Jet ID variables for jets in central dijet sample in p13 data and p13.08 MC

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Data sample

- p13.04 and p13.05 data
- single jet triggers JT_25TT_NG, JT_45TT, JT_65TT, and JT_95TT
- selection of good runs, $\mathcal{L} = 37\,\text{pb}^{-1}$

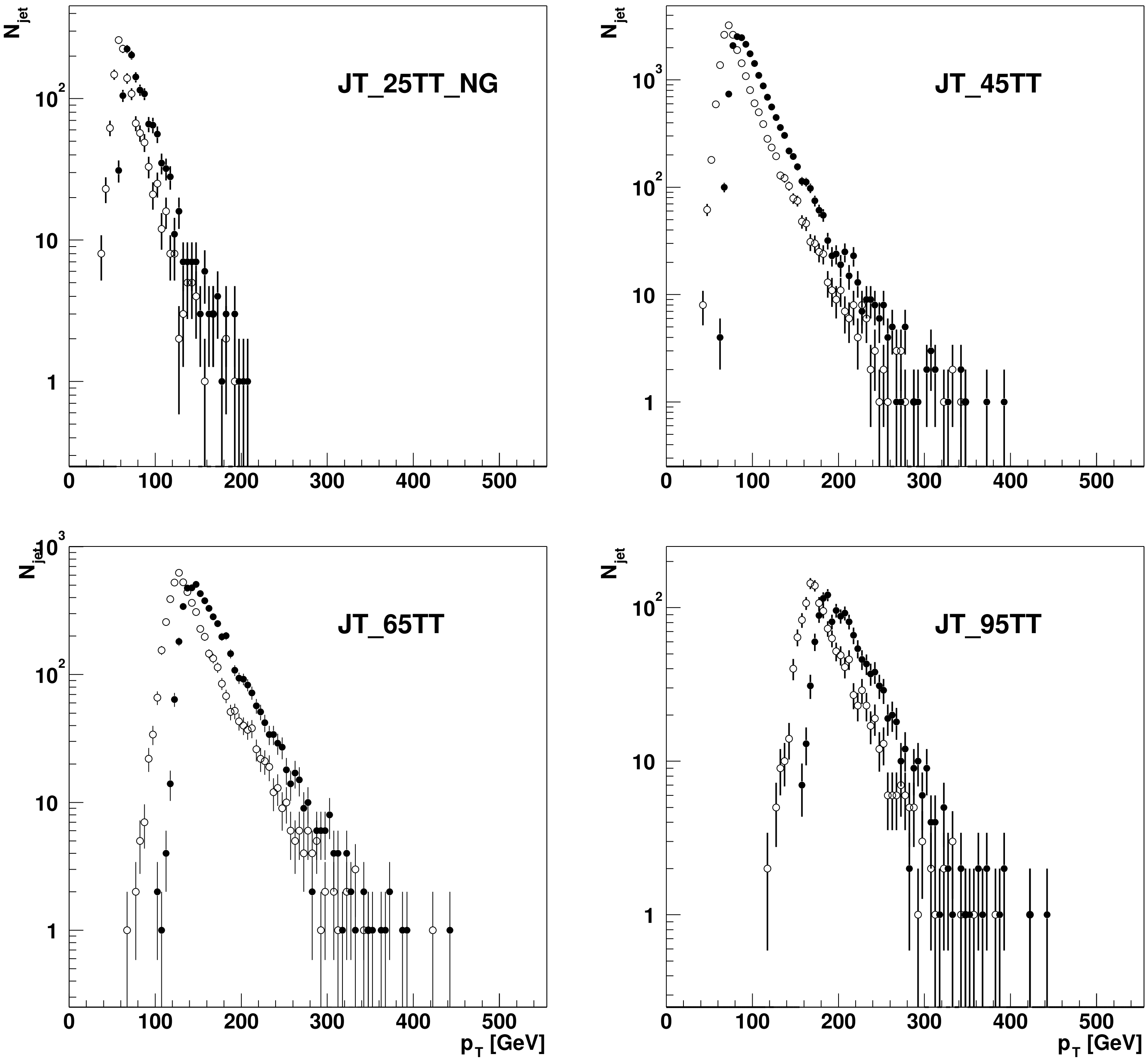
Event selection

- at least two jets
- the two leading jets are in the central region of calorimeter, $|\eta| < 0.5$
- missing E_T is smaller than $0.7\,p_T$ of the leading jet
- z-position of the primary vertex : $|z_{vtx}| < 50\,\text{cm}$
- there are at least 5 tracks associated with the primary vertex
- cut on dijet mass applied in orded to stay above trigger turn-on
  - $150\,\text{GeV}$, $180\,\text{GeV}$, $300\,\text{GeV}$, and $390\,\text{GeV}$

