Multiplicity dependence of two-particle correlation in √s=7TeV pp collisions at LHC-ALICE experiment

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Outline

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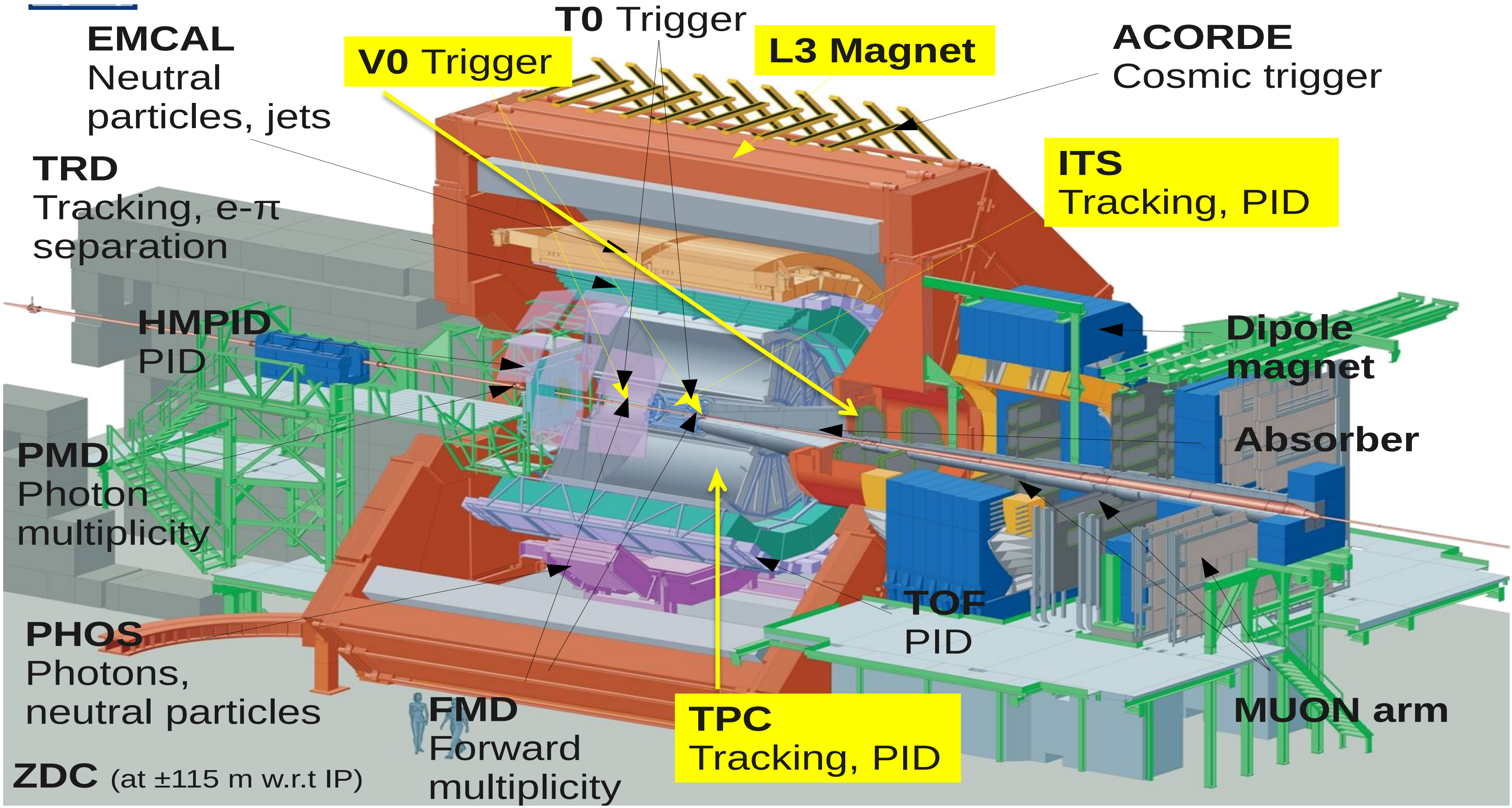
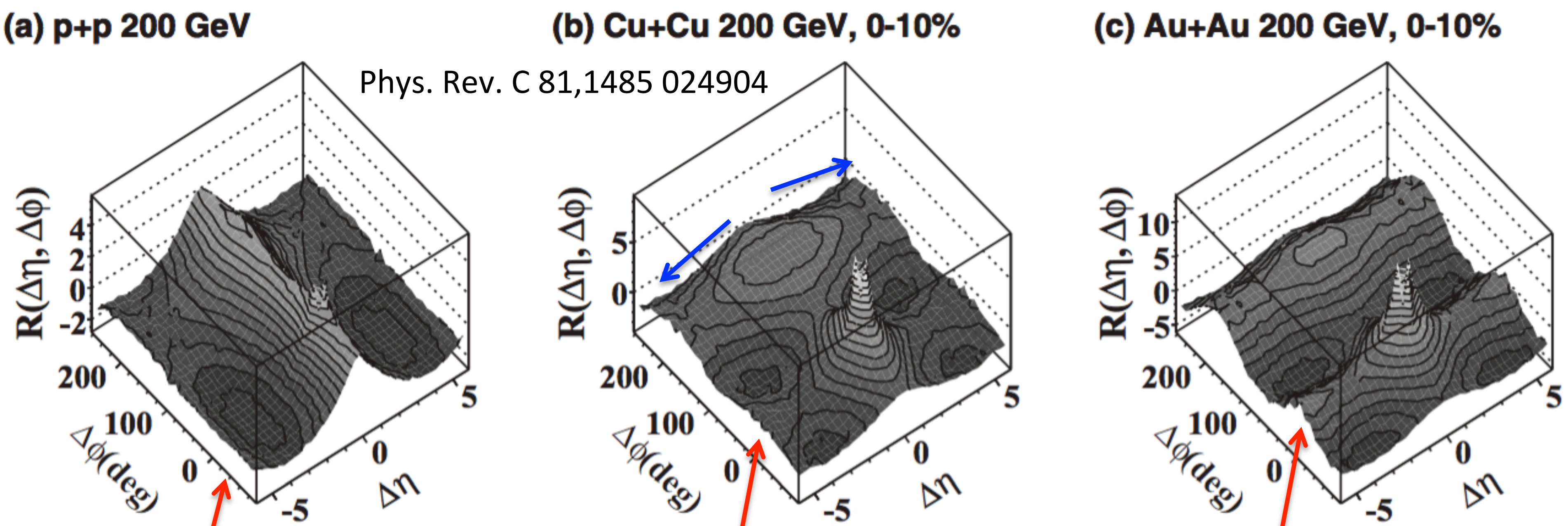
A Large Ion Collider Experiment



http://aliweb.cern.ch/

Introduction



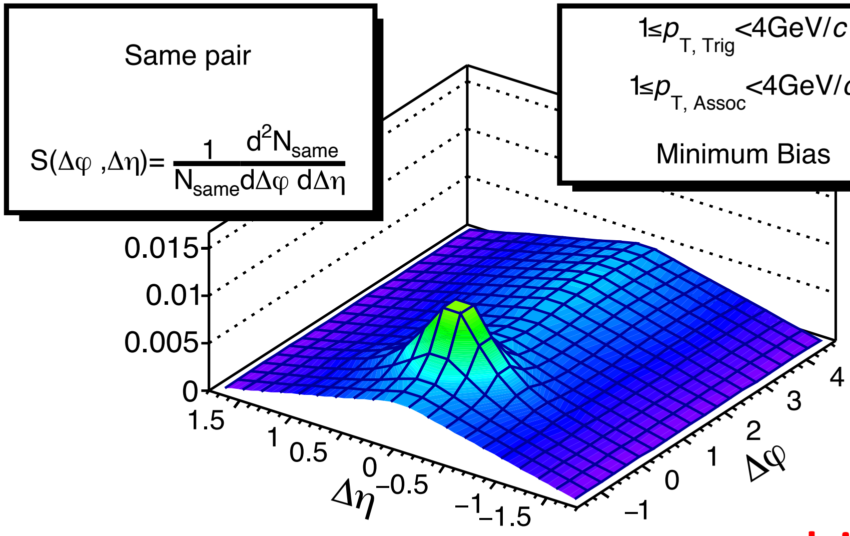
An ordinary (?) pp collisions

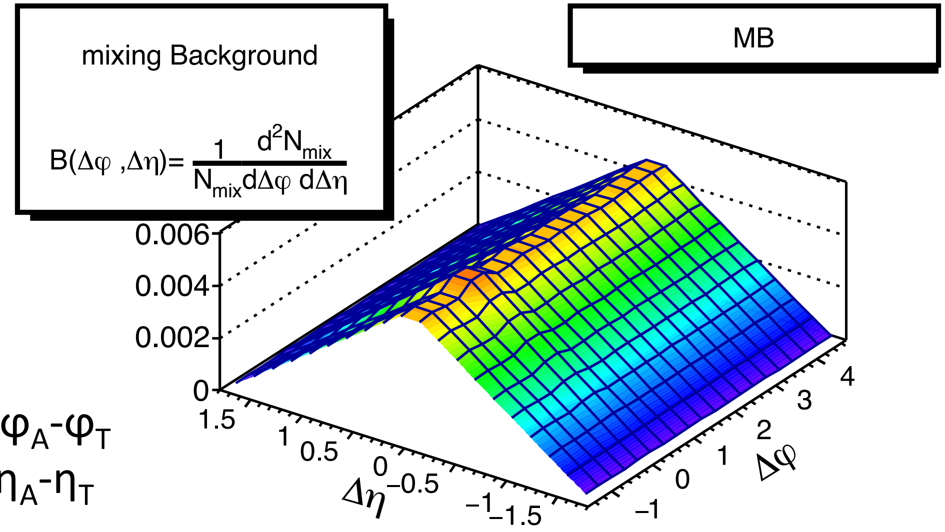
v2?

v2

- 2-D Two-particle angular correlation functions for (a) p + p, the central 10% (b) Cu + Cu and (c) Au + Au collisions at √sNN= 200 GeV in PHOBOS.

