Jets in Data

DØ Collaboration meeting: November 7, 2001

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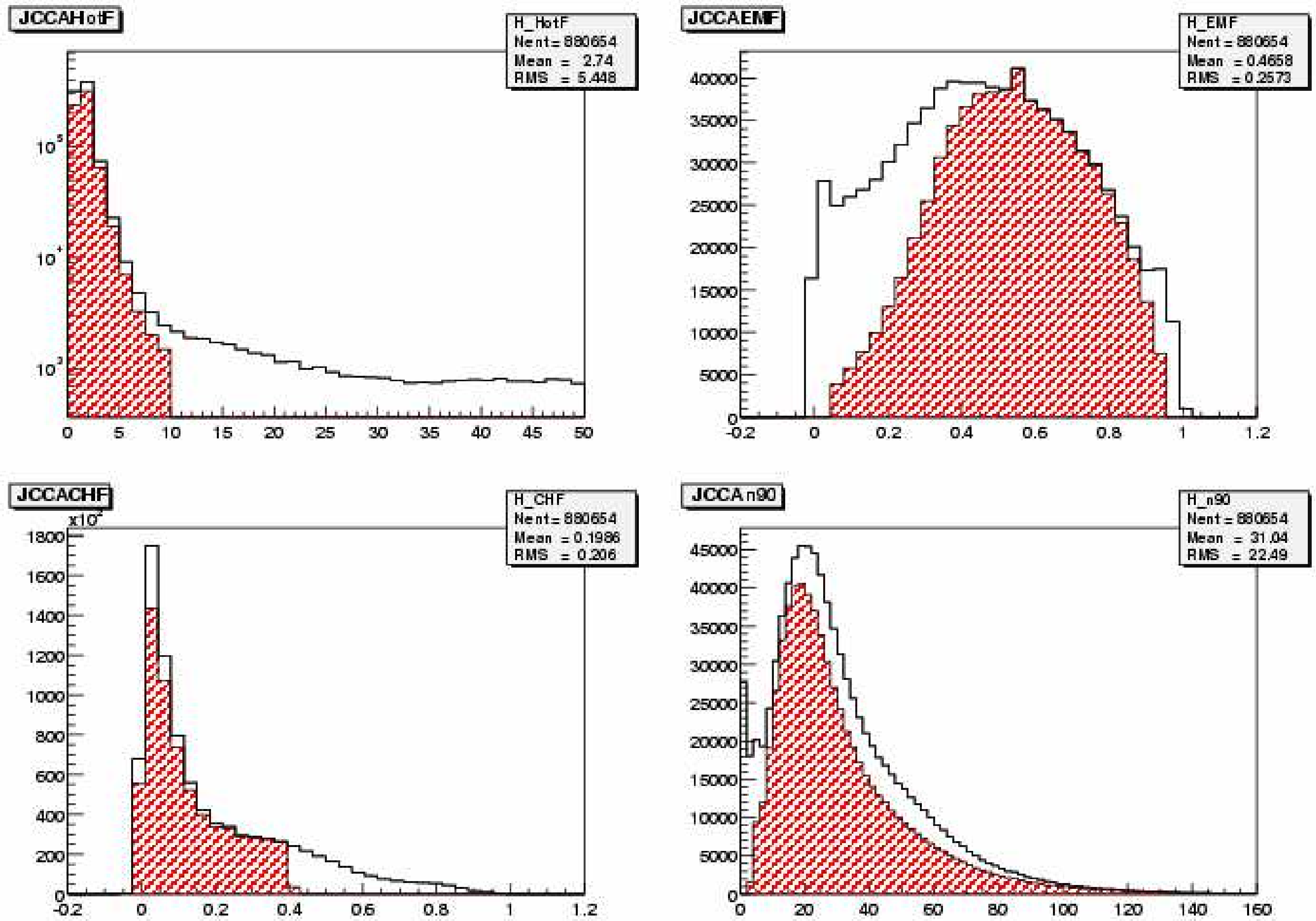
data sample