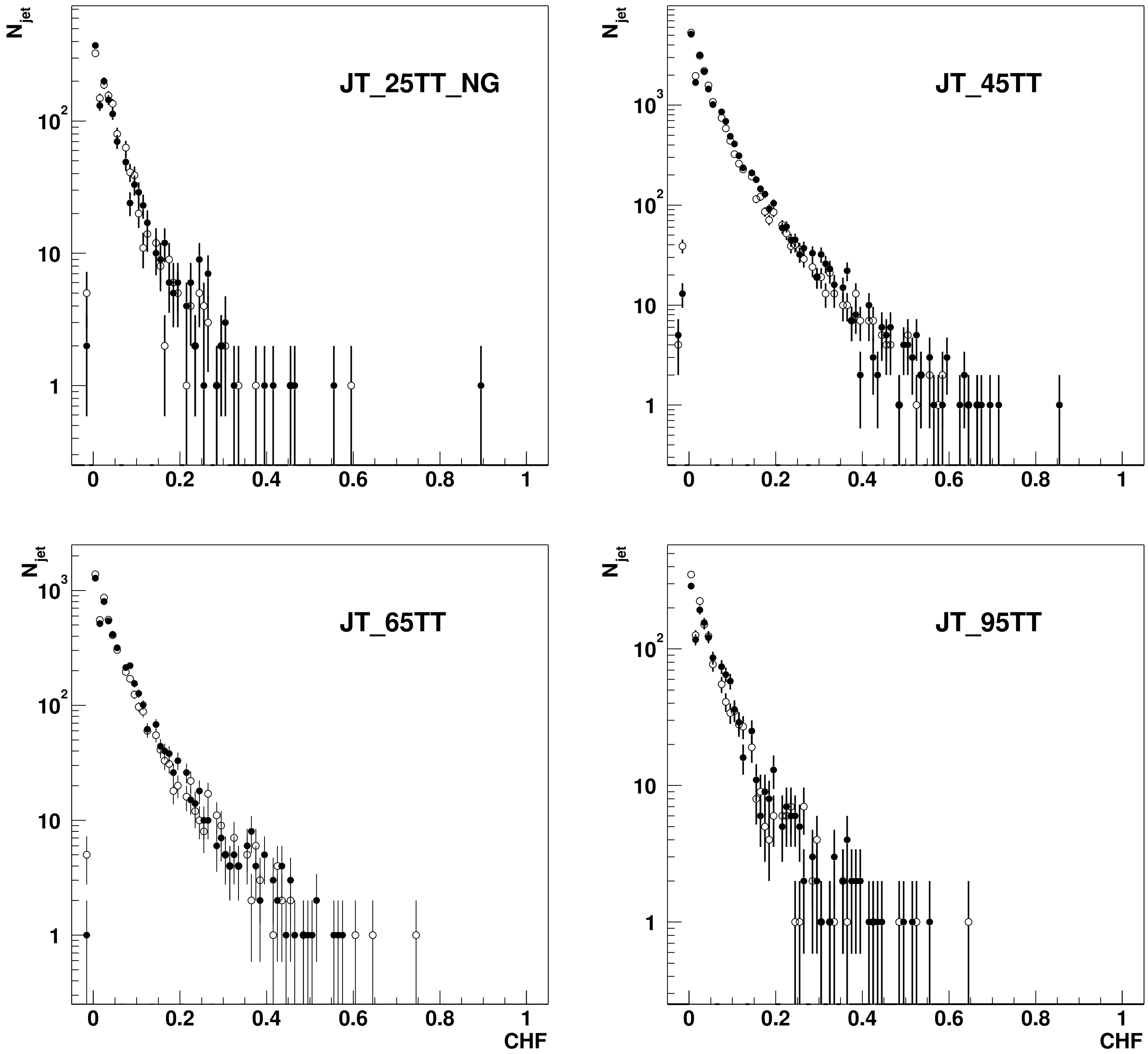
Jet ID variables plots

- all p13 jet ID cuts applied except the plotted one
- distributions of jetID variables for the first two leading jets

