DELPHI 23^{rd} of february 2000

Hadronic $\gamma\gamma$ physics as background for searches

Presentation's content:

- SAMPLE 1 and 3 definition.
- Cuts to extract the SIGNAL.
- MC/DATA comparison @ 189 GeV.
- MC/DATA comparison @ 200 GeV.
- Conclusions.

SAMPLE 1 and 3 definition.

SAMPLE 1.

- TWOGAM2 generator
- $W_{\gamma\gamma} > 3$ GeV
- .AND. $E_{tr} > 3$ GeV, $P_T^{max} > 1.2$ GeV
- .AND. 1 particle with $E > 0.4\ E_{beam}$
- $\sigma = 0.88 \pm 0.01$ nb, 200 K evts @ 189 GeV
- $\sigma = 0.94 \pm 0.01$ nb, 800 K evts @ 200 GeV

SAMPLE 3

- TWOGAM2 generator.
- $W_{\gamma\gamma} > 3$ GeV
- .AND. 2 visible ($\theta > 10$) tracks both with P >1 GeV
- .AND. 1 particle with $E > 0.4\ E_{beam}$
- $\sigma = 5.98 \pm 0.03$ nb, 600 K evts @ 189 GeV

Cuts to extract the SIGNAL

COMMON SELECTION CUTs

DELANA filter, 1 particle with $P_t > 1.5$ GeV required
$P_{vd-id}/P_{ch} < 0.9$
P_{vd-id} =momentum associated to vd-id tracks,
P_{ch} =total charged momentum
At least 5 TPC tracks and $\sum |P^i_{TPC}| > 4$ GeV.
$P_{tr} < 10$ GeV, $E_{tr} < 20$ GeV, $N_{charged} < 30$
$E_{had}/E_{beam} < 0.3$ in each hemisphere

ONE TAGGED CUTs

$P_{miss} > 70$ GeV, $E_{cone}(\theta < 10^0) > 70$ GeV
$E_{max}/E_{beam} > 0.7$, $E_{min}/E_{beam} < 0.4$

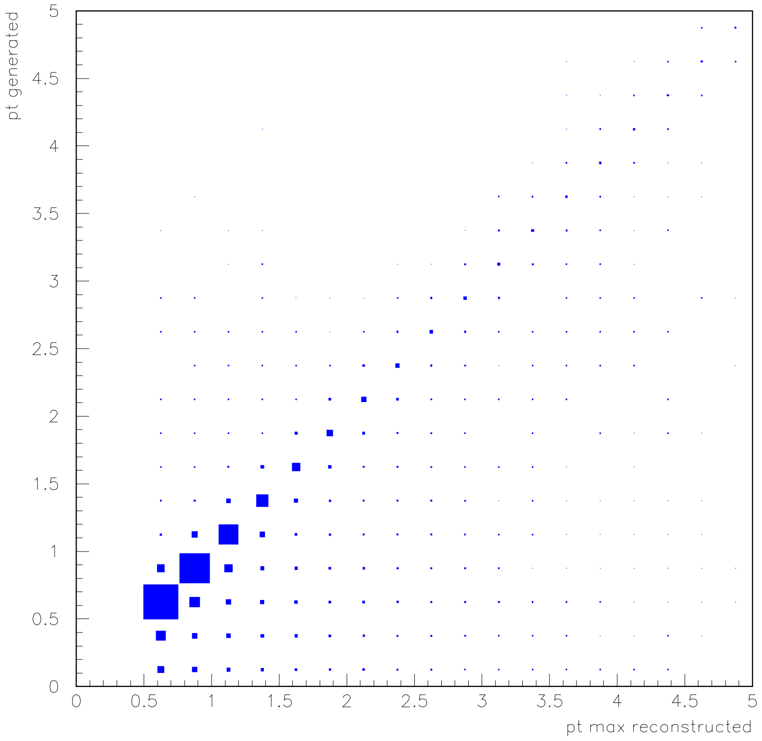
NO TAGGED CUTs

$P_{tr} < 7$ GeV, $E_{miss} > 150$ GeV, $E_{rad}/E_{beam} < 0.4$
$E_{rad} = \sqrt{E^2_{hem1} + E^2_{hem2}}$
$P_T^{max} < 5$ GeV

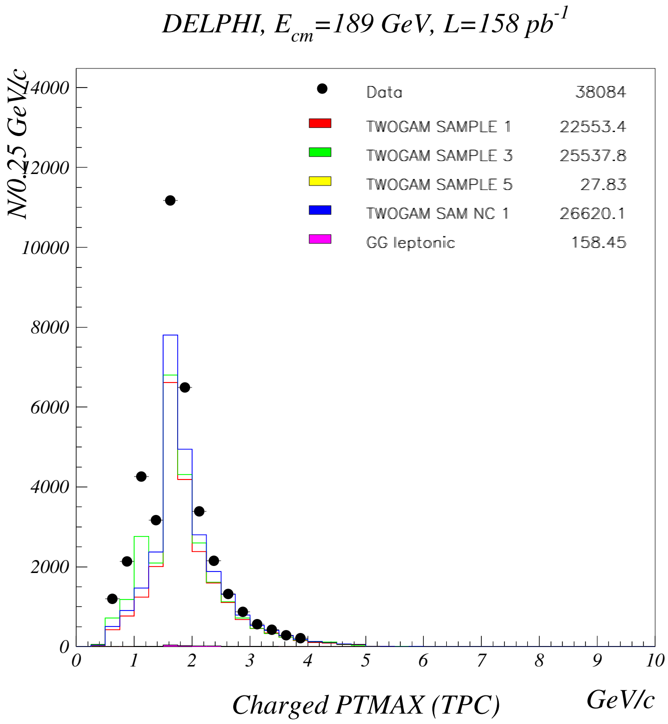
DATA/MC comparison at 189 GeV

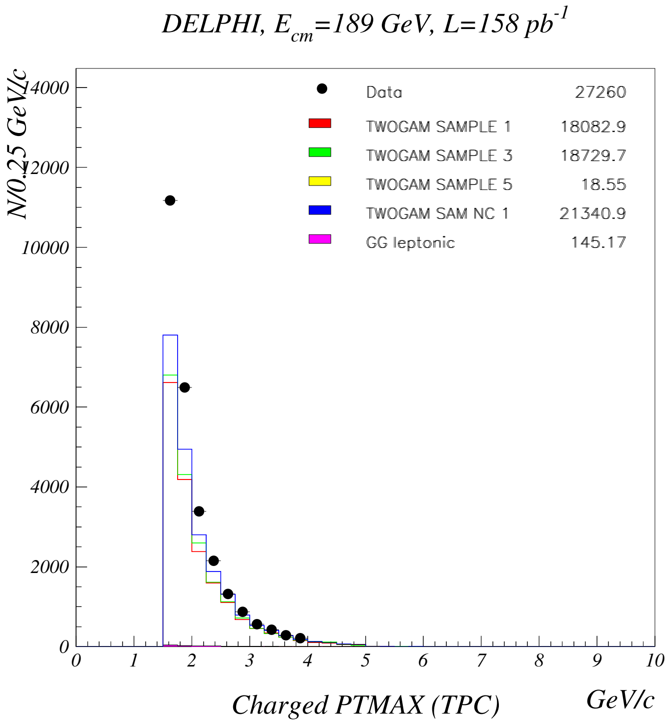
The DATA/MC comparison is performed at 3 levels:

- By applying the MAD/DAFNE cuts
- $+ P_T^{max}(TPC) > 1.5$ GeV to reduce smearing effect



- $+ P_T^{max}(TPC) > 2.5$ GeV to compare with previous work performed by Klas, Anna and Maria C....


