“Generic” DCC Generator

Apologies to Sean Gavin (model from QM ‘95)

Designed to “overlay” on a HIJING event

QGP “droplets” --> single DCC domains

Pion production in domain is from “excess” energy from Chiral Transition

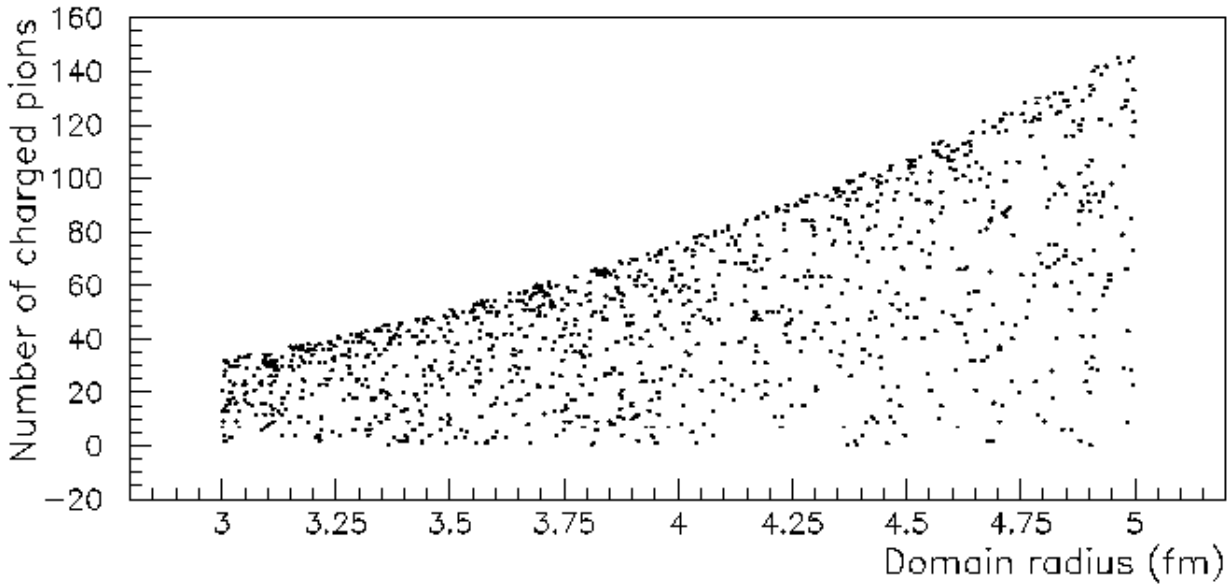
$N_{dcc} = 4\pi/3\ r_D^3\ \Delta V/m_\pi \quad \Delta V = 40\text{-}60\ \mathrm{MeV/fm^3}$