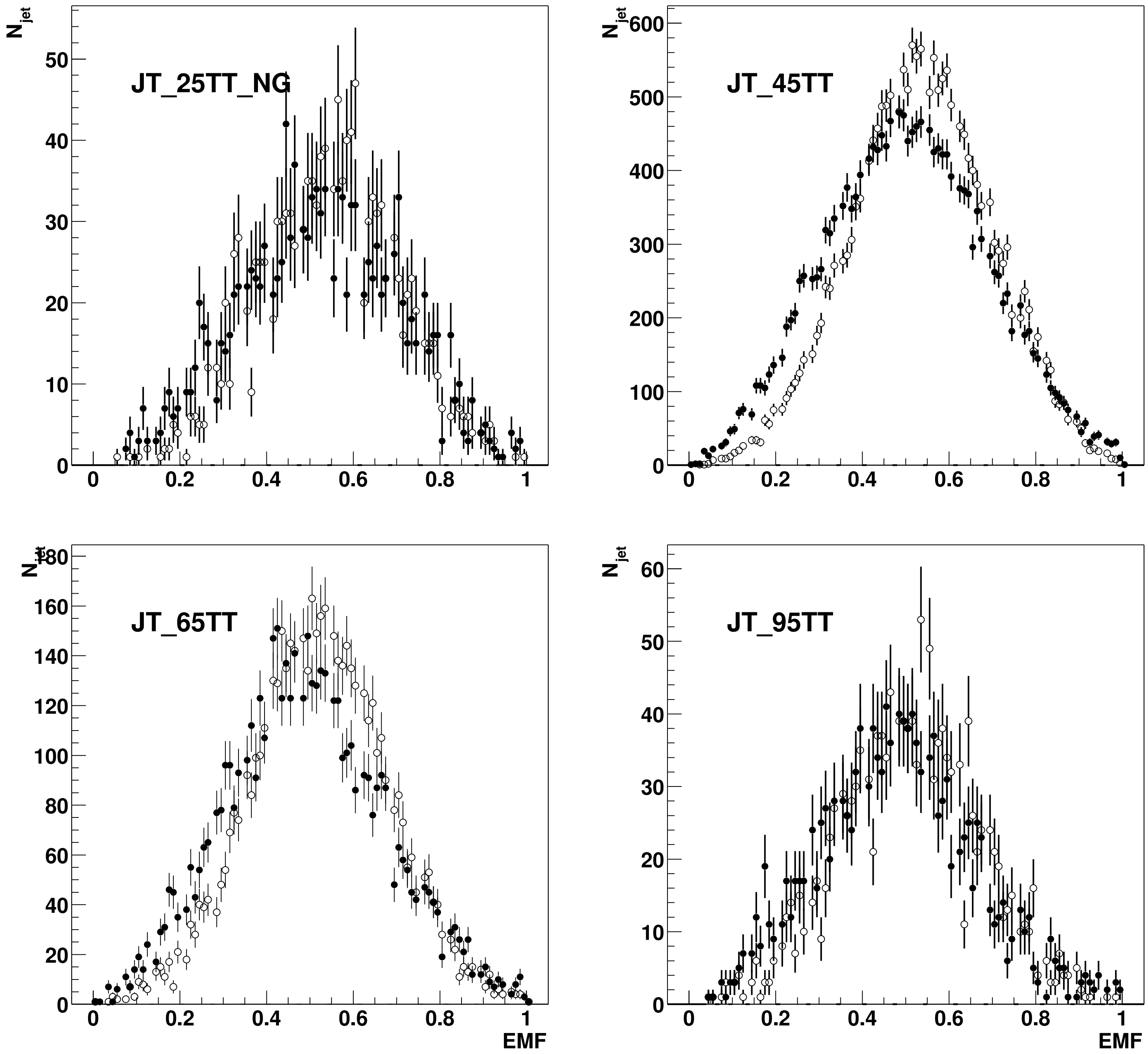
jet p_T



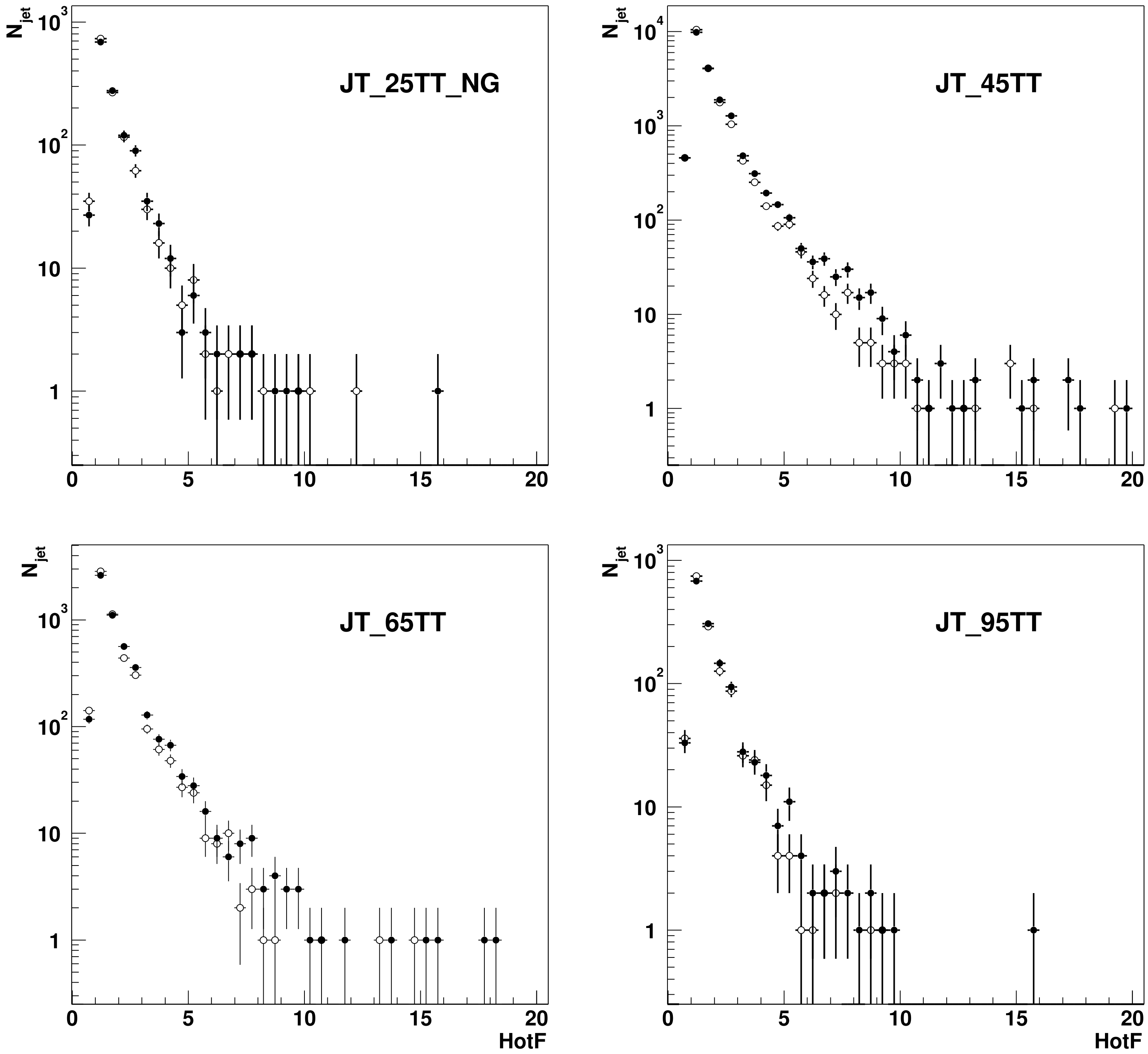
CHF


N_jet
JT_25TT_NG
JT_45TT
JT_65TT
JT_95TT
CHF
0
0.2
0.4
0.6
0.8
1
10
1
10^2
10^3

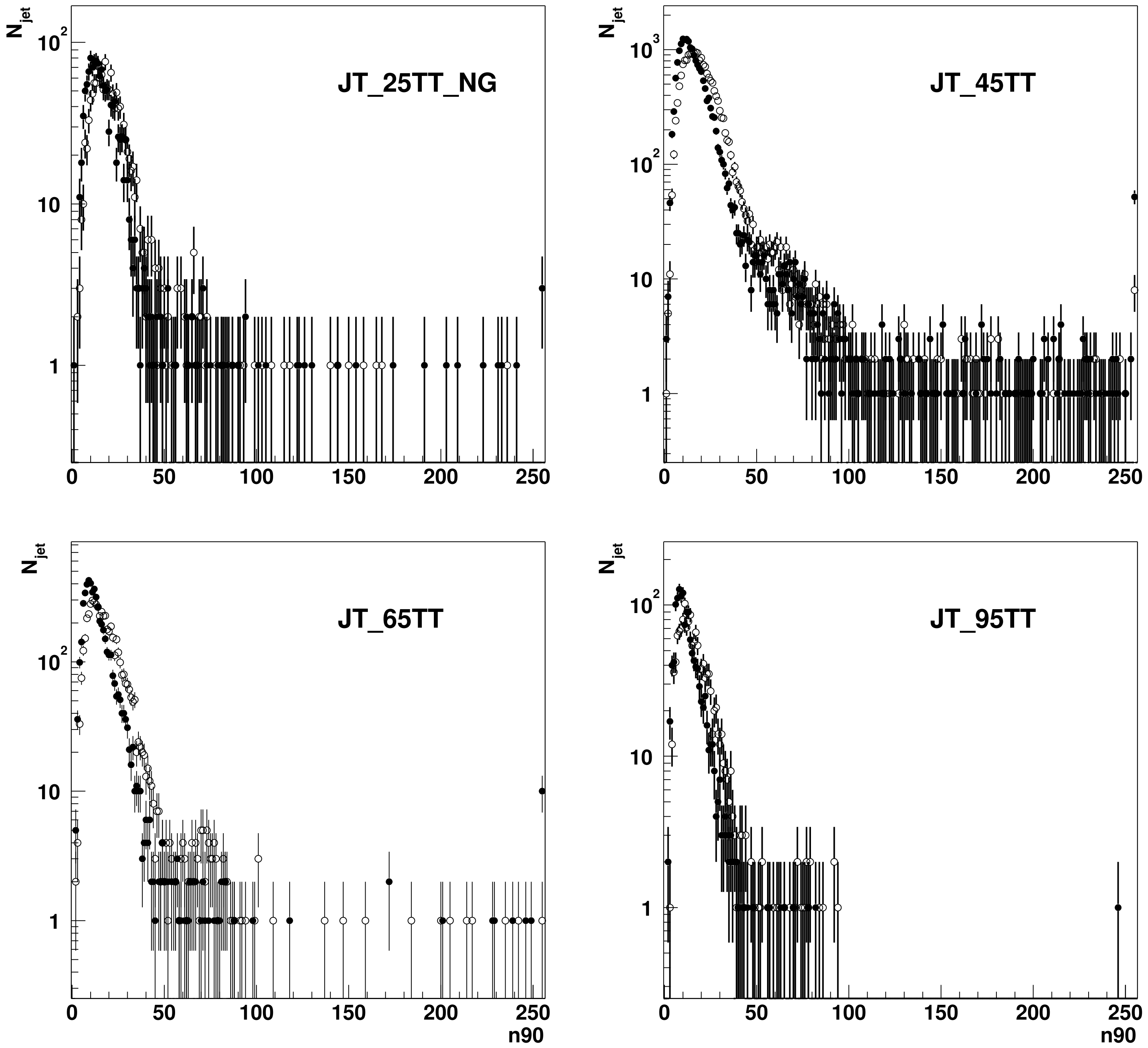
EMF



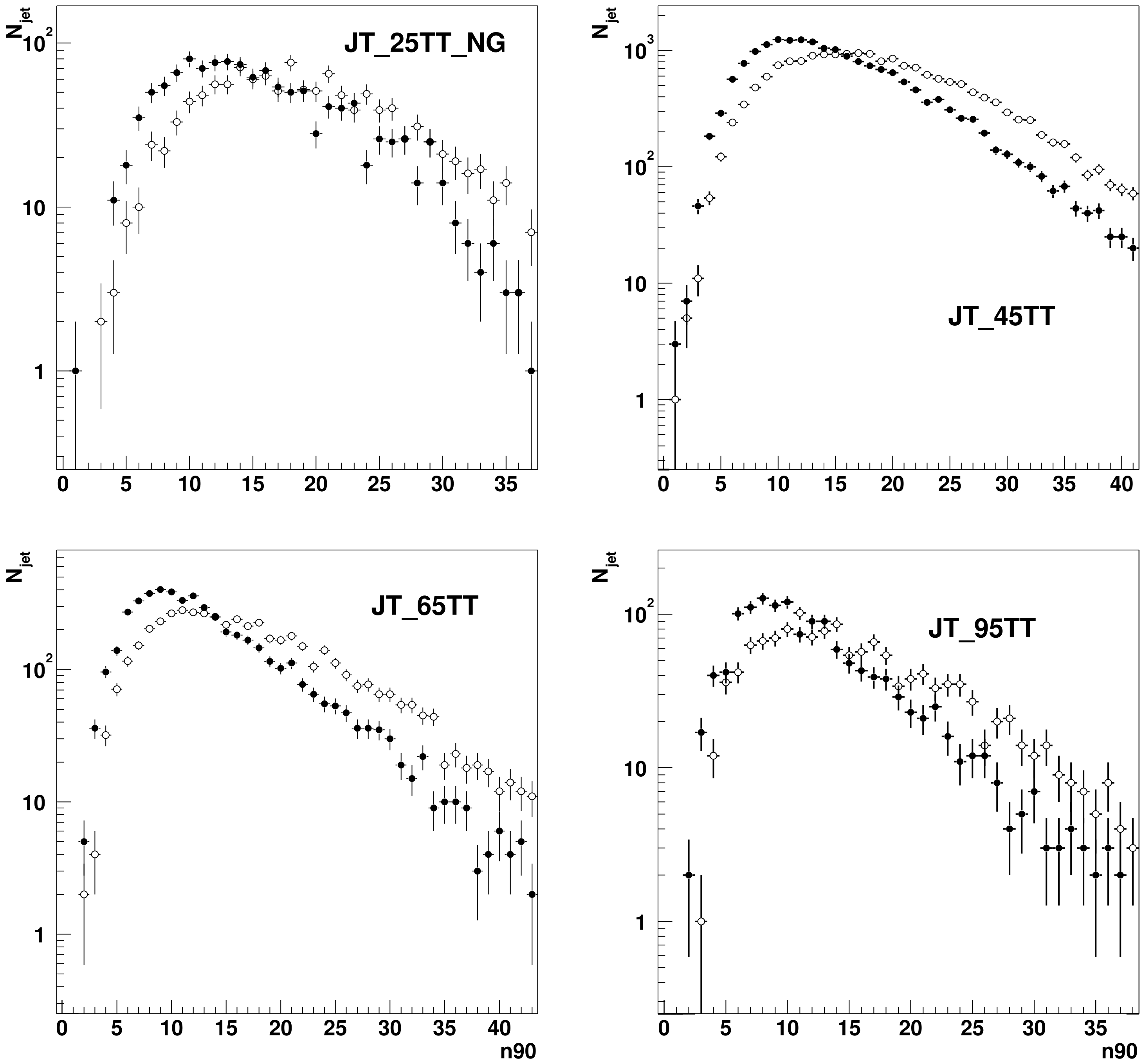
HotF



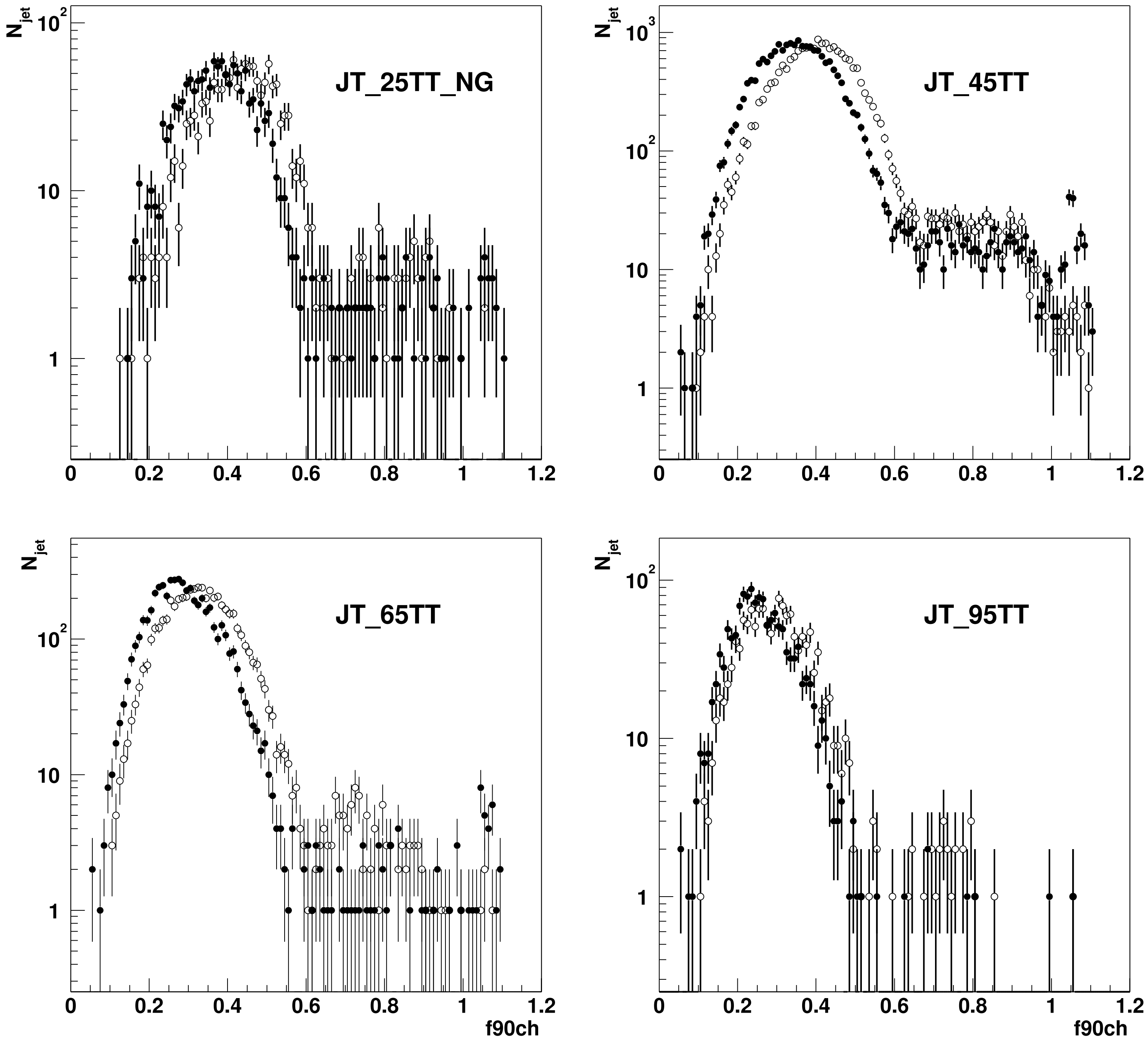
n90


JT_25TT_NG