DELPHI, E_cm=189 GeV, L=158 pb^-1
N/0.25 GeV/c
Data 38084
TWOGAM SAMPLE 1 22553.4
TWOGAM SAMPLE 3 25537.8
TWOGAM SAMPLE 5 27.83
TWOGAM SAM NC 1 26620.1
GG leptonic 158.45
Charged PTMAX (TPC)
GeV/c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N/0.25 GeV/c
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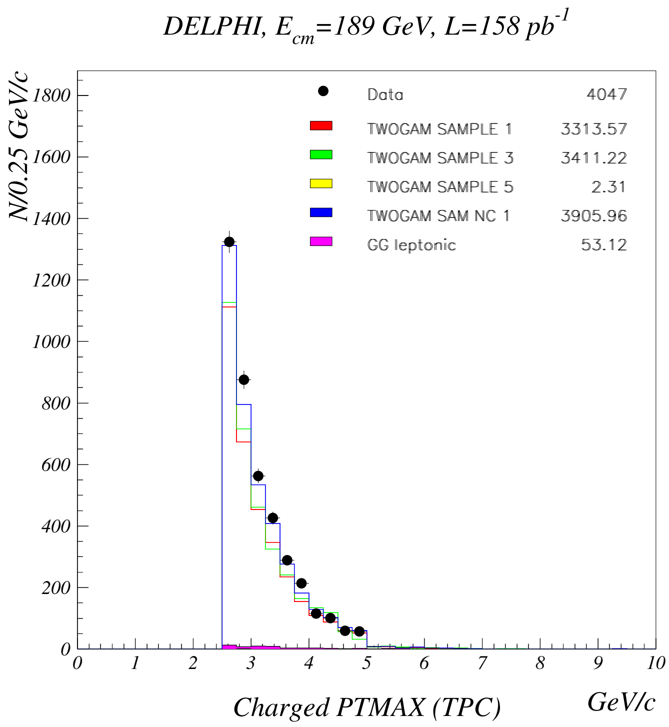
TWOGAM SAMPLE 5 18.55
TWOGAM SAM NC 1 21340.9
GG leptonic 145.17
Charged PTMAX (TPC)
GeV/c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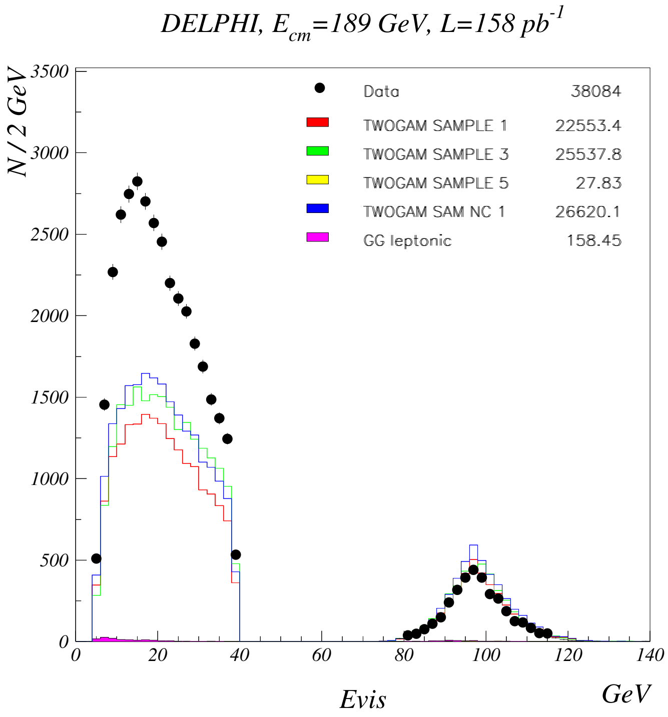
N/0.25 GeV/c
Data 4047
TWOGAM SAMPLE 1 3313.57
TWOGAM SAMPLE 3 3411.22
TWOGAM SAMPLE 5 2.31
TWOGAM SAM NC 1 3905.96
GG leptonic 53.12
Charged PTMAX (TPC)
GeV/c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N / 2 GeV
Data 38084
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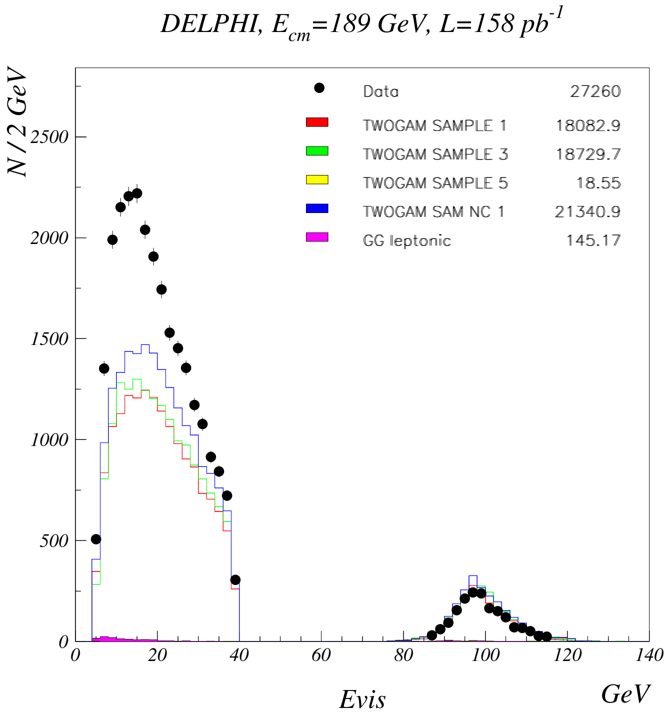
GG leptonic 158.45
Evis
GeV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N / 2 GeV
