Interplay between jet and v_2

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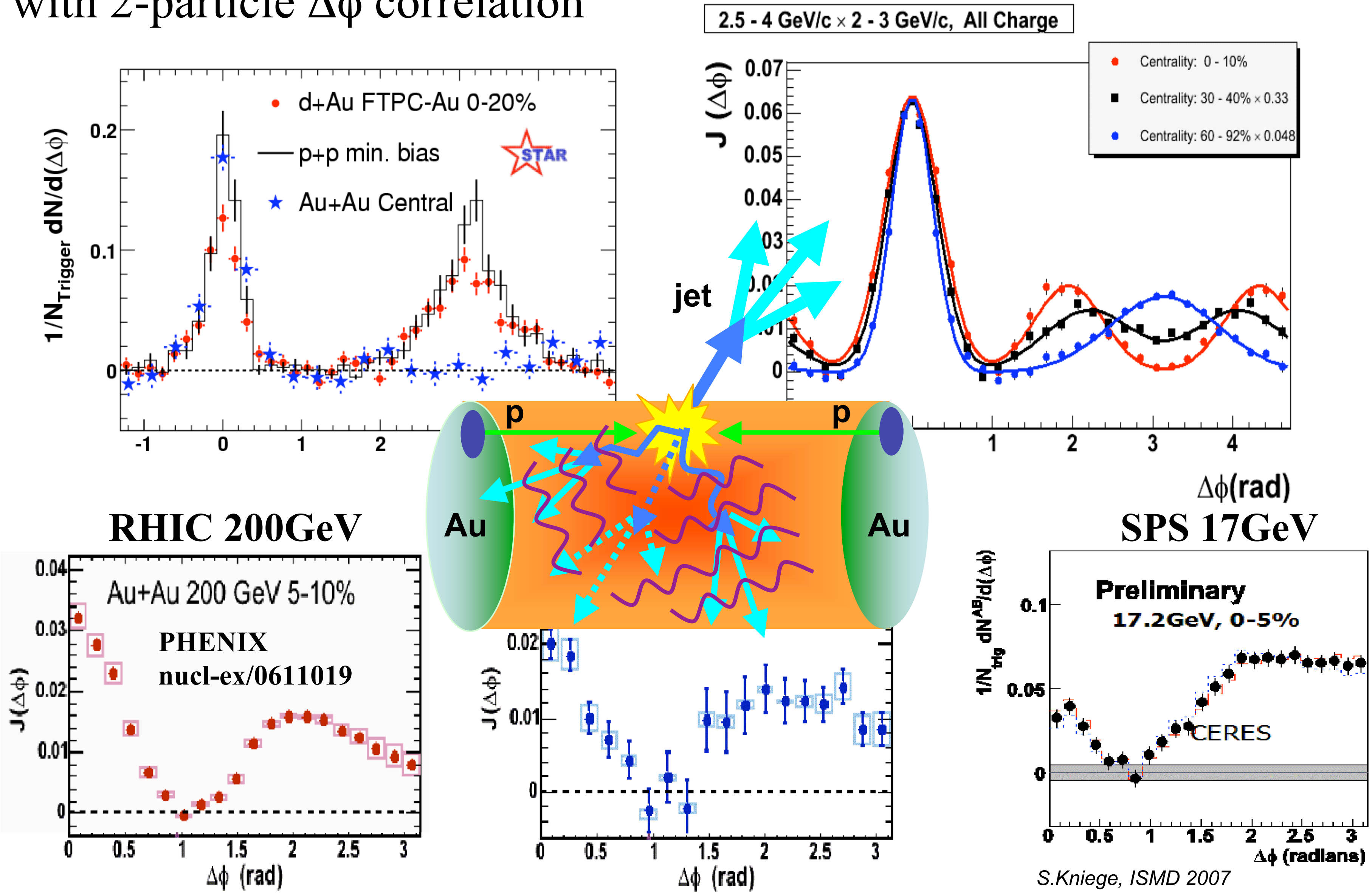
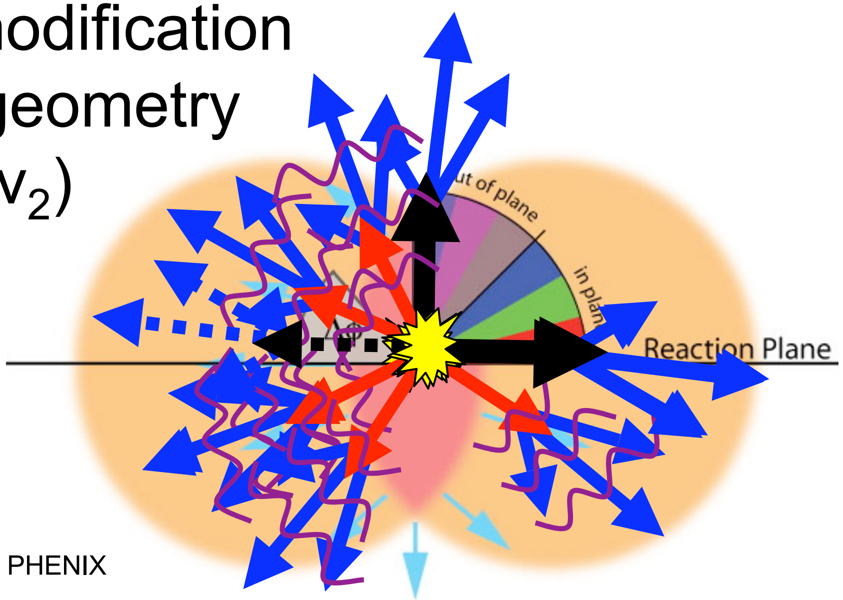
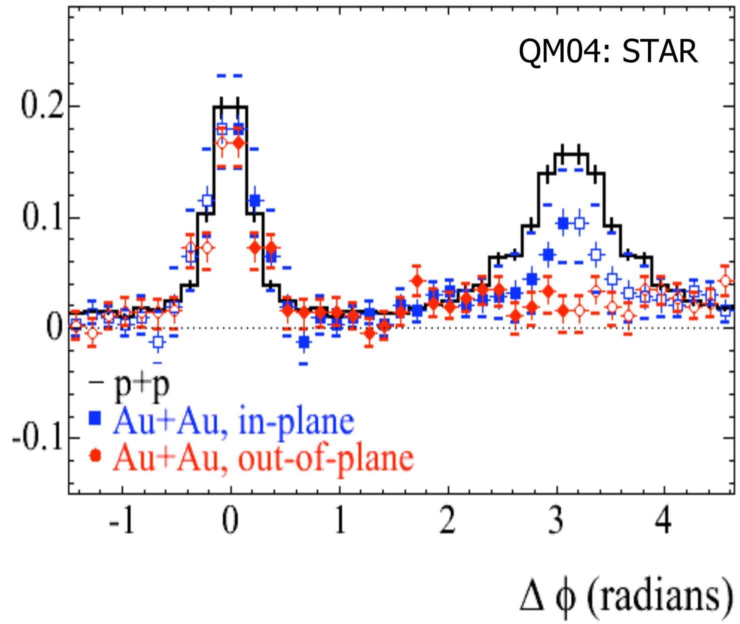
measurements and simulations