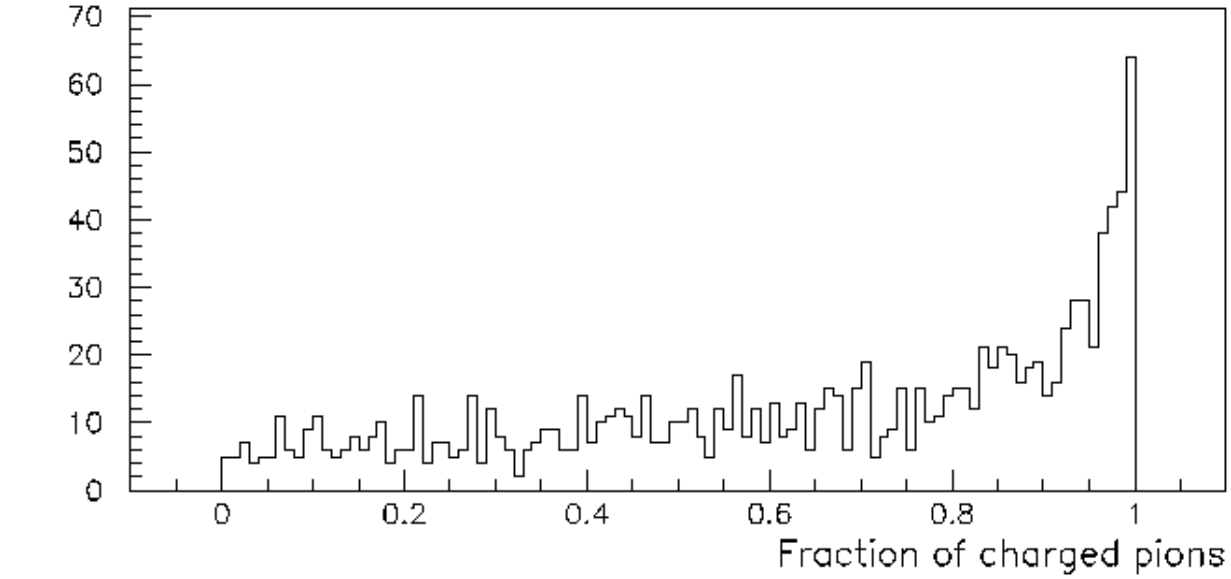
Isospin Fraction

$P(f_o) = 1/2 * f^{-1/2} \qquad P(f_c) = 1 - f_o$

Momentum distribution in Domain rest frame

$E\ d^3N/dp^3 \sim \exp(-p^2 r_D^2/4)$


Number of charged pions
160
140
120
100
80
60
40
20
0
−20
3
3.25
3.5
3.75
4
4.25
4.5
4.75
5
Domain radius (fm)


70
60
50
40
30
20
10
0
0
0.2
0.4
0.6
0.8
1
Fraction of charged pions

Algorithm

- Choose a number of droplets (domains) 1 - 3
- Choose a radius for each domain 3 - 5 fm
- Choose a charged-pion fraction for each domain
- Calculate the number of charged pions in each domain
- Choose a mean rapidity and p_t for the domain
    - No boost (all domains at rest in CM frame)
    - HIJING pion distibution
    - HIJING proton distribution
    - Bjorken (flat y, exp(-mt/200)
    - Landau I (Gauss. y, sigma=0.85, exp(-mt/200)
    - Landau II (Gauss. y, sigma=0.42, exp(-mt/100)
- Choose 3-momentum for each charged pion in the domain rest frame, and boost to lab frame