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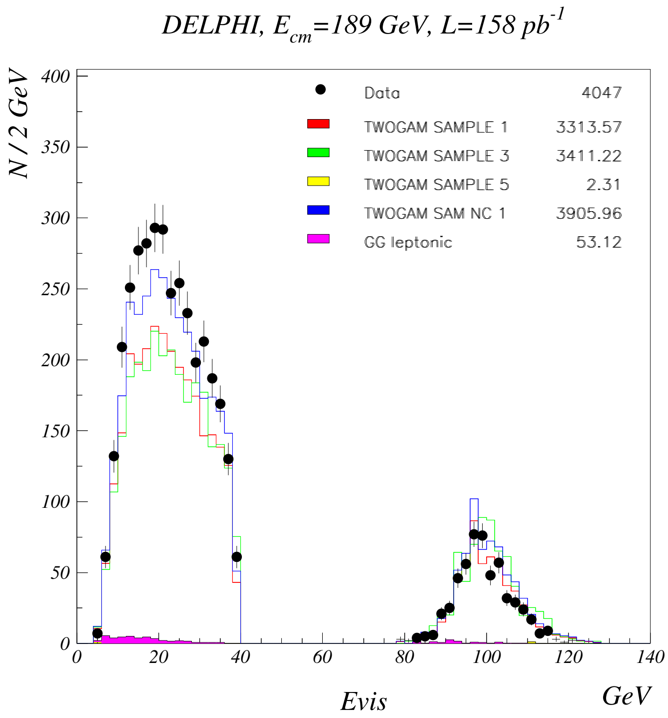
Evis
GeV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N / 2 GeV
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TWOGAM SAMPLE 3 3411.22
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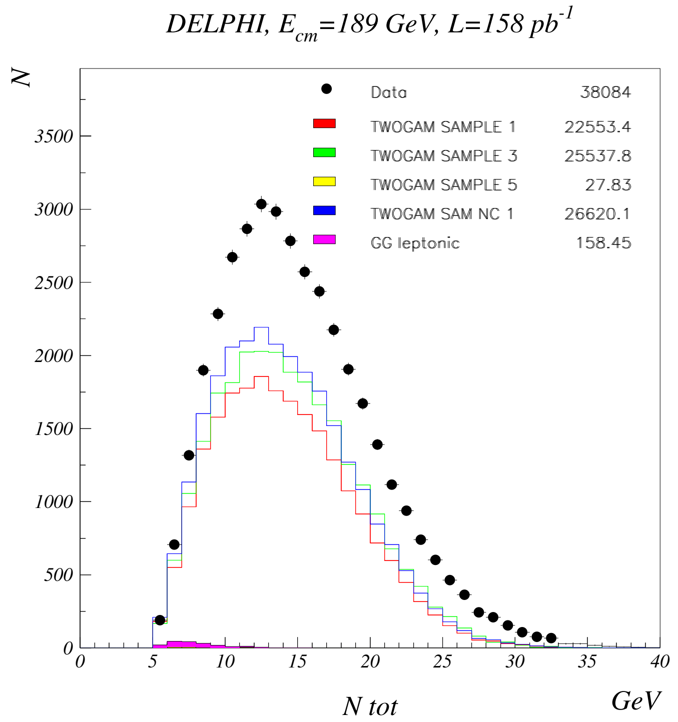
GG leptonic 53.12
Evis
GeV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N
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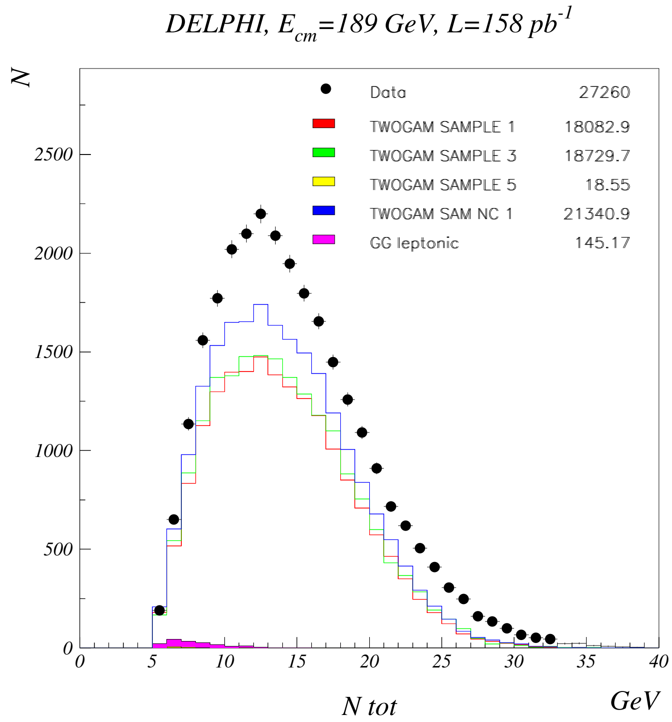
TWOGAM SAM NC 1 26620.1
GG leptonic 158.45
N tot
GeV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N
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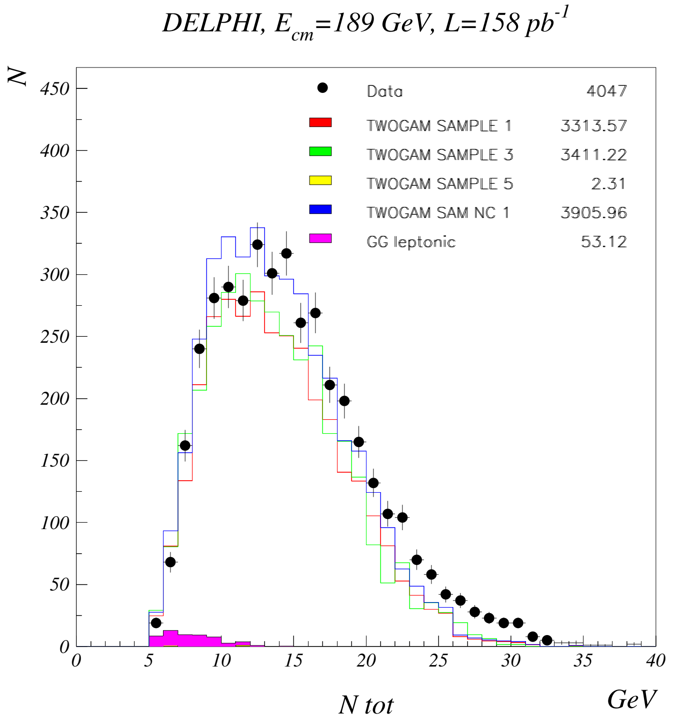
GG leptonic 145.17
N tot
GeV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N
Data 4047
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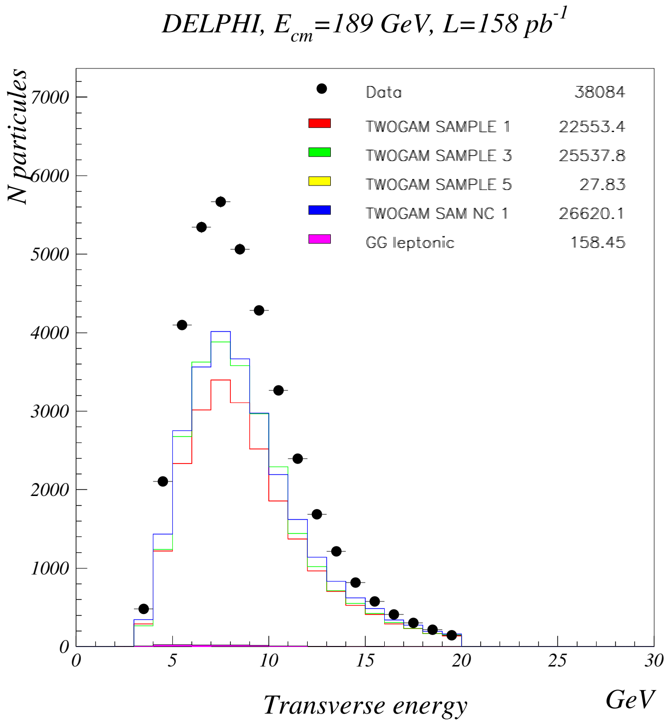
TWOGAM SAM NC 1 3905.96
GG leptonic 53.12
N tot
GeV