Jet suppression ➡ modification with 2-particle Δφ correlation

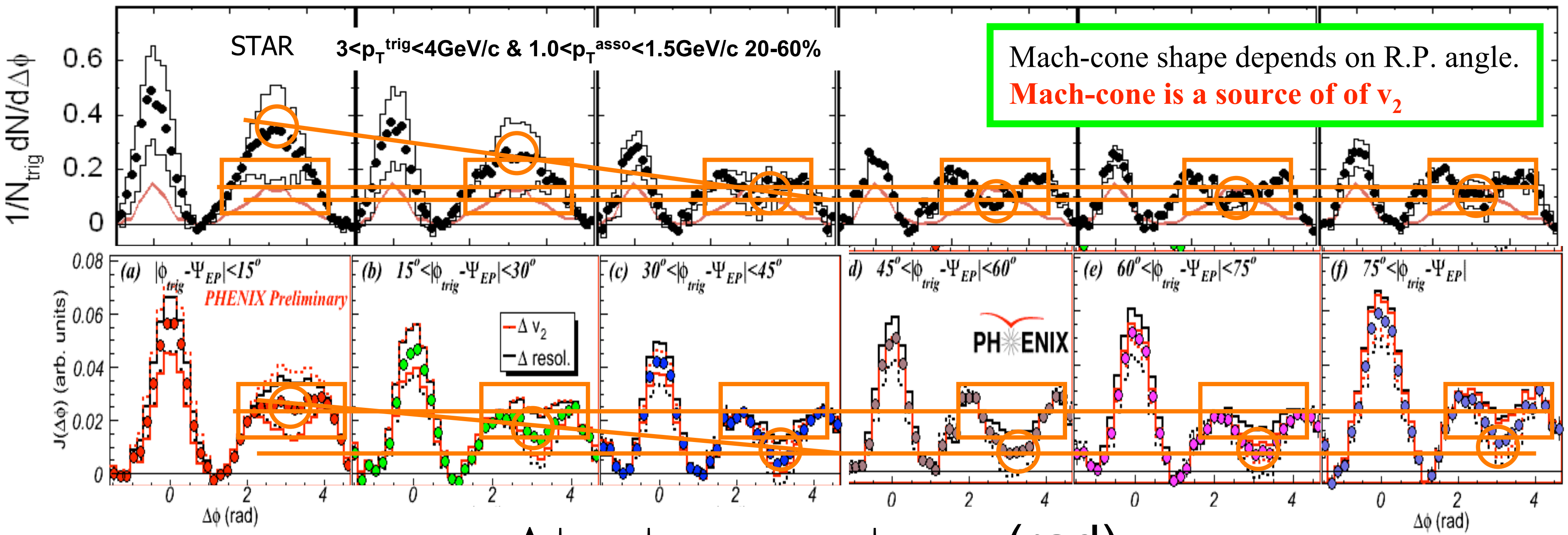


Jet modification and geometry (and v_2)