JT_45TT
JT_65TT
JT_95TT
N_{jet}
n90
0
50
100
150
200
250
1
10
10^2
10^3

n90 at low end



f90ch



JT_25TT_NG
JT_45TT
JT_65TT
JT_95TT
N_{jet}
f90ch
0
0.2
0.4
0.6
0.8
1
1.2
1
10
10^2
10^3

limits on efficiencies

- no fit on signal and background performed
- limits on efficiencies made by counting the jets that satisfy jetID cut

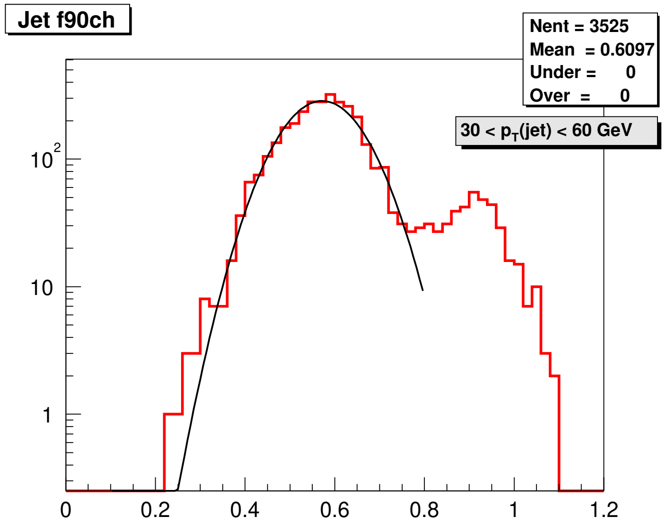
$$\varepsilon = \frac{N_{good}}{N_{all}}, \qquad \Delta\varepsilon = \sqrt{\frac{\varepsilon\,(1-\varepsilon)}{N_{all}}}$$

- calculated only for the leading jet

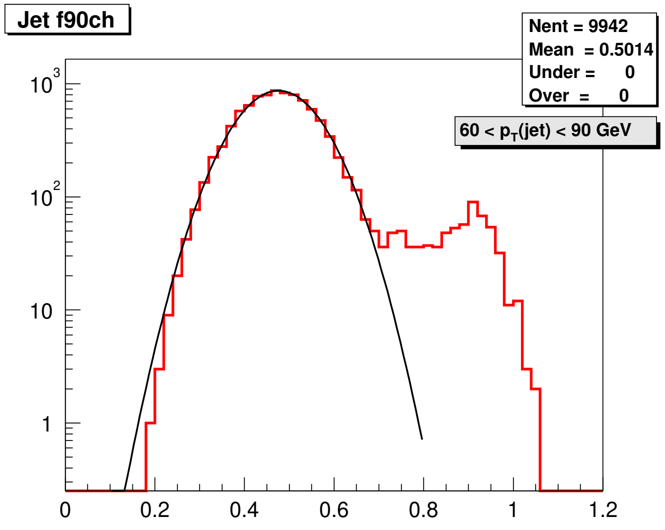
M_{JJ}	JT_25TT_NG > 150 GeV	JT_45TT > 180 GeV	JT_65TT > 300 GeV	JT_95TT > 390 GeV
CHF	$99.6 \pm 0.2\%$	$99.64 \pm 0.04\%$	$99.6 \pm 0.1\%$	$99.5 \pm 0.2\%$
EMF	$99.3 \pm 0.2\%$	$99.27 \pm 0.06\%$	$99.3 \pm 0.1\%$	$99.4 \pm 0.2\%$
HotF	$99.97 \pm 0.03\%$	$99.88 \pm 0.03\%$	$99.85 \pm 0.05\%$	$99.93 \pm 0.07\%$
n90	1	1	1	1
f90ch	$96.4 \pm 0.5\%$	$97.7 \pm 0.1\%$	$99.1 \pm 0.1\%$	$99.8 \pm 0.1\%$

f90ch cut efficiency (Pavel Demine)

