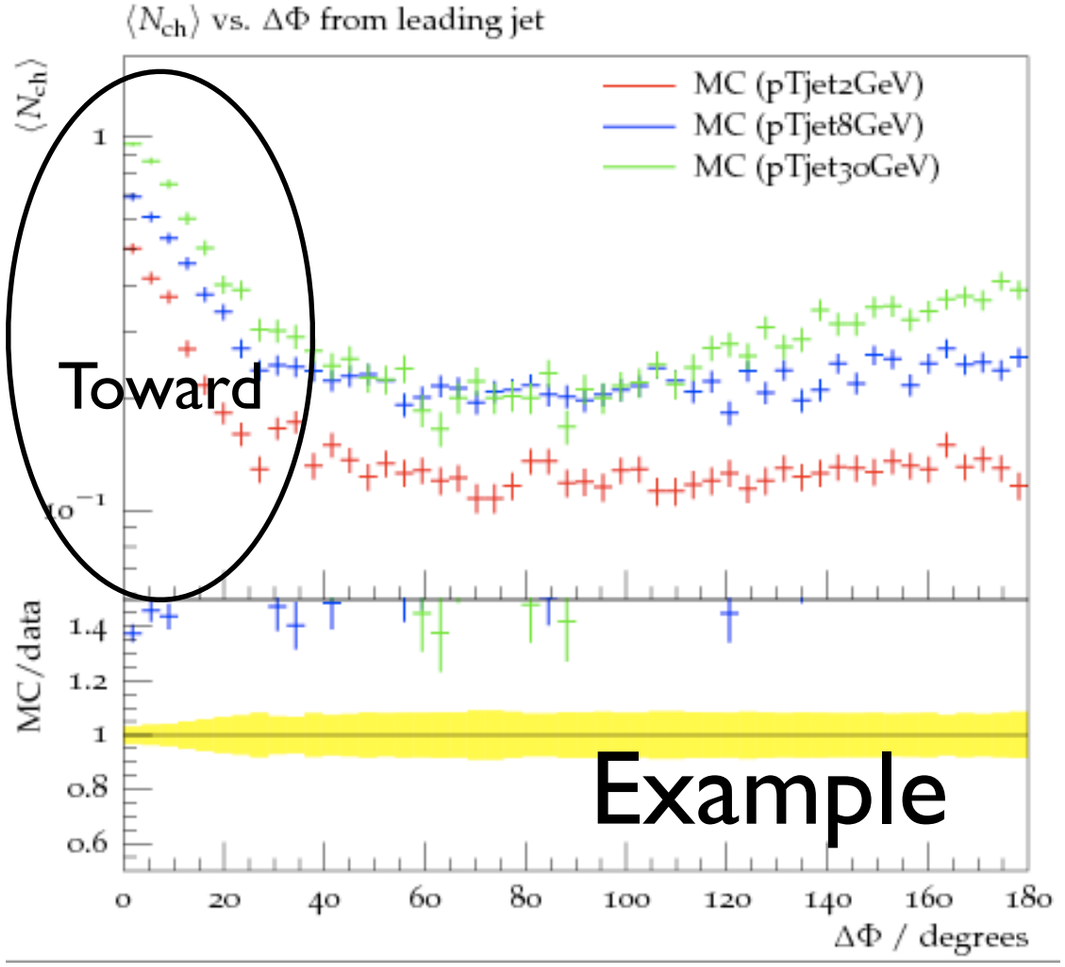
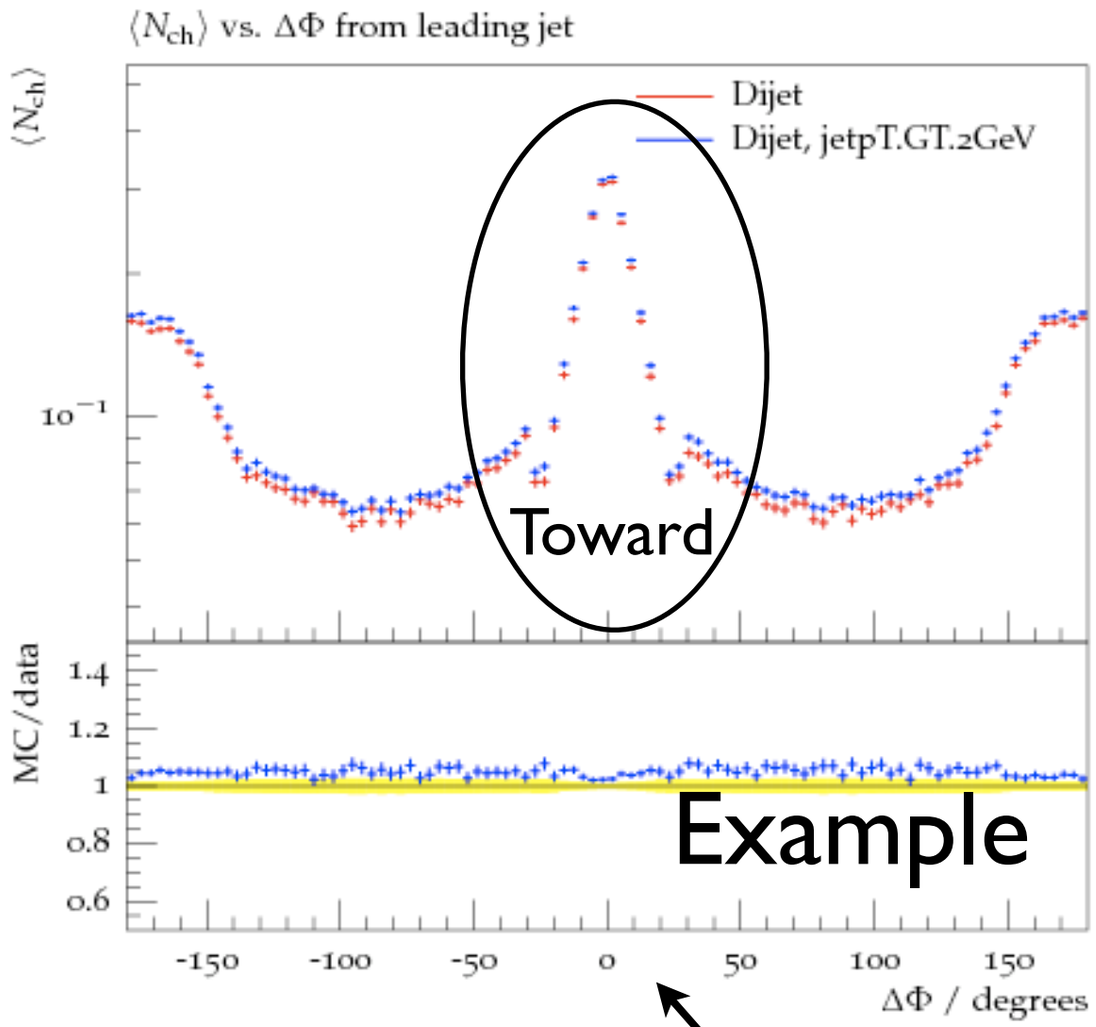




We look at the histograms between phi[-π,π], then jet structure becomes more visible.

Jets, |η|<1, AntiKT-0.5, (lead) jetpT > 2 GeV

Charged Particles, |η|<1, pT > 500MeV

"Leading Jet"

"Dijet" Back-to-Back

$\Delta\Phi(1,2) > 150^\circ$

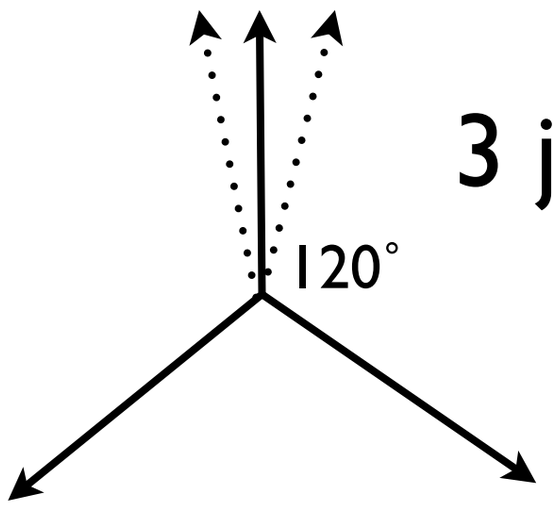
pT (jet#2) / pT (jet#1) > 0.8 almost equal transverse energy.

"Three Jets" (well balanced)

$105^\circ < \Delta\Phi(1,2) < 135^\circ$

$105^\circ < \Delta\Phi(2,3) < 135^\circ$

$105^\circ < \Delta\Phi(1,3) < 135^\circ$



3 jets

Dijet Events phi regions;

"Toward"

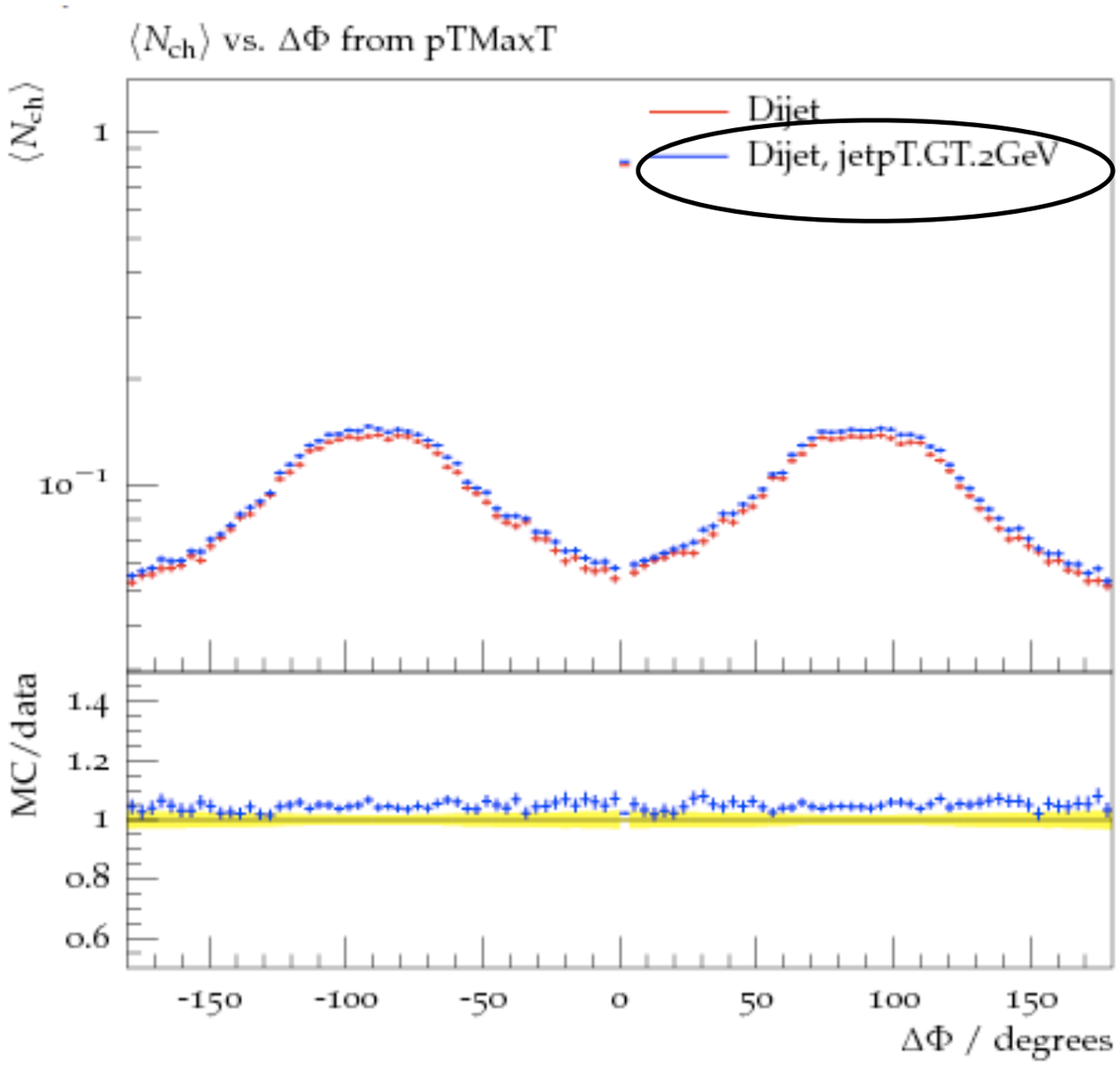
$-60^\circ < \Delta\Phi < 60^\circ$

"Transverse"

$-120^\circ < \Delta\Phi < -60^\circ \;\&\&\; 60^\circ < \Delta\Phi < 120^\circ$

"Away"

$-180^\circ < \Delta\Phi < -120^\circ \;\&\&\; 120^\circ < \Delta\Phi < 180^\circ$



Dijet (default)

jet#1_pT > 2GeV

jet#1

jet#2

jetpT.GT.2GeV (second scenario)

Greater Than

jet#1

jet#2

jet#1_pT > 2GeV

jet#2_pT > 2GeV

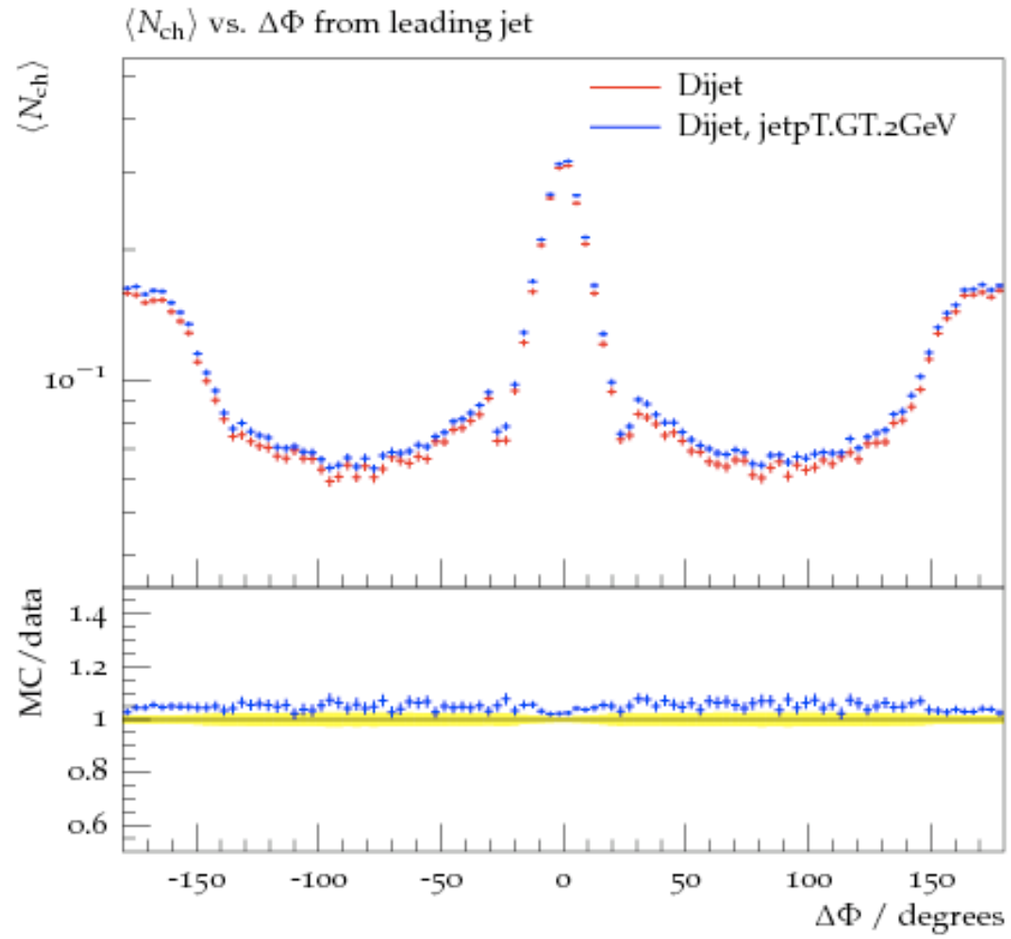
3 observables;