DELPHI, E_{cm}=189 GeV, L=158 pb^{-1}
N particules
Data 38084
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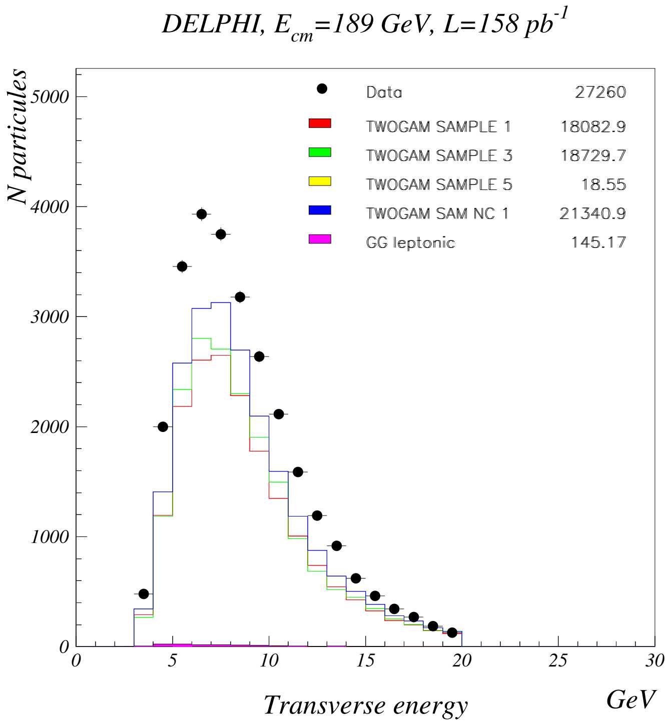
TWOGAM SAMPLE 5 27.83
TWOGAM SAM NC 1 26620.1
GG leptonic 158.45
Transverse energy
GeV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N particules
Data 27260
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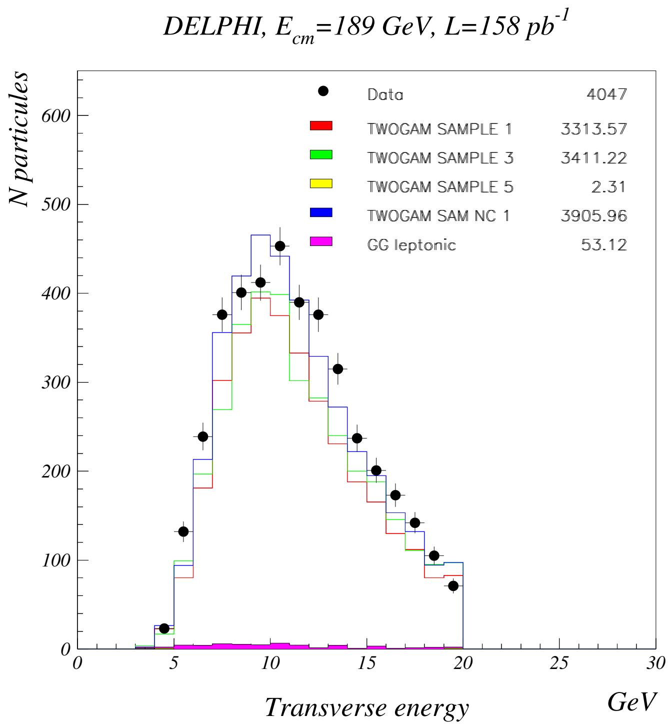
TWOGAM SAMPLE 5 18.55
TWOGAM SAM NC 1 21340.9
GG leptonic 145.17
Transverse energy
GeV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N particules
Data 4047
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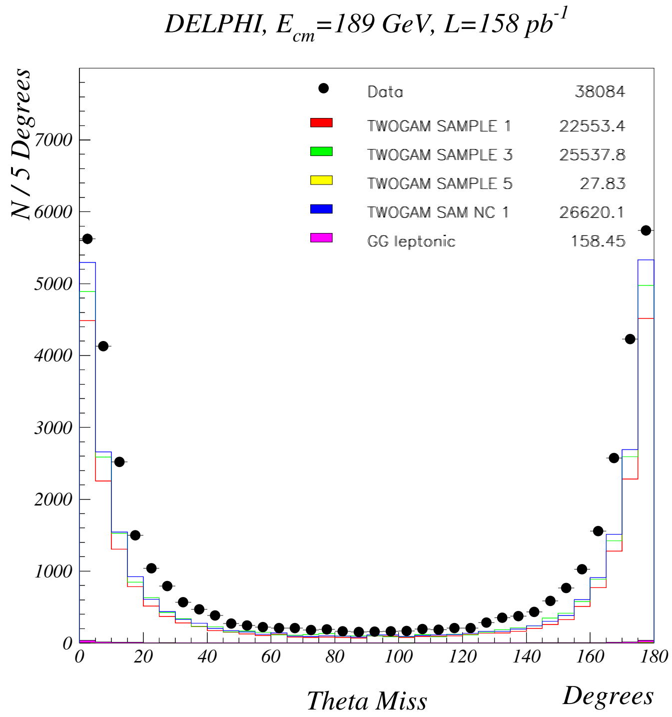
GG leptonic 53.12
Transverse energy
GeV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N / 5 Degrees
Data 38084
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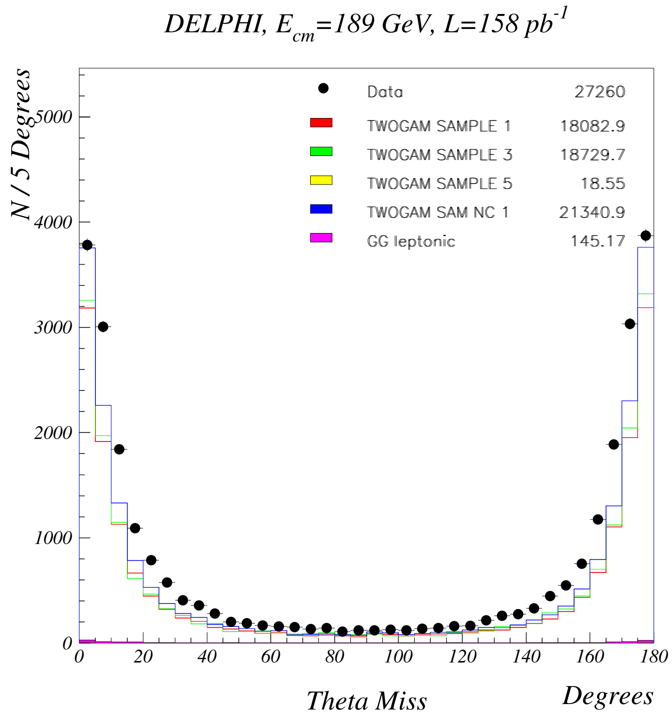
TWOGAM SAMPLE 5 27.83
TWOGAM SAM NC 1 26620.1
GG leptonic 158.45
Theta Miss
Degrees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N / 5 Degrees
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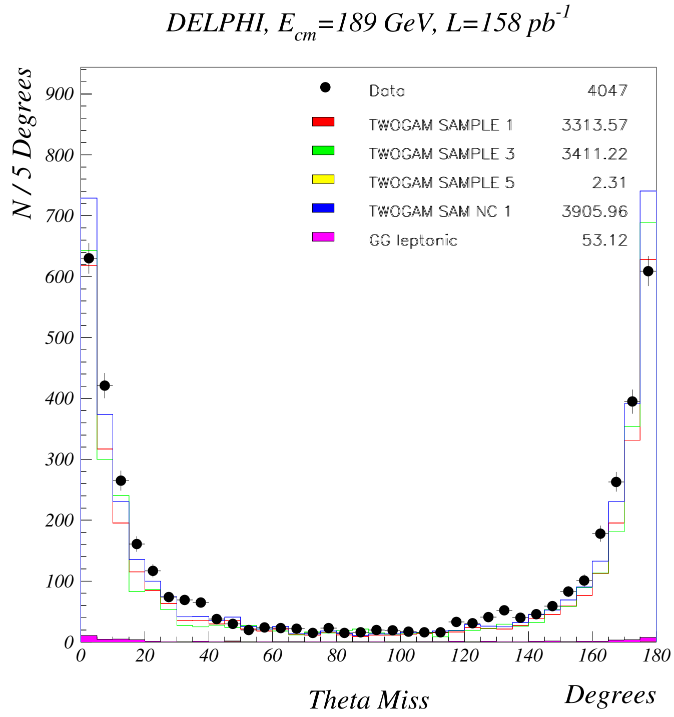
Theta Miss
Degrees