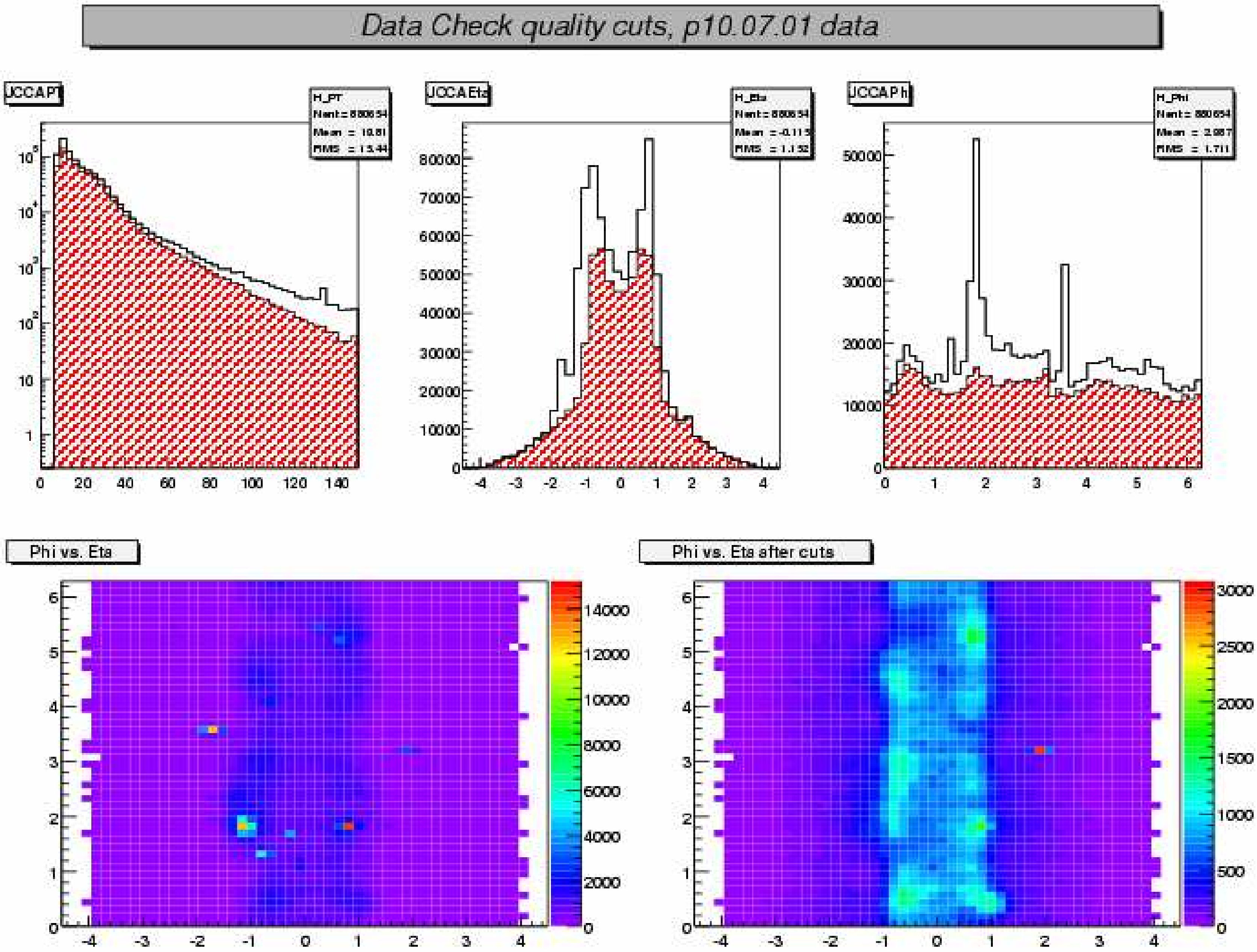
- data reprocessed with p10.07.01
- two samples
  - October data (luminosity about $90\,\text{nb}^{-1}$)
  - all data (luminosity about $0.7\,\text{pb}^{-1}$), 3.8 million events
- problem with mark and pass events
  - only October data have proper information which allows to distinguish between the case when event passed the physics L3 trigger and the case when event was just marked and passed
- stripped data
  - only events that passed `JT_LO`, `JT_HI`, and `CJT40` triggers accepted
- jets only in central region with $|\eta| < 0.5$

jet quality cuts

- RunI jet quality cuts
  - $0.05 < EMF < 0.95$
  - $CHF < 0.4$
  - $HotF < 10$
  - $n90 > 1$

Data Check quality cuts, p10.07.01 data




Data Check quality cuts, p10.07.01 data
UCCAPT
H_PT
Nent = 880654
Mean = 10.81
RMS = 13.44
UCCAEta
H_Eta
Nent = 880654
Mean = -0.115
RMS = 1.152
UCCAPhi
H_Phi
Nent = 880654
Mean = 2.987
RMS = 1.711
Phi vs. Eta
Phi vs. Eta after cuts

jet energy corrections

- M_Z factor $(91/86 \approx 1.06)$
- energy response correction (used RunI values)