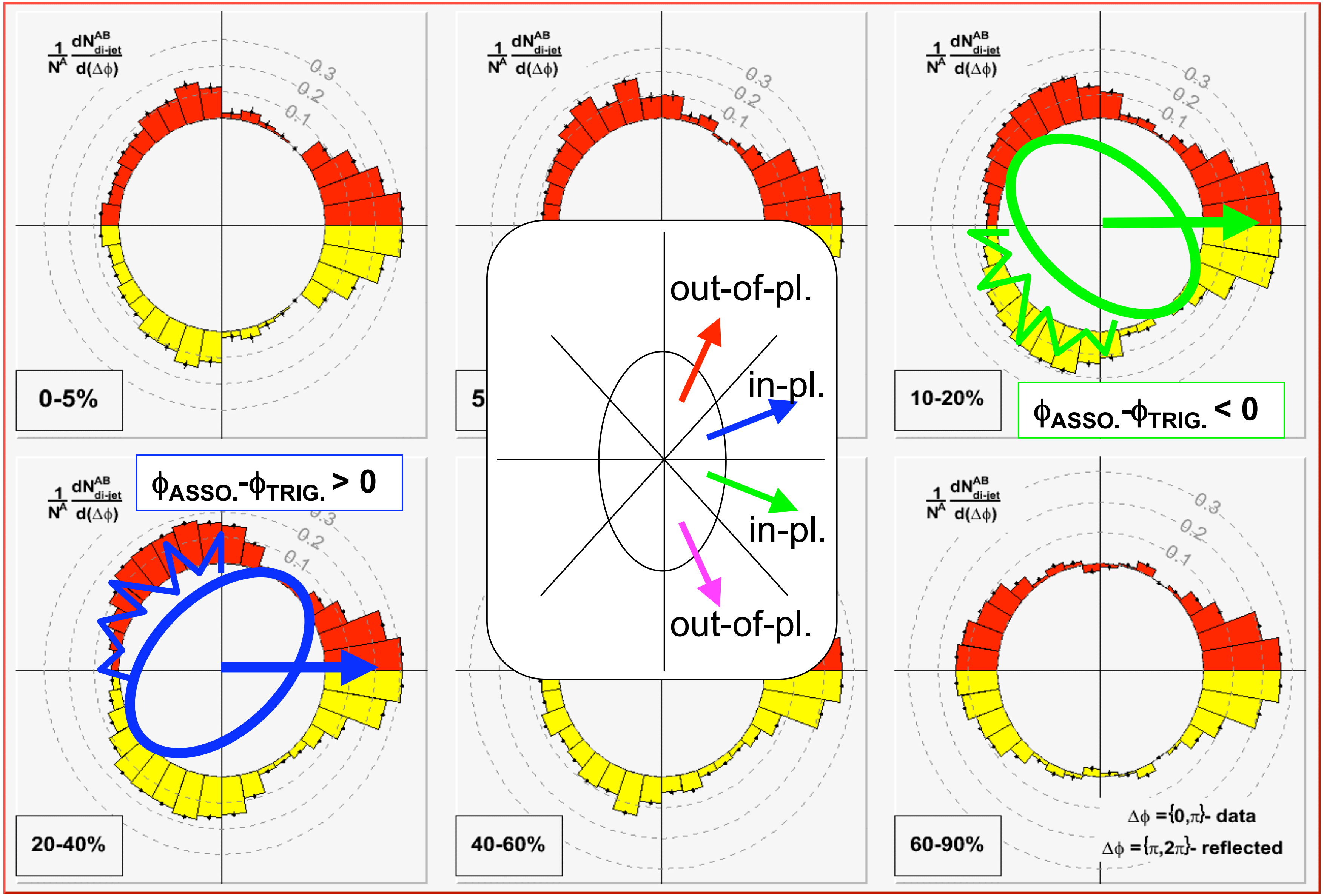




QM08: STAR, PHENIX

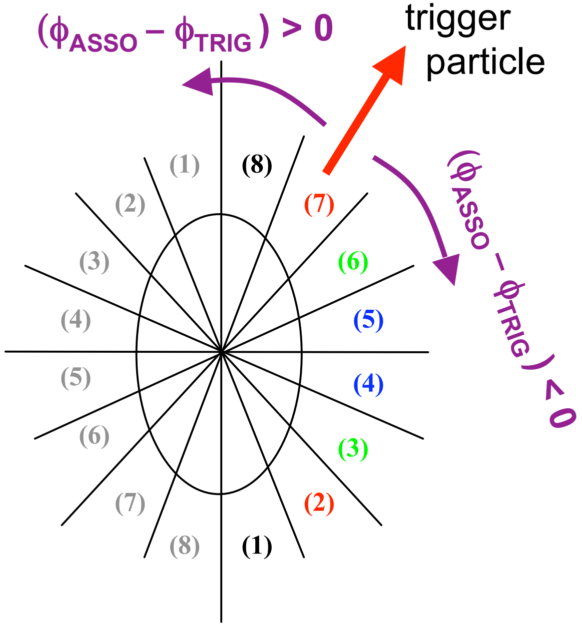


