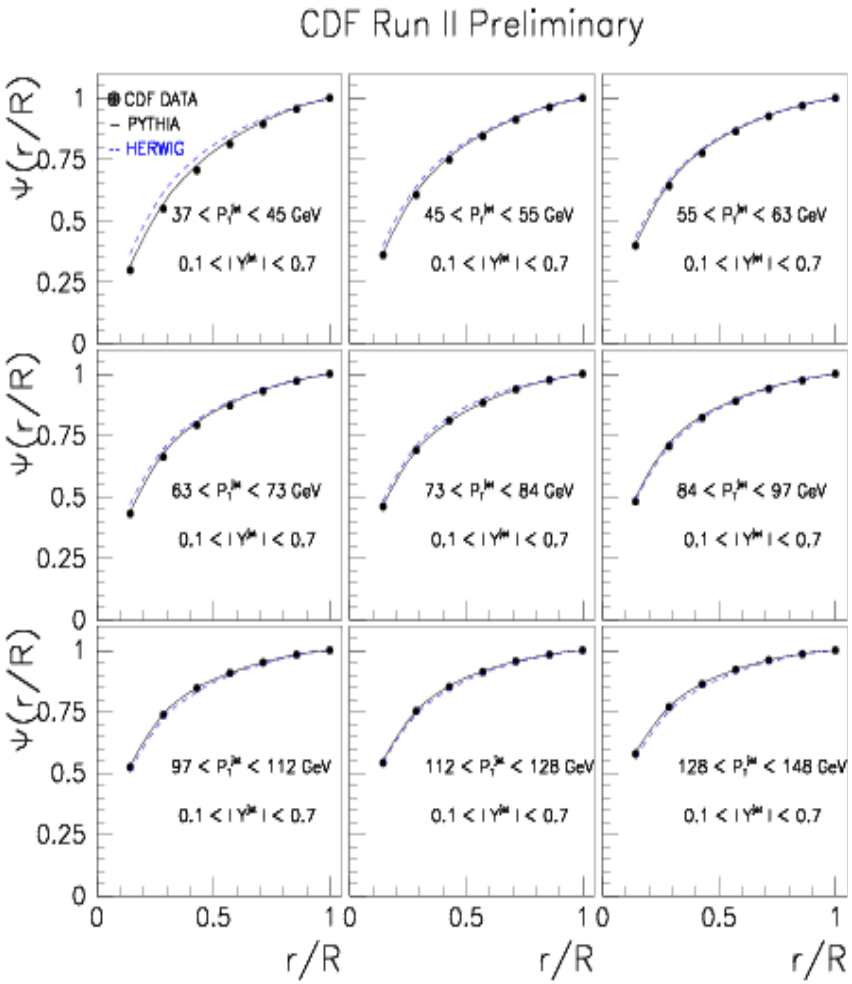
MC error