Definition of correlation function

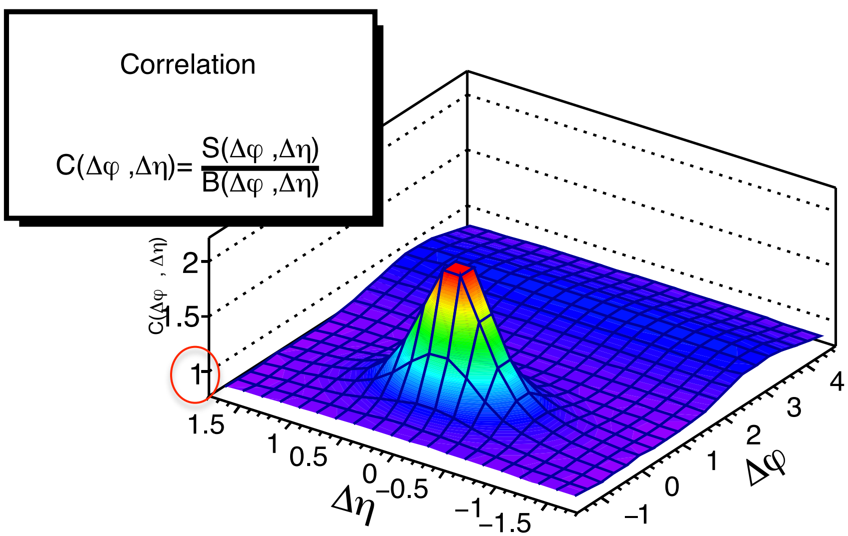




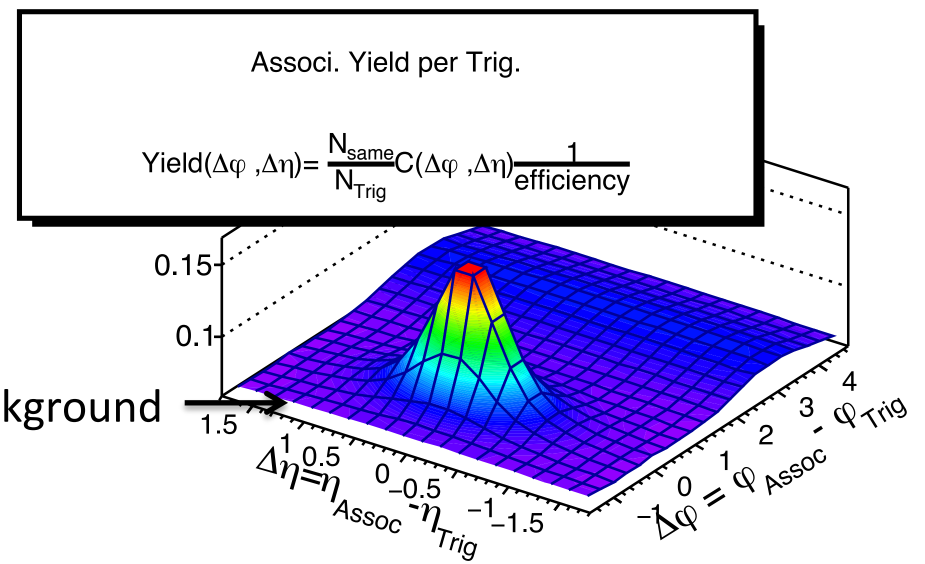
$\Delta\varphi = \varphi_A - \varphi_T$

$\Delta\eta = \eta_A - \eta_T$

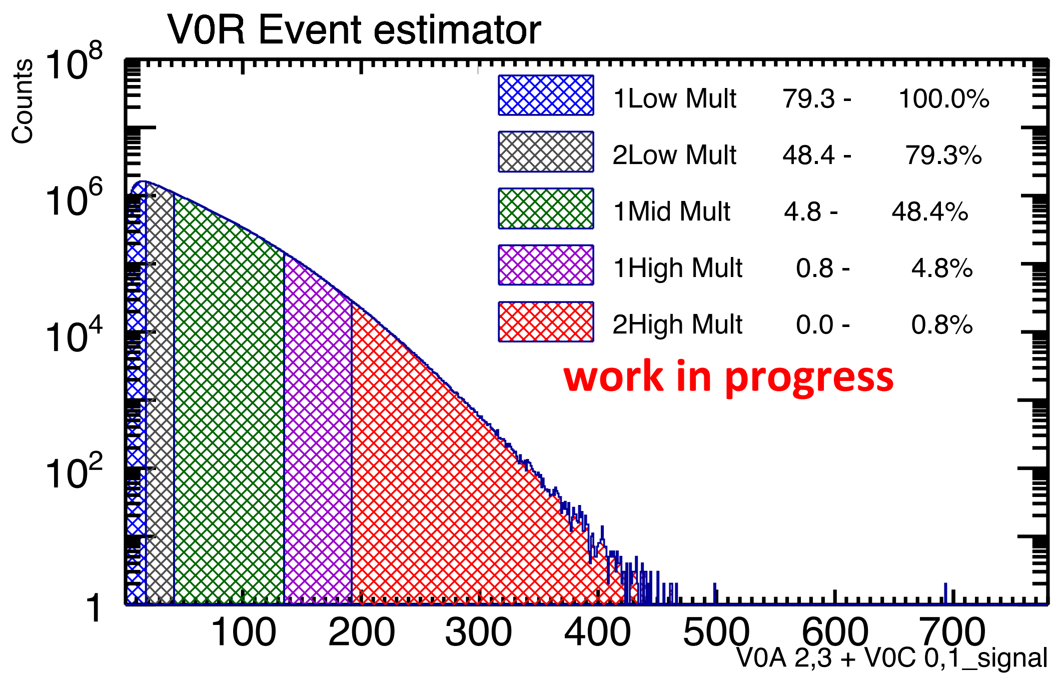
work in progress



background



Event definition



Mean number of track ($|\eta|<0.9$)
2.72 ± 0.000
4.34 ± 0.000
9.11 ± 0.001
16.99 ± 0.001
21.80 ± 0.001

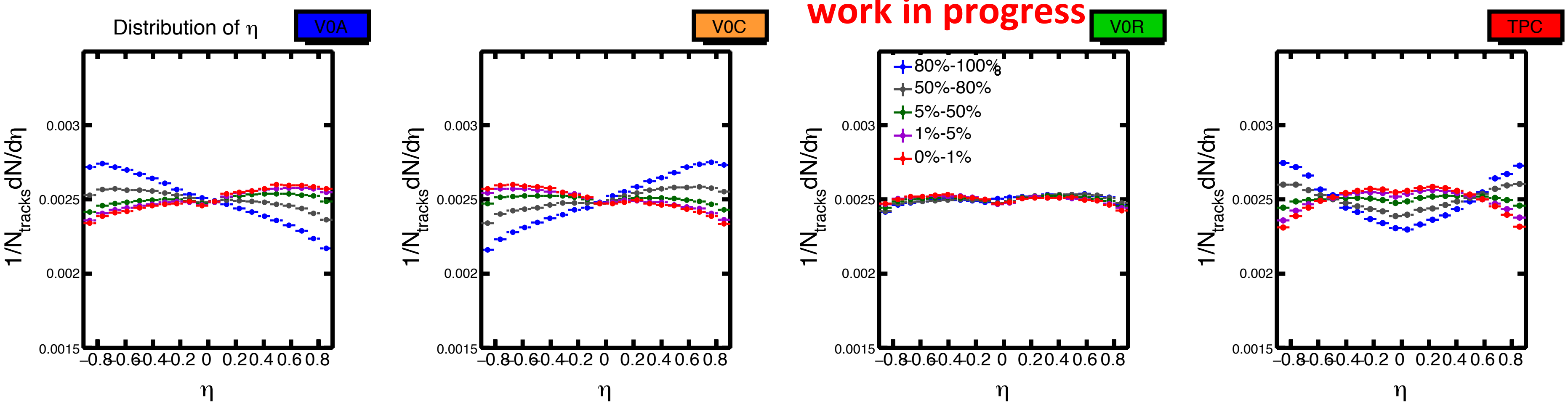
V0R=V0A 2,3 Ring+V0C 0,1Ring

➔ $2.8<\eta_A<3.4$ + $-3.7<\eta_C<-2.7$

➔Aliroot "V0S"