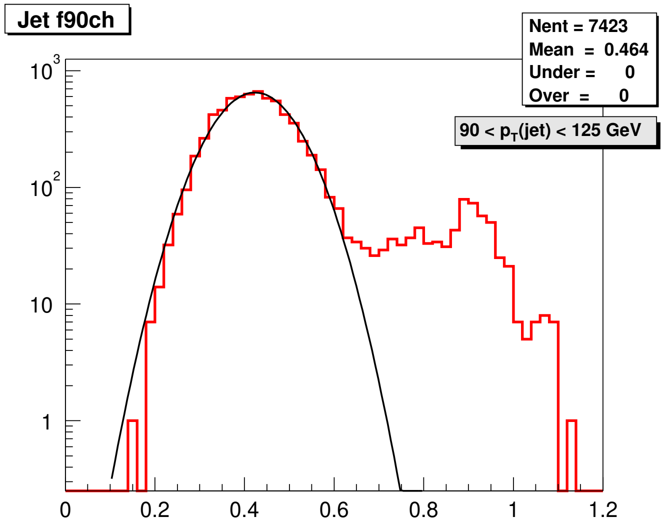
0.97 ± 0.03



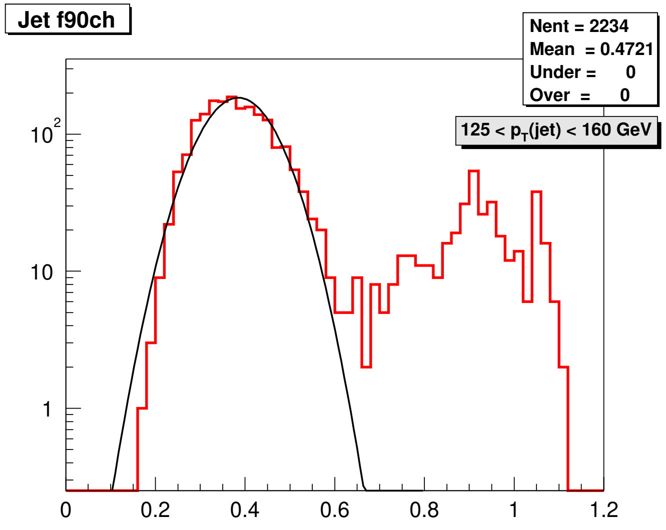
0.98 ± 0.02



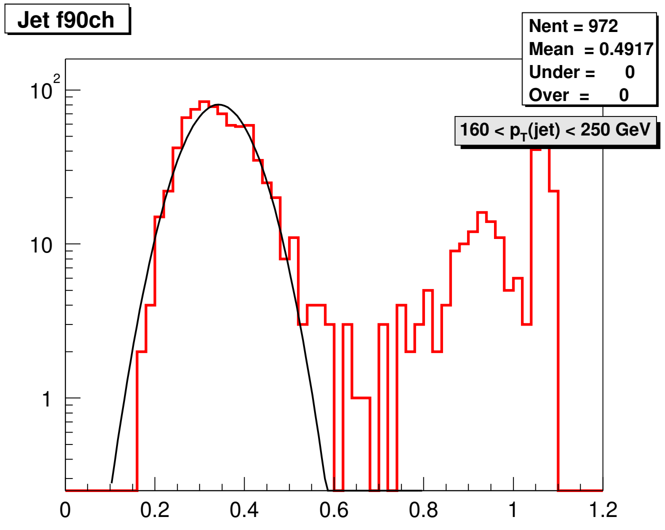
0.98 ± 0.02



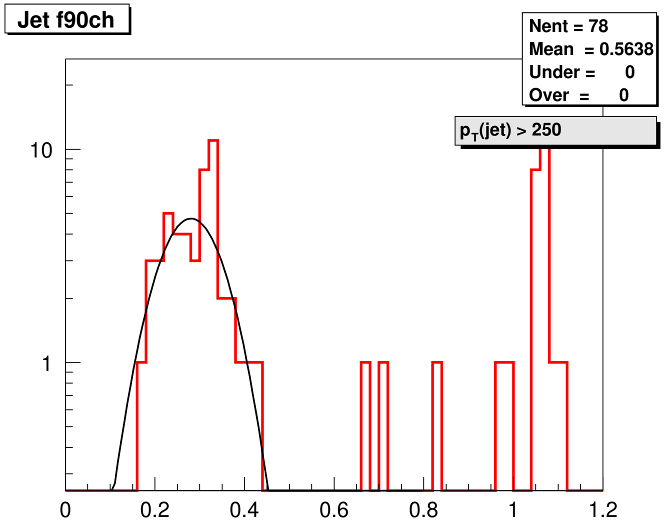
0.98 ± 0.02



0.99 ± 0.01

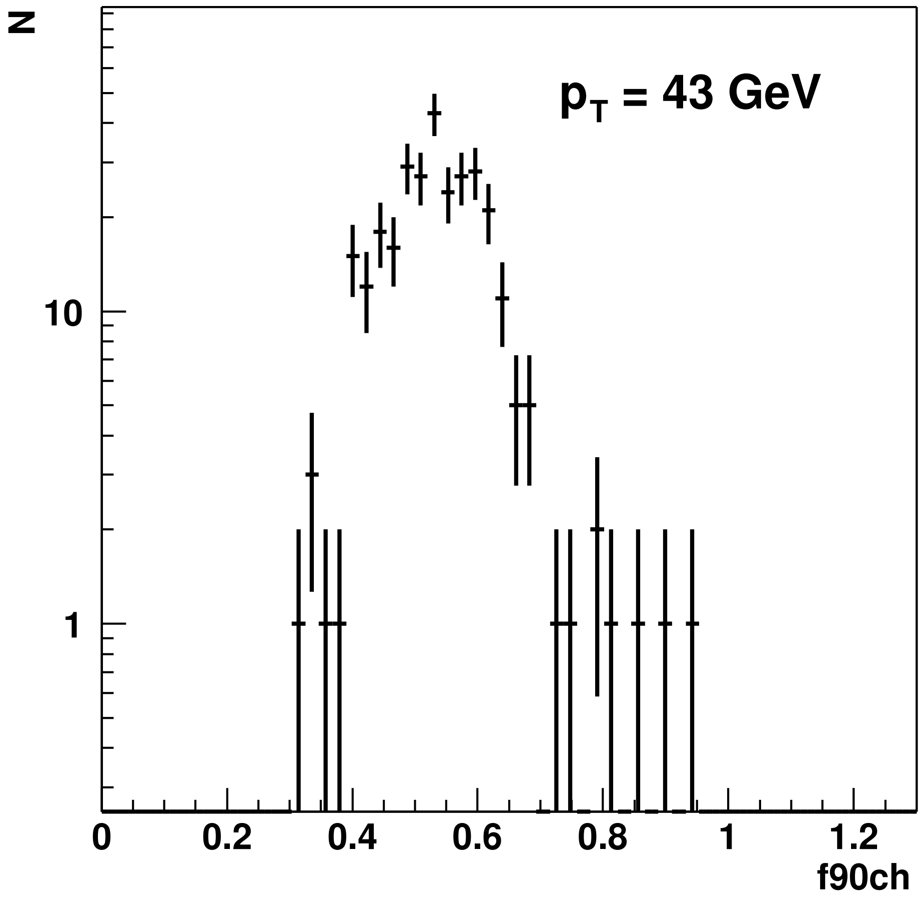


0.99 ± 0.01



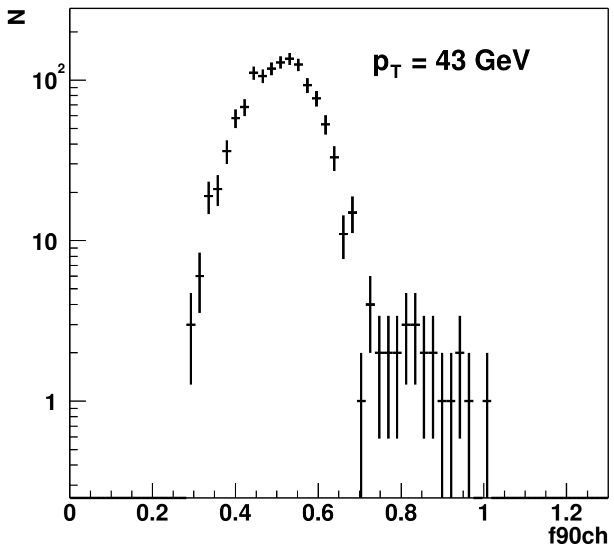
f90ch in p13.08 MC

- are jets with high f90ch good?
- answer can be given by MC studies
- QCD sample generated with p_T cut 40 GeV using p13.08.00 release on UTA farm
- jets with $\eta_{det} < 0.5$ and with p_T between 30 GeV and 60 GeV
- require a jet on MC level within $\Delta R < 0.1$
- only jets with $\mathrm{CHF} > 0.1$ plotted

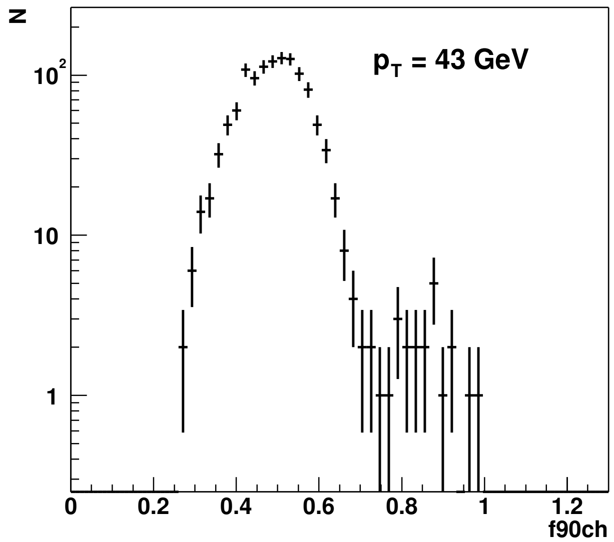


f90ch in different zero suppresion modes