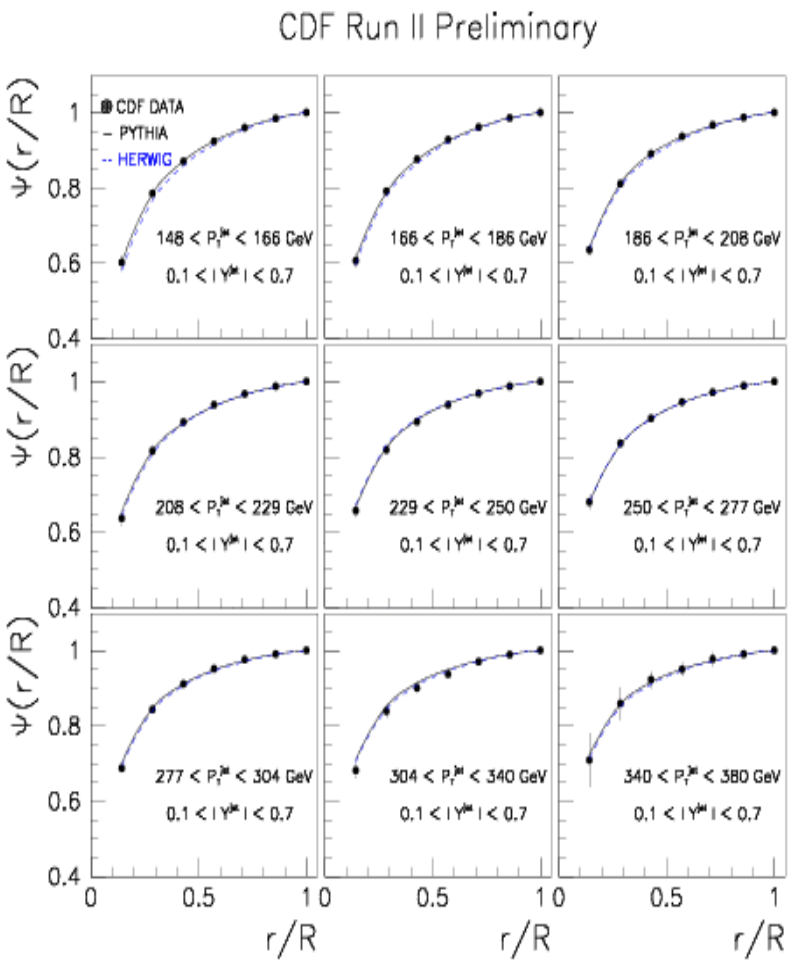




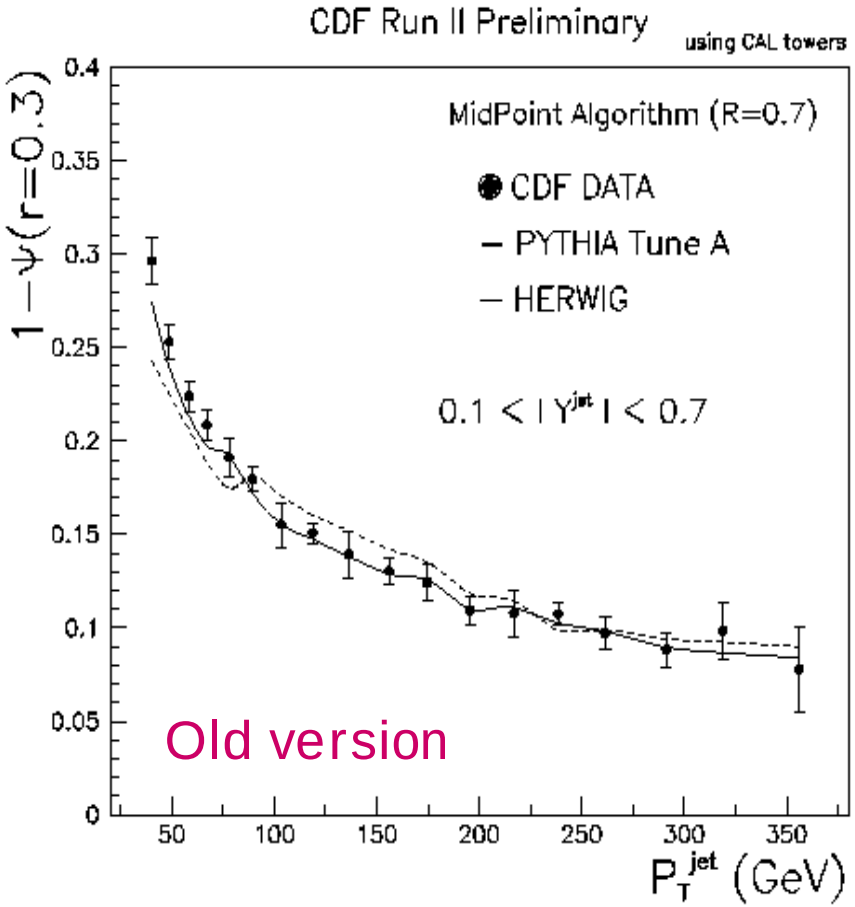