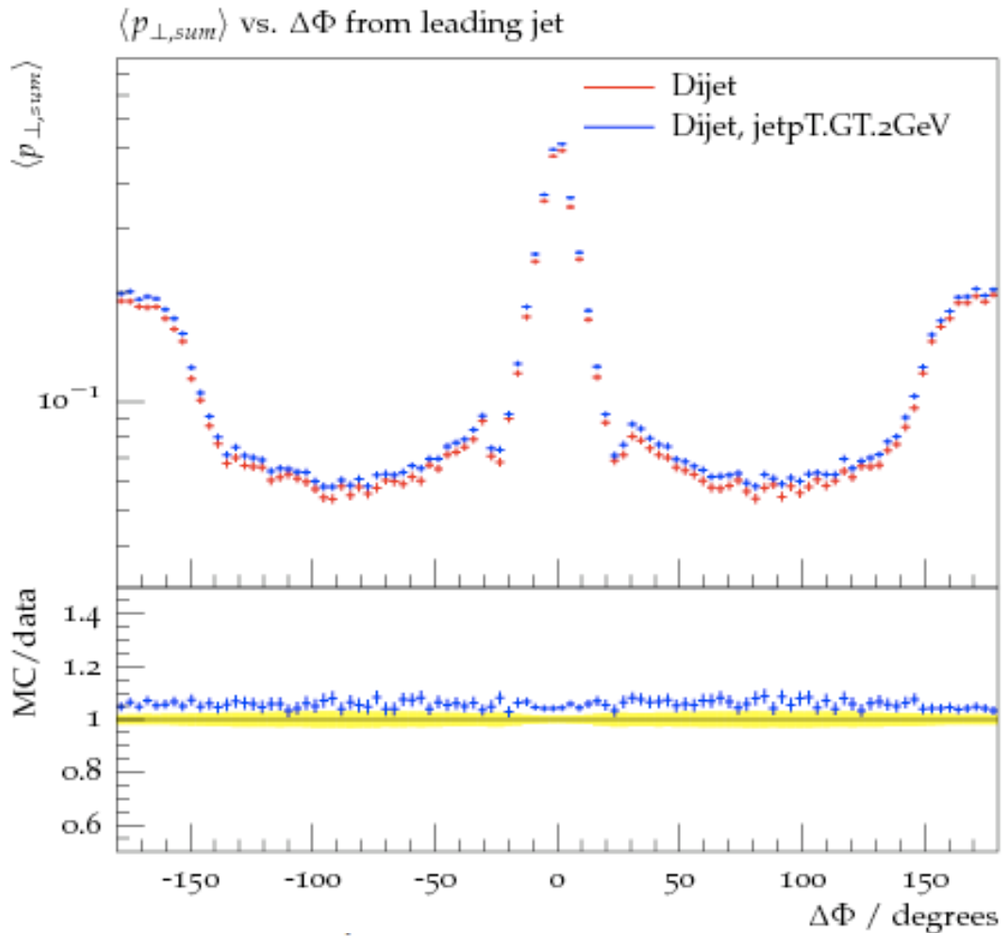
number of charged particles:
N_ch vs ΔΦ (relative to the Φ of the leading jet)

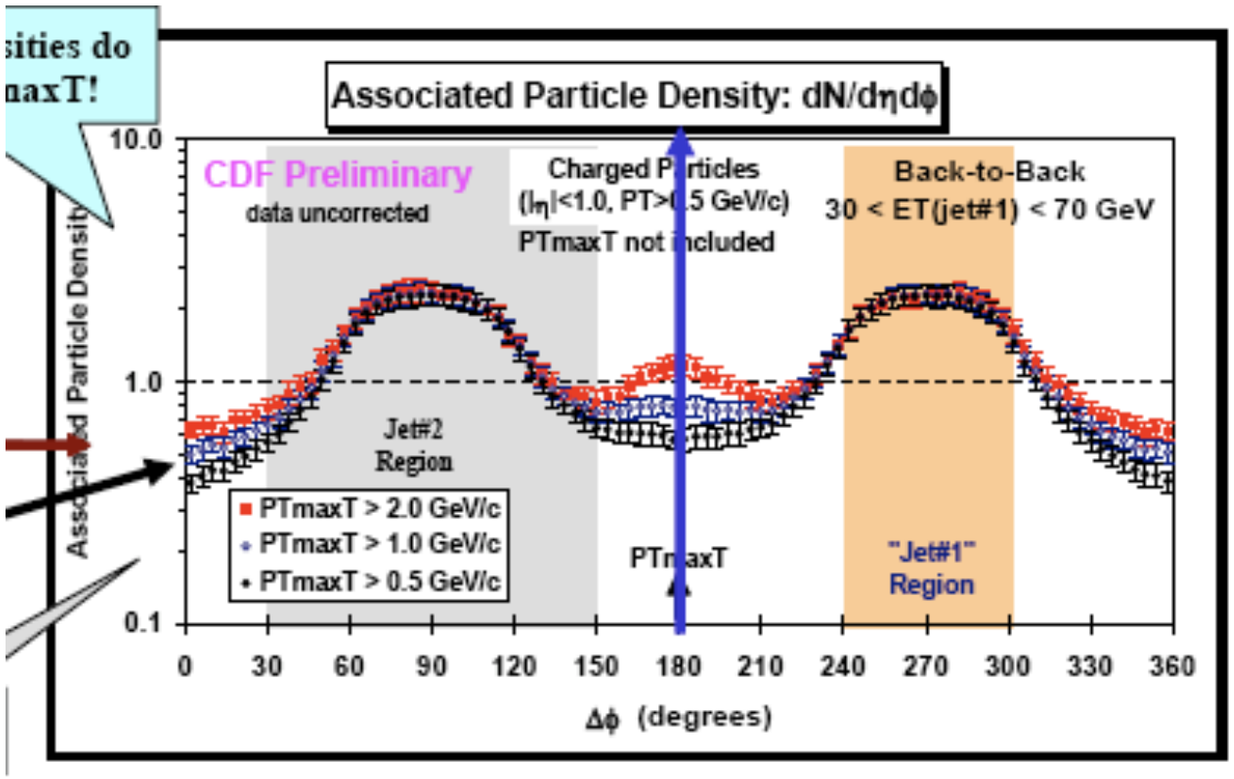
scalar pT sum of charged particles:
pT_sum vs ΔΦ (relative to the Φ of the leading jet)

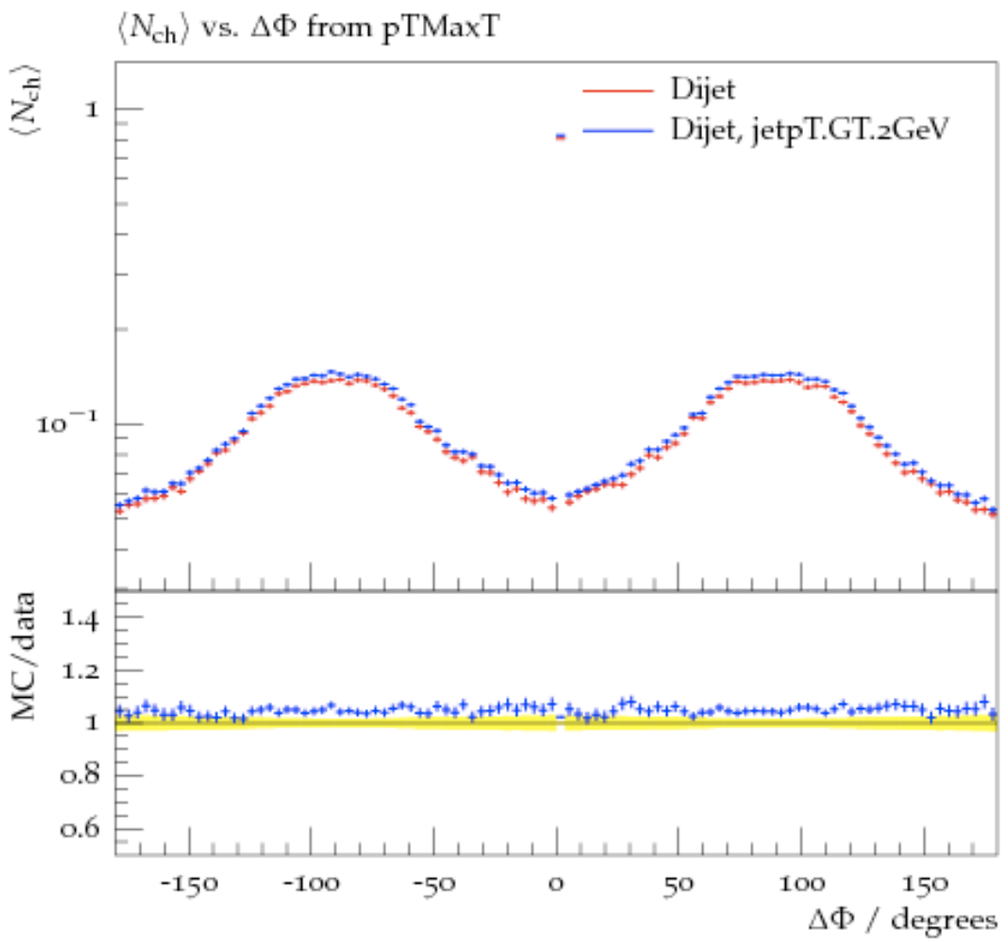
number of charged particles:
N_ch vs ΔΦ (relative to the Φ of the pTmaxT)

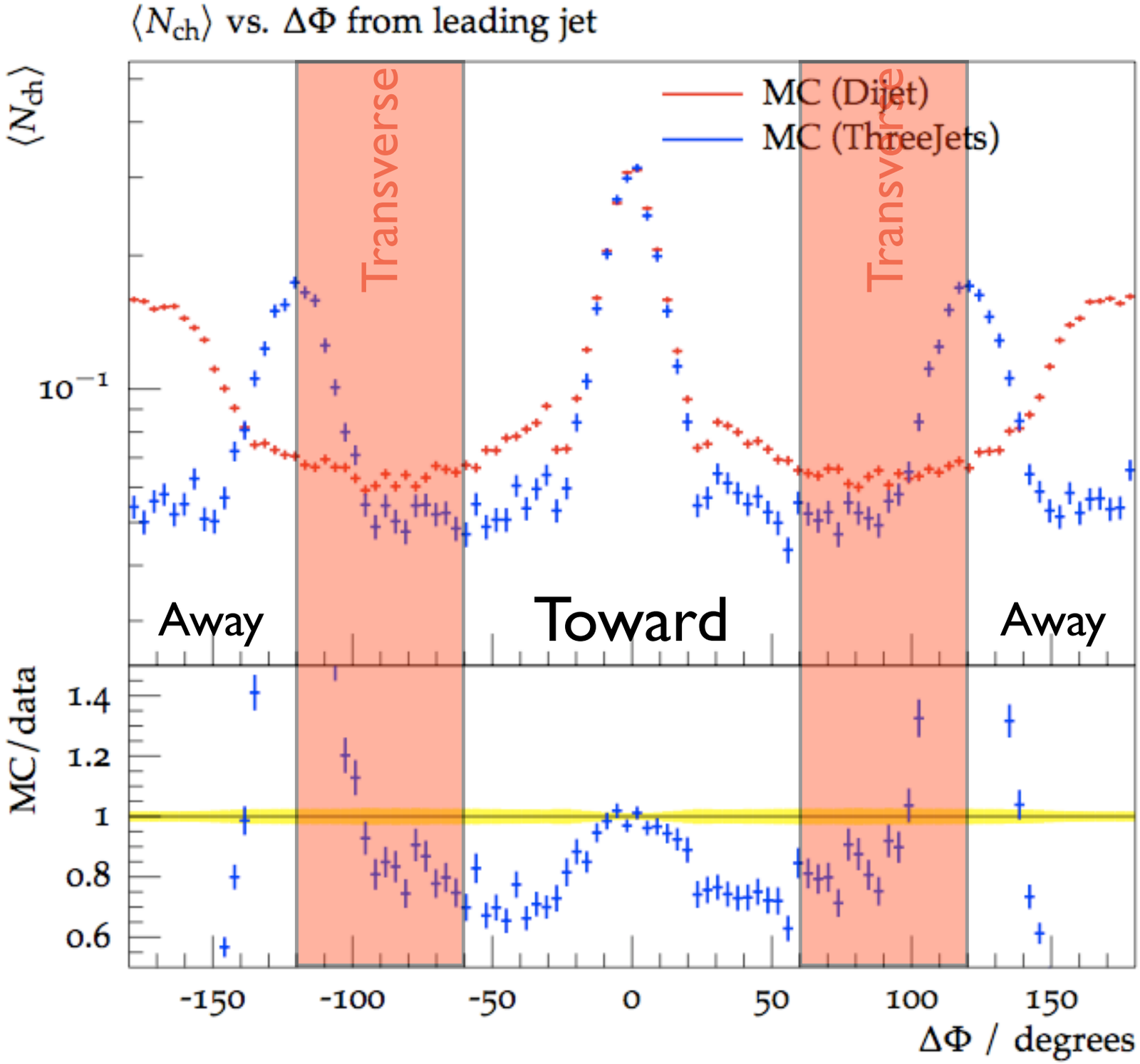
pTmaxT : maximum pT charged particle in the "transverse" region.

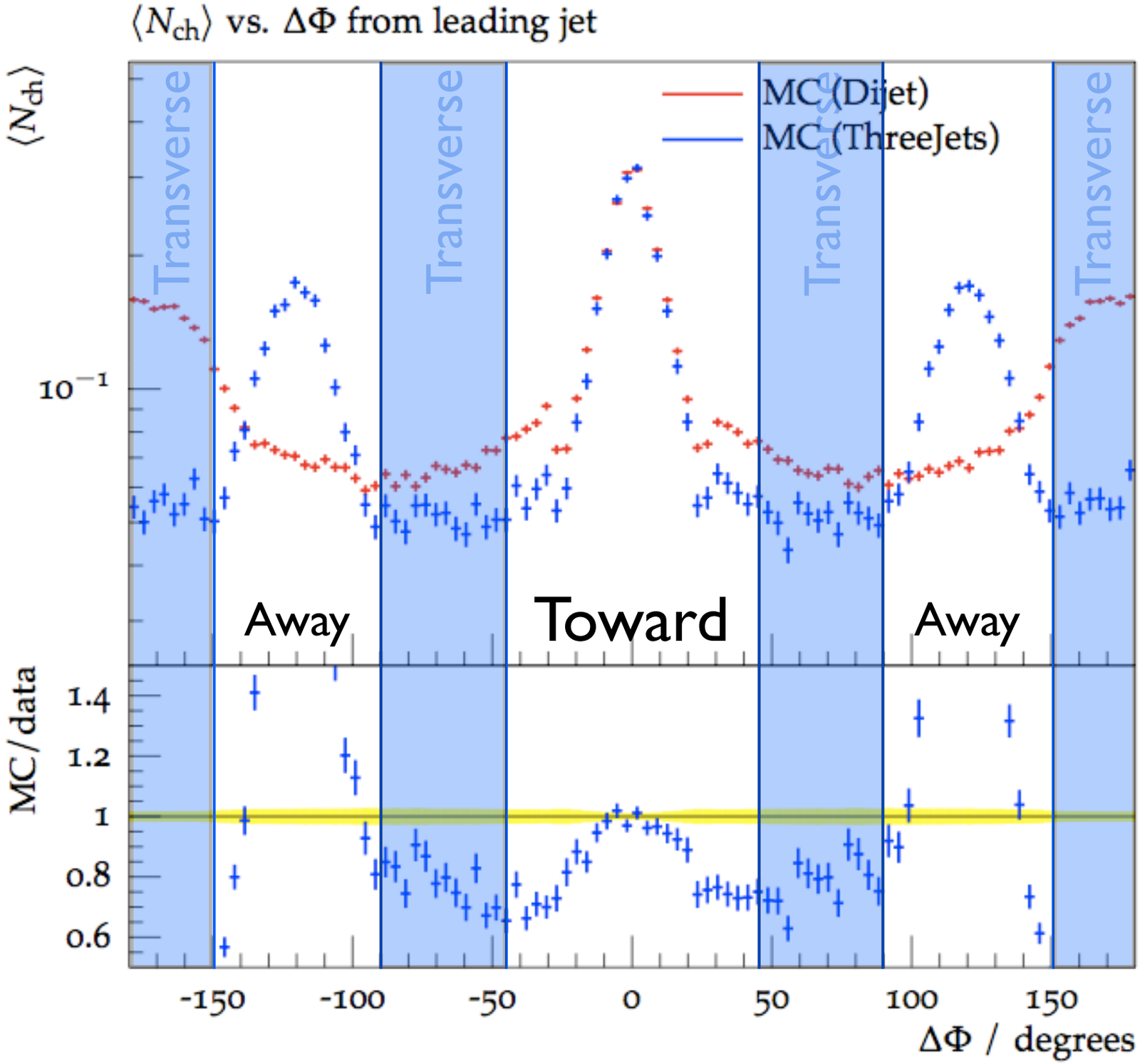

⟨N_ch⟩ vs. ΔΦ from leading jet
Dijet
Dijet, jetpT.GT.2GeV
⟨N_ch⟩
10^-1
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees

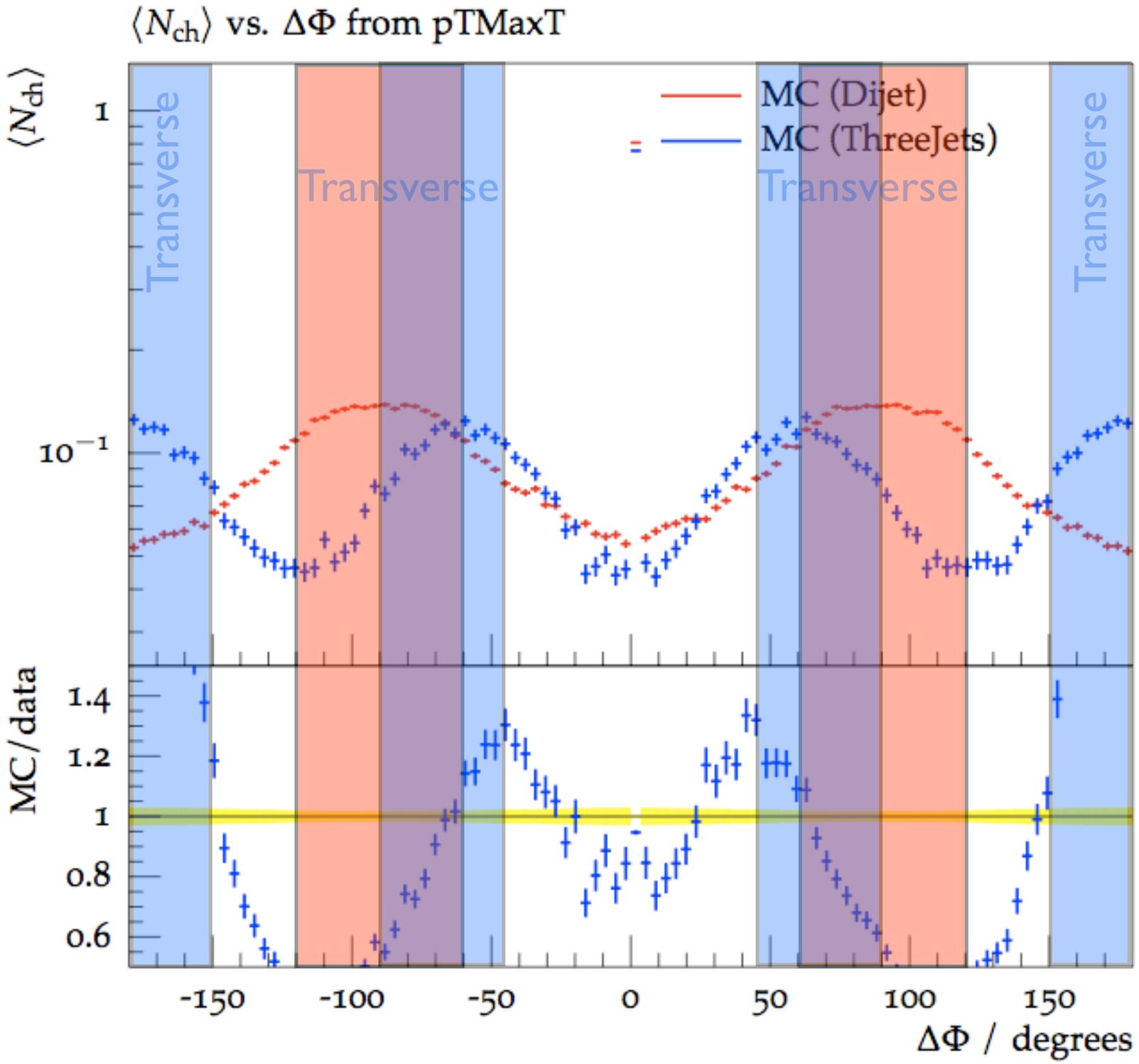

⟨p_⊥,sum⟩ vs. ΔΦ from leading jet
Dijet
Dijet, jetpT.GT.2GeV
⟨p_⊥,sum⟩
10^-1
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees

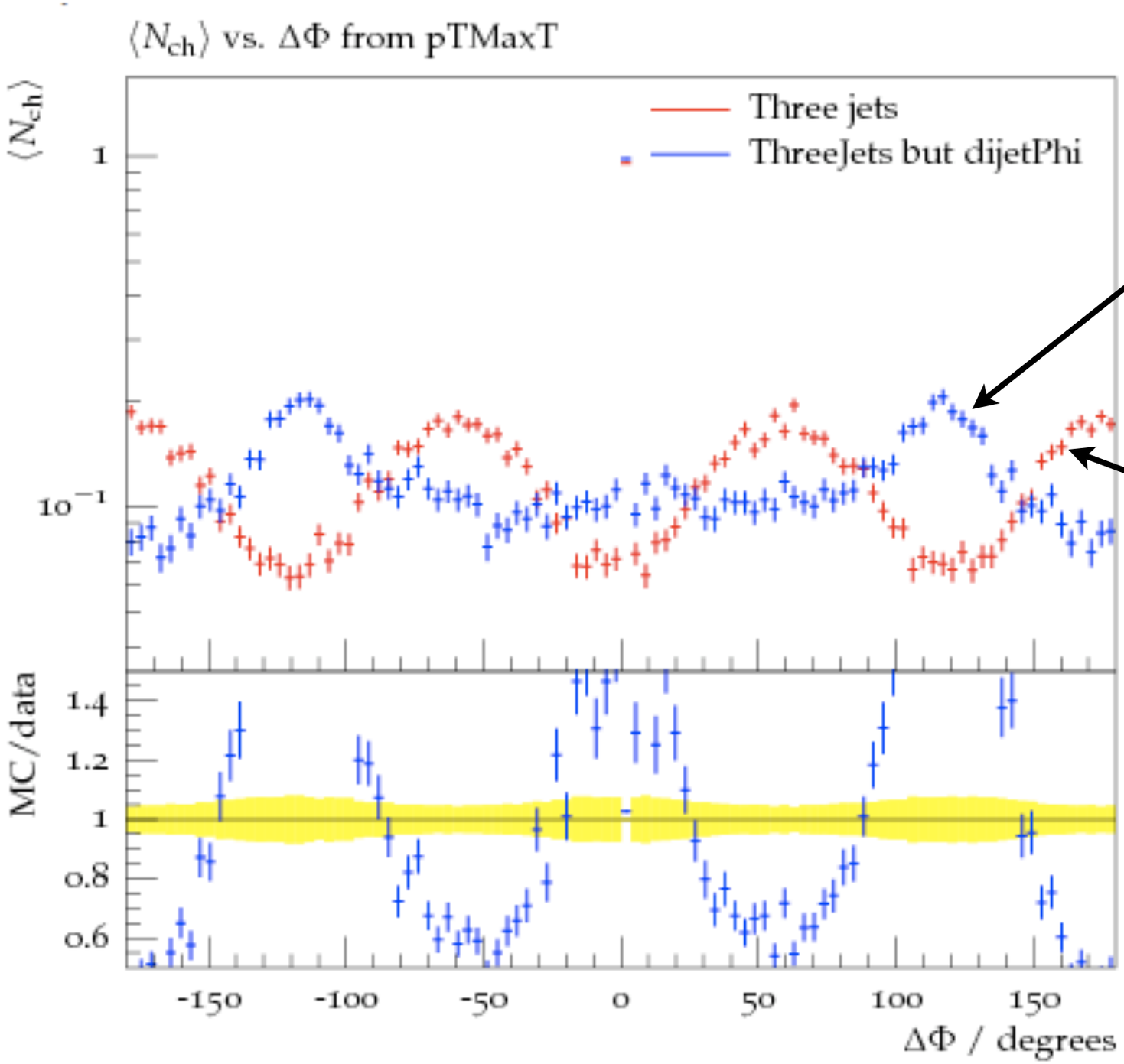

sities do
naxT!
Associated Particle Density: dN/dηdϕ
CDF Preliminary
data uncorrected
Charged Particles
(|η|<1.0, PT>0.5 GeV/c)
PTmaxT not included
Back-to-Back
30 < ET(jet#1) < 70 GeV
Jet#2
Region
"Jet#1"
Region
PTmaxT
PTmaxT > 2.0 GeV/c
PTmaxT > 1.0 GeV/c
PTmaxT > 0.5 GeV/c
Associated Particle Density
10.0
1.0
0.1
0
30
60
90
120
150
180
210
240
270
300
330
360
Δϕ (degrees)


⟨N_ch⟩ vs. ΔΦ from pTMaxT
Dijet
Dijet, jetpT.GT.2GeV
⟨N_ch⟩
1
10^-1
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees


⟨N_ch⟩ vs. ΔΦ from leading jet
⟨N_ch⟩
MC (Dijet)
MC (ThreeJets)
Transverse
Transverse
Away
Toward
Away
10^-1
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees


⟨N_{ch}⟩ vs. ΔΦ from leading jet
⟨N_{ch}⟩
MC (Dijet)
MC (ThreeJets)
Transverse
Transverse
Transverse
Transverse
Away
Toward
Away
10^{-1}
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees


⟨N_ch⟩ vs. ΔΦ from pTMaxT
⟨N_ch⟩
1
10^−1
MC (Dijet)
MC (ThreeJets)
Transverse
Transverse
Transverse
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees



Dijet phi regions

Three jets phi regions

ThreeJets Events phi regions;

"Toward"

$-45^\circ < \Delta\Phi < 45^\circ$

"Transverse"