$$\mathrm{JCCA}: 0.6802 + 0.0422 \log E - 0.0013 \log^2 E$$

$$\mathrm{JCCB}: 0.6807 + 0.0429 \log E - 0.0014 \log^2 E$$

$$\mathrm{JKCA}: 0.7174 + 0.0399 \log P - 0.0007 \log^2 P$$

- showering corrections for cone (RunI values)
  - for cone $R = 0.7$ negligible

$$0.987 + 0.000065 * E\,, \qquad E < 200\,\mathrm{GeV}$$

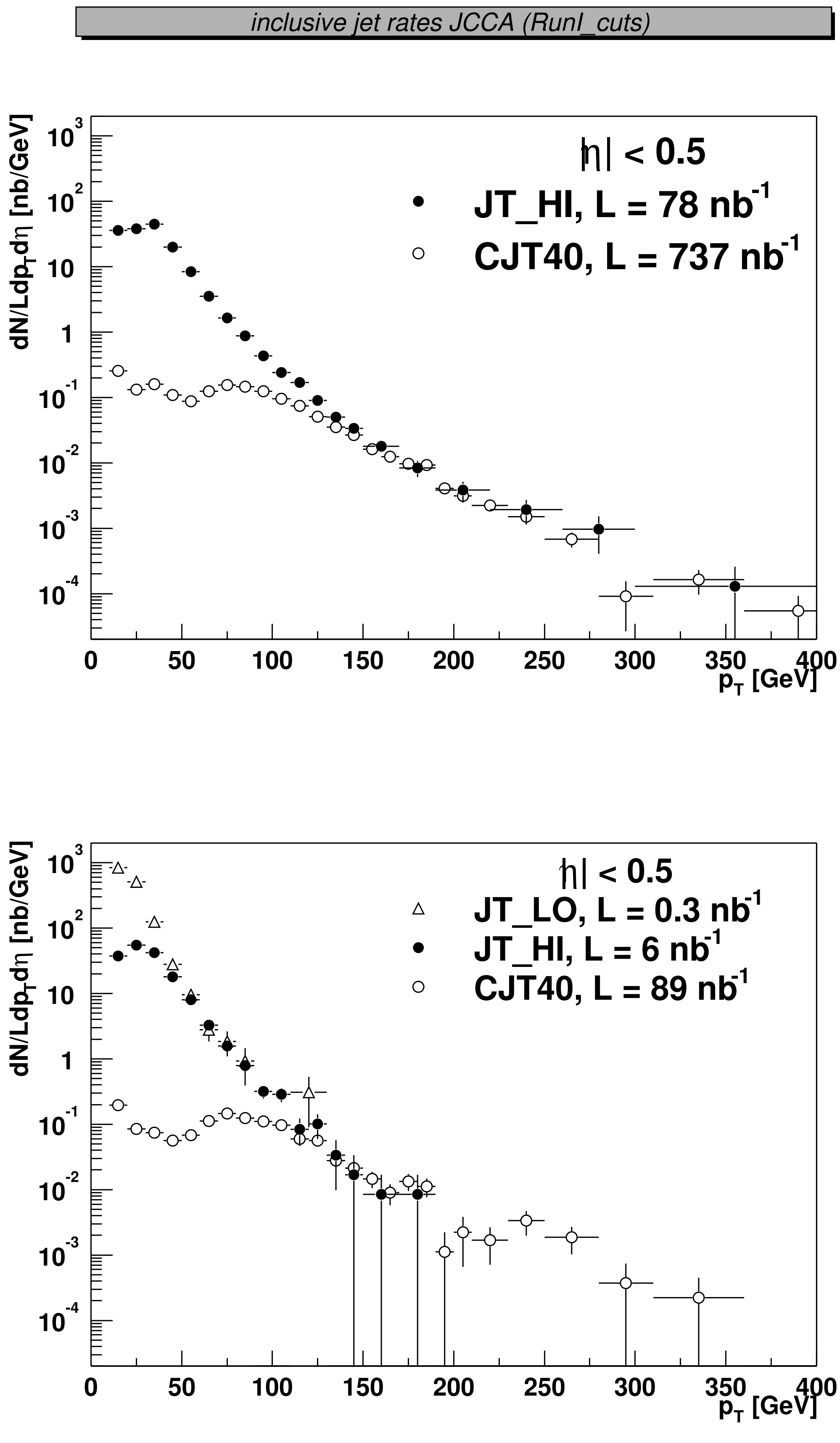
  - for cone $R = 0.5$

$$0.892 + 0.019 * \log(E)\,, \qquad E < 260\,\mathrm{GeV}$$

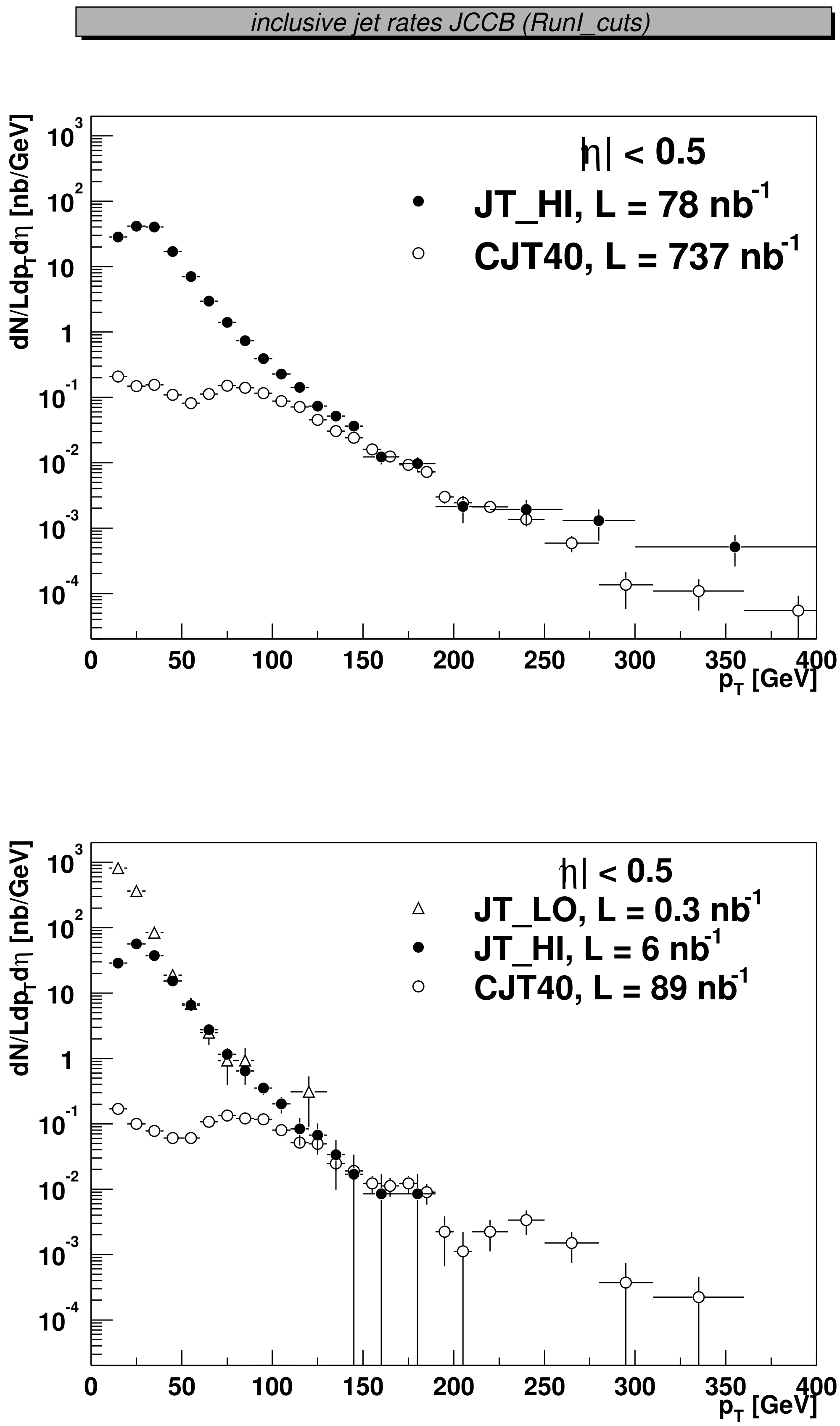
- for jet resolution purpose plots were made also not using any jet energy corrections

jet rates

- triggers
  - `JT_LO`
  - `JT_HI`
  - `CJT40`
- normalization
  - L1 luminosity provided by `lm_access` package
- October data
  - all triggers match each other
- all data
  - `JT_HI` and `CJT40` match and look similar to October sample
  - `JT_LO` is off by factor of 2 in all data sample