DELPHI, E_{cm}=189 GeV, L=158 pb^{-1}
N / 5 Degrees
Data 4047
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TWOGAM SAM NC 1 3905.96
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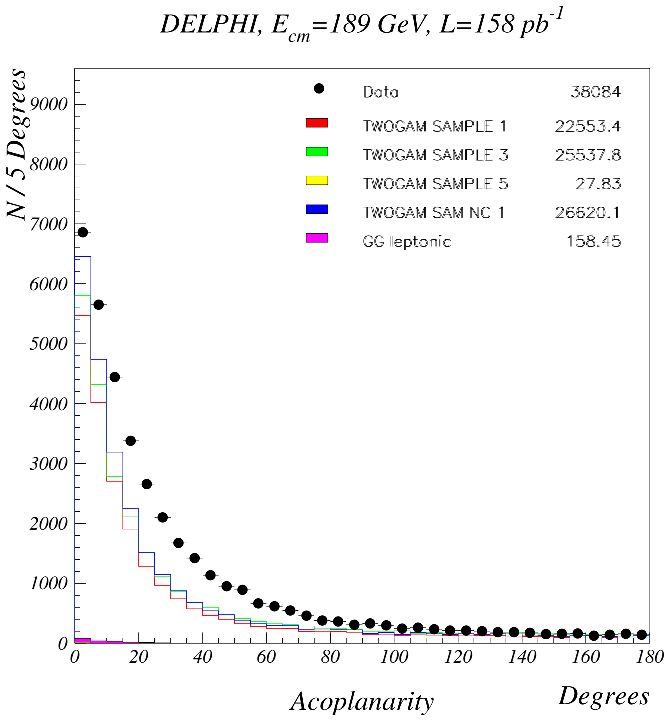
Theta Miss
Degrees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N / 5 Degrees
Data 38084
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TWOGAM SAM NC 1 26620.1
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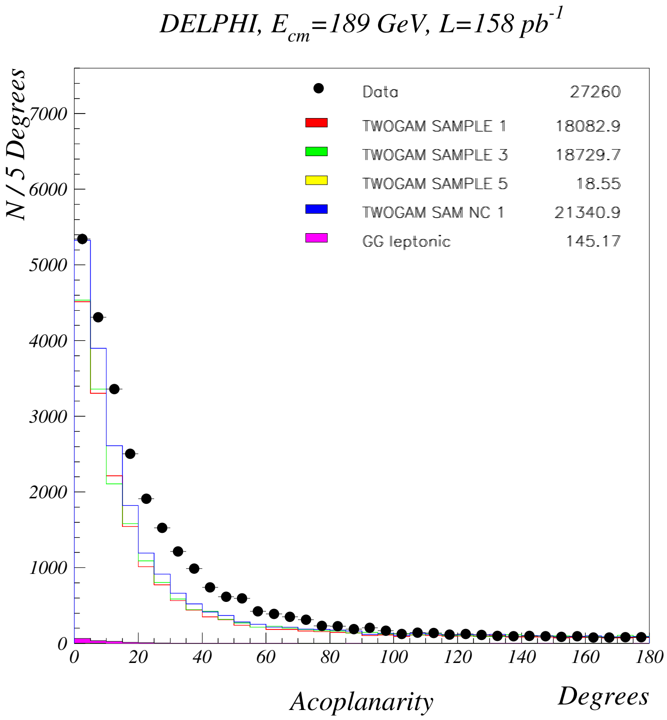
Acoplanarity
Degrees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N / 5 Degrees
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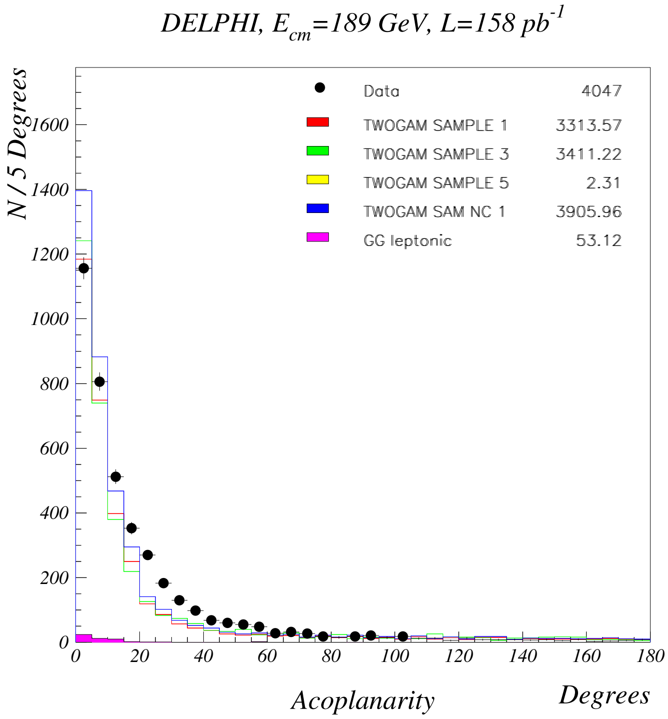
Acoplanarity
Degrees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N / 5 Degrees
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TWOGAM SAM NC 1 3905.96
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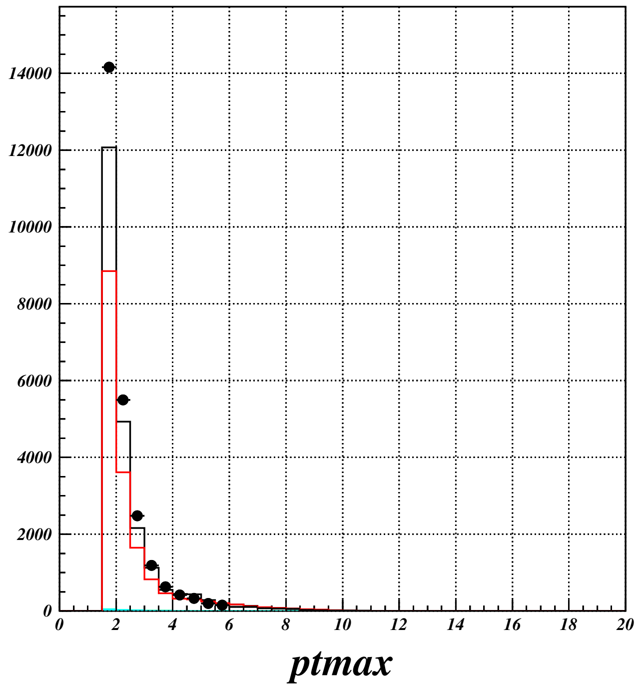
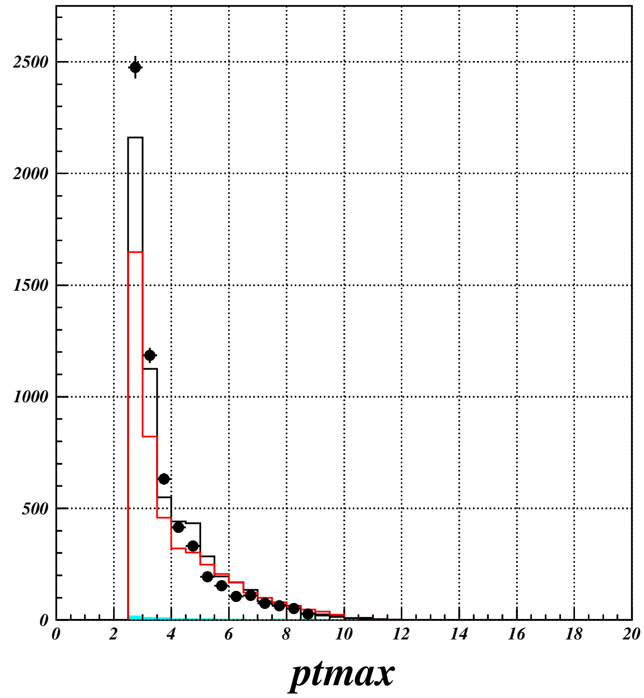
Acoplanarity
Degrees