Single distribution of η by various event estimators

$2.8 < \eta < 5.1$ $\quad$ $-3.7 < \eta < -1.7$ $\quad$ $|\eta| < 0.9$

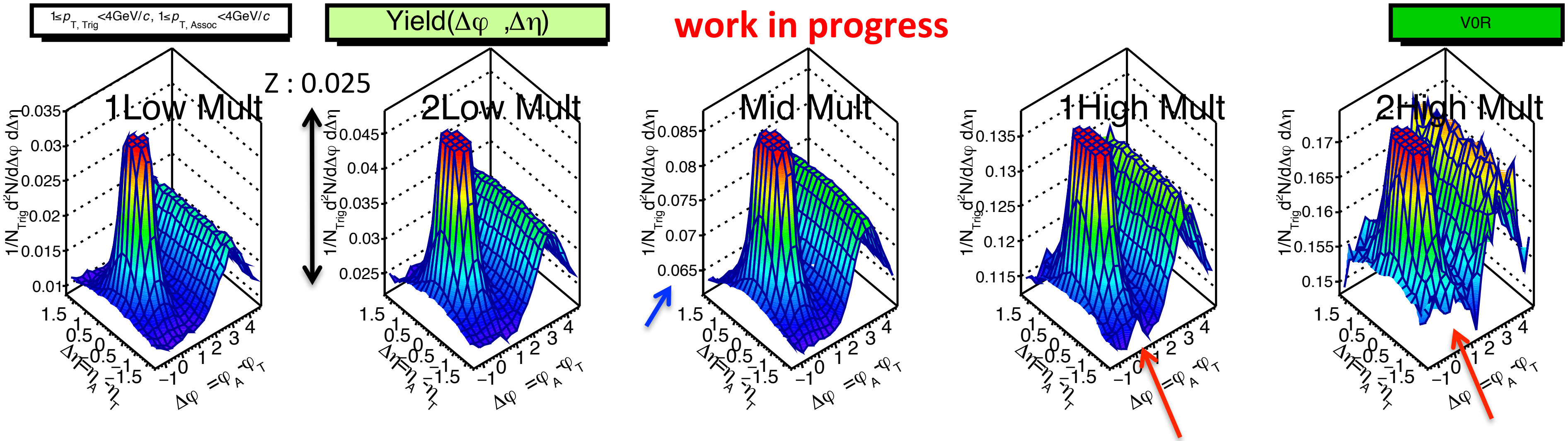


$2.8 < \eta_A < 3.4 + -3.7 < \eta_C < -2.7$

Measuring correlations in small systems has advantages (strong correlated particle production) and disadvantages (biased event centrality selection).

- In order to avoid jet biased multiplicity selection, hybrid event estimator (V0R) is applied.
- η in high multiplicities are less jet biased than low multiplicities.
- TPC event estimator show self-/auto correlation, such as wing shape.

Multiplicity dependence of two- particle correlation -Assoc. yields per Trig.

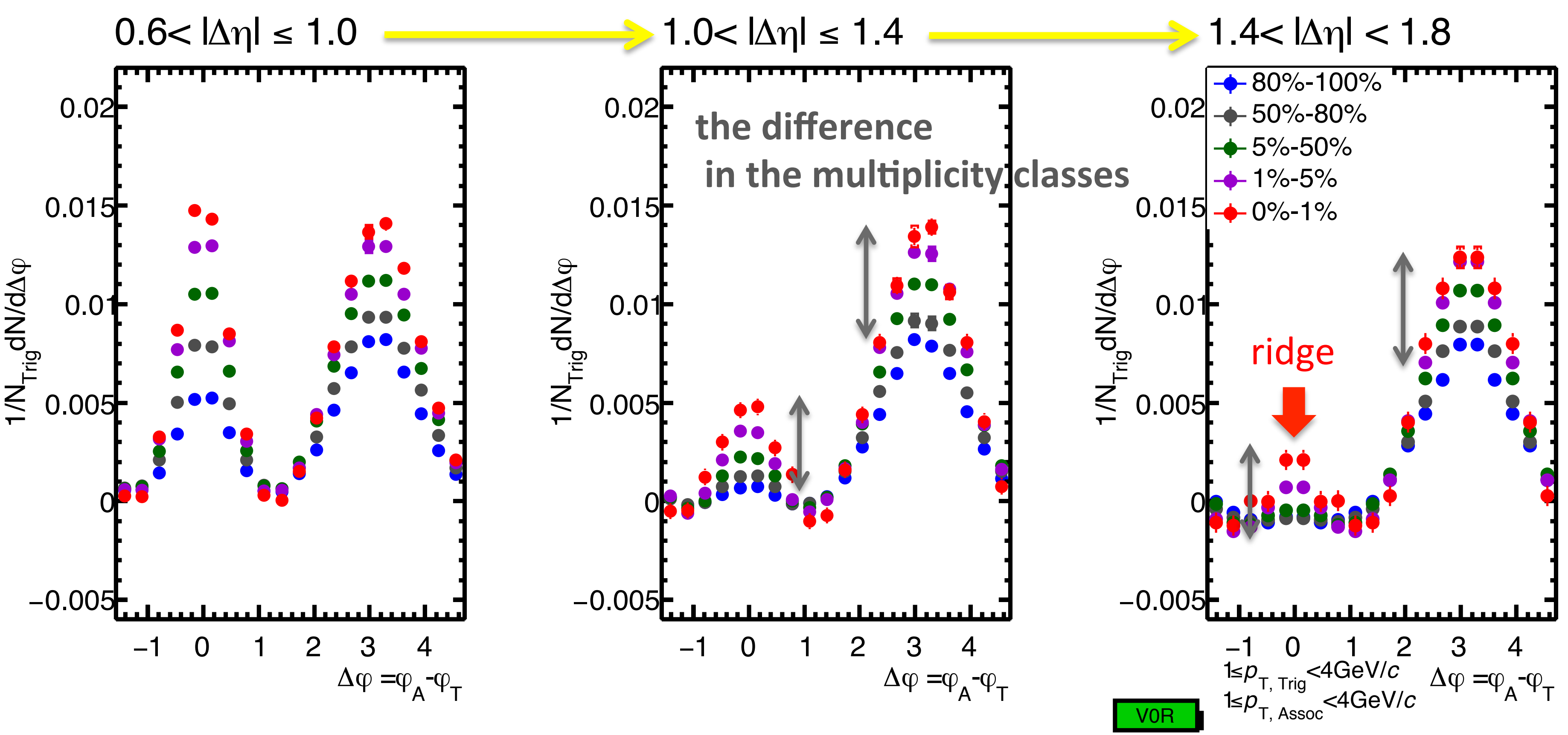


- Background increase with increasing multiplicities.
- Near side jets ((Δφ,Δη)≈(0,0)) increase with increasing multiplicities.
- Ridge structures in the highest multiplicity and 2nd highest multiplicity in Δφ≈0.

Long range correlation function

- after flat background (Avg.ZYAM) subtraction, near-side jet is gone for low multiplicities, but not at high multiplicities.

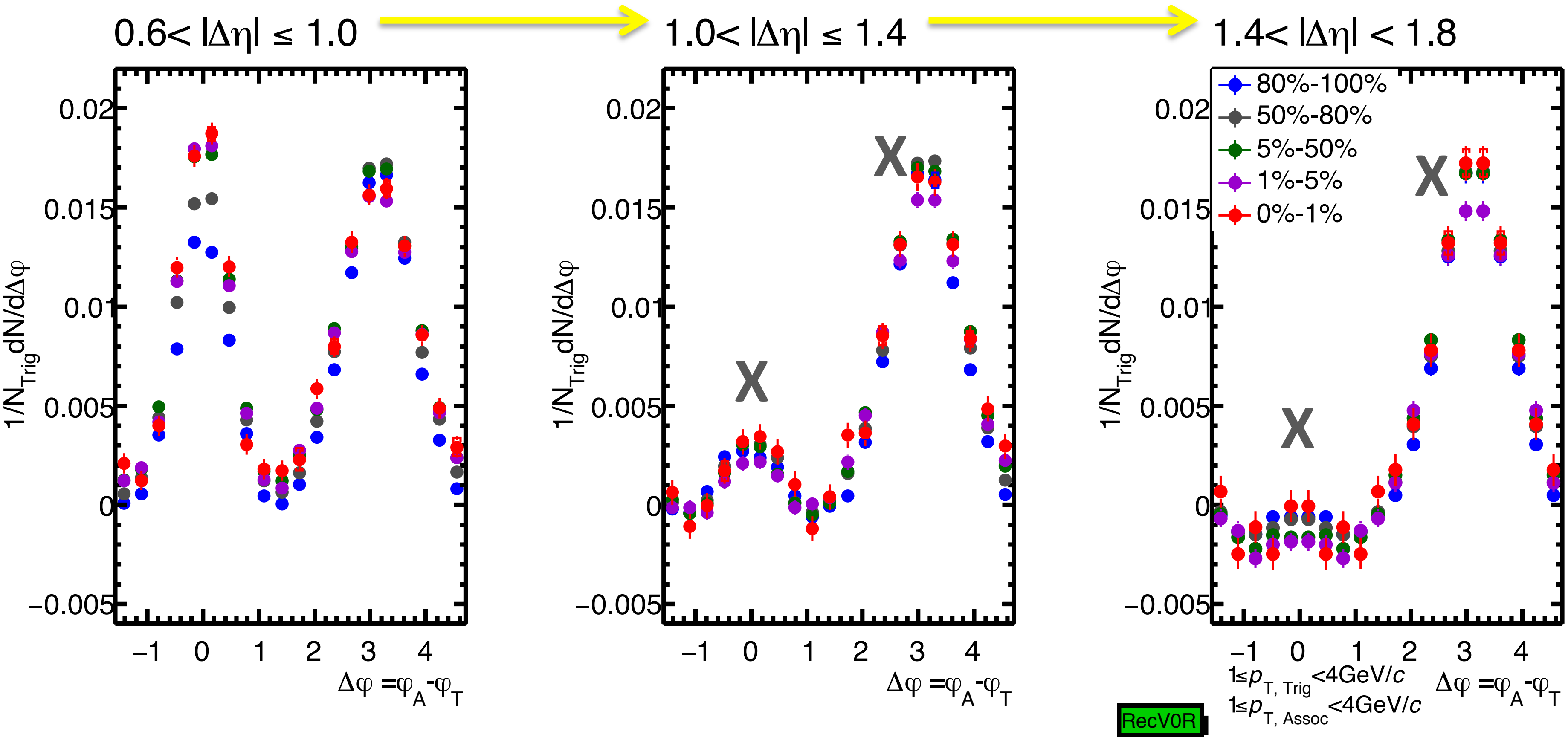
work in progress



Long range correlation function, Pythia

- after flat background subtraction, near-side jet dies out at larger $\Delta\eta$