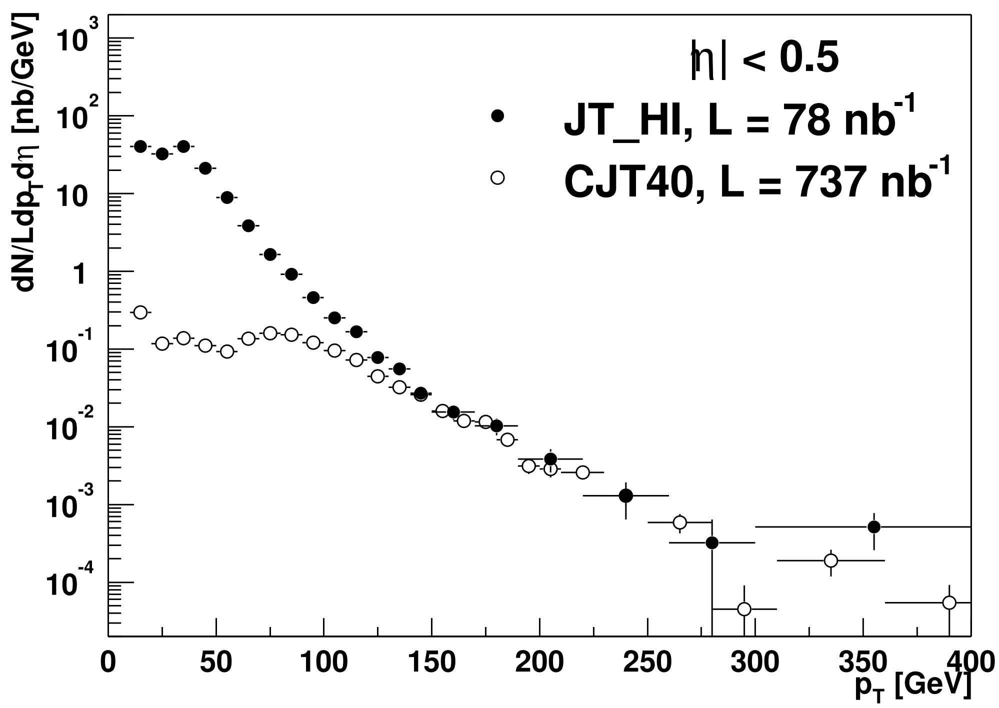


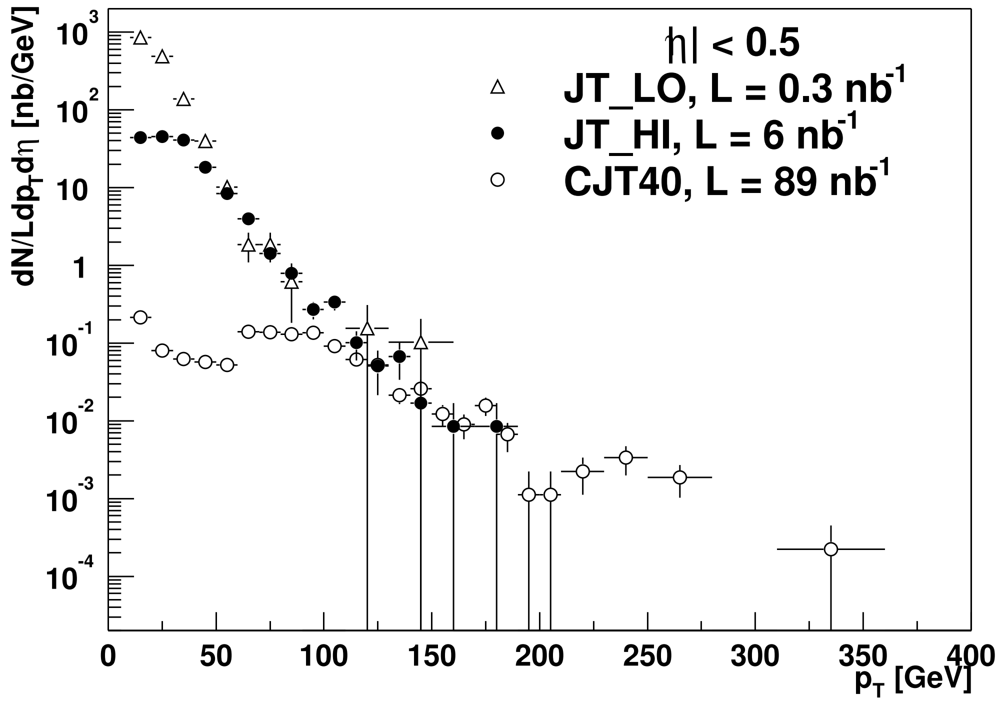
inclusive jet rates JCCA (RunI_cuts)
dN/Ldp_T dη [nb/GeV]
|η| < 0.5
JT_HI, L = 78 nb^-1
CJT40, L = 737 nb^-1
p_T [GeV]
dN/Ldp_T dη [nb/GeV]
|η| < 0.5
JT_LO, L = 0.3 nb^-1
JT_HI, L = 6 nb^-1
CJT40, L = 89 nb^-1
p_T [GeV]