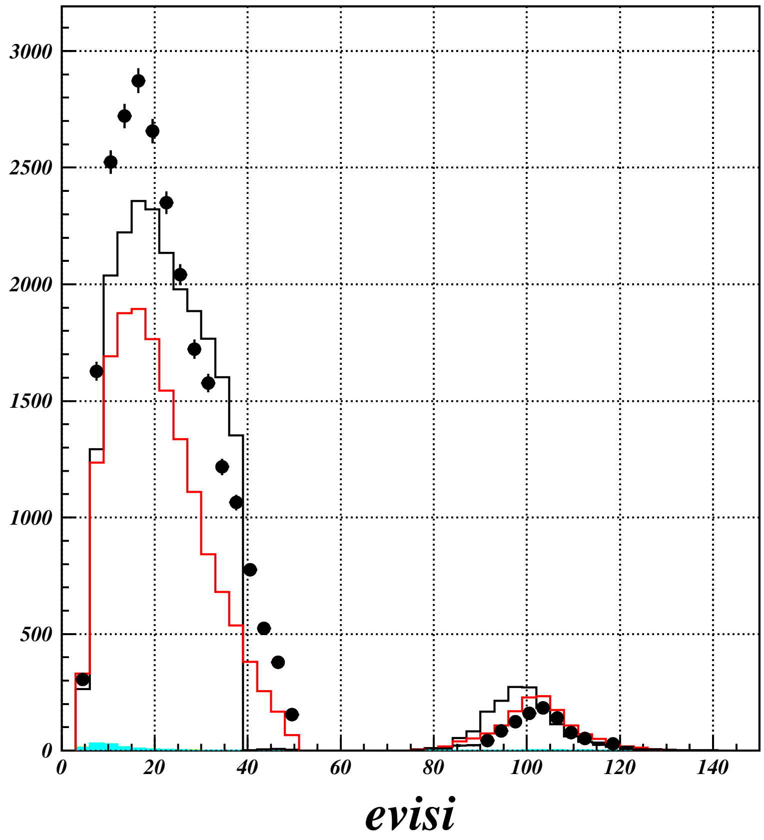
DATA/MC comparison at 200 GeV

@ 200 GeV SETs of cuts 1 and 3 only

P_T^{max} computed for both charged and neutrals (no TPC required)



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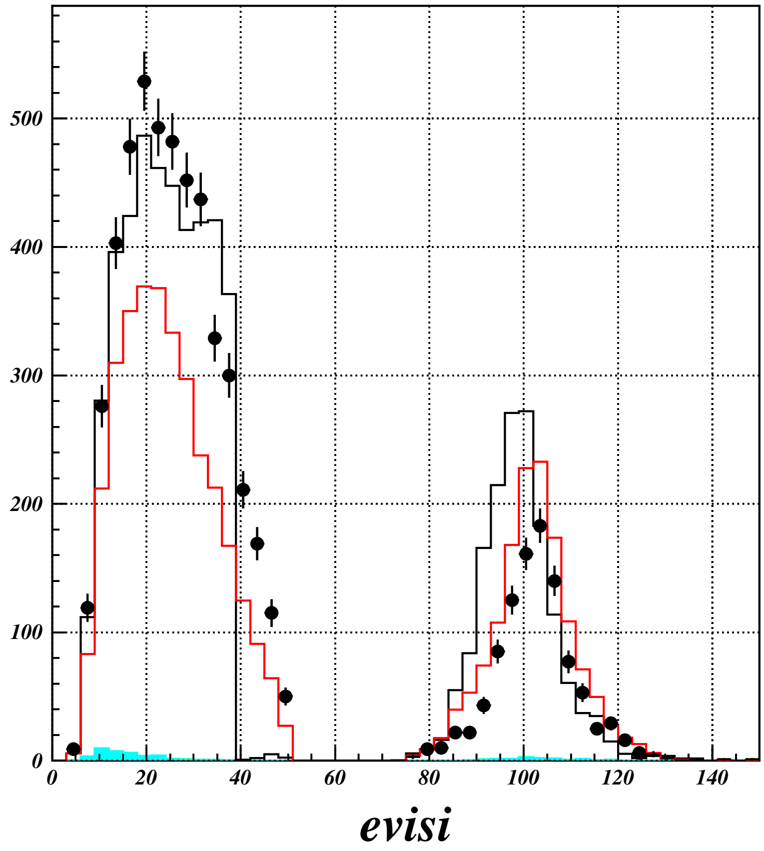
2500
2000
1500
1000
500
0
0
20
40
60
80
100
120
140
evisi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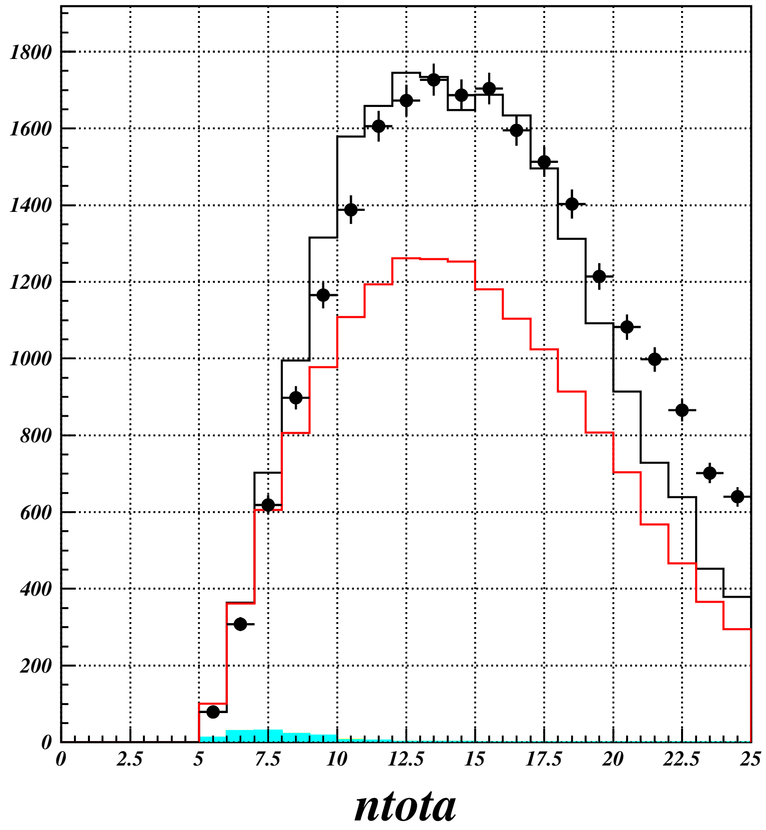
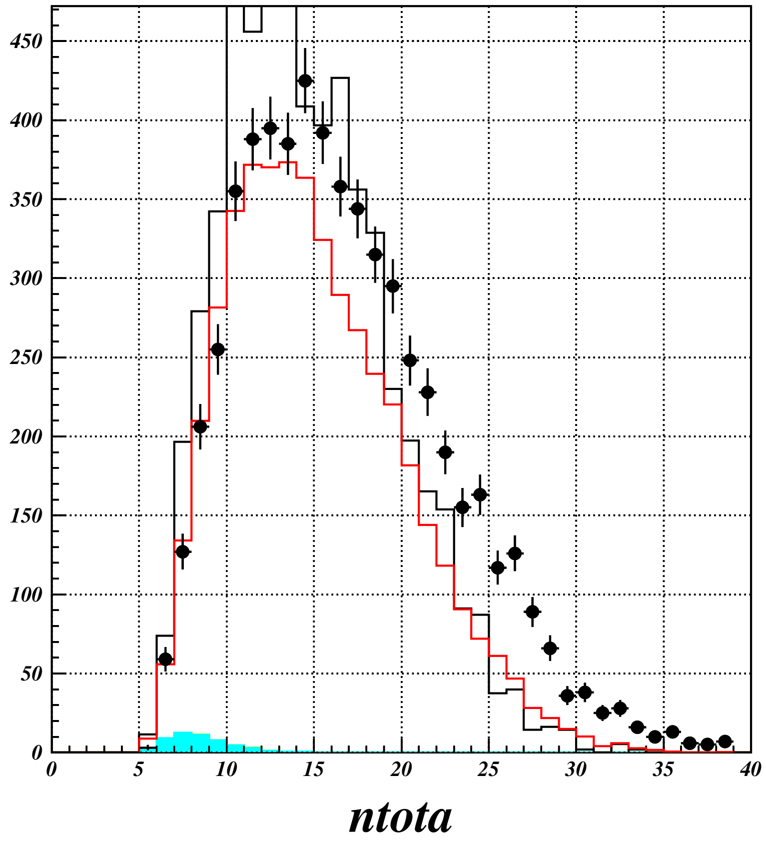
400
300
200
100
0
0
20
40
60
80
100
120
140
evisi