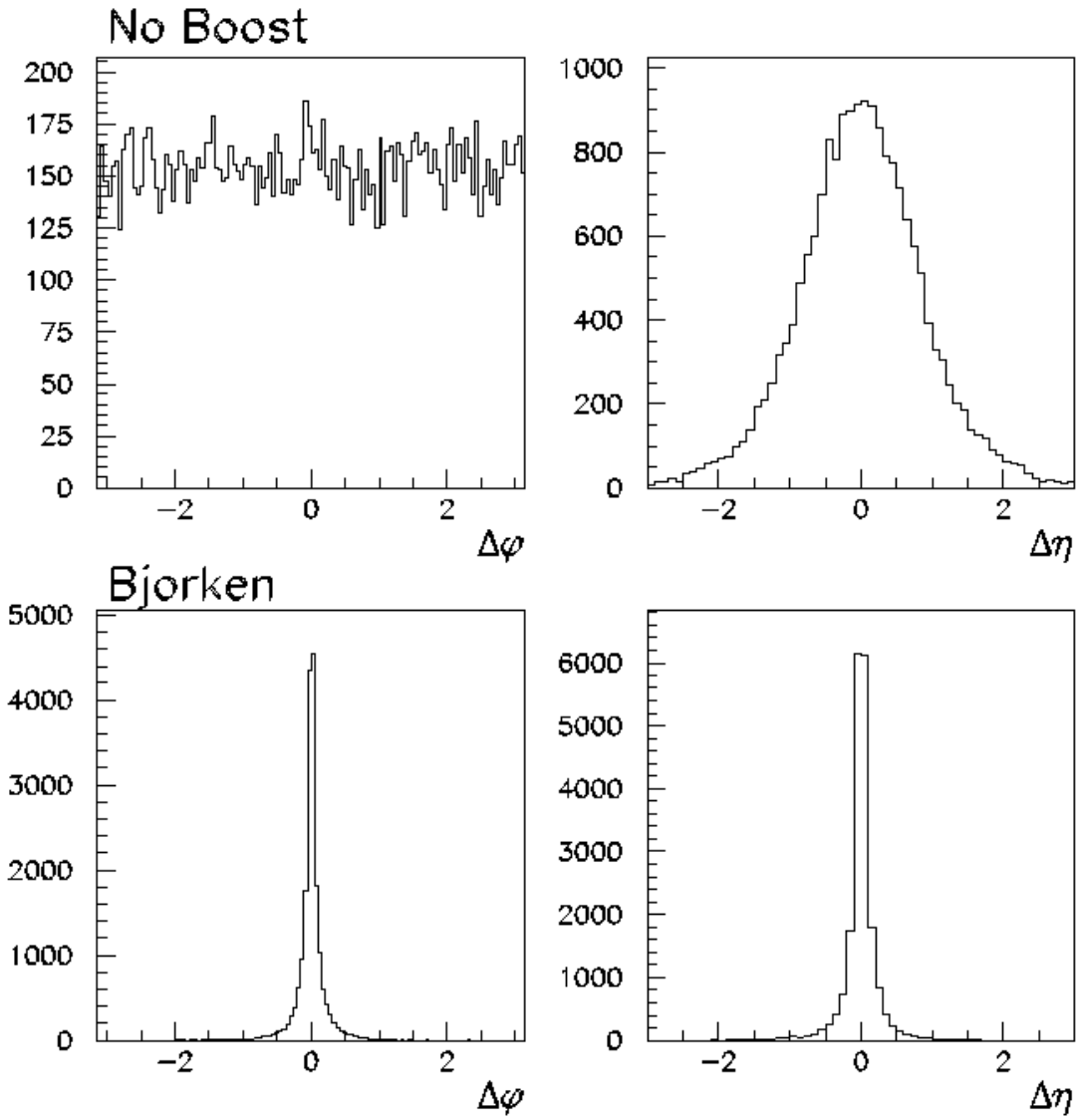
Things to study

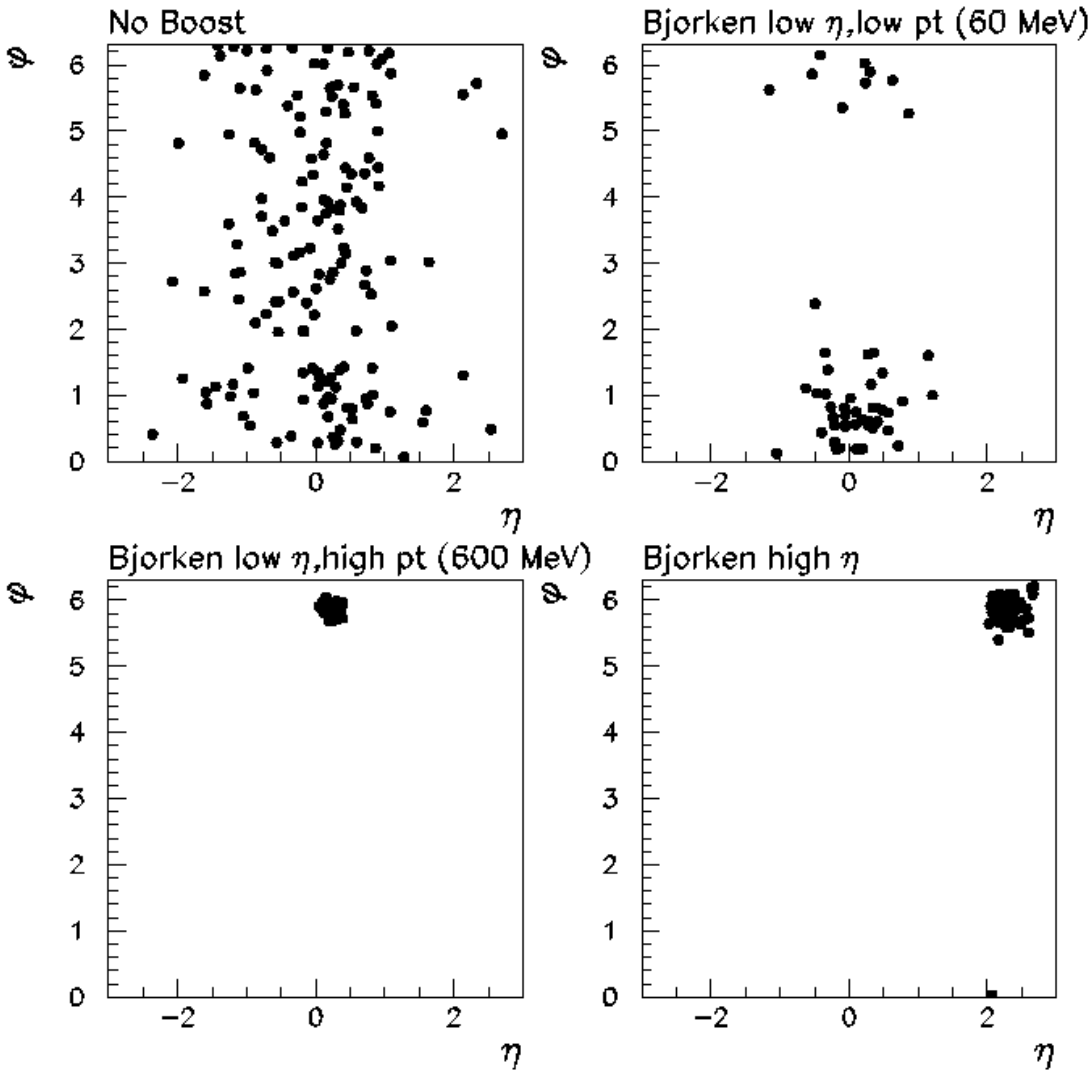
Domain size, ΔV dependence

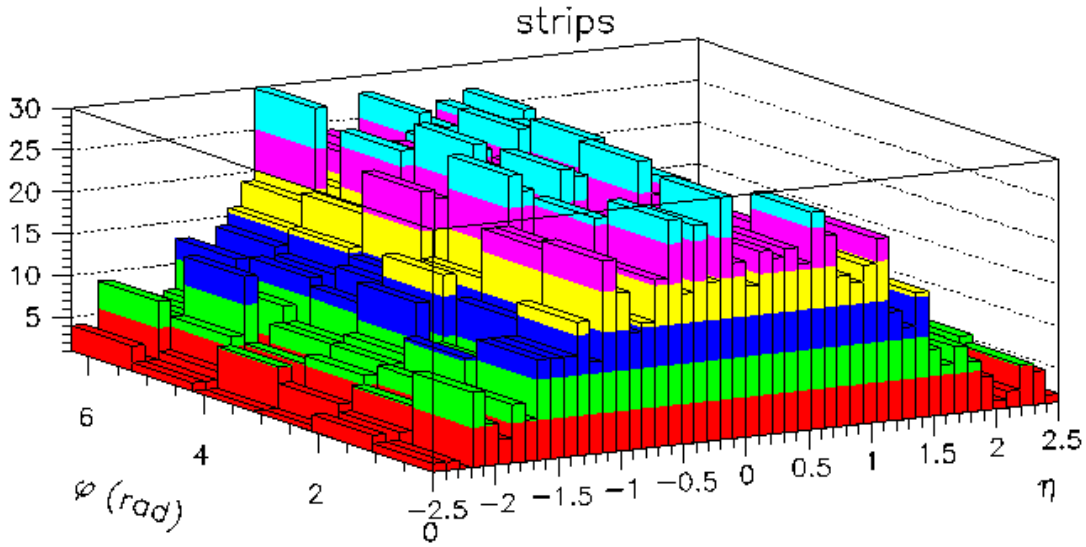