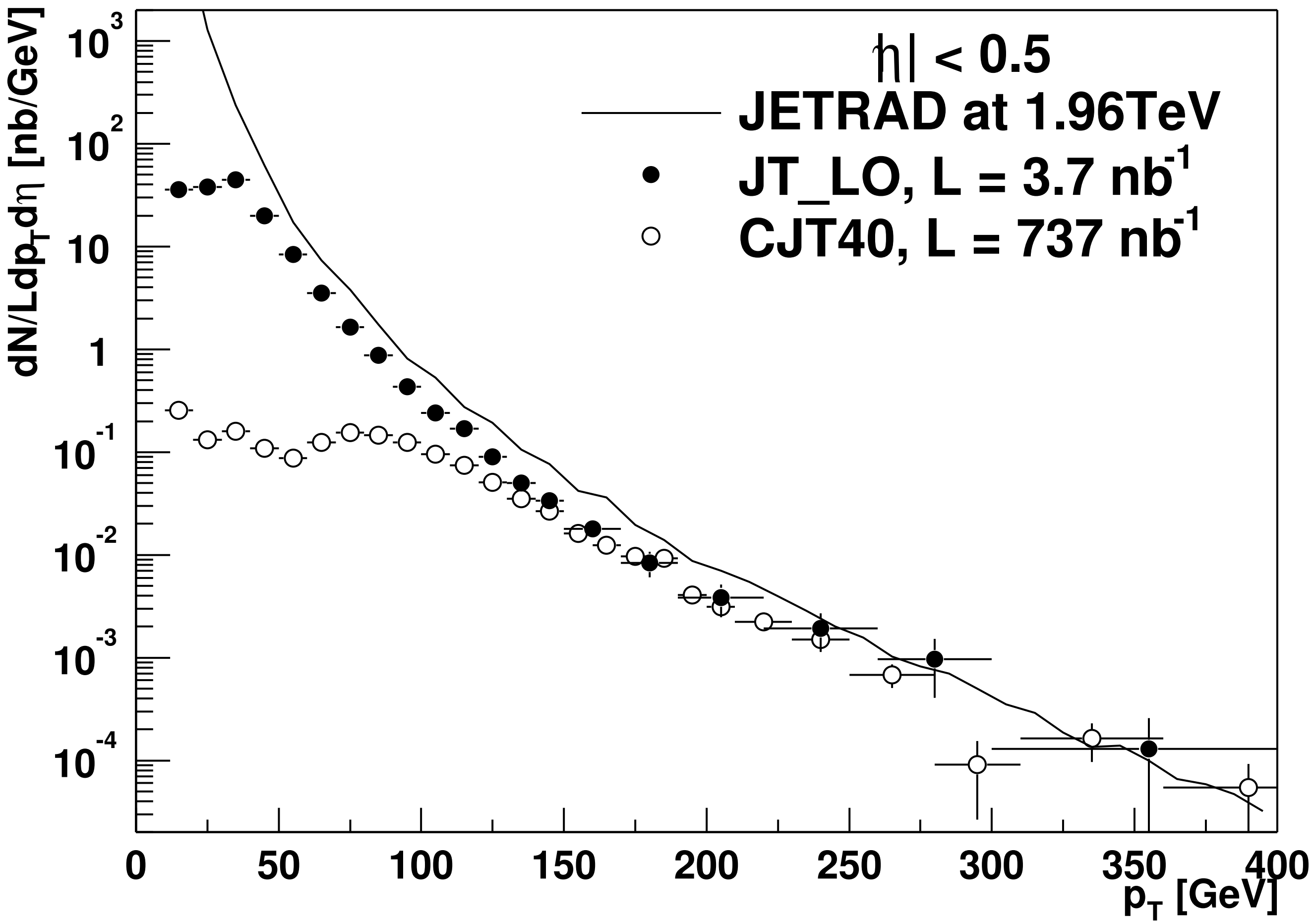
inclusive jet rates JCCB (RunI_cuts)
|η| < 0.5
JT_HI, L = 78 nb-1
CJT40, L = 737 nb-1
dN/Ldp_T dη [nb/GeV]
p_T [GeV]
|η| < 0.5
JT_LO, L = 0.3 nb-1
JT_HI, L = 6 nb-1
CJT40, L = 89 nb-1
dN/Ldp_T dη [nb/GeV]
p_T [GeV]

inclusive jet rates JKCA (RunI_cuts)





Run II cone R=0.7



jet resolutions

- event cuts
  - only dijet events (before and after applying jet quality cuts)
  - z-position of the primary vertex $|z_{vtx}| < 50\,\text{cm}$
  - back to back jets
    $\Delta\phi > 175^\circ$ for data sample with jet energy corrections
    $\Delta\phi > 165^\circ$ for data sample without jet energy corrections
- asymmetry variable A

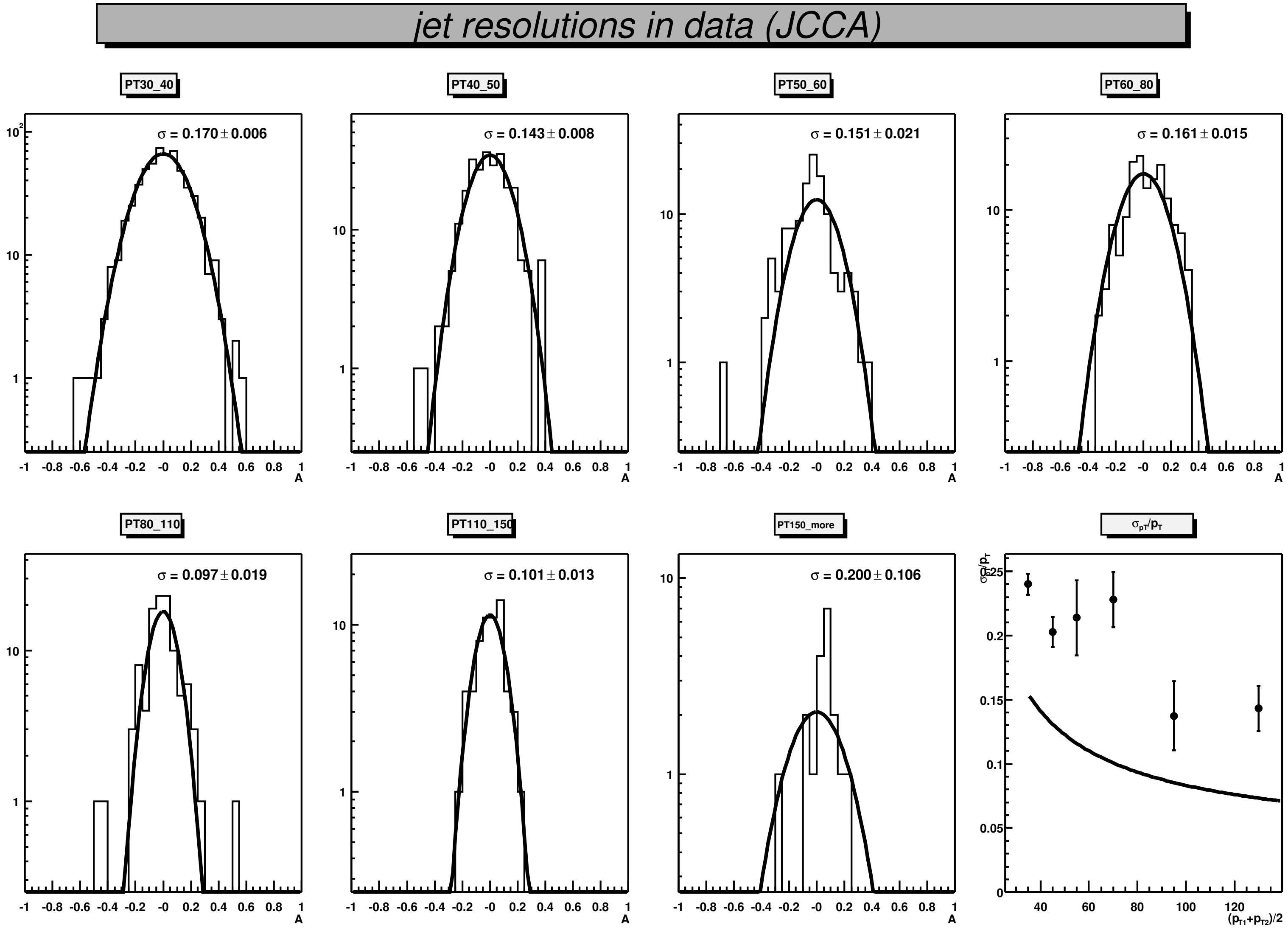
$$A = \frac{p_T^{jet1} - p_T^{jet2}}{p_T^{jet1} + p_T^{jet2}}$$