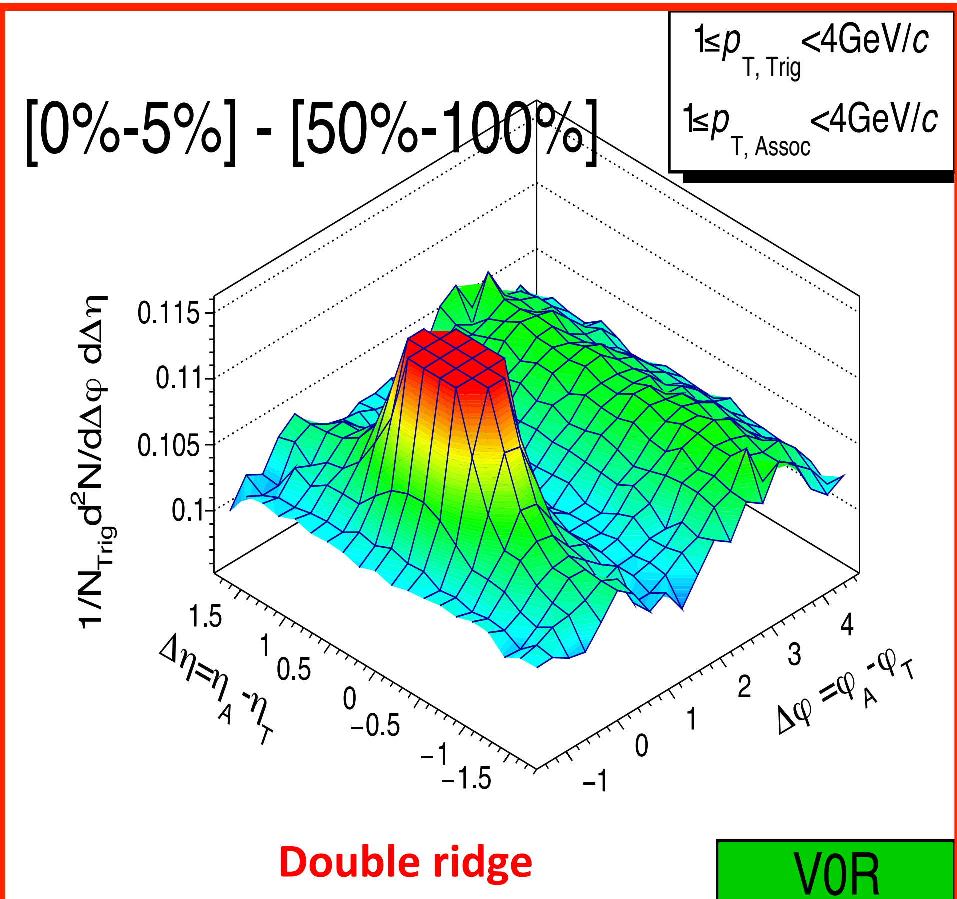
work in progress



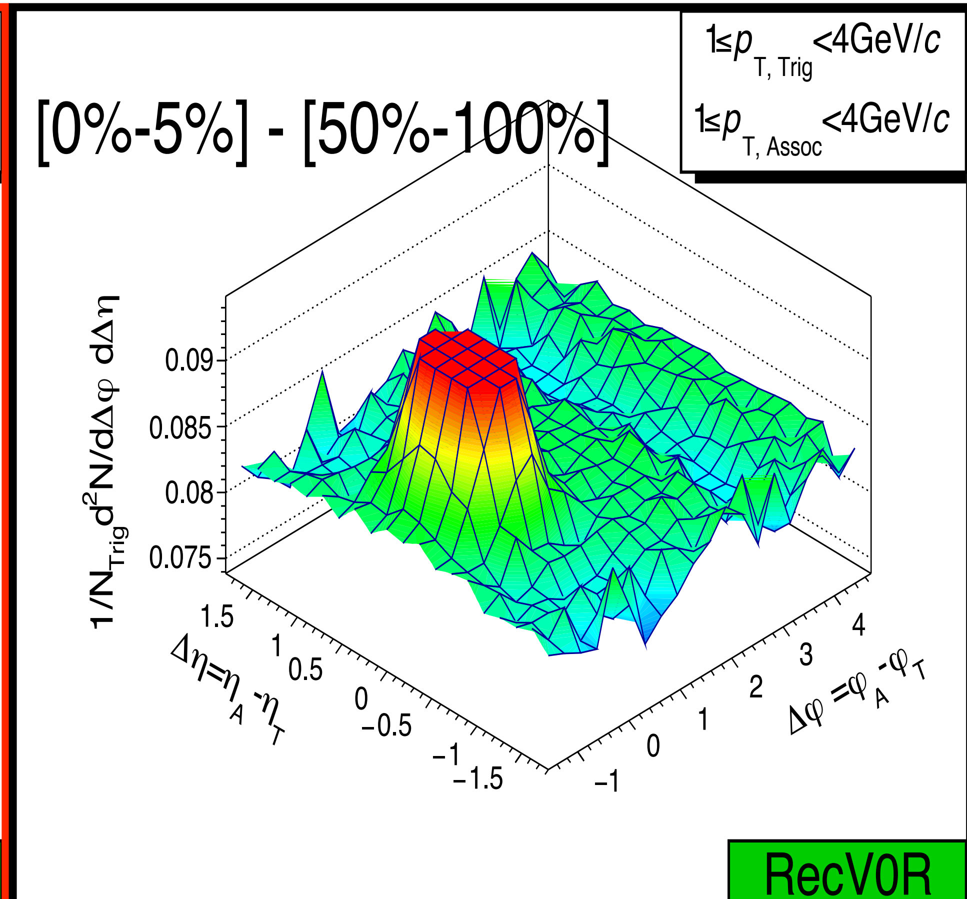
High - Low

work in progress

Pythia



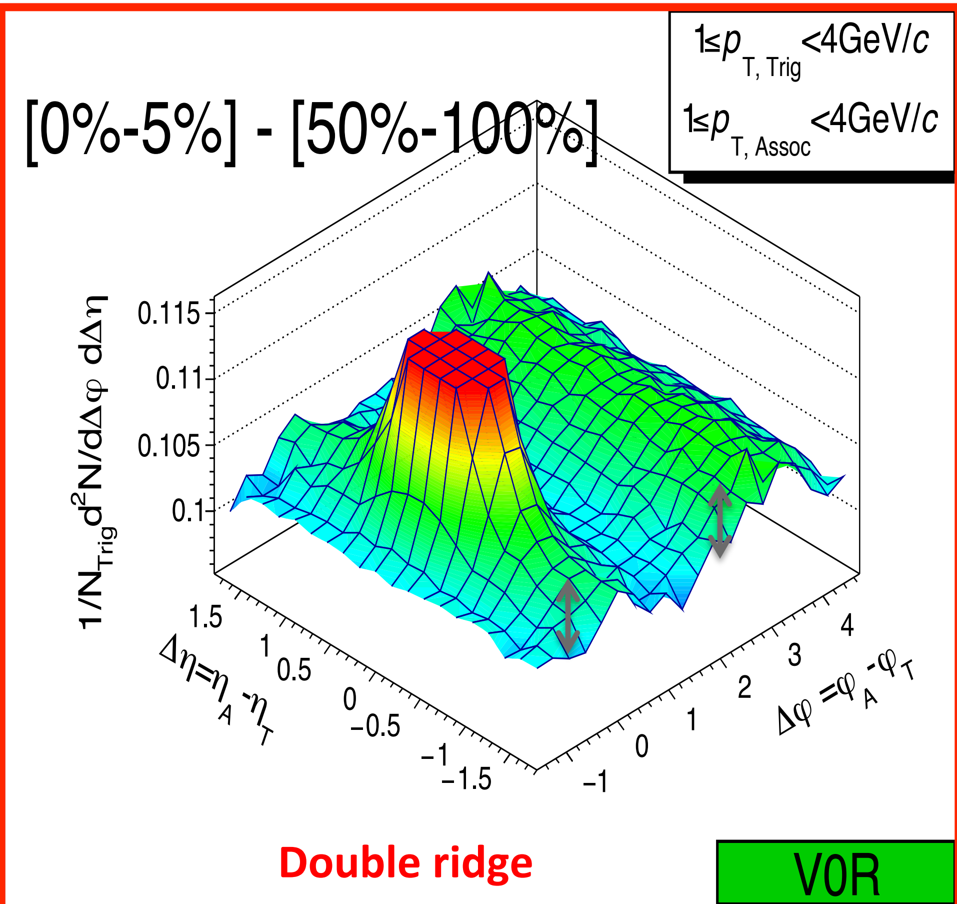
Double ridge

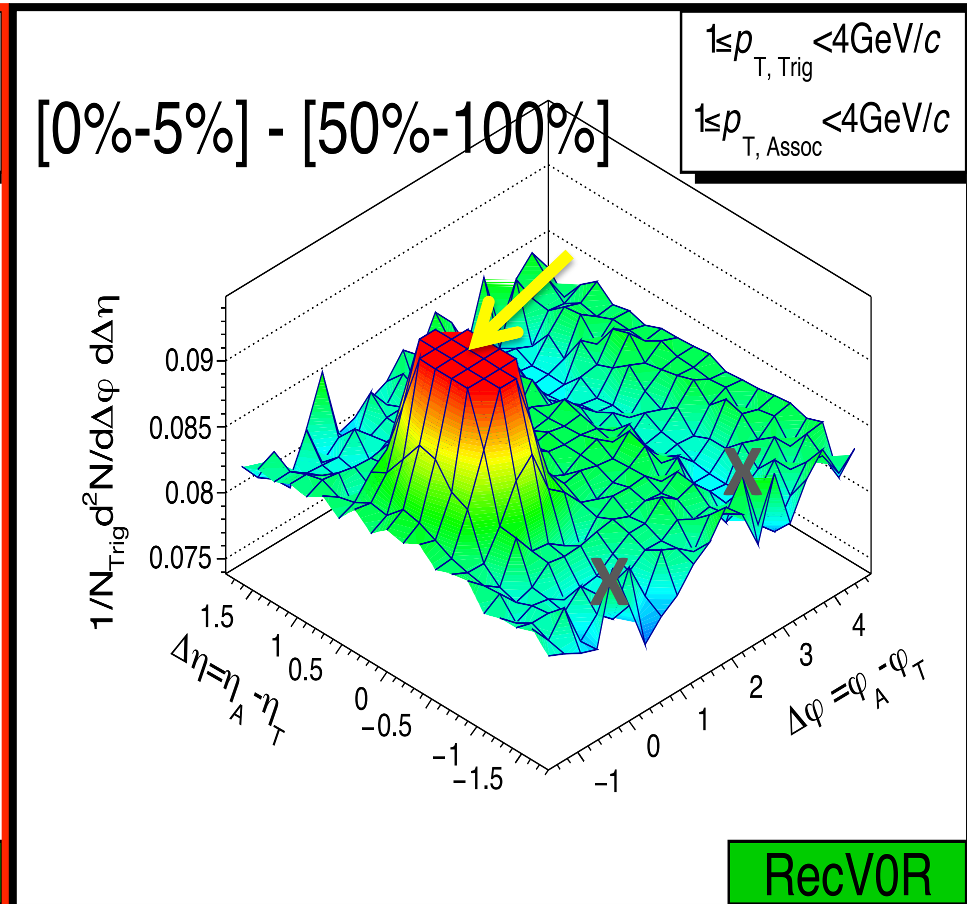


High - Low

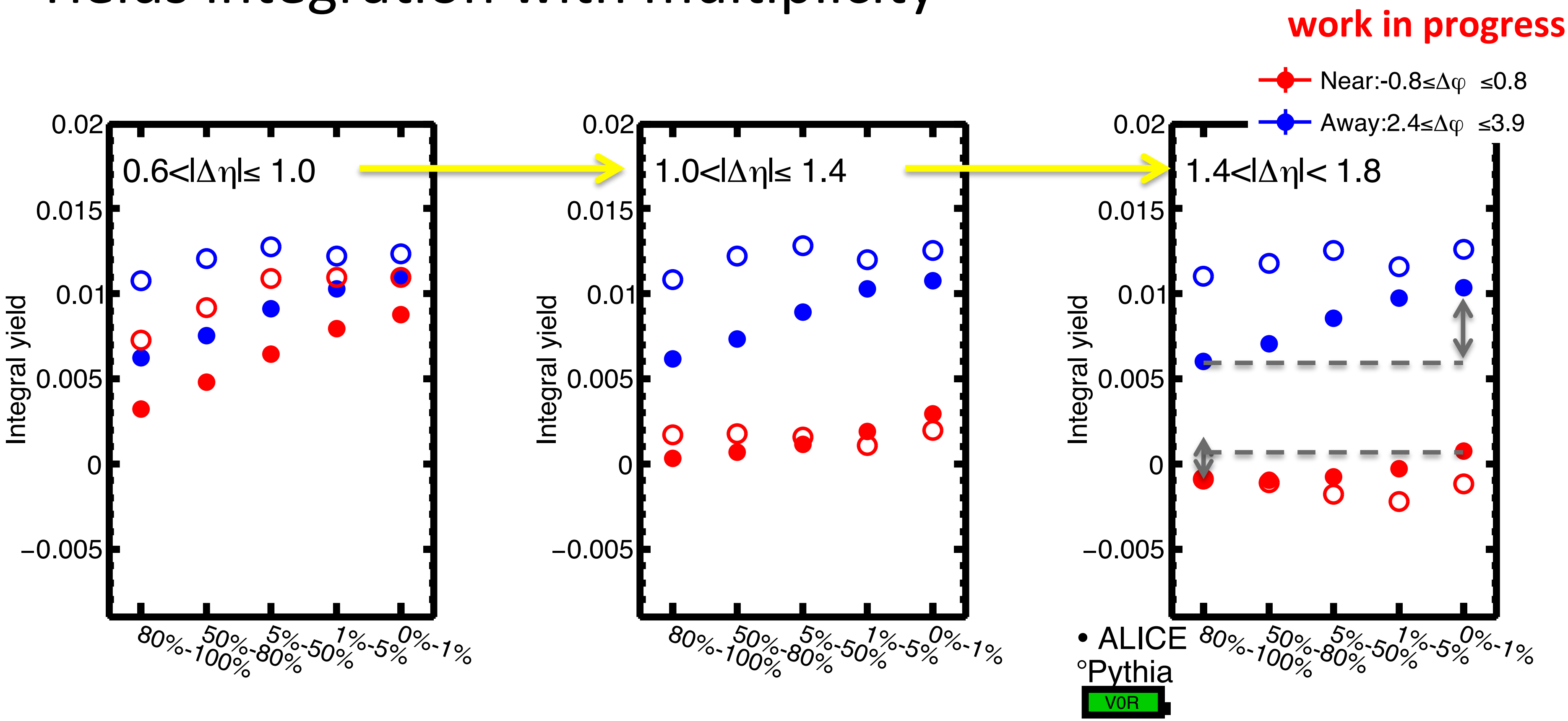
work in progress

Pythia





Yields integration with multiplicity



- Integrated yields in near side increase with increasing multiplicity.
