PROGRESS REPORT ON EVENT SHAPE ANALYSIS

ESA using reconstruction in the TPC

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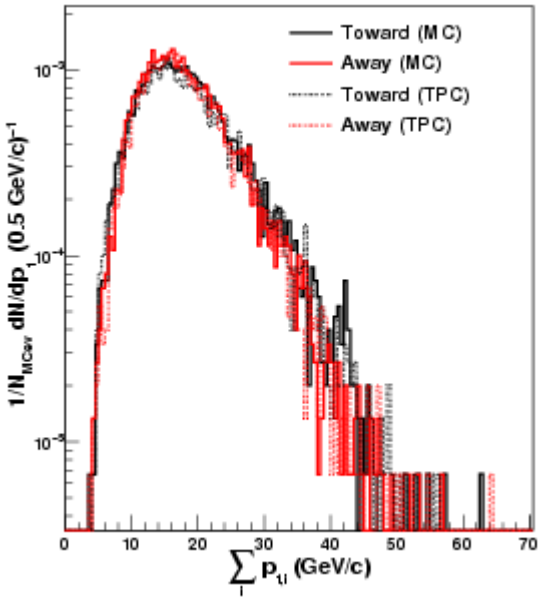
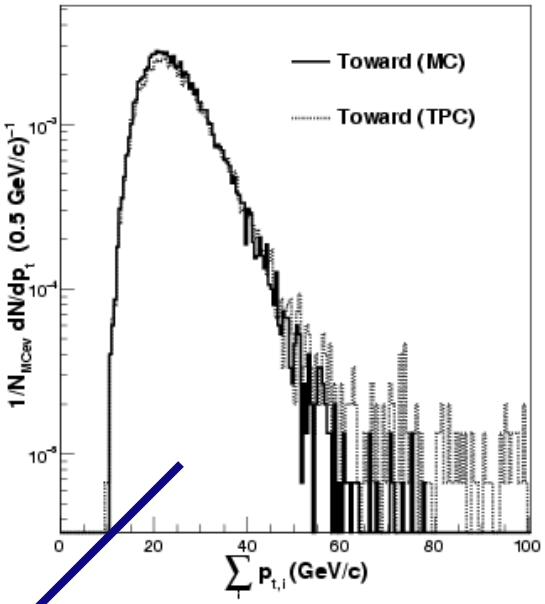
Details of the simulations:

Generator: Pyhtia, proton-proton collisions at 14 TeV in the c. m., magnetic field 0.5 T, 15 GeV/c <pt hard <50 GeV/c., 300 K events.

In previous analysis we demanded at least 3 particles with pt>3GeV/c.
But we found a problem with this cut….



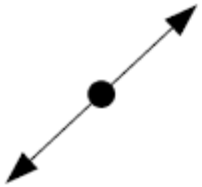
Di-jets



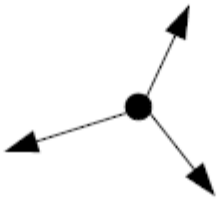
Mono-jets

We rejected mono-jets of low energies. This explains the shift in the distribution.

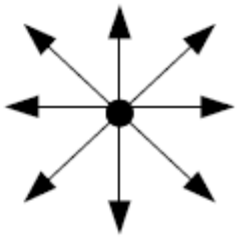
It is easy to compute T for the following geometrical configurations in the transverse plane…



T = 1



T = 2/3



T = 1/2

So, to compute shape variables we can demand only one particle with certain ptcutoff…