- jet resolution

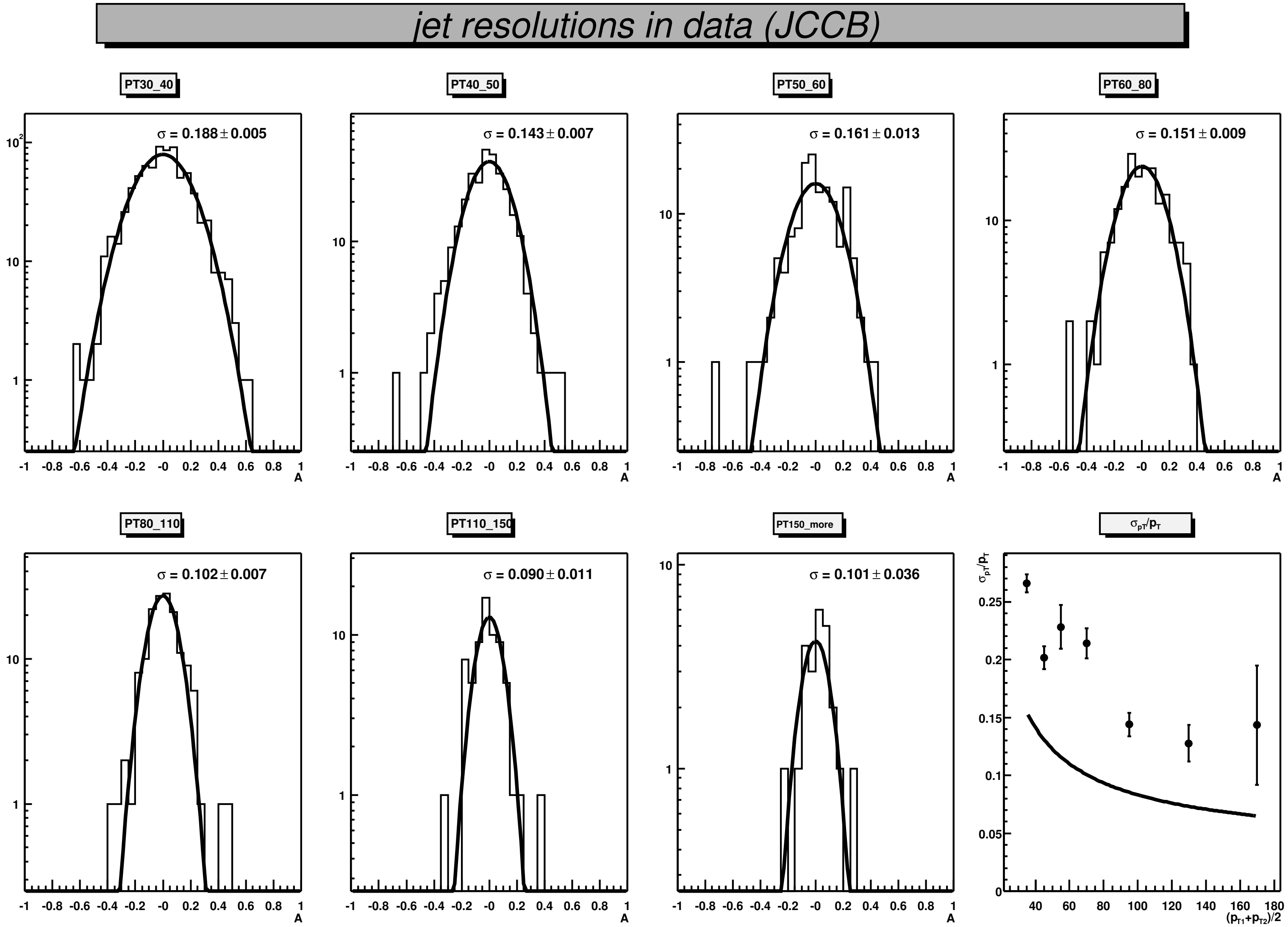
$$\frac{\sigma_{p_T}}{p_T} = \sqrt{2}\sigma_A$$

- Monte Carlo sample (phase mcp08)
  - production release p09.10.00
  - pythia with PtGt40.0 and PtGt80.0, mixed with 0.5 minimum bias event