1800
1600
1400
1200
1000
800
600
400
200
0
0
2.5
5
7.5
10
12.5
15
17.5
20
22.5
25
ntota


450
400
350
300
250
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150
100
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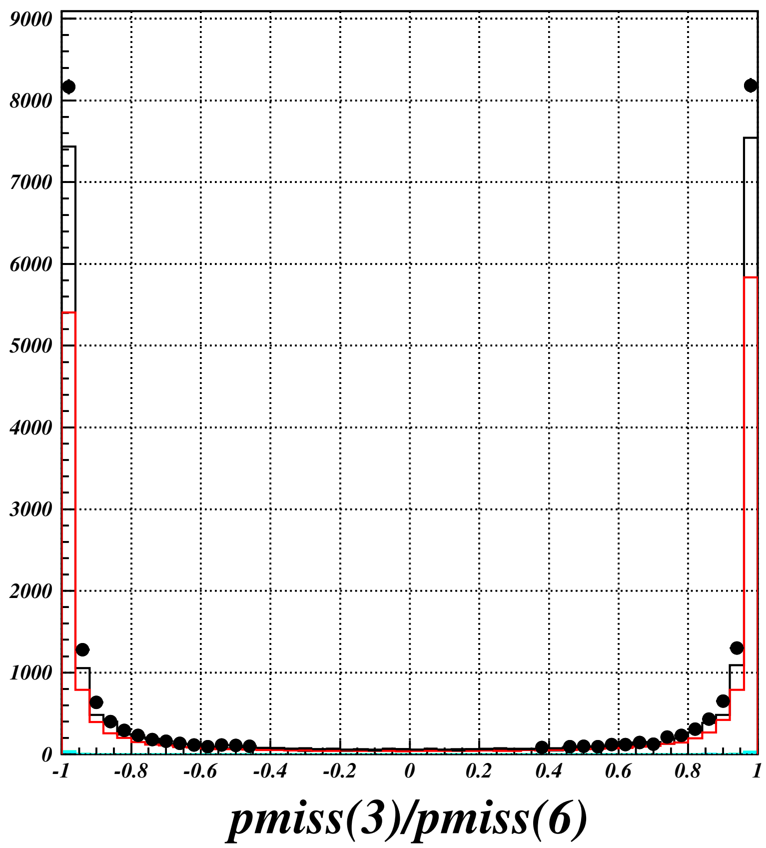
0
0
5
10
15
20
25
30
35
40
ntota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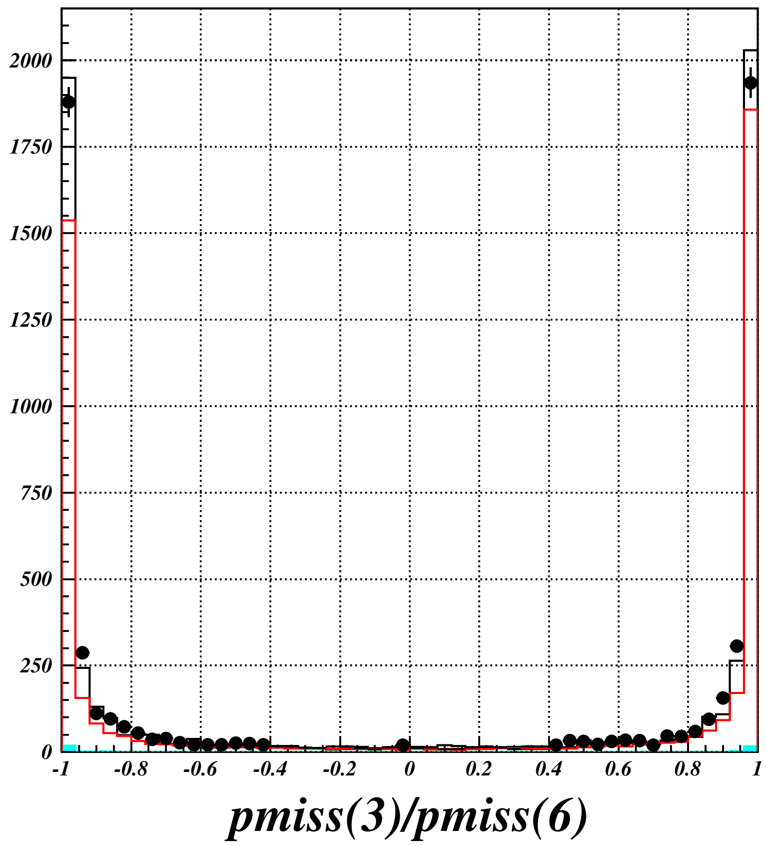
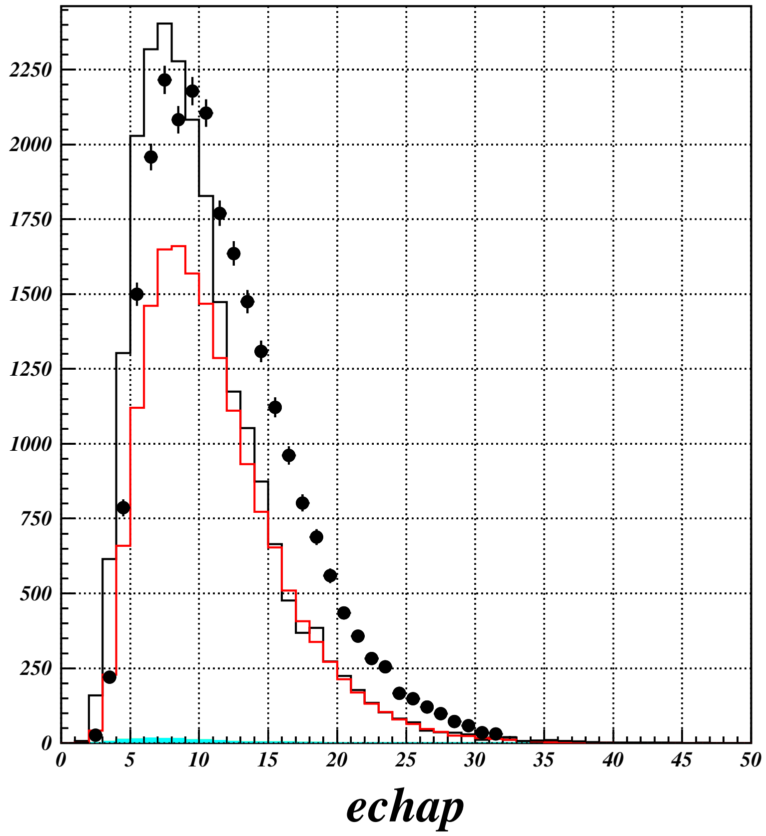
8000
7000
6000
5000
4000
3000
2000
1000
0
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
pmiss(3)/pmiss(6)