Different domain kinematic distributions

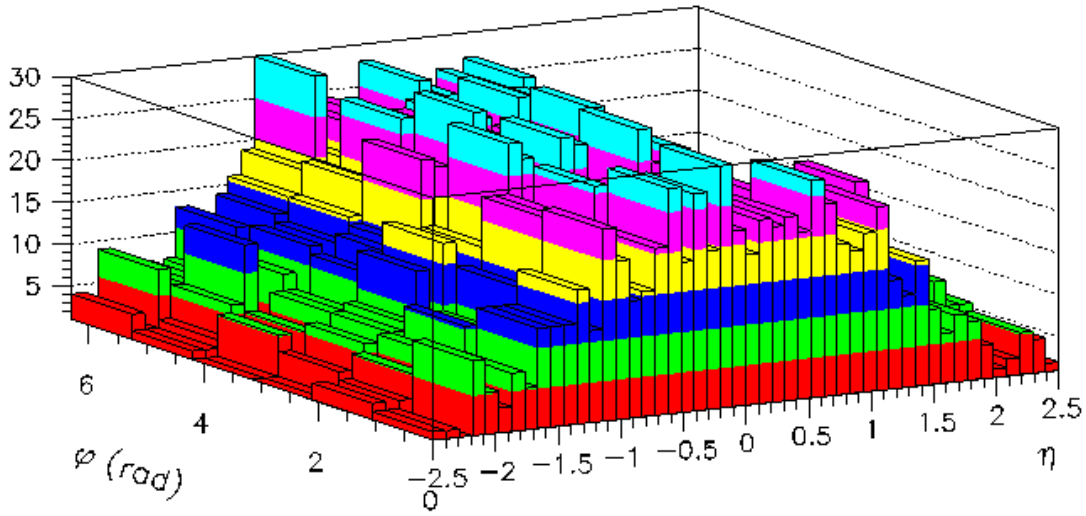
Isospin domain fluctuations on a QGP background