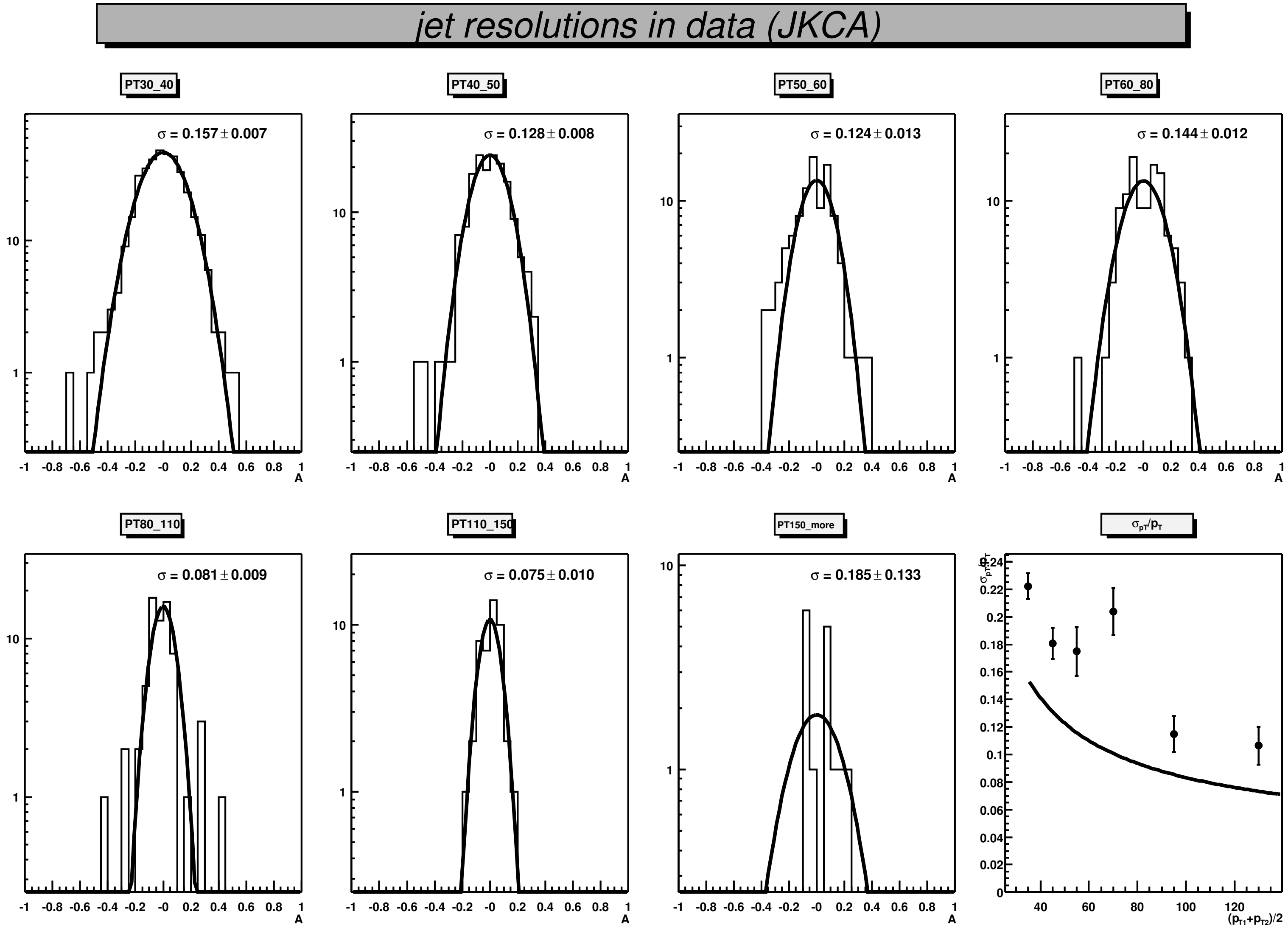
jet resolutions - JCCA



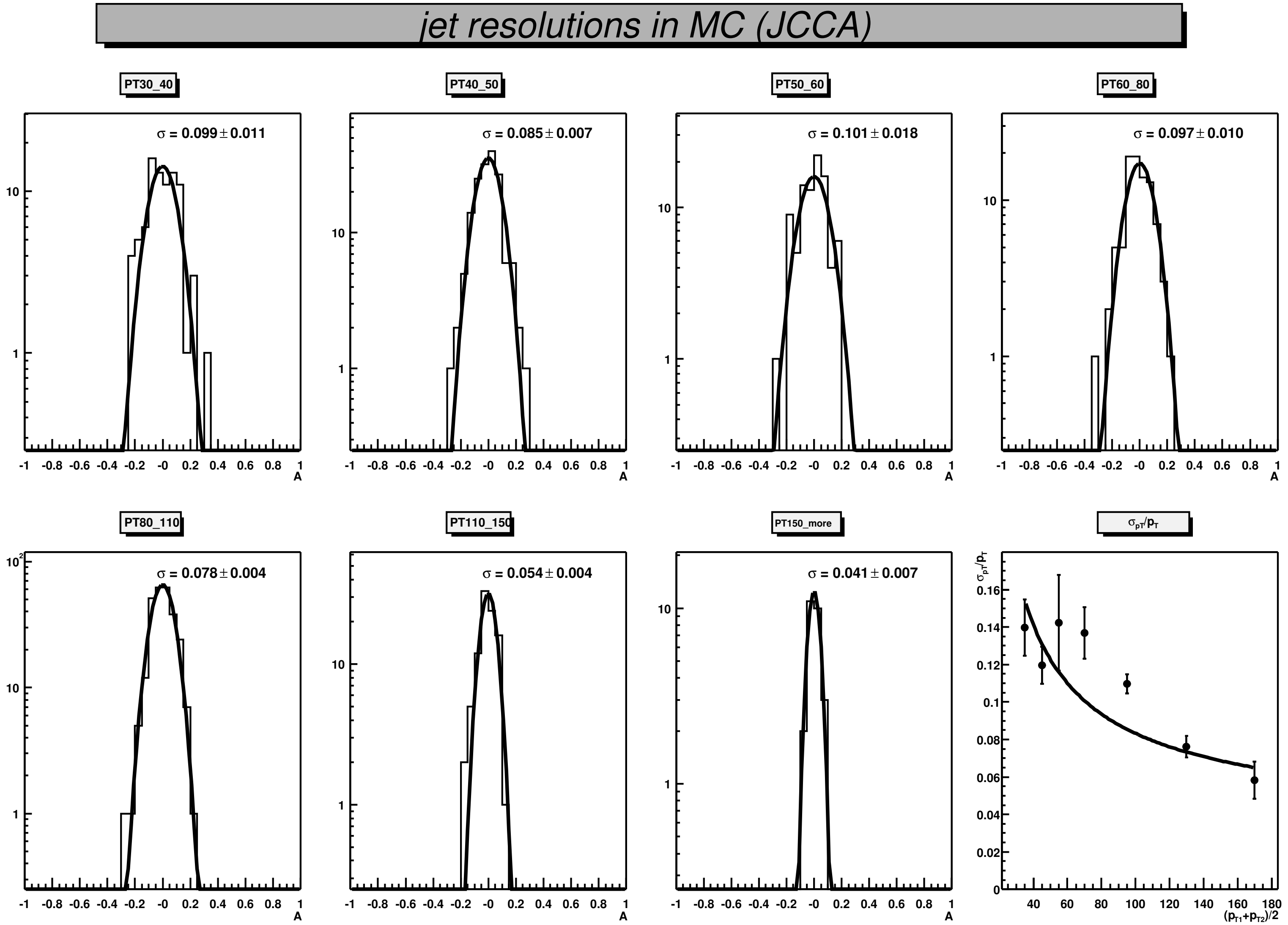
jet resolutions - JCCB