2000
1750
1500
1250
1000
750
500
250
0
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
pmiss(3)/pmiss(6)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1750
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750
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250
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0
5
10
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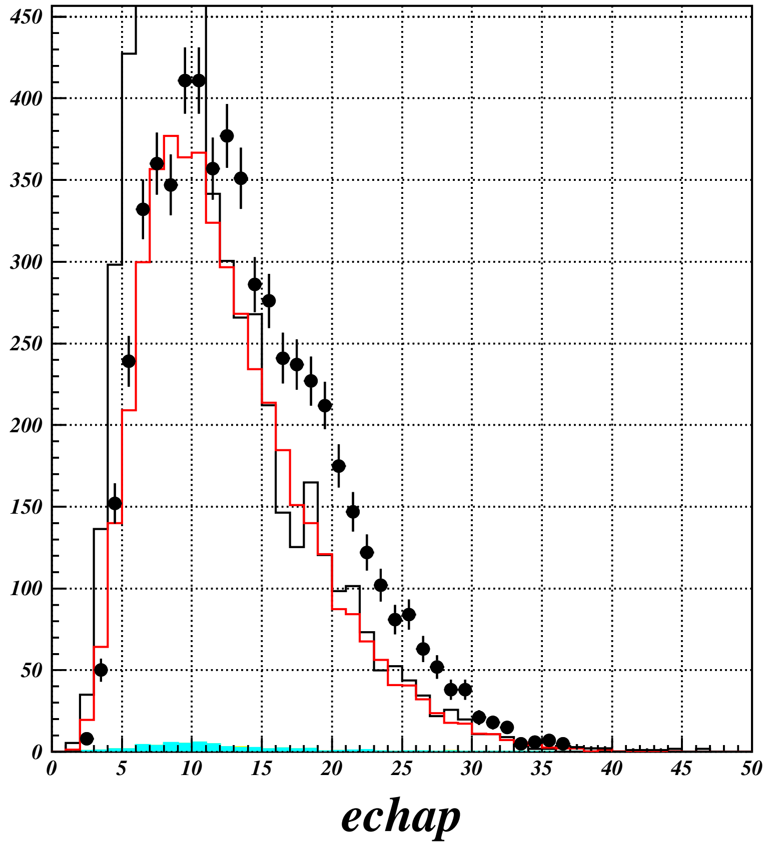
30
35
40
45
50
echap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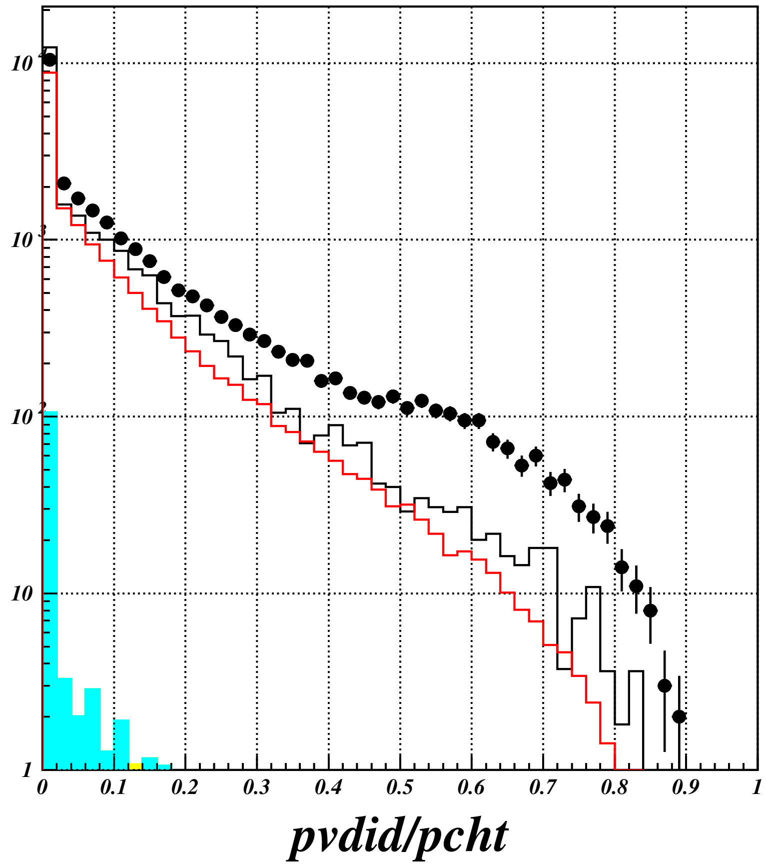
50
echap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0.3
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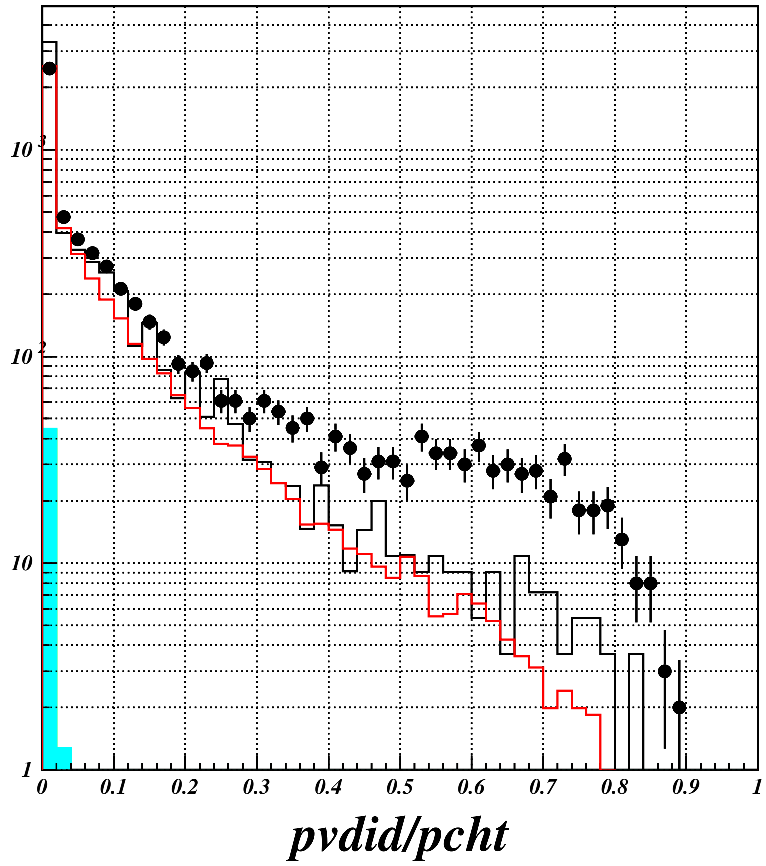
0.7
0.8
0.9
1
pvdid/pcht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10
10
1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
pvdid/pcht

- We still suffer from disagreements in the HARD $\gamma\gamma$ region.
- The prescription to require $P_T^{max} > 2.5$ GeV is not satisfactory.
- Disagreements seem to come from the GENERATOR itslef......
  ... BUT detector simulation can be a source of bias.
- A test sample has been processed (less biased) to study detector simulation effects and to tune the P_{cut}^T value where the QCD process starts (now it is 1.9 GeV).
  This may perhaps improve the agreement....
  .....results soon.
- Tests with other generators will be performed as well.

- In order to cope with SUSY searches (degenerate searches) a SAMPLE of type 3 is needed at higher energy.