- Integrated yields in away side are constant with Δη.
- Δη dependence is clearly different between data and pythia model, especially with large rapidity.

Summary

- Multiplicity dependence of the correlation functions measured in $\Delta\eta$

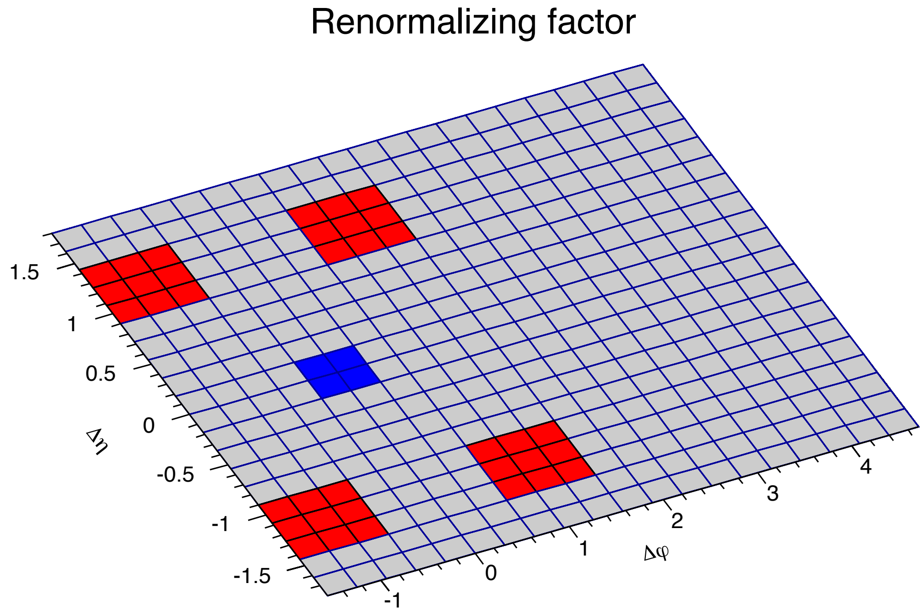
  ➔Ridge/Double ridge at $\Delta\varphi \approx 0$ and π in 0-5% high multiplicity.
- Integrated yield increases with multiplicity.
- Pythia can not reproduce ridge structure.