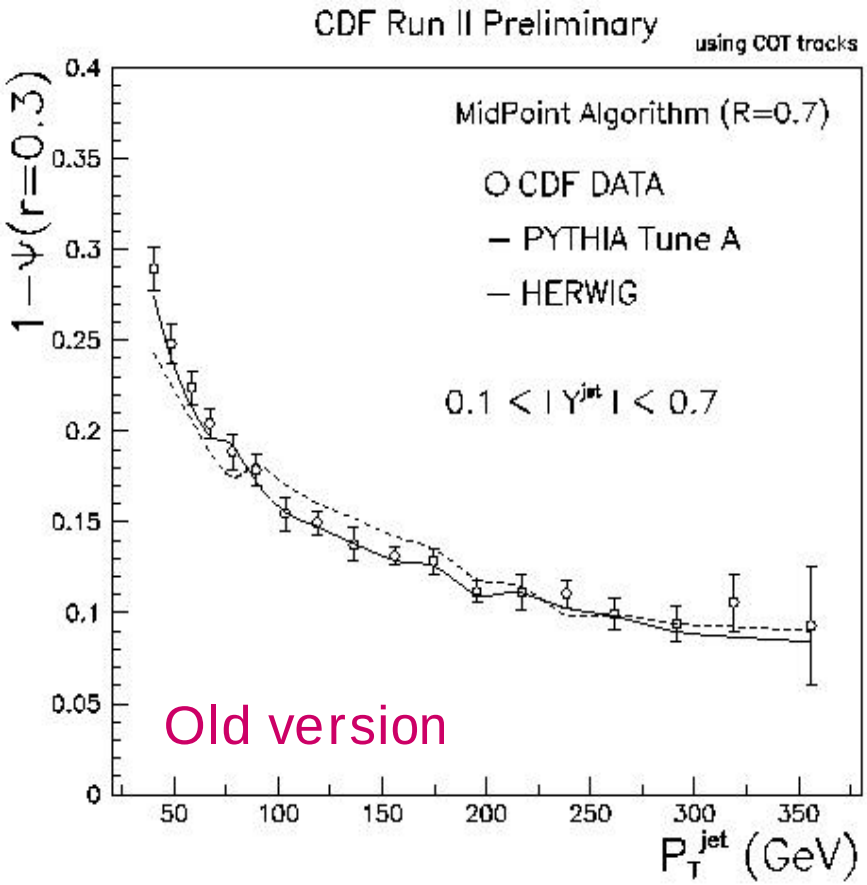
Results for Blessing (II)