$-180^\circ < \Delta\Phi < -150^\circ$ &&

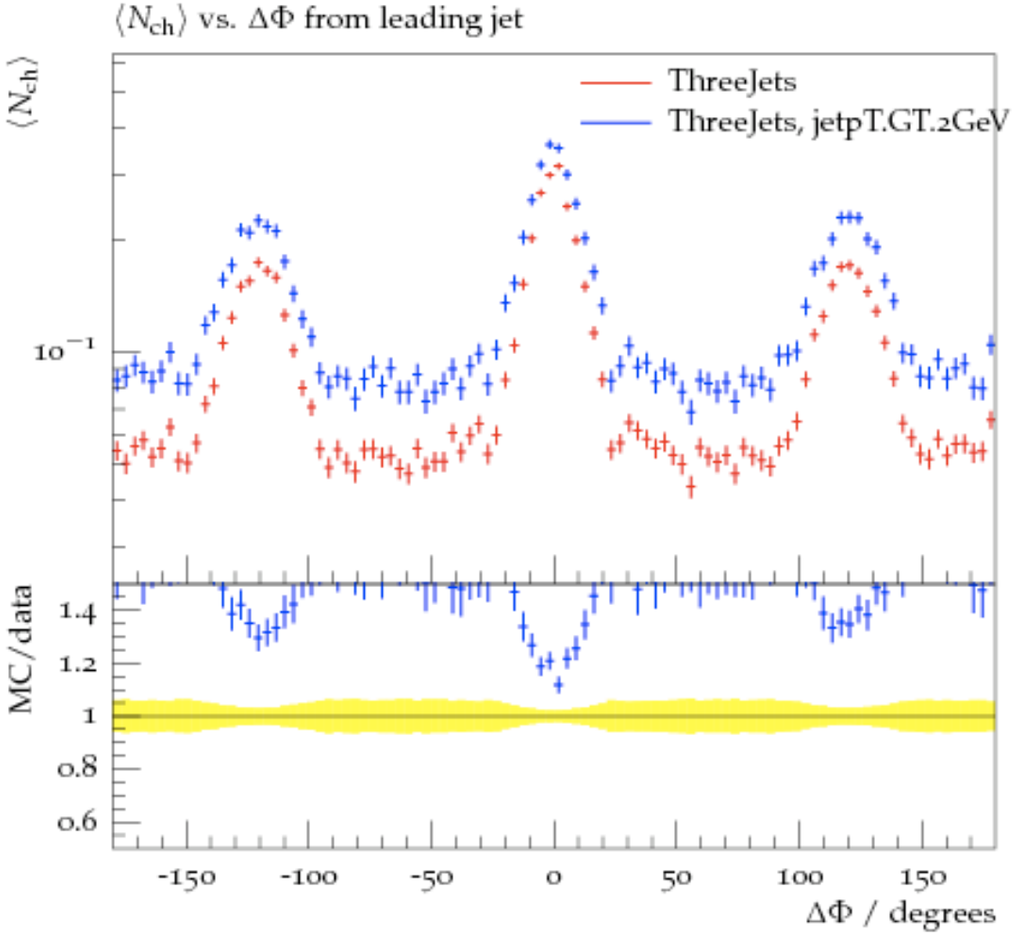
$-90^\circ < \Delta\Phi < -45^\circ$ &&

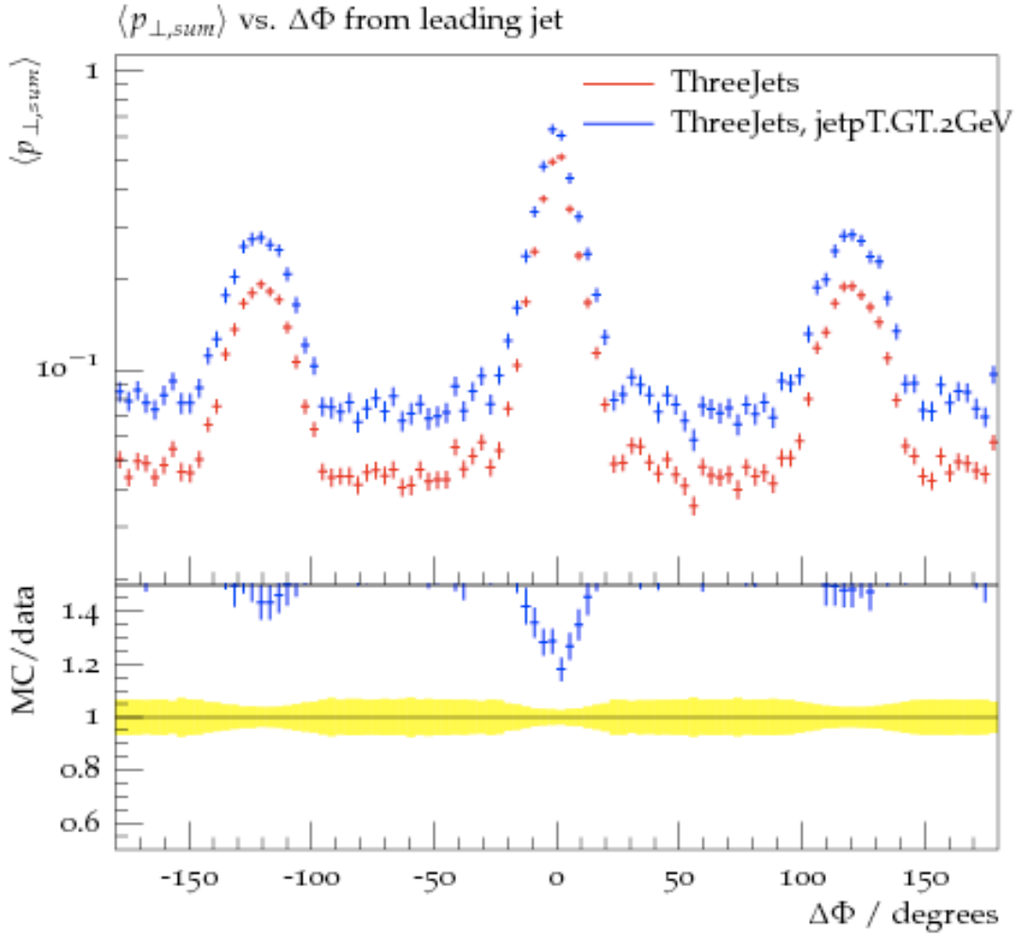
$45^\circ < \Delta\Phi < 90^\circ$ &&

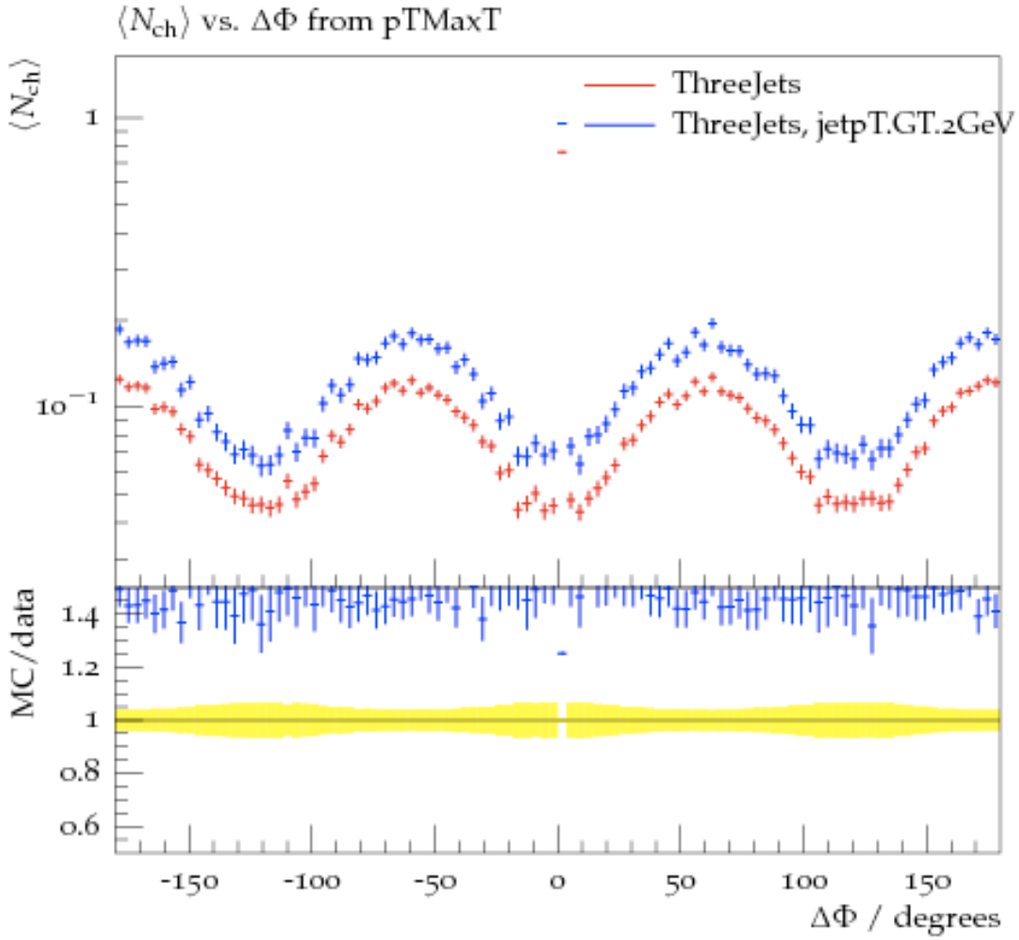
$150^\circ < \Delta\Phi < 180^\circ$

"Away"

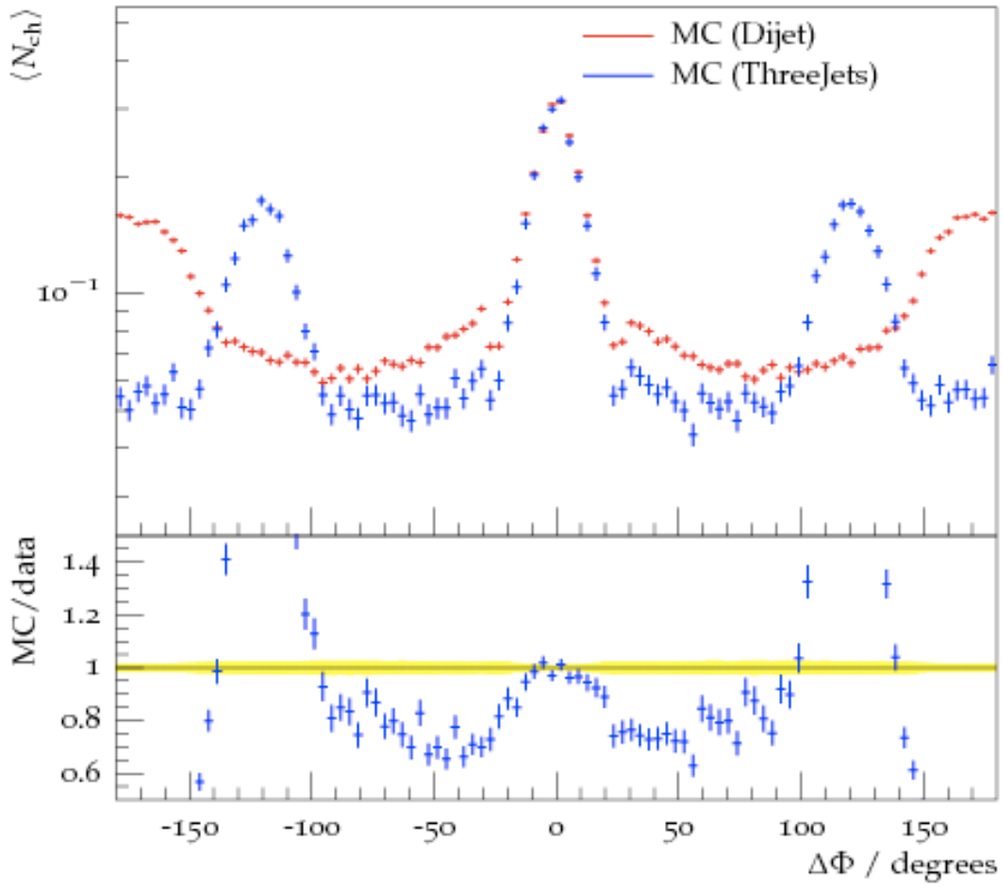
$-150^\circ < \Delta\Phi < -90^\circ$ && $90^\circ < \Delta\Phi < 150^\circ$


⟨N_ch⟩ vs. ΔΦ from leading jet
ThreeJets
ThreeJets, jetpT.GT.2GeV
⟨N_ch⟩
10^-1
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees

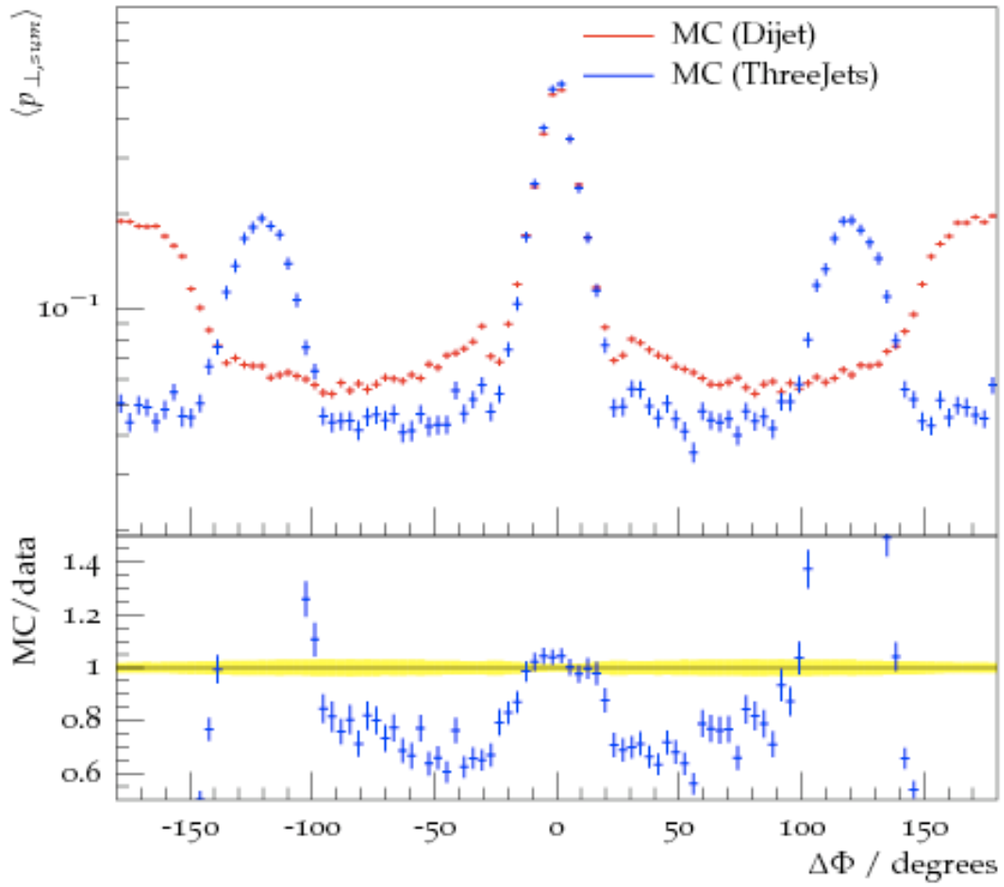

⟨p_⊥,sum⟩ vs. ΔΦ from leading jet
ThreeJets
ThreeJets, jetpT.GT.2GeV
⟨p_⊥,sum⟩
1
10^-1
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees


⟨N_ch⟩ vs. ΔΦ from pTMaxT
ThreeJets
ThreeJets, jetpT.GT.2GeV
⟨N_ch⟩
1
10^-1
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees

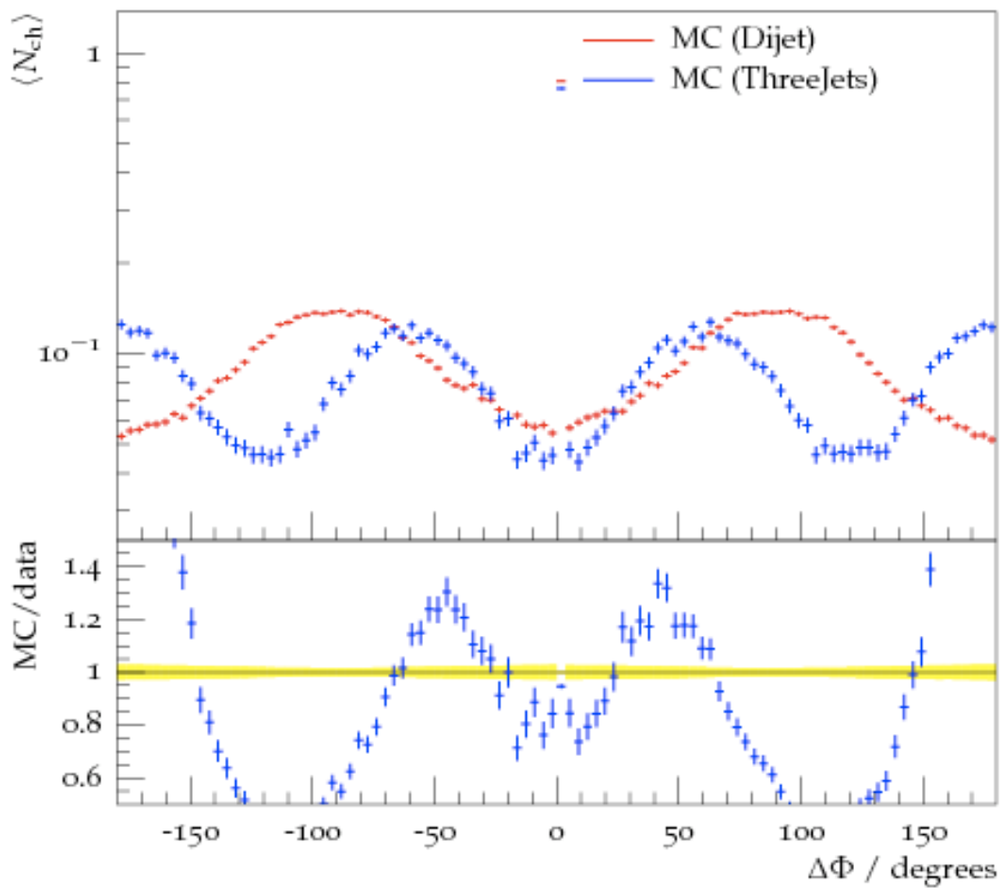
$\langle N_{ch} \rangle$ vs. $\Delta\Phi$ from leading jet



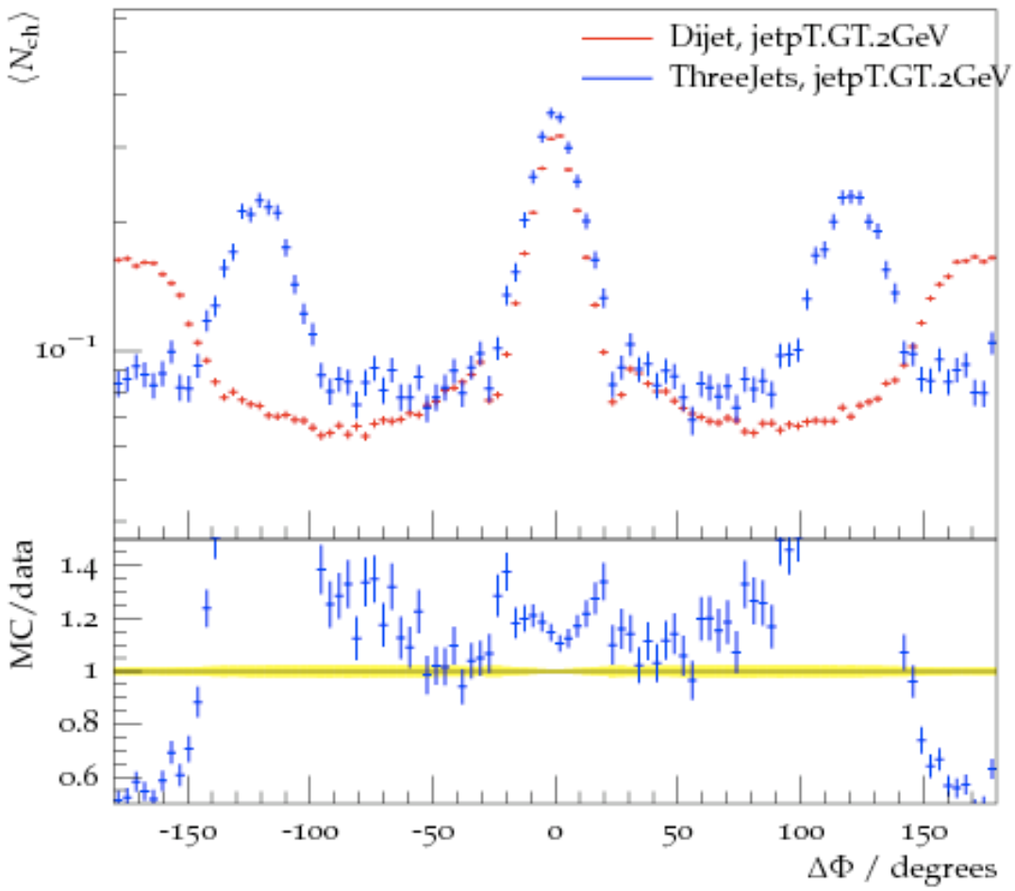
$\langle p_{\perp,sum} \rangle$ vs. $\Delta\Phi$ from leading jet



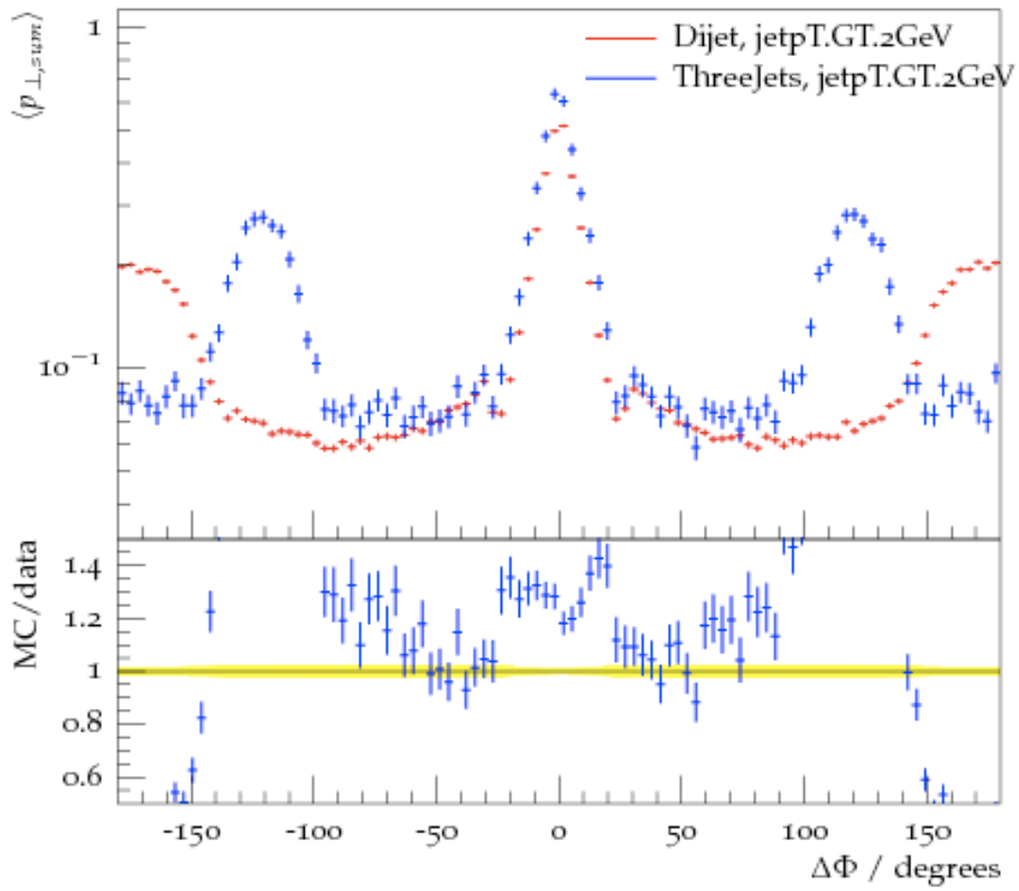
$\langle N_{ch} \rangle$ vs. $\Delta\Phi$ from pTMaxT