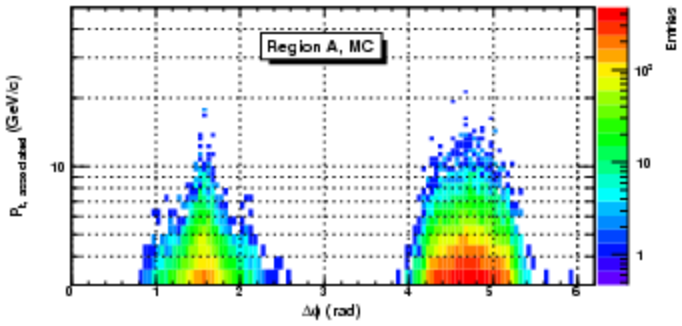
Before…

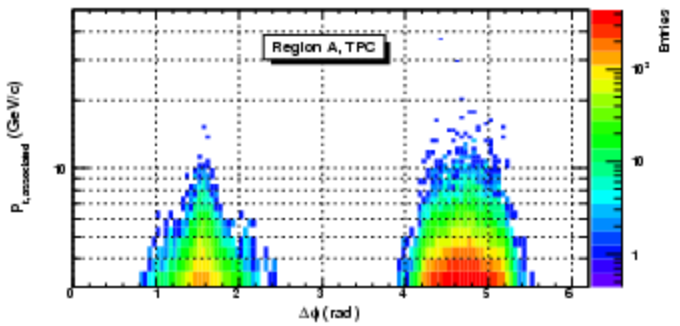
Event	MC	TPC	$1-T$ (τ) cuts	R cuts
All	300000	300000	no	no
With T	51480	47450	no	no
Dijet	5074	4649	$\tau \leq 0.03$	$R \leq 0.35$
Monojet	12530	12090	$\tau \leq 0.03$	$R \geq 0.9$
Mercedes	371	365	$\tau \geq 0.25$	$R \leq 0.4$

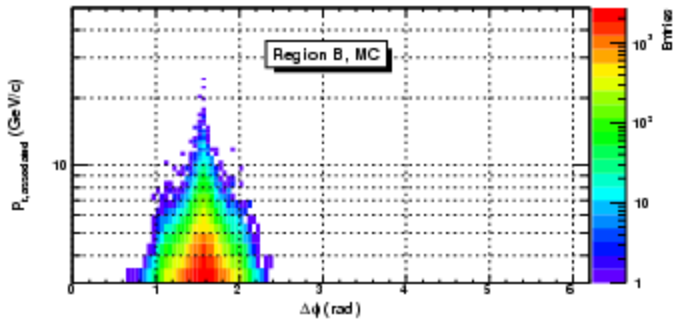
After

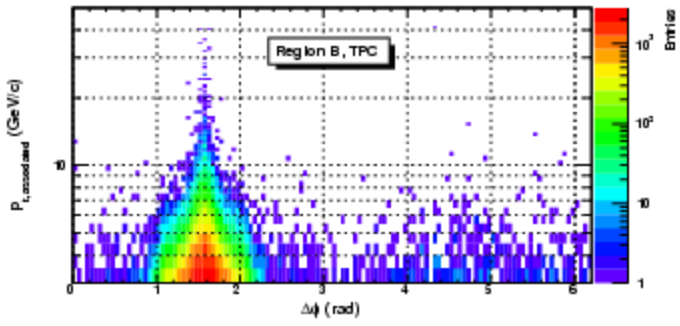
Event	MC	TPC	$1-T$ (τ) cuts	R cuts
All	300000	300000	no	no
With T	197600	192400	no	no
Dijet	12150	11340	$\tau \leq 0.03$	$R \leq 0.35$
Monojet	133400	132800	$\tau \leq 0.03$	$R \geq 0.9$
Mercedes	371	365	$\tau \geq 0.25$	$R \leq 0.4$

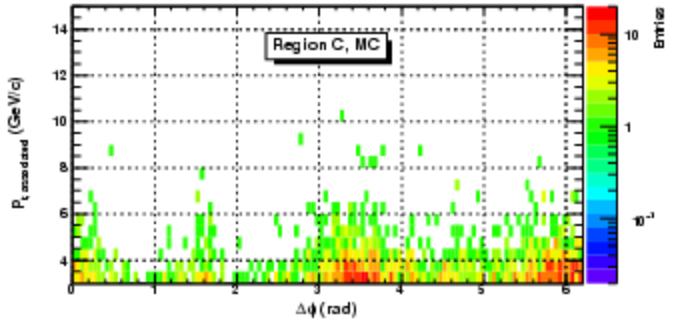
Without changes!