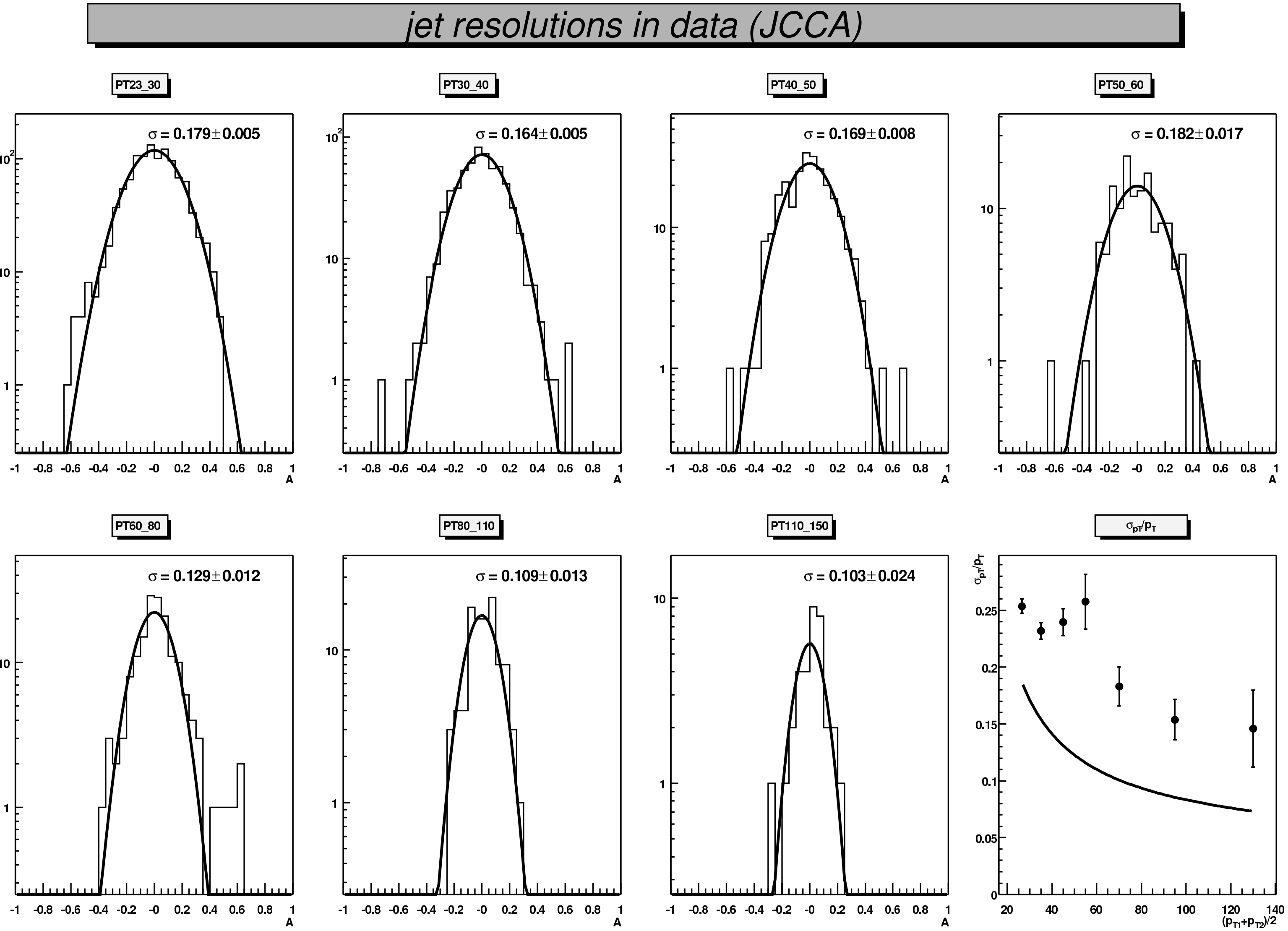
jet resolutions - JKCA



MC jet resolutions - JCCA



jet res. JCCA, uncorr.



MC jet res. JCCA, uncorr.