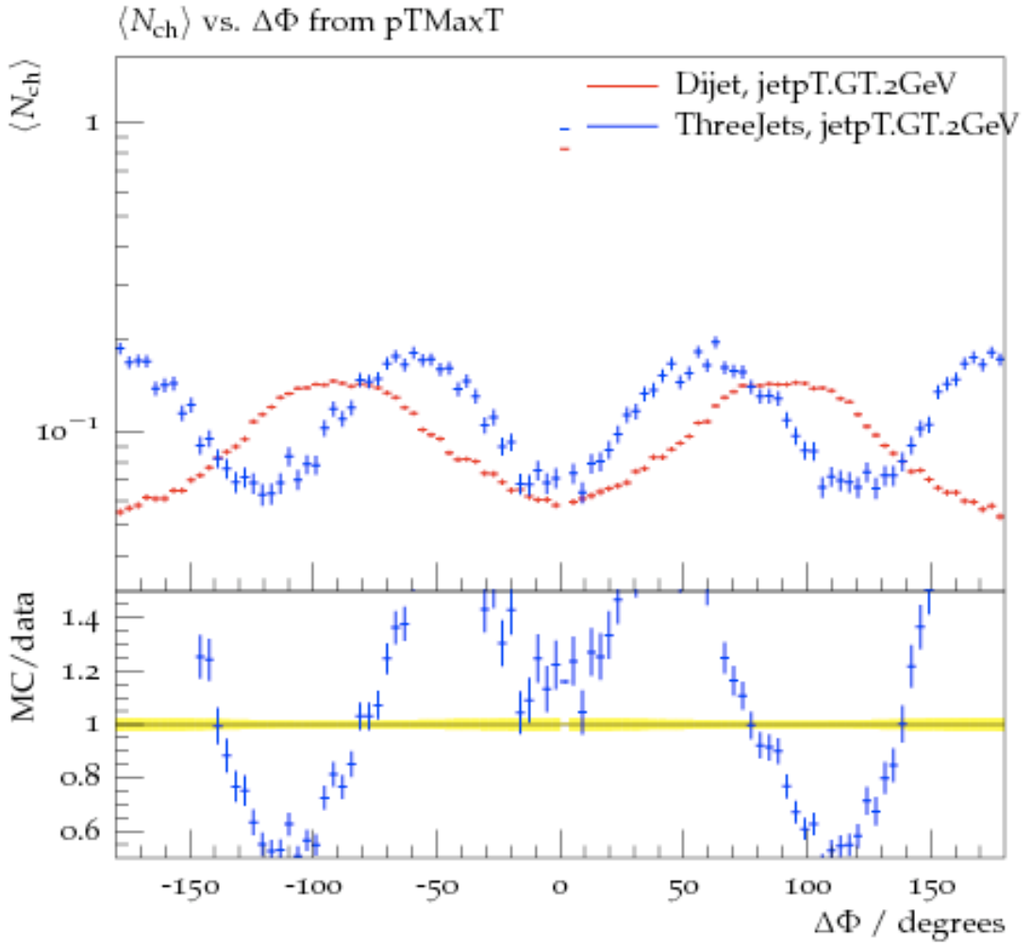
$\langle N_{ch} \rangle$ vs. ΔΦ from leading jet

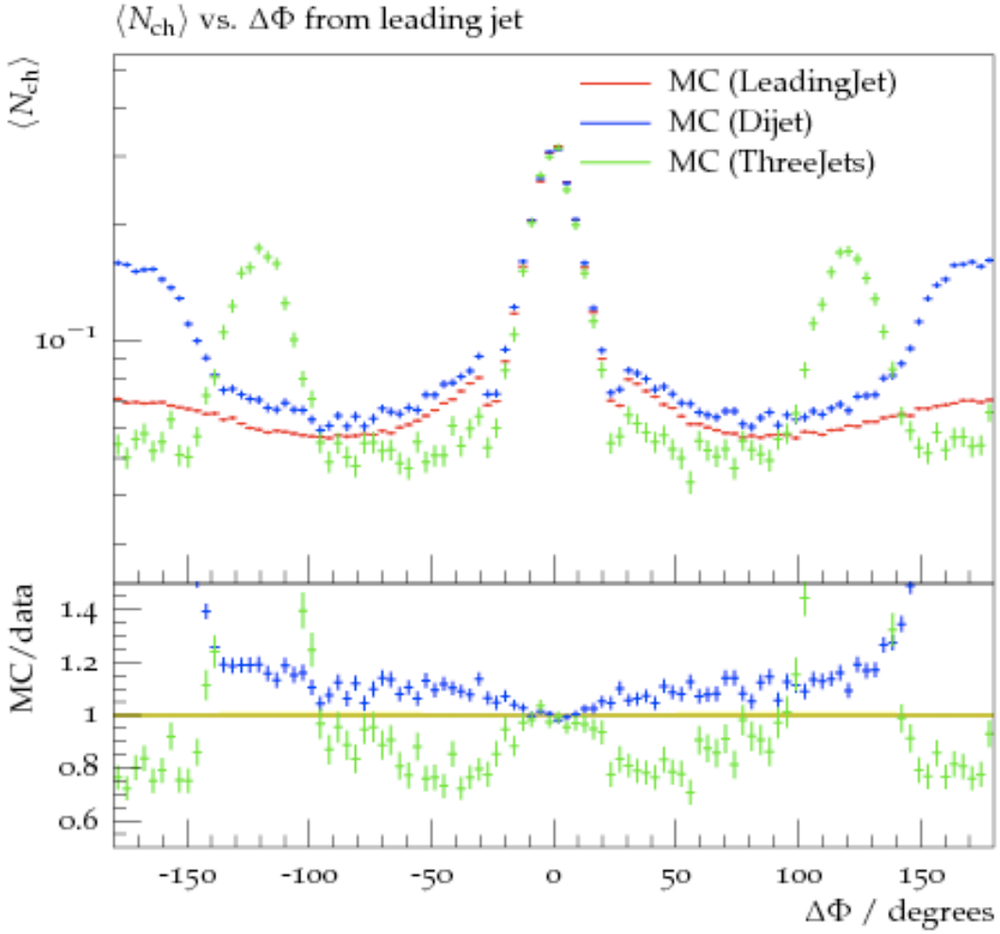


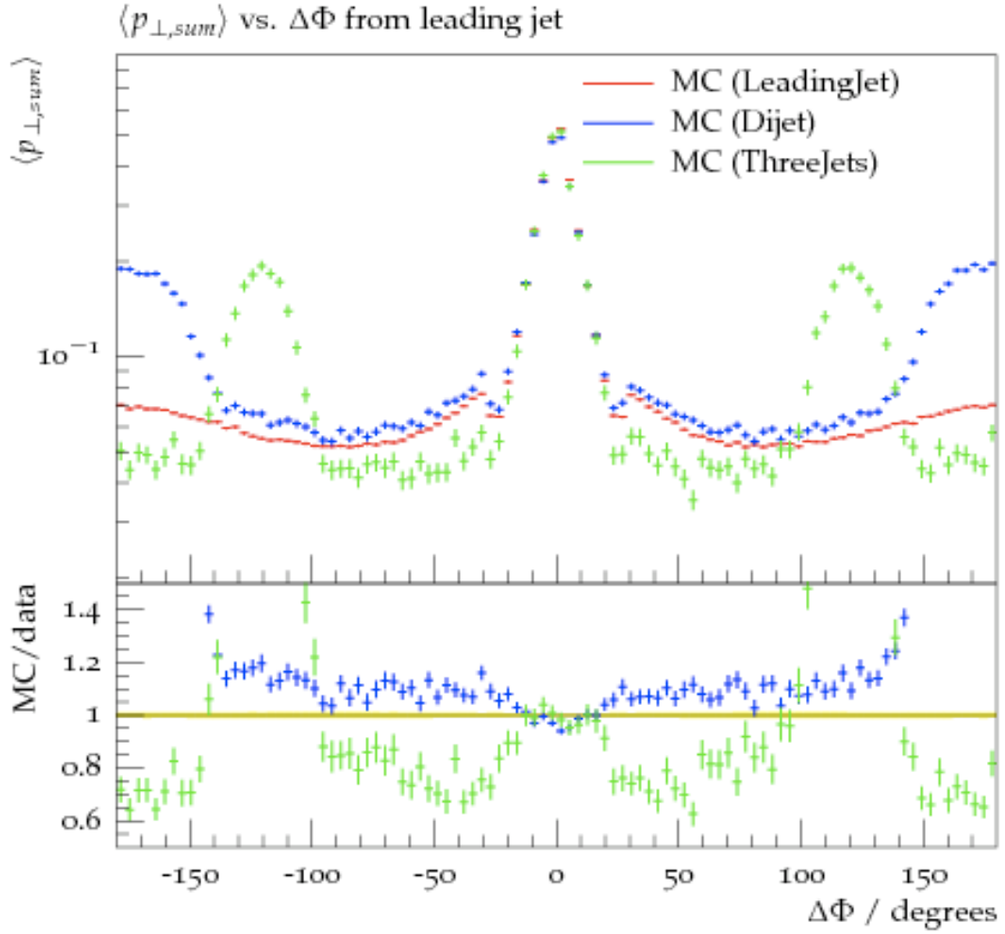
$\langle p_{\perp,sum} \rangle$ vs. ΔΦ from leading jet

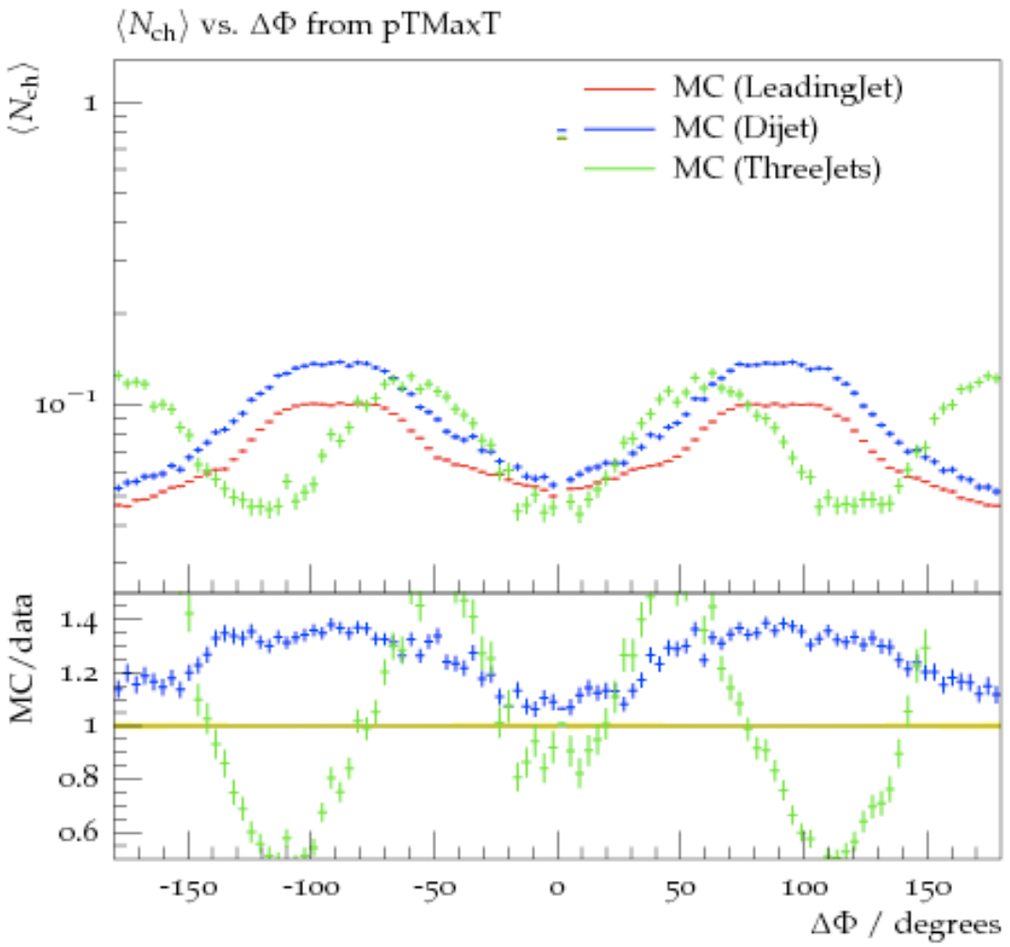


$\langle N_{ch} \rangle$ vs. ΔΦ from pTMaxT

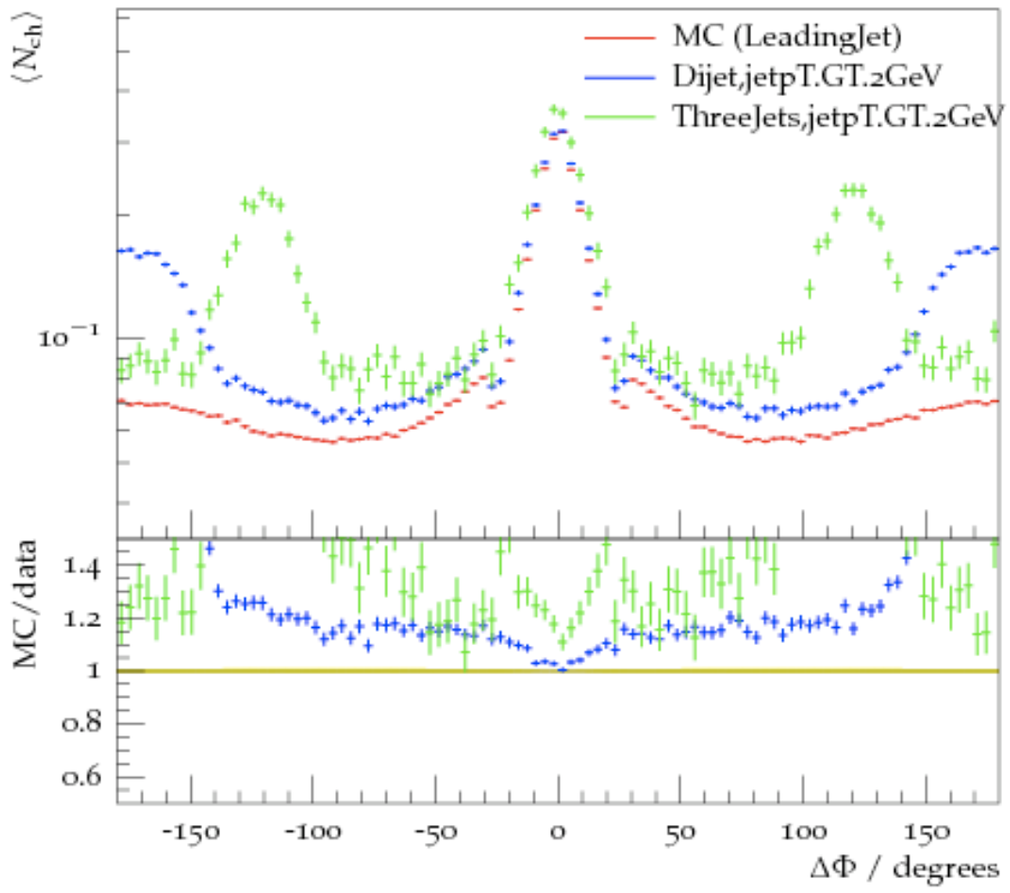



⟨N_ch⟩ vs. ΔΦ from leading jet
⟨N_ch⟩
MC (LeadingJet)
MC (Dijet)
MC (ThreeJets)
10^-1
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees