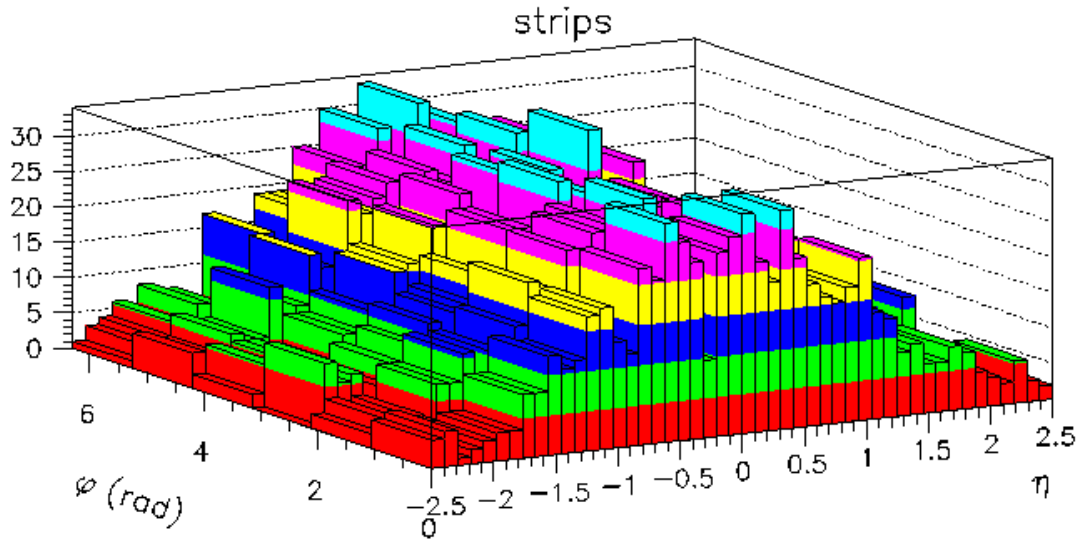
Rescattering--both domain diffusion and dilepton signal

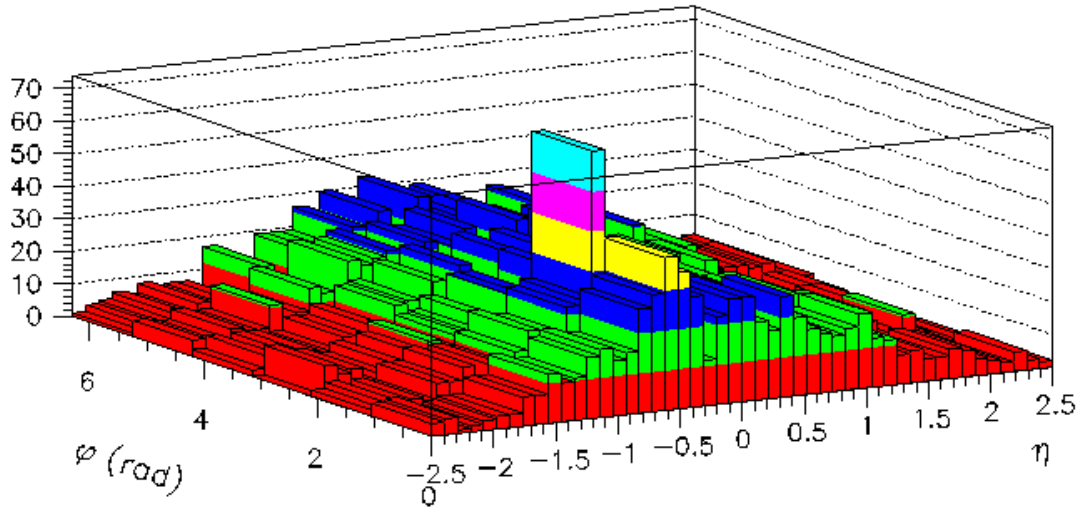

No Boost
200
175
150
125
100
75
50
25
0
−2
0
2
Δφ
1000
800
600
400
200
0
−2
0
2
Δη
Bjorken
5000
4000
3000
2000
1000
0
−2
0
2
Δφ
6000
5000
4000
3000
2000
1000
0
−2
0
2
Δη