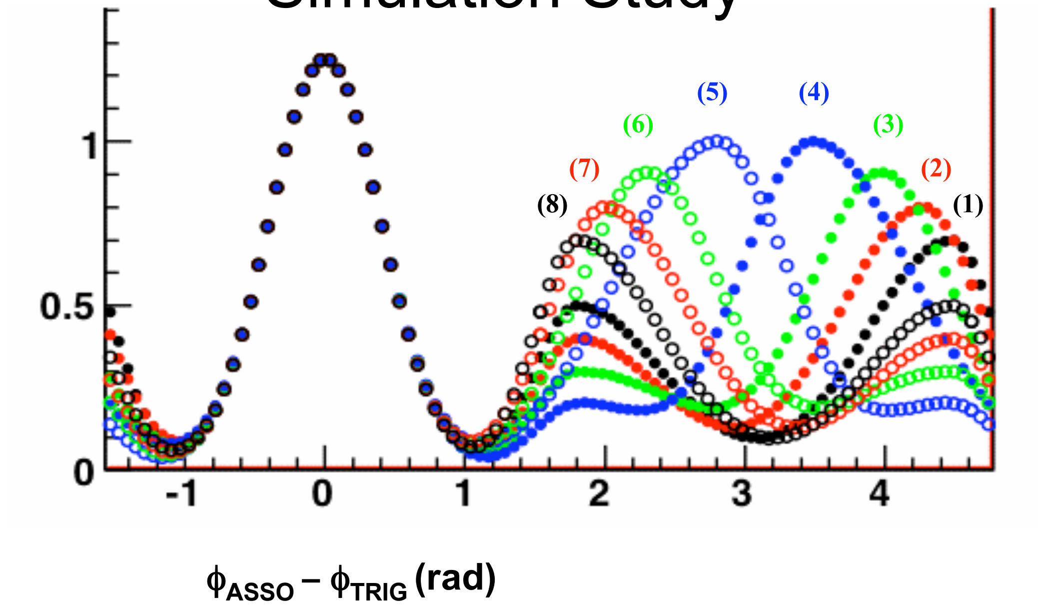
$\Delta\phi = \phi_{associate} - \phi_{trigger}$ (rad)