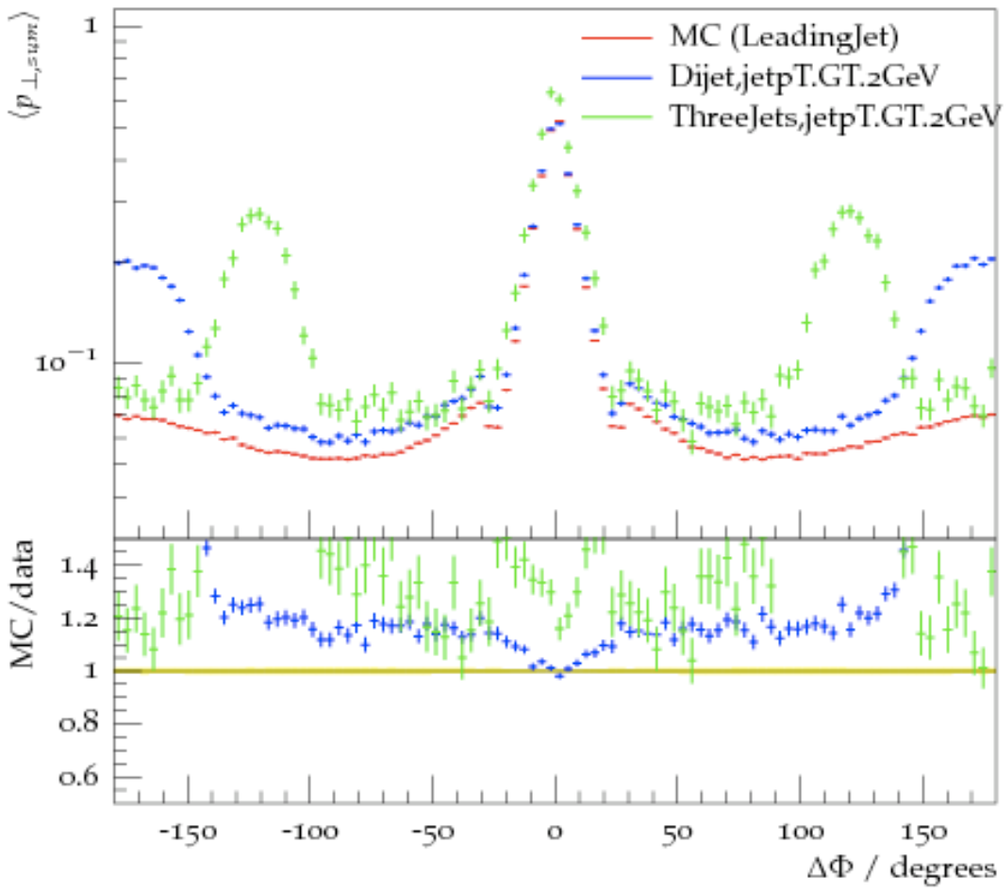

⟨p_⊥,sum⟩ vs. ΔΦ from leading jet
⟨p_⊥,sum⟩
MC (LeadingJet)
MC (Dijet)
MC (ThreeJets)
10^-1
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees


⟨N_ch⟩ vs. ΔΦ from pTMaxT
⟨N_ch⟩
1
10^-1
MC (LeadingJet)
MC (Dijet)
MC (ThreeJets)
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees

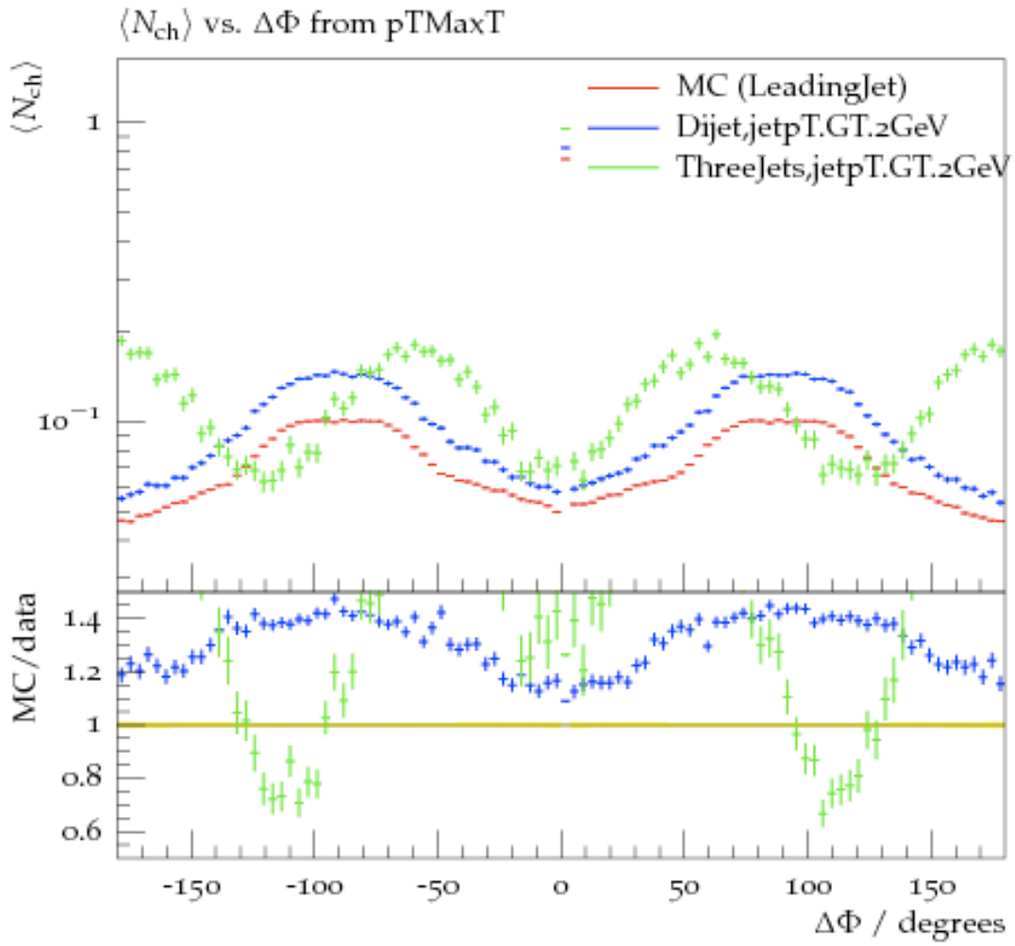
$\langle N_{ch} \rangle$ vs. $\Delta\Phi$ from leading jet



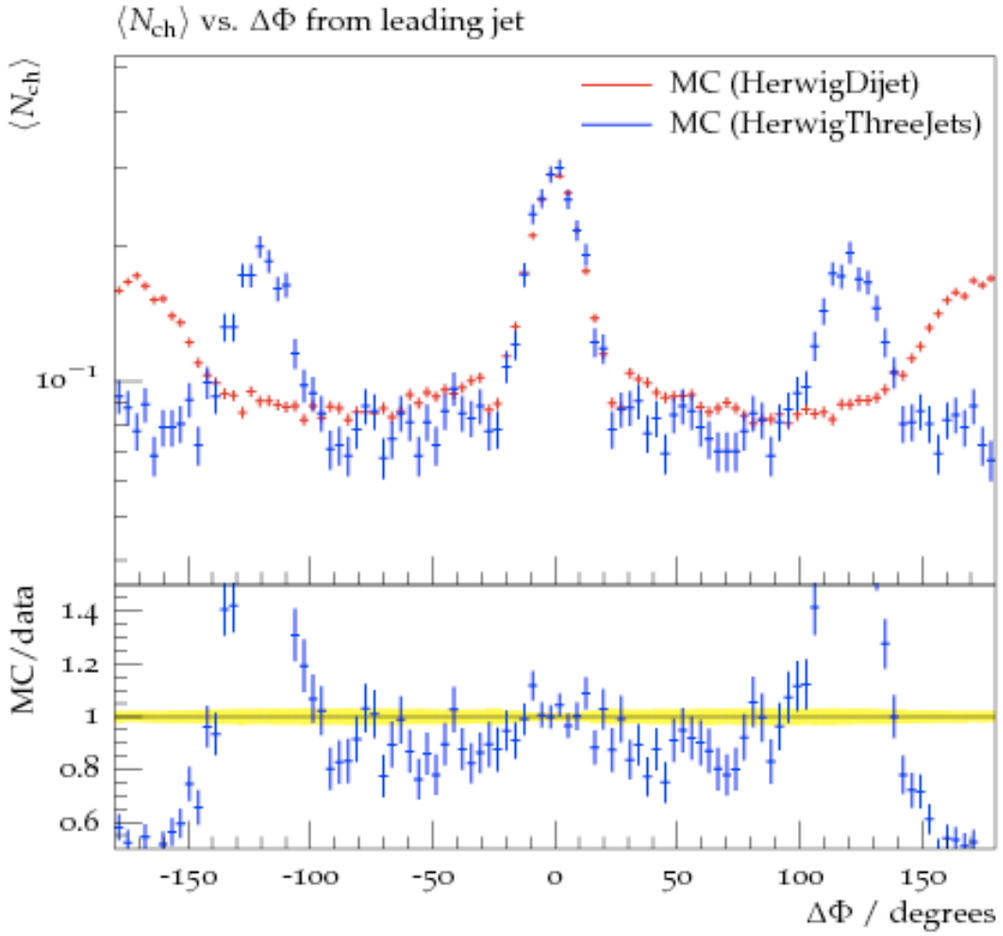
$\langle p_{\perp,sum} \rangle$ vs. $\Delta\Phi$ from leading jet

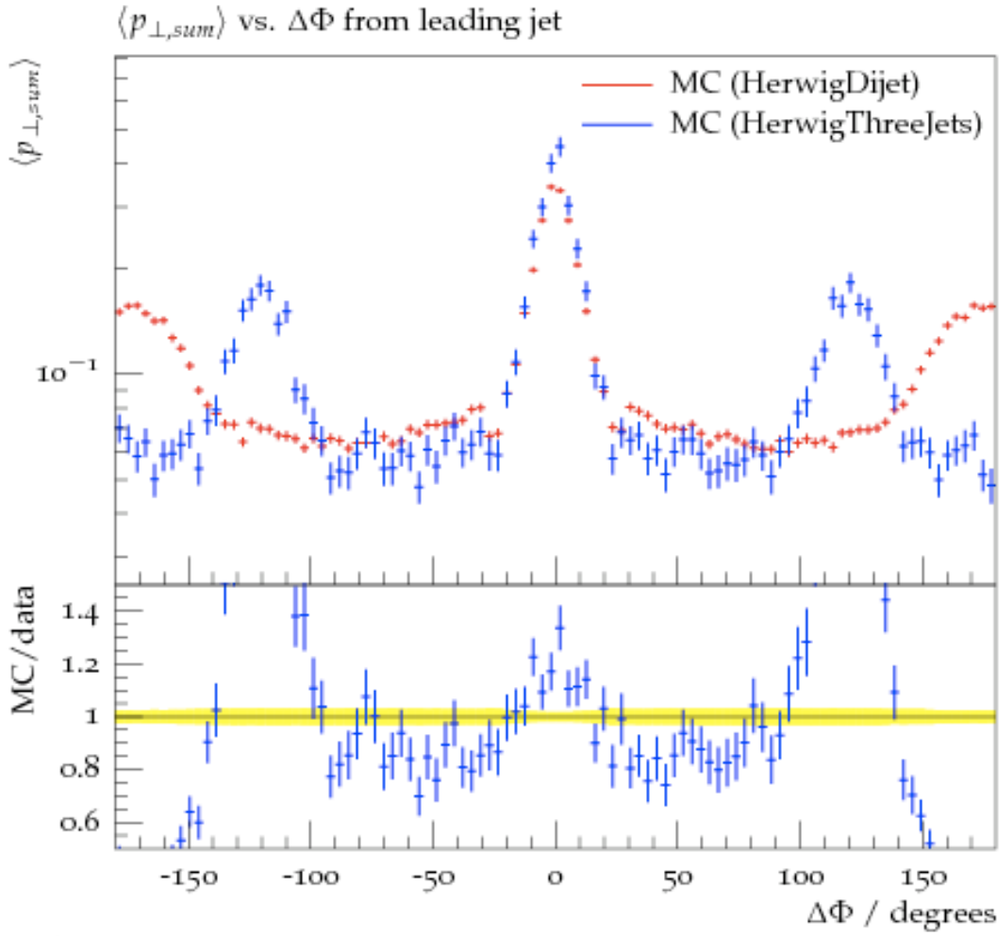


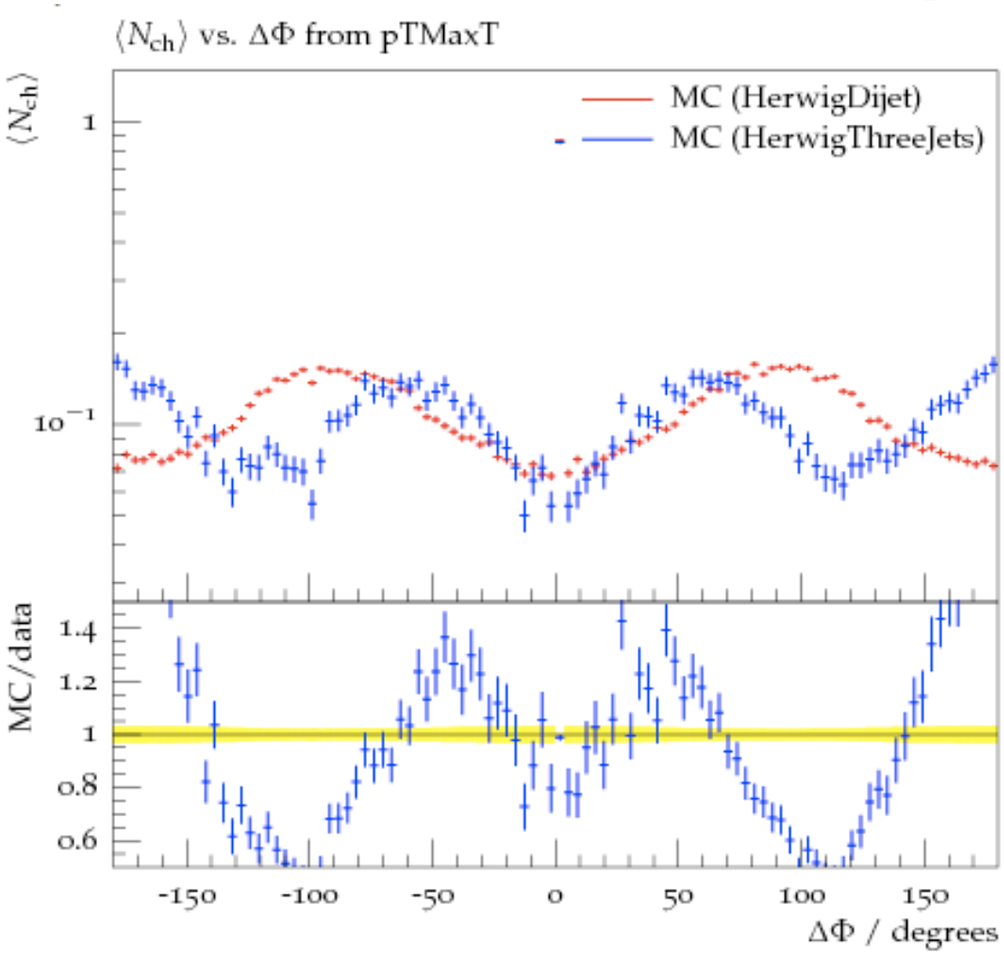
$\langle N_{ch} \rangle$ vs. $\Delta\Phi$ from pTMaxT