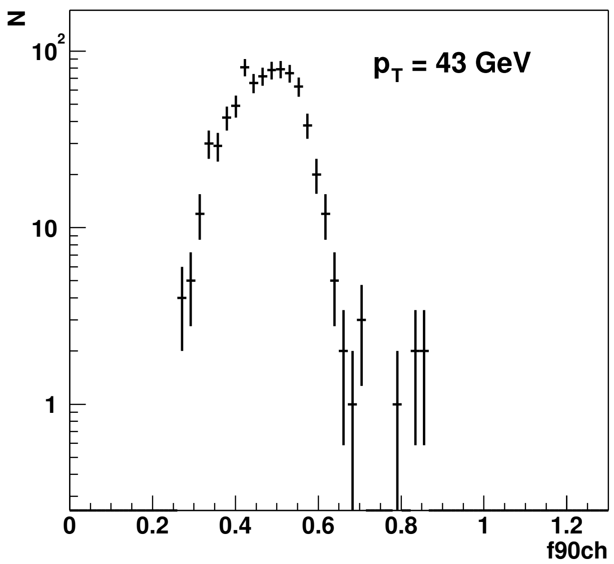
2.5σ



$2.0\sigma + 2.5\sigma$ CHF



$2.0\sigma + 3.5\sigma$ CHF



- more suppression on CHF reduces number of jets with large f90ch
- noise in CHF may cause the wide jets
- f90ch > 0.6
  - $\mu = 0.733(4)$, $\sigma/\mu = 0.154(4)$
- f90ch < 0.6
  - $\mu = 0.803(1)$, $\sigma/\mu = 0.120(1)$

Summary

- central dijet sample represents a clean sample with not too many fake jets
- suitable to study the distribution of jet ID cut variables
- the look of the distributions is sample dependent
- even in the clean dijet sample there are high p_T jets with large $\mathrm{f90ch}$
- also p13.08 MC shows jets with high $\mathrm{f90ch}$
- jets in MC with high $\mathrm{f90ch}$ have different jet energy scale and resolution