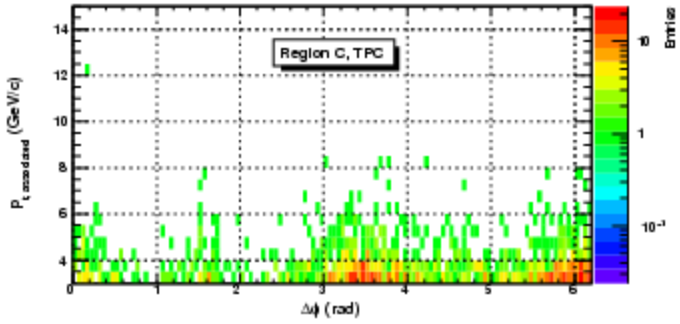




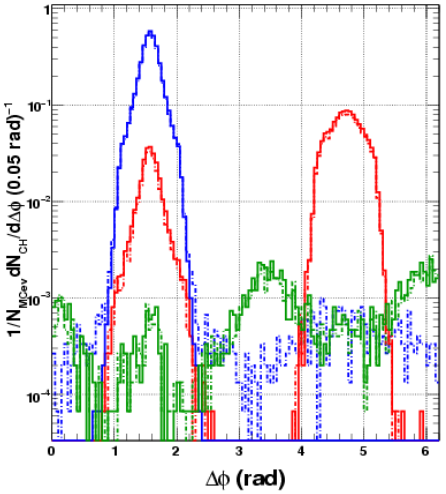


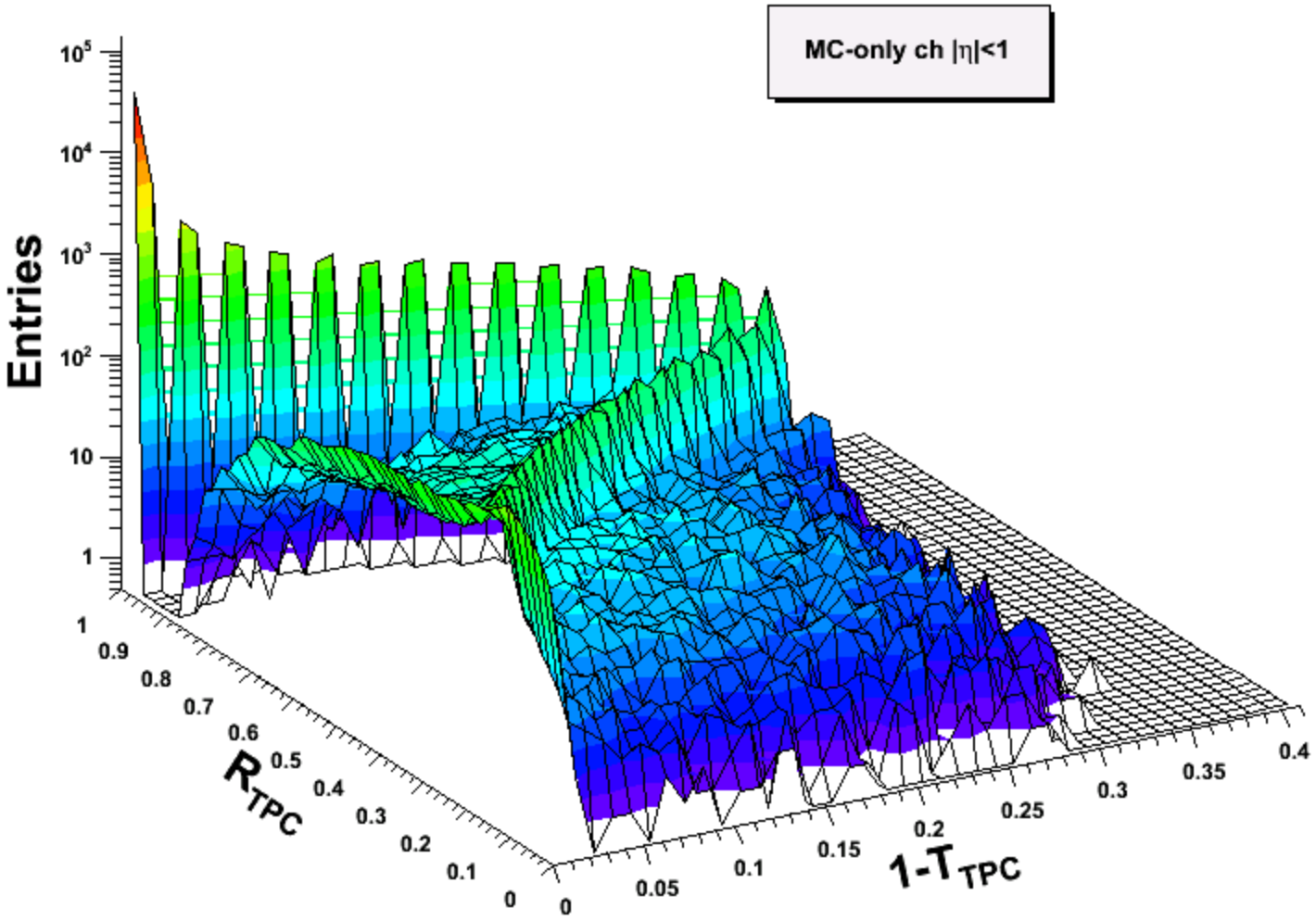


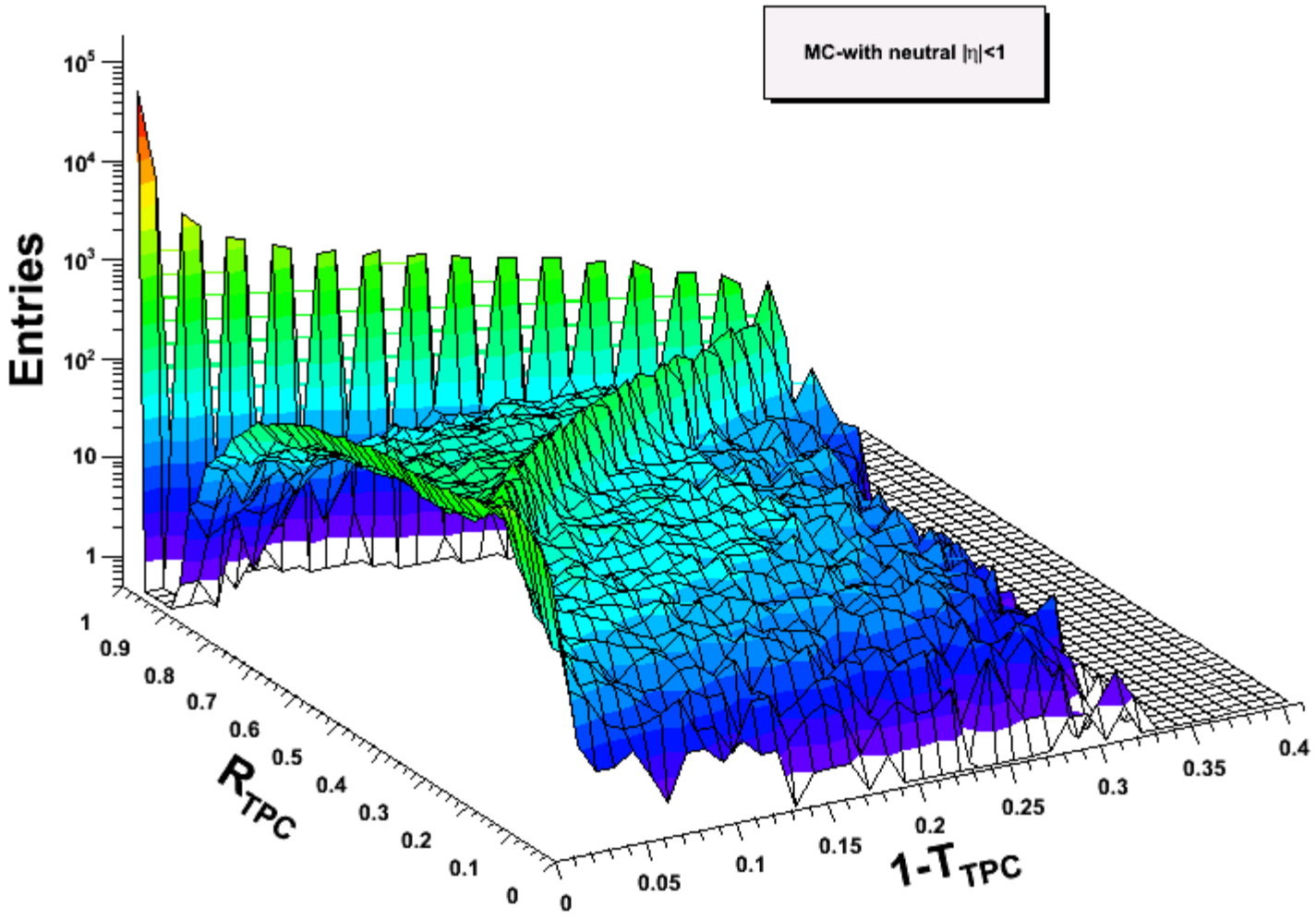


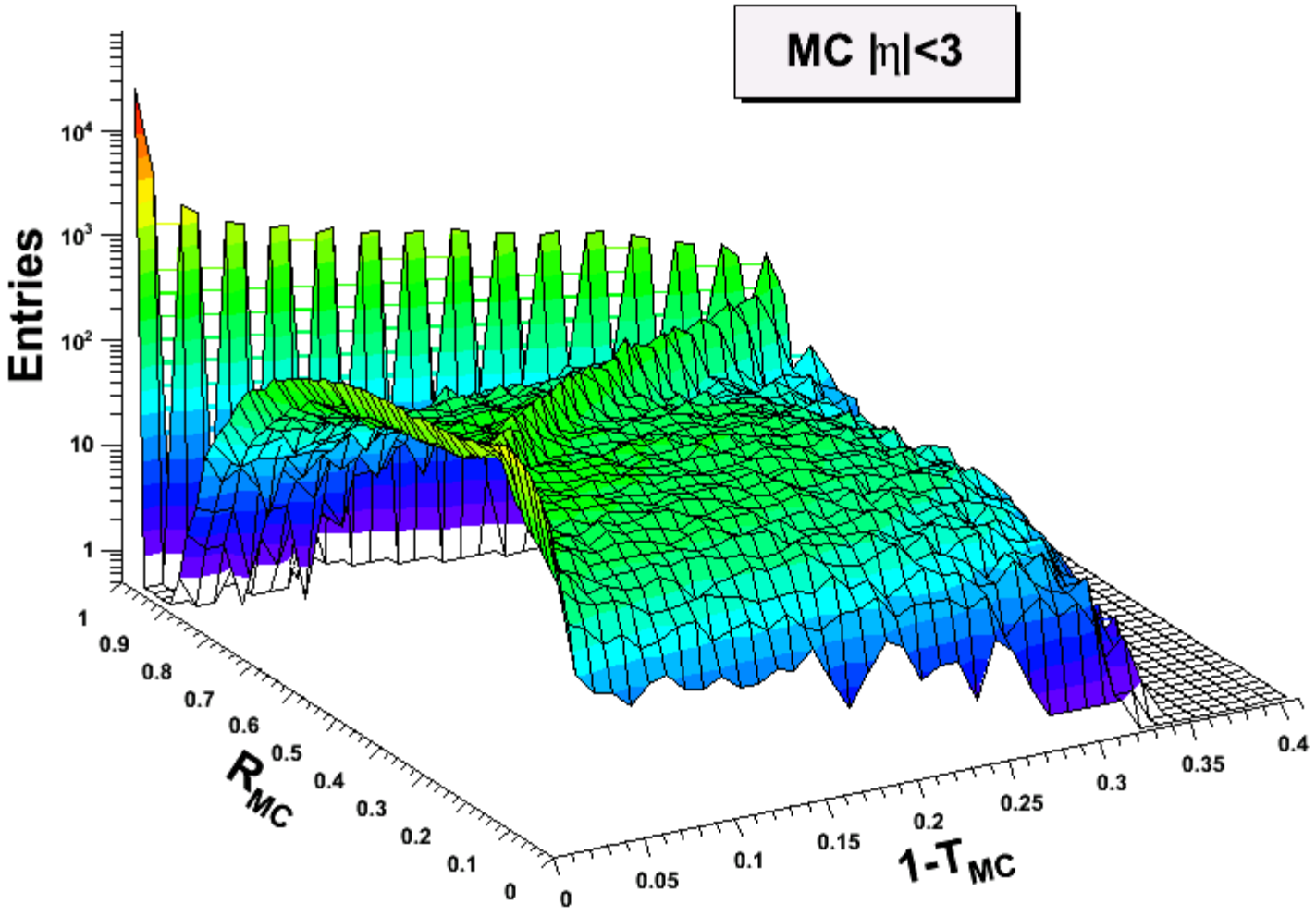


We can get the same topologies…