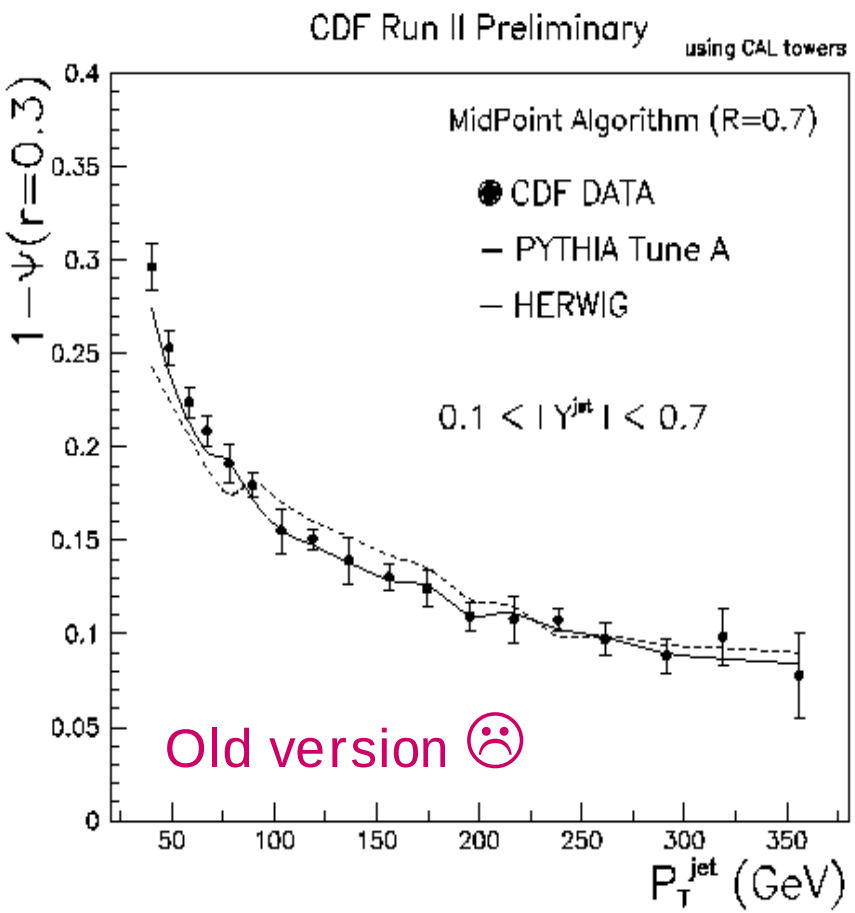


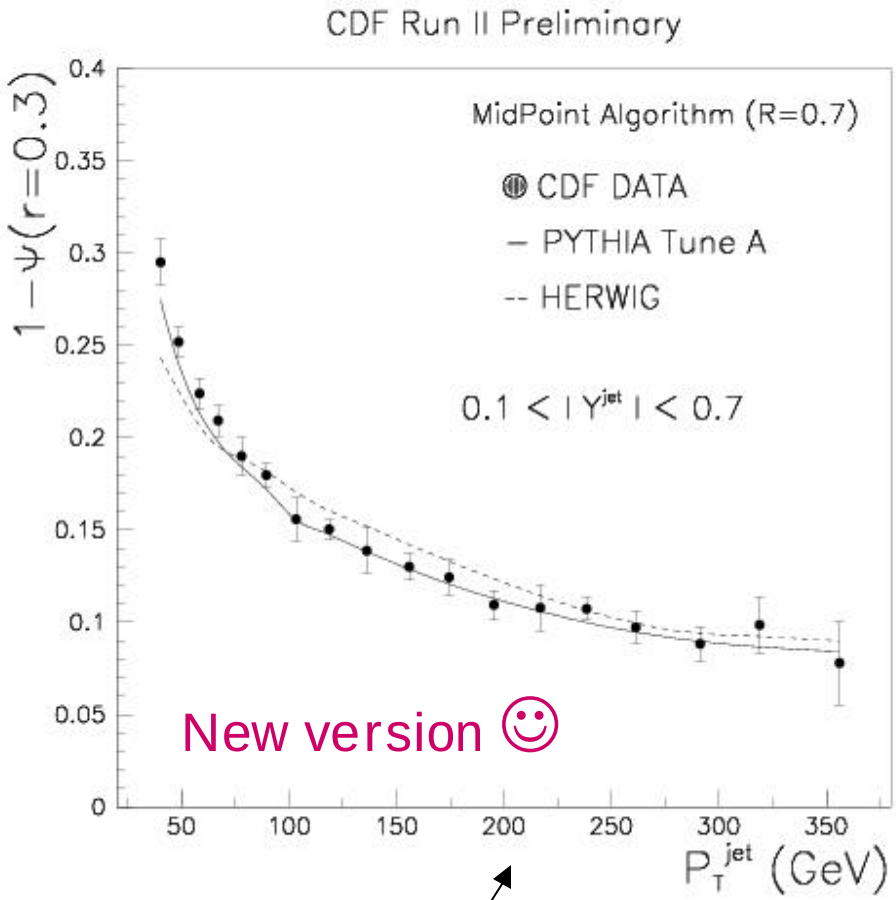
Please…smooth predictions …





...smooth predictions ...





...for blessing....

Plans and Prospects

- Still working on the paper draft and comparison with NLO parton level calculations.....