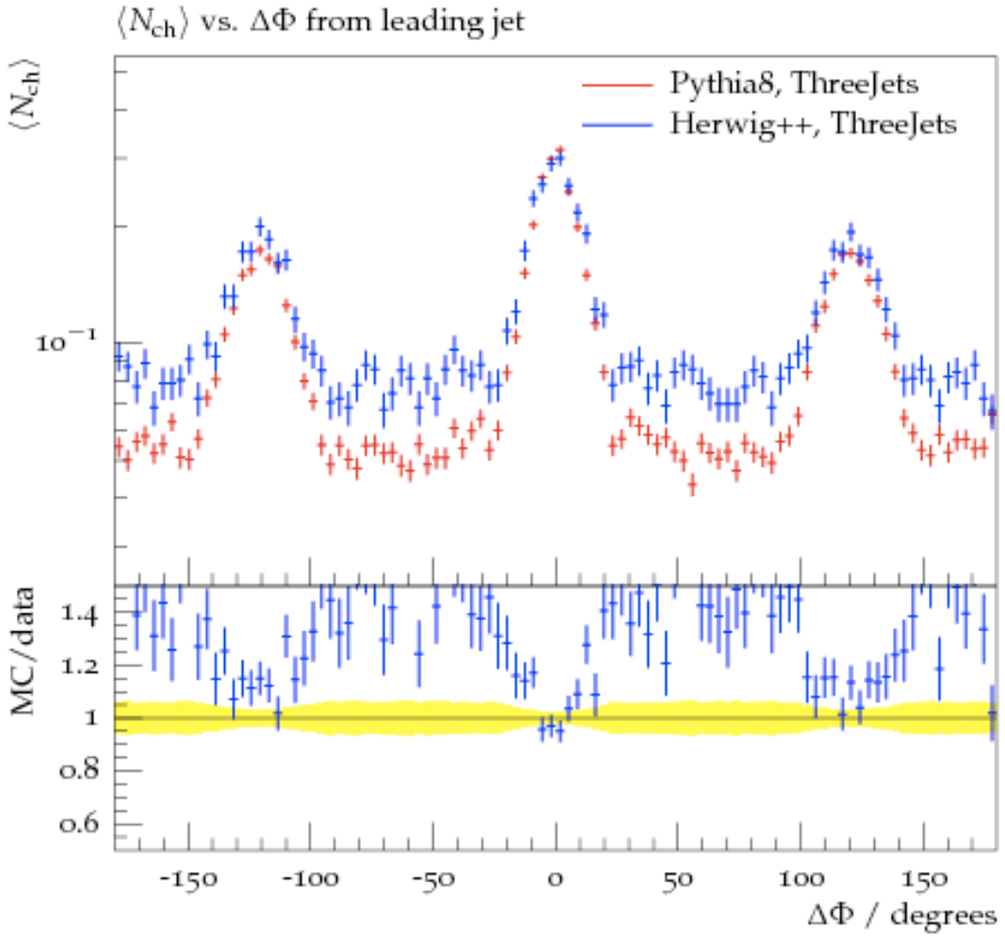


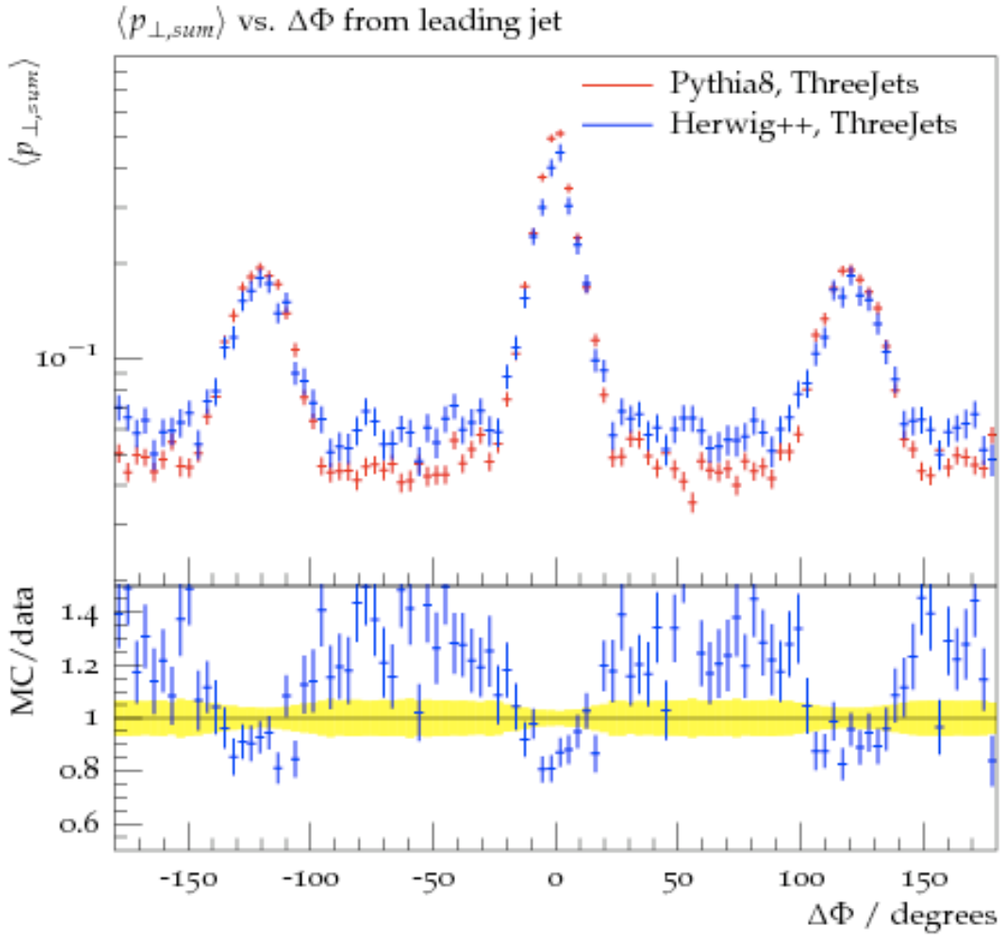
Herwig++

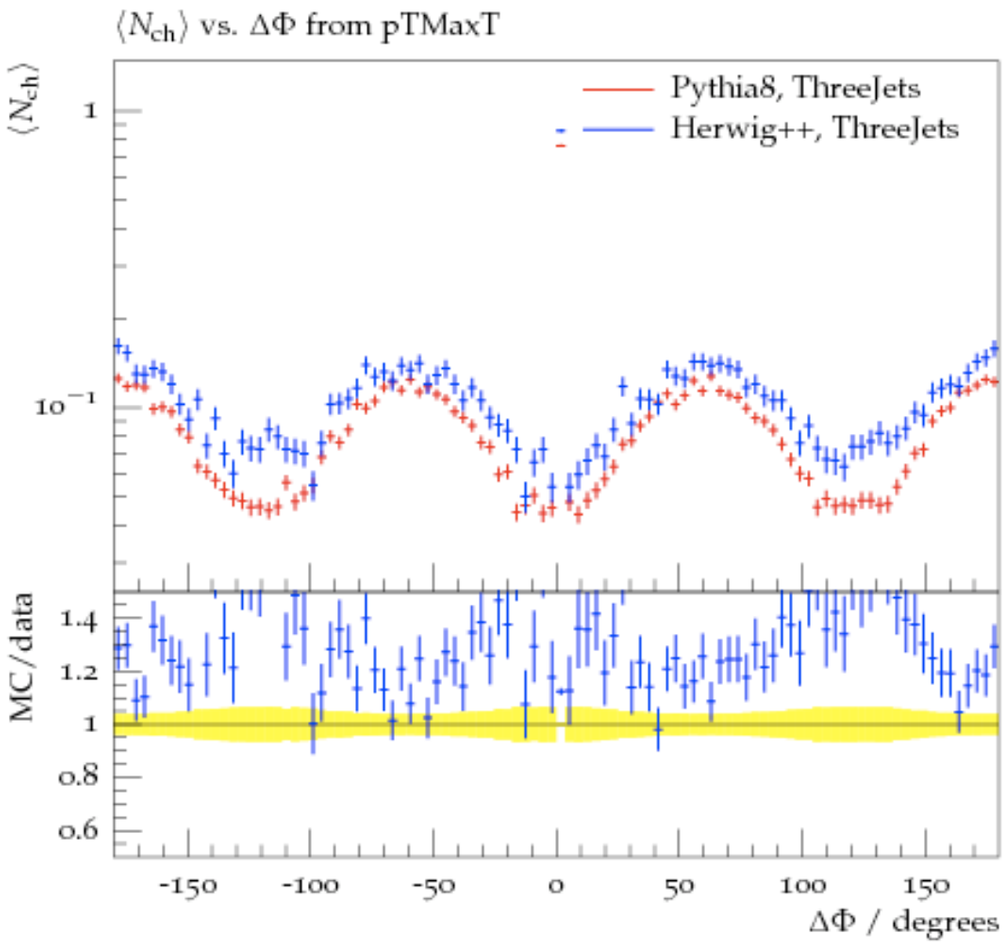

⟨N_ch⟩ vs. ΔΦ from leading jet
⟨N_ch⟩
MC (HerwigDijet)
MC (HerwigThreeJets)
10^-1
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees


⟨p_⊥,sum⟩ vs. ΔΦ from leading jet
⟨p_⊥,sum⟩
MC (HerwigDijet)
MC (HerwigThreeJets)
10^-1
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees


⟨N_ch⟩ vs. ΔΦ from pTMaxT
⟨N_ch⟩
MC (HerwigDijet)
MC (HerwigThreeJets)
1
10^-1
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees


⟨N_ch⟩ vs. ΔΦ from leading jet
Pythia8, ThreeJets
Herwig++, ThreeJets
⟨N_ch⟩
10^-1
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees


⟨p_⊥,sum⟩ vs. ΔΦ from leading jet
Pythia8, ThreeJets
Herwig++, ThreeJets
⟨p_⊥,sum⟩
10^-1
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees


⟨N_ch⟩ vs. ΔΦ from pTMaxT
Pythia8, ThreeJets
Herwig++, ThreeJets
⟨N_ch⟩
1
10^-1
MC/data
1.4
1.2
1
0.8
0.6
-150
-100
-50
0
50
100
150
ΔΦ / degrees

Pythia 6

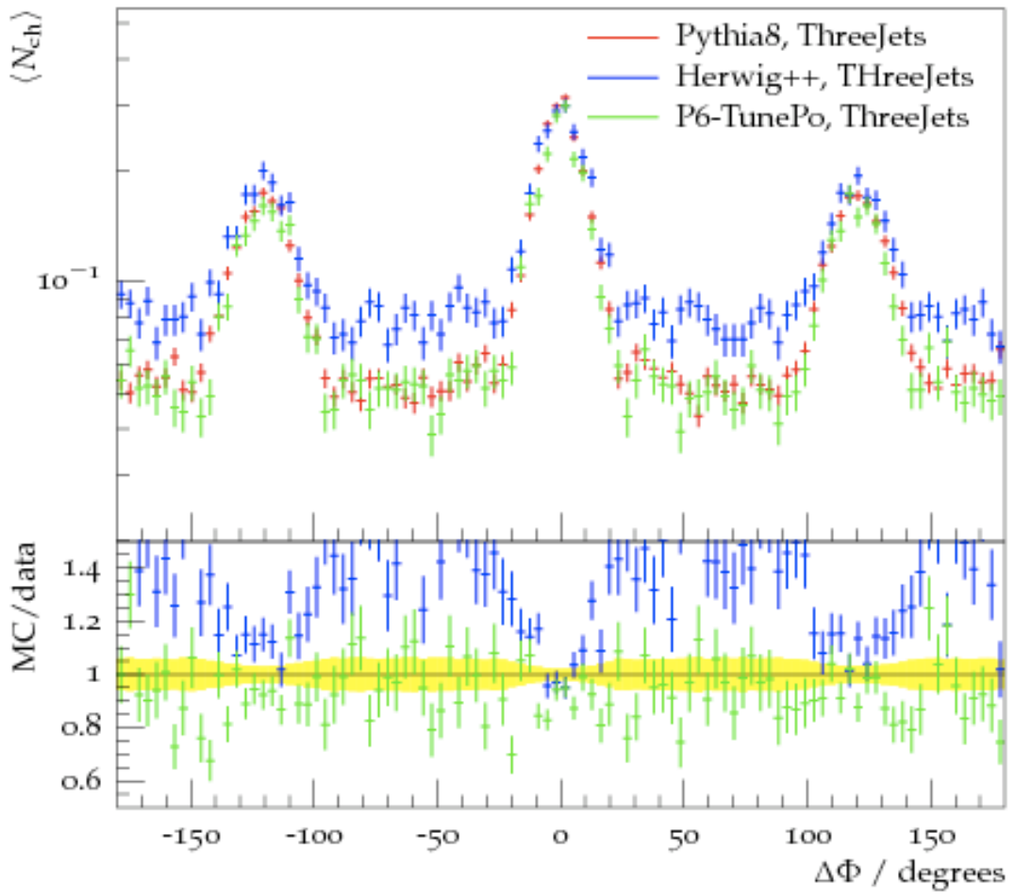
P0

DW

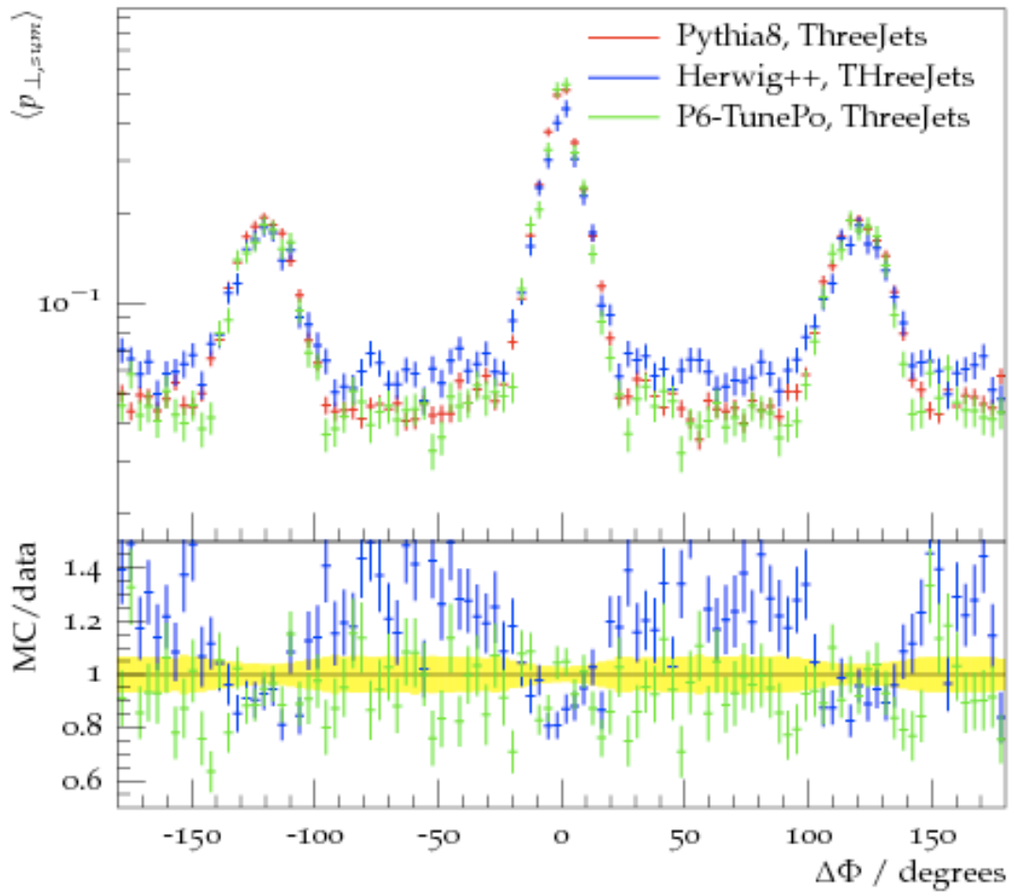
D6T (CMS official tune)