Key words: pp high multiplicity, ridge, hydrodynamical evolution

Backup

Avg.ZYAM

work in progress



Strategy for p2 parameter

work in progress

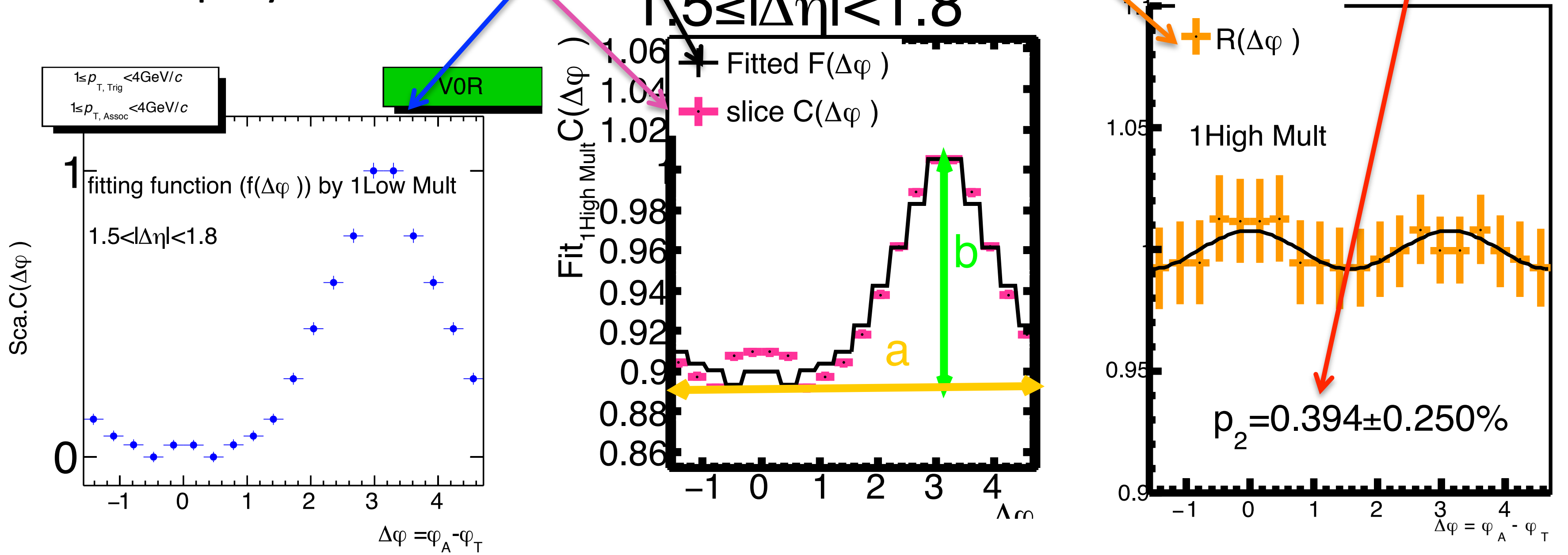
C(Δφ,Δη)➔ C(Δφ)➔ Fitting function ➔ R(Δφ) ➔ Fourier fit➔ p2 parameter

F(Δφ) = a+bf(Δφ)

=C(Δφ)/F(Δφ)

= v_2^2 parameter

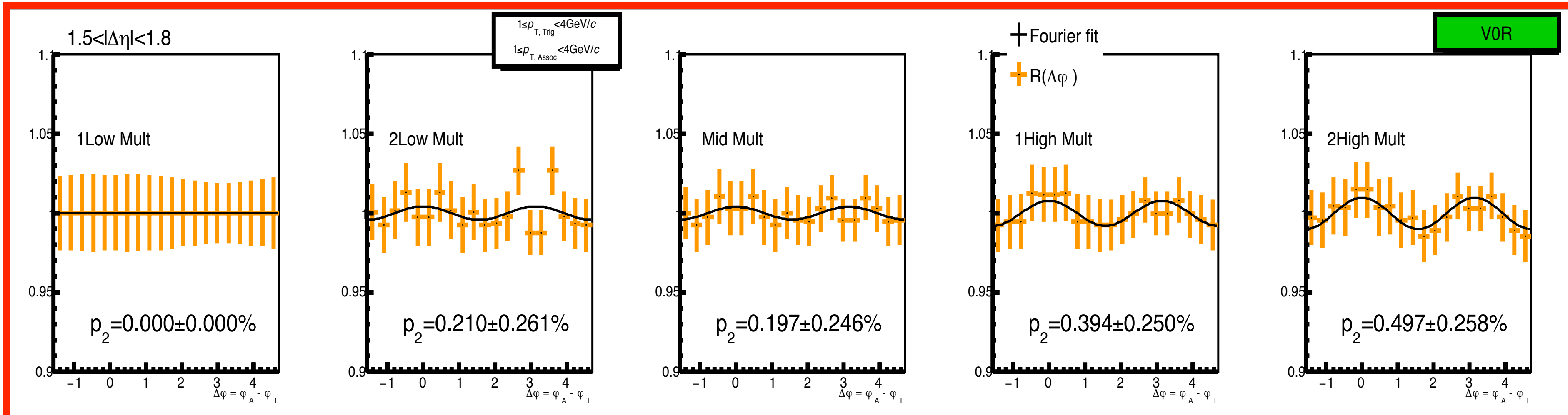
f(Δφ) by rescaling [0-1]
the lowest multiplicity data