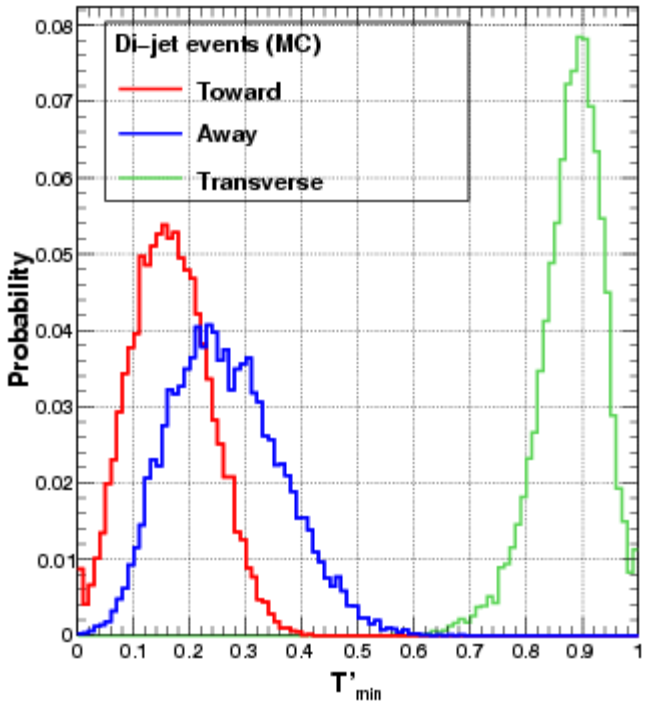


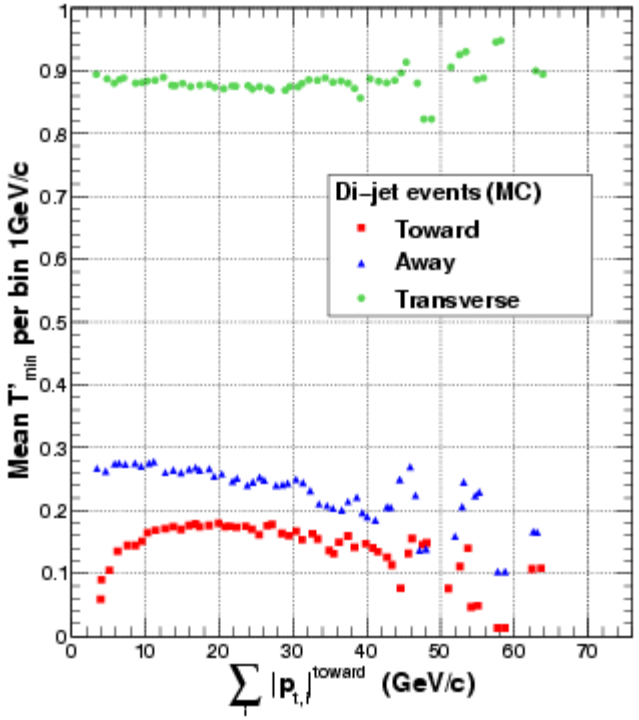

MC-only ch |η|<1
Entries
10^5
10^4
10^3
10^2
10
1
R_{TPC}
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
$1-T_{TPC}$
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4


MC-with neutral |η|<1
Entries
10^5
10^4
10^3
10^2
10
1
R_{TPC}
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
$1-T_{TPC}$
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4


MC |η|<3
Entries
10^4
10^3
10^2
10
1
R_MC
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1-T_MC
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4

Tmin


Di–jet events (MC)
Toward
Away
Transverse
Probability
T'min


Di–jet events (MC)
Toward
Away
Transverse
Mean T'min per bin 1GeV/c
(GeV/c)