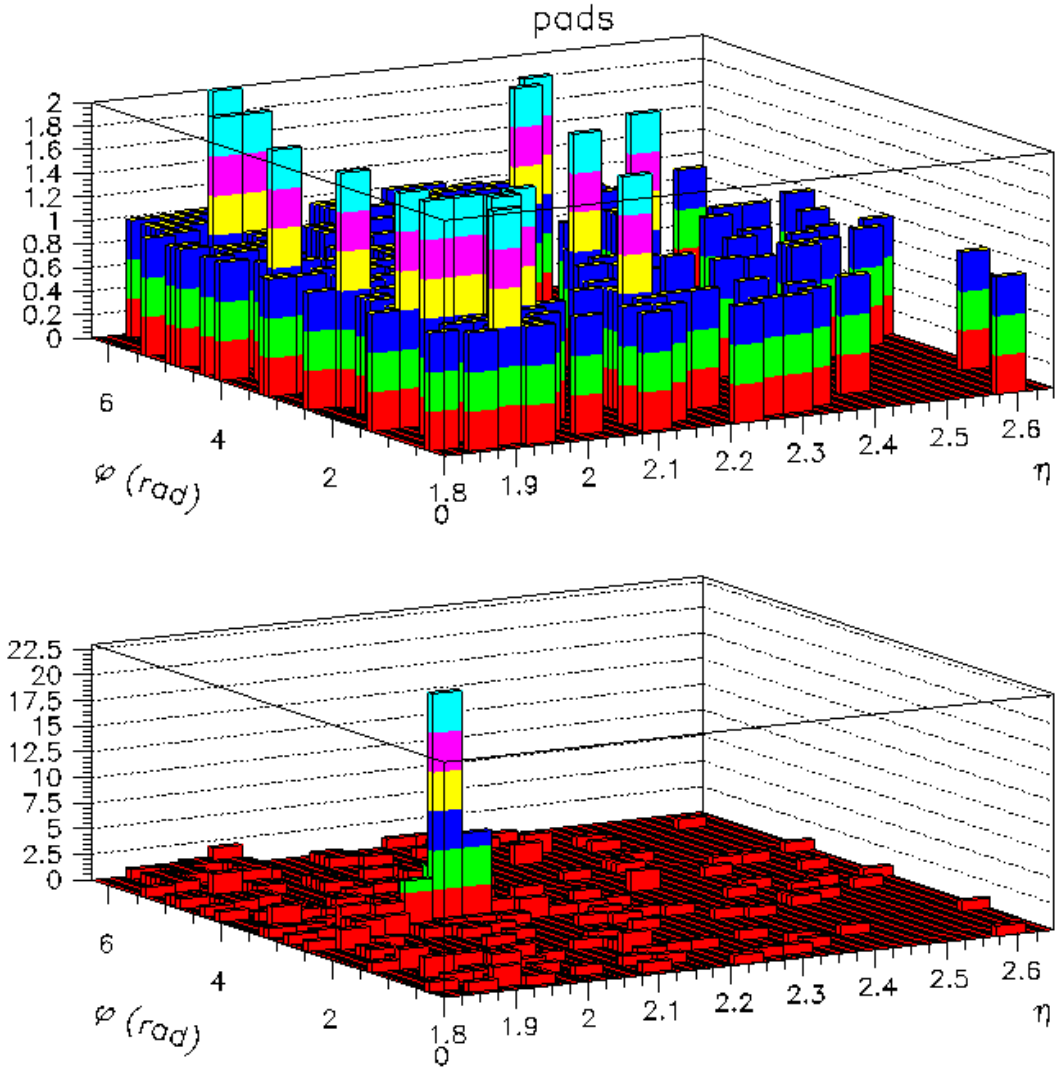

No Boost
Bjorken low η,low pt (60 MeV)
Bjorken low η,high pt (600 MeV)
Bjorken high η
φ
η
0
1
2
3
4
5
6
−2
0
2


strips
30
25
20
15
10
5
6
4
2
0
φ (rad)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5
η


30
25
20
15
10
5
6
4
2
0
φ (rad)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5
η


strips
30
25
20
15
10
5
0
6
4
2
0
φ (rad)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5
η


70
60
50
40
30
20
10
0
6
4
2
0
φ (rad)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5
η


pads
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
6
4
2
0
φ (rad)
1.8
1.9
2
2.1
2.2
2.3
2.4
2.5
2.6
η
22.5
20
17.5
15
12.5
10
7.5
5
2.5
0
6
4
2
0
φ (rad)
1.8
1.9
2
2.1
2.2
2.3
2.4
2.5
2.6
η