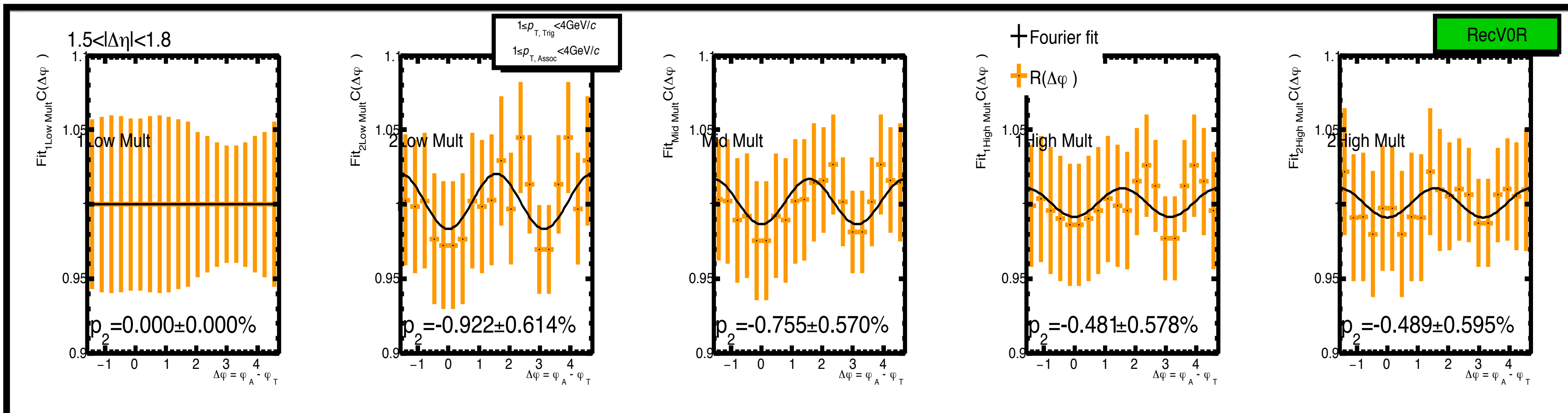


Fitted F(Δφ) and Fourier fit in 1.5≤|Δη|<1.8

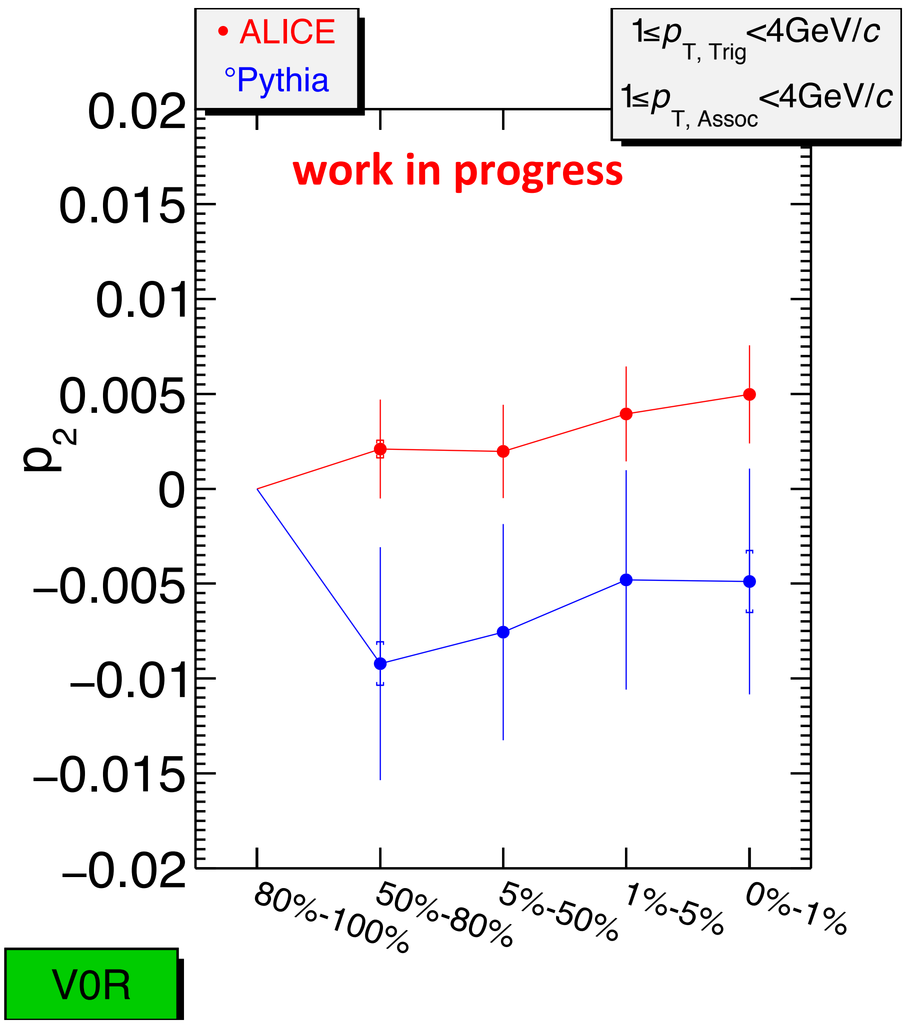
work in progress

Shapes (C(Δφ)) become narrower with increasing multiplicities





P_2 parameter (V_2^2) in $1.5 \leq |\Delta\eta| < 1.8$



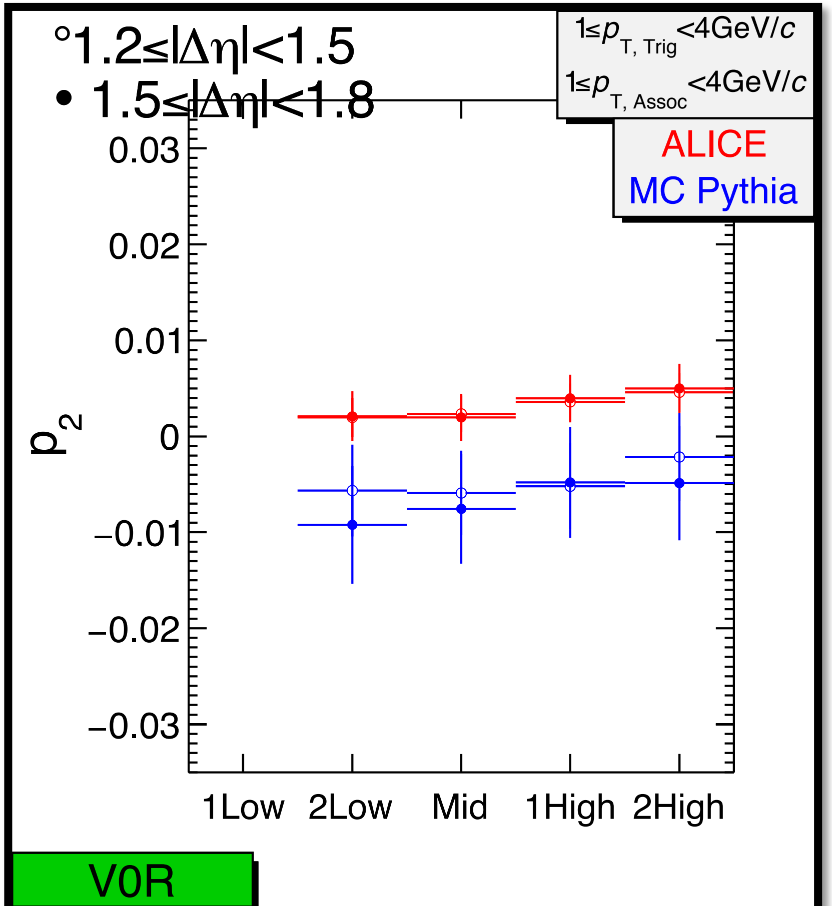
p2 parameter =0.2 - 0.5%

p2 parameter =-0.9 - -0.5%

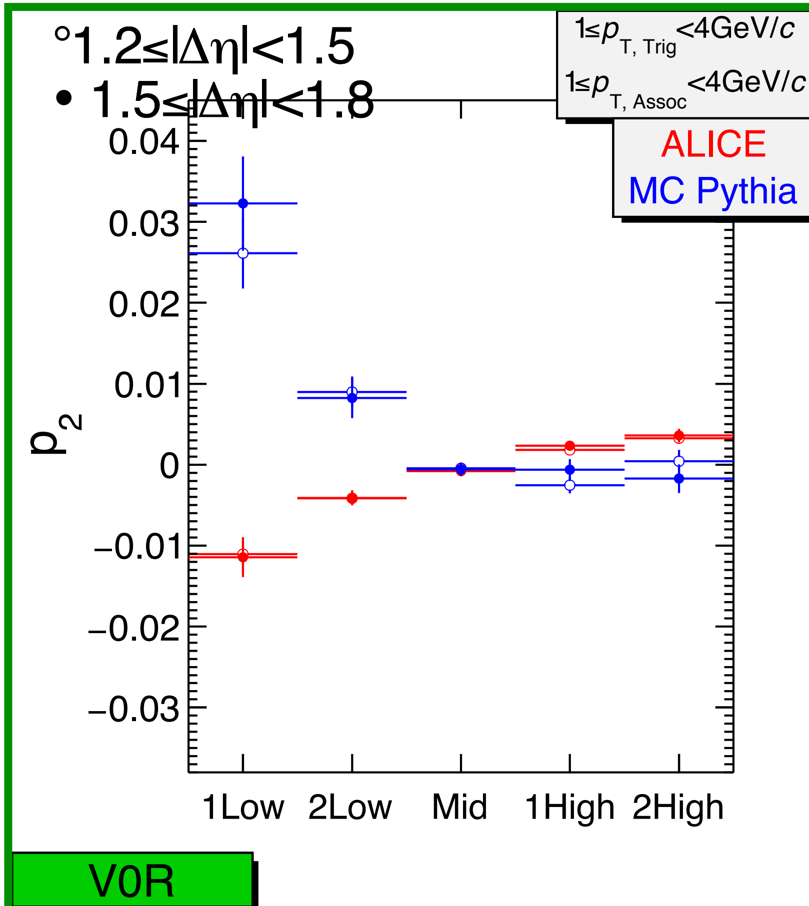
P2 parameter

work in progress

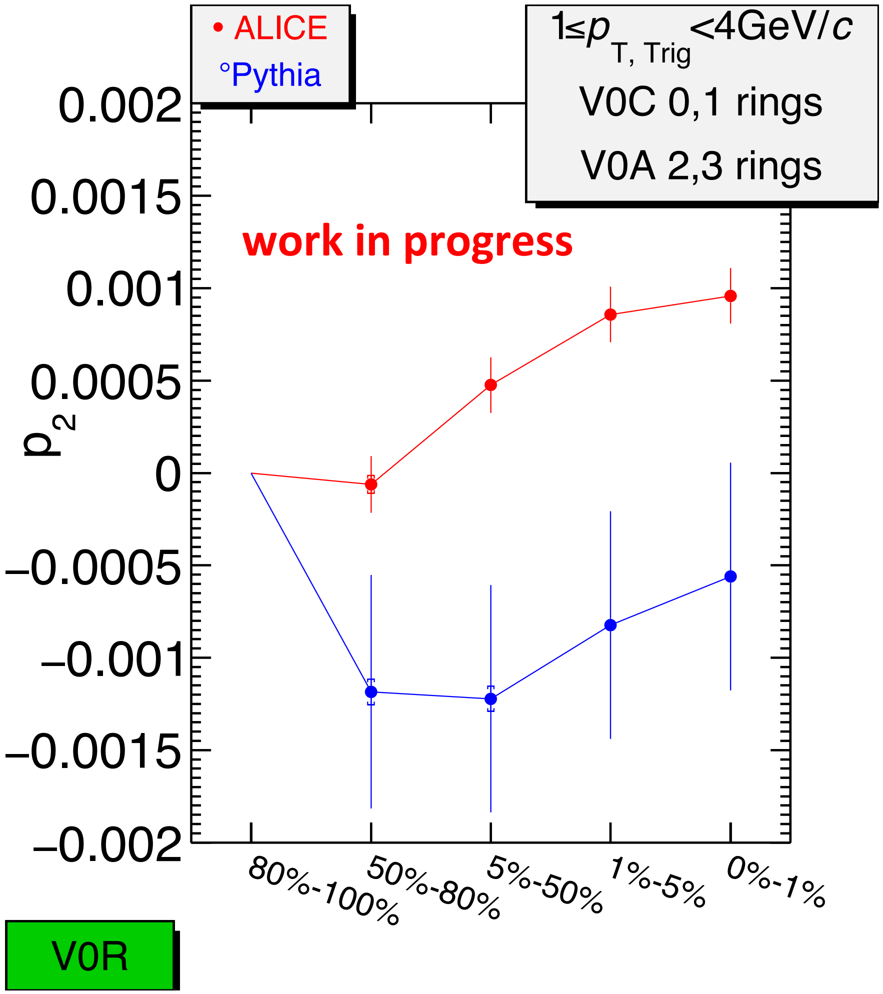
With respect to the lowest multiplicity



With respect to MB



P_2 parameter (V_2^2) in TPC-V0 (2<|Δη|<4)