ProQ20

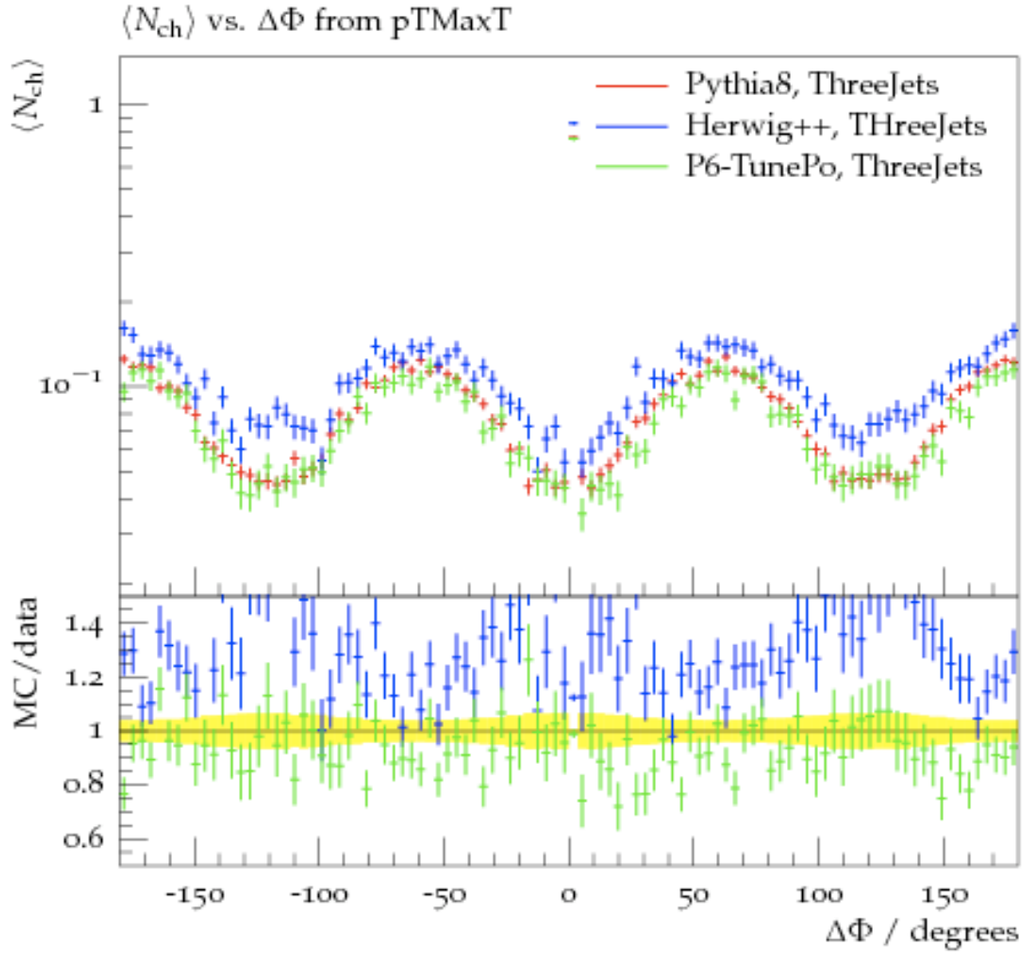
$\langle N_{ch} \rangle$ vs. $\Delta\Phi$ from leading jet



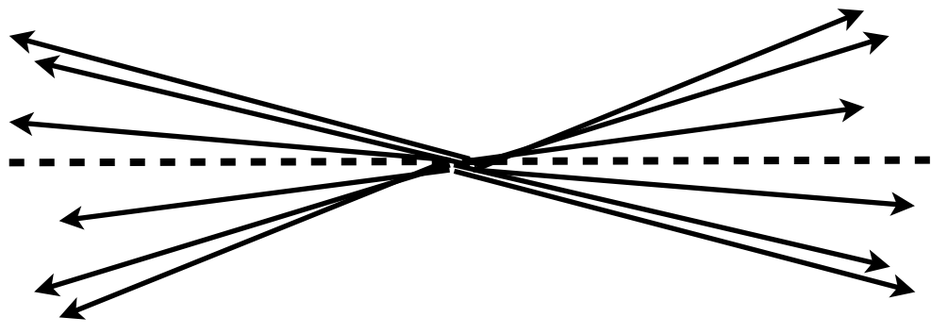
$\langle p_{\perp,sum} \rangle$ vs. $\Delta\Phi$ from leading jet



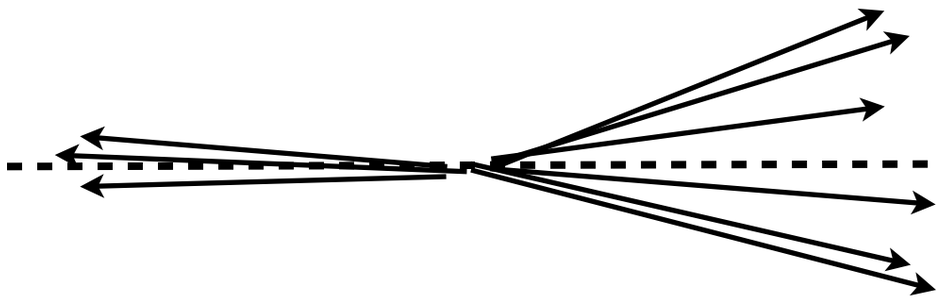
$\langle N_{ch} \rangle$ vs. $\Delta\Phi$ from pTMaxT



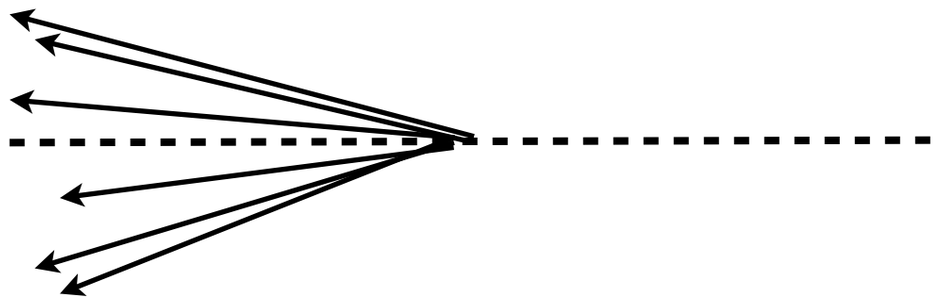
How to distinguish Double Diffractive 2 and Single Diffractive ?



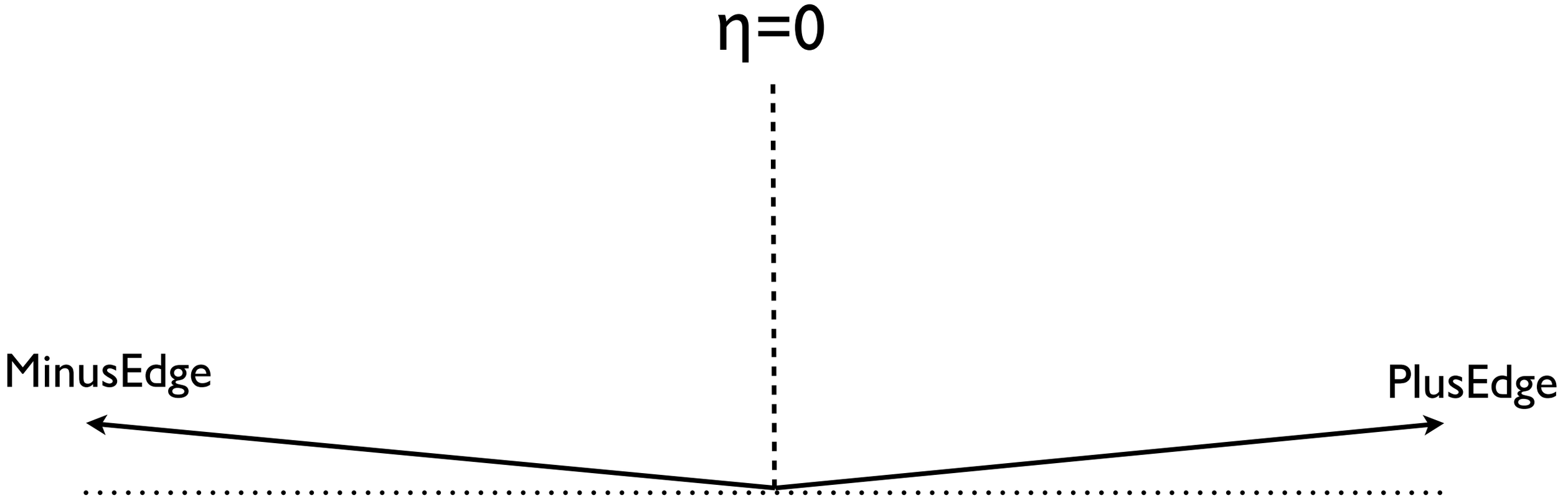
Double Diffractive 1



Double Diffractive 2



Single Diffractive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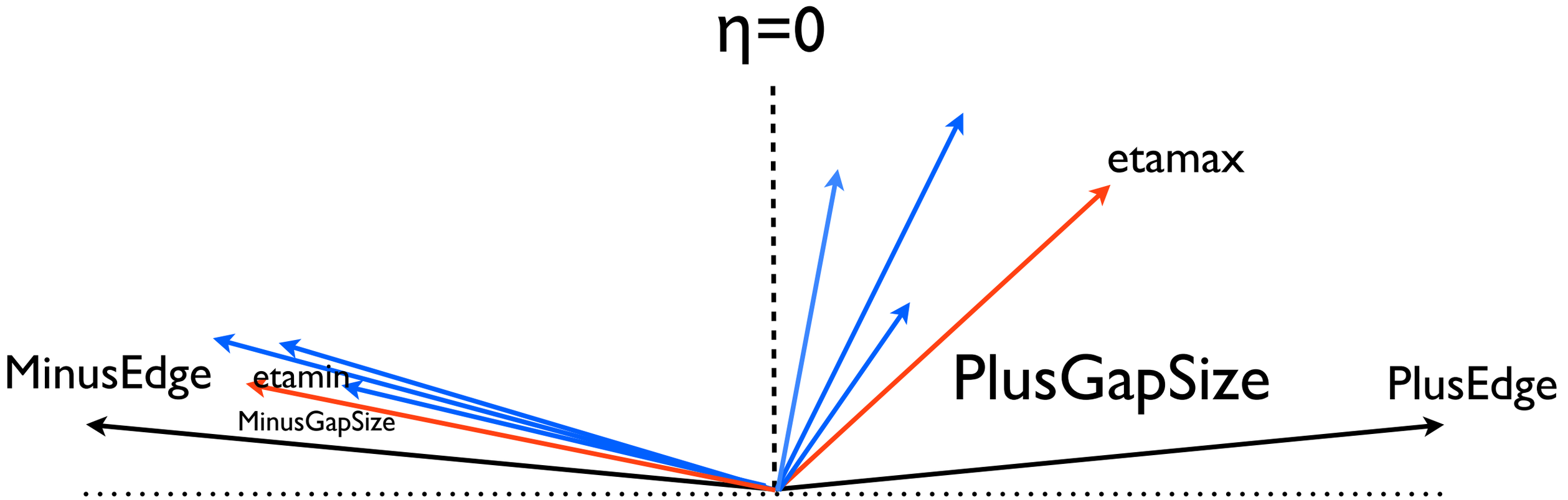

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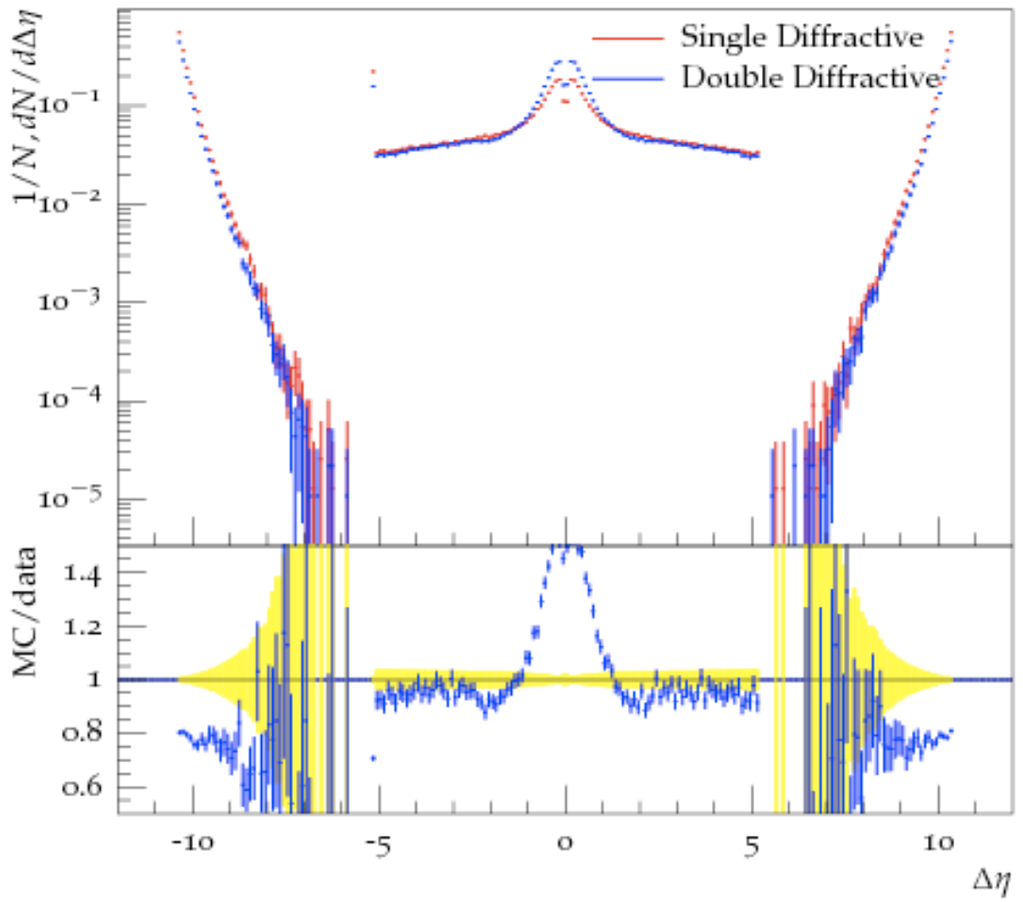

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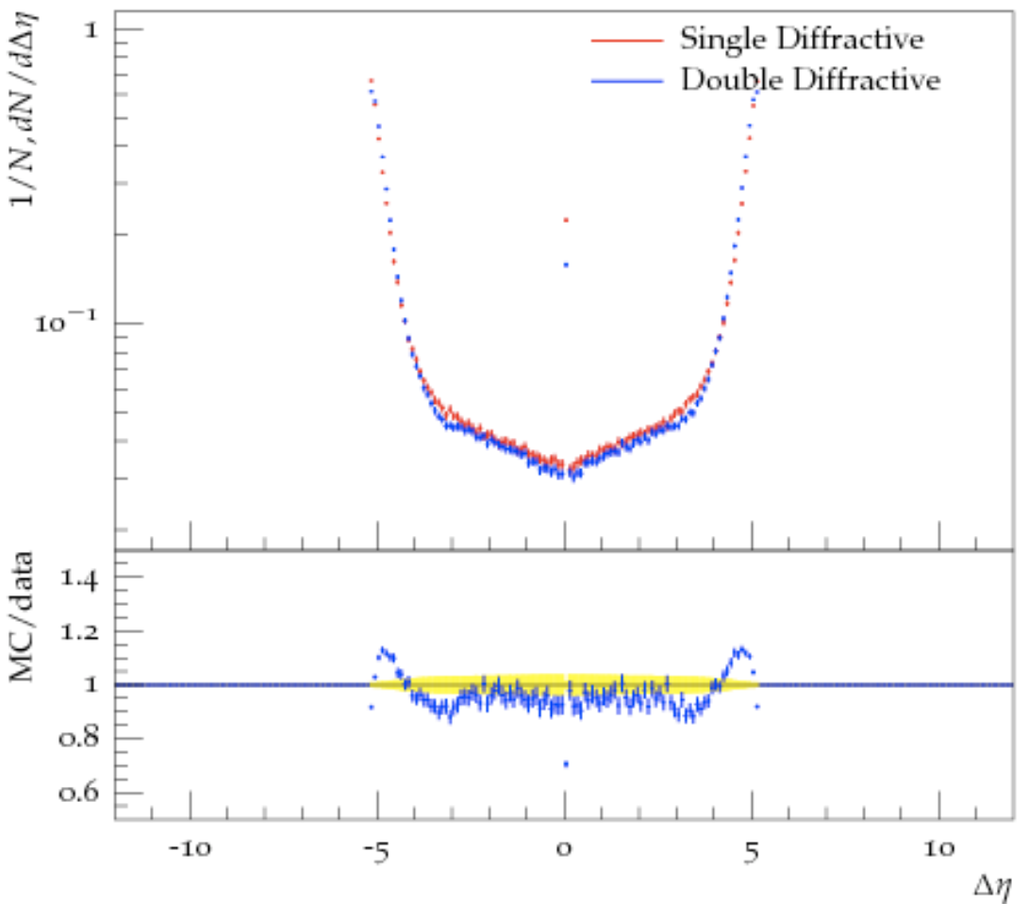

Etamin