p2 parameter =0 – 0.09%

p2 parameter =-0.09 - -0.06%

The p2 extraction

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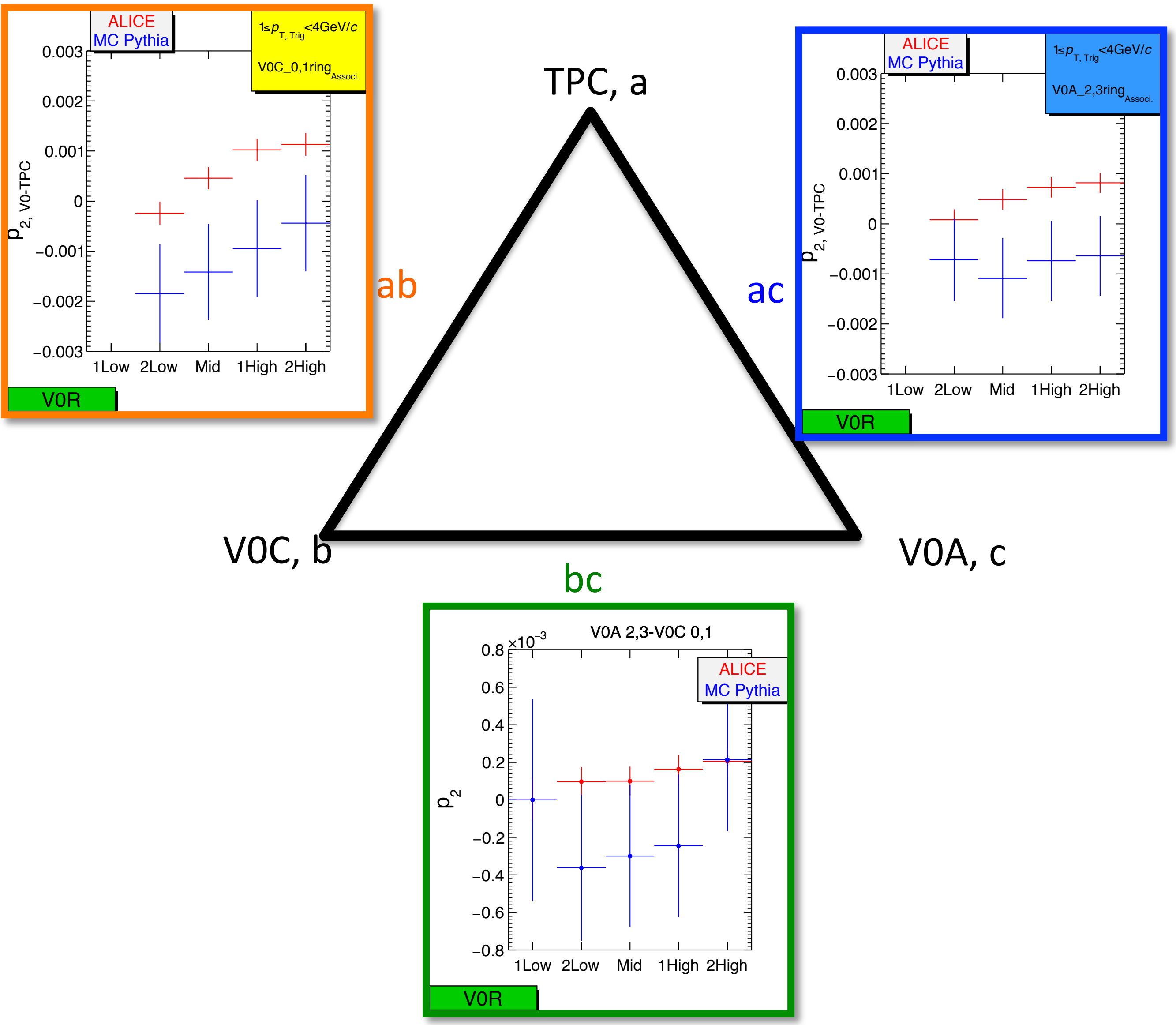
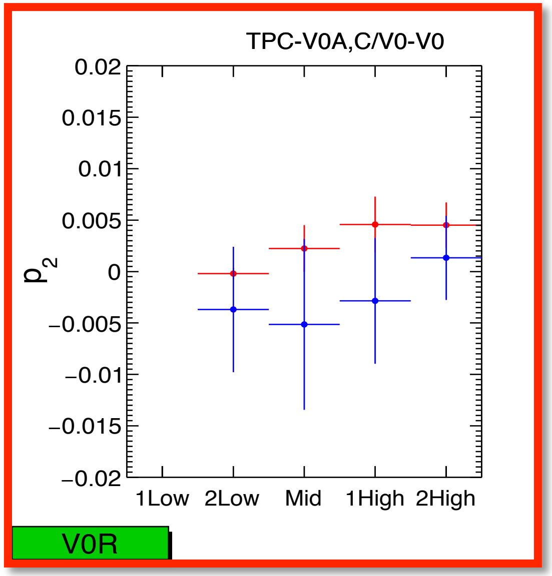


ab, ac = p2 of TPC-V0
bc = p2 of V0-V0

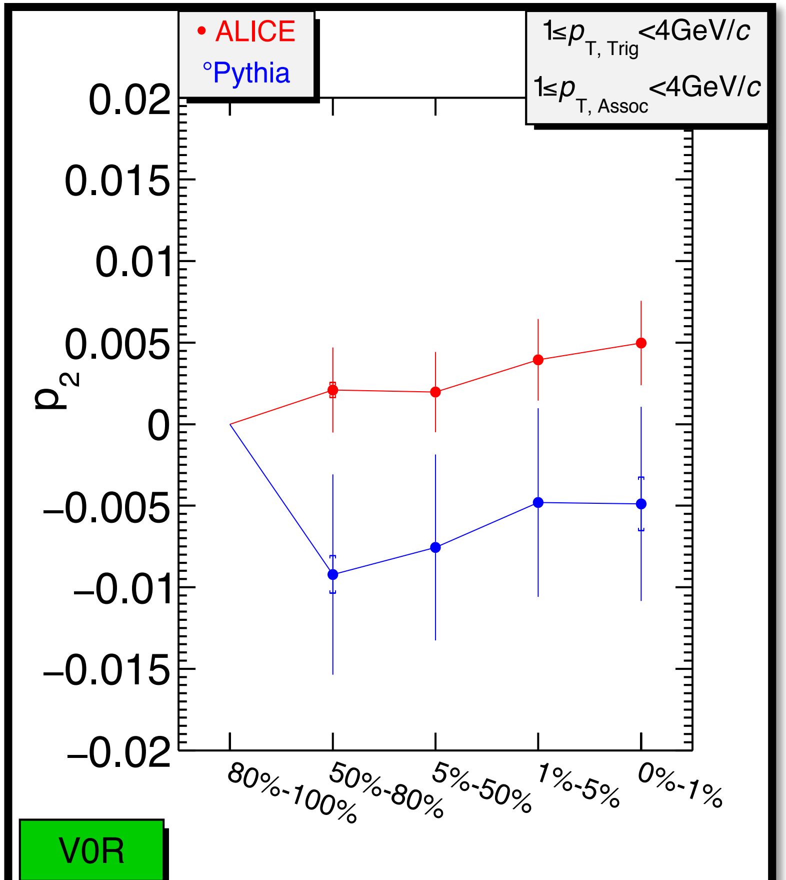
ab x ac/ bc = a^2

$a^2 = v2^2$ of TPC

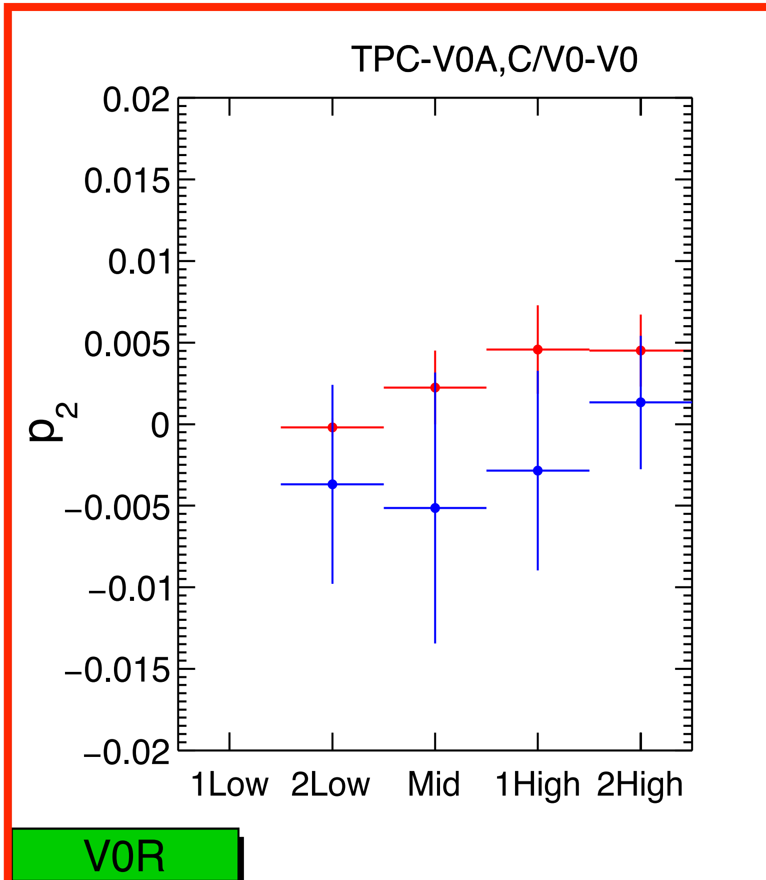


work in progress

TPC-TPC
extract v2[2]



Extraction of v2[2] from V0-V0



Due to the most tight track cut in TPC

Data set

- LHC10d and LHC10e (AOD 147)
- Pythia, LHC10f6a

- Event selection
  kMB
  $|Vertex_z| < 10cm$

- Track selection
  (X) the hybrid track cut (IsHybridGlobalConstrainedGlobal()).
  (O)track cuts 1 is the BIT(4) (kTrkGlobalNoDCA).
  (OK)track cuts 2 is the BIT(5) (kTrkGlobal).