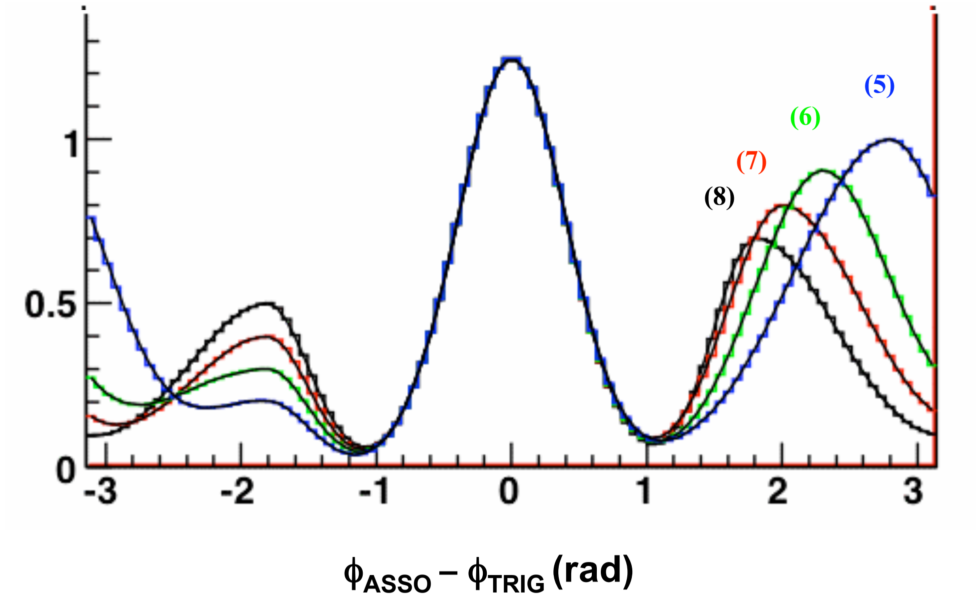
$\frac{1}{N^A}\frac{dN^{AB}_{di\text{-}jet}}{d(\Delta\phi)}$
0.3
0.2
0.1
0-5%
10-20%
20-40%
40-60%
60-90%
$\phi_{ASSO.}-\phi_{TRIG.} < 0$
$\phi_{ASSO.}-\phi_{TRIG.} > 0$
out-of-pl.
in-pl.
in-pl.
out-of-pl.
$\Delta\phi = \{0,\pi\}$- data
$\Delta\phi = \{\pi,2\pi\}$- reflected

Simulation Study



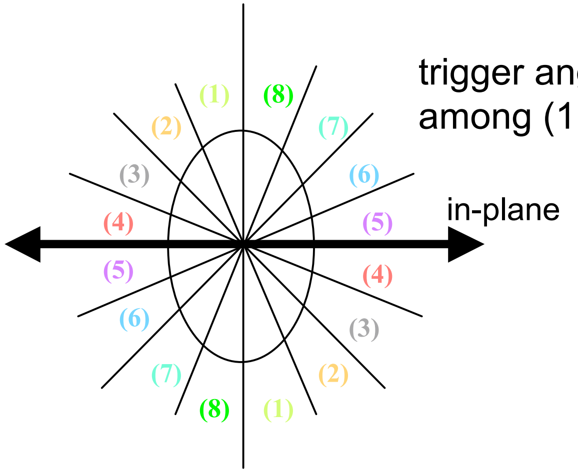


shape(1) = $f_1(x)$
shape(2) = $f_2(x)$
shape(3) = $f_3(x)$
shape(4) = $f_4(x)$
shape(5) = $f_5(x) = f_4(-x)$
shape(6) = $f_6(x) = f_3(-x)$
shape(7) = $f_7(x) = f_2(-x)$
shape(8) = $f_8(x) = f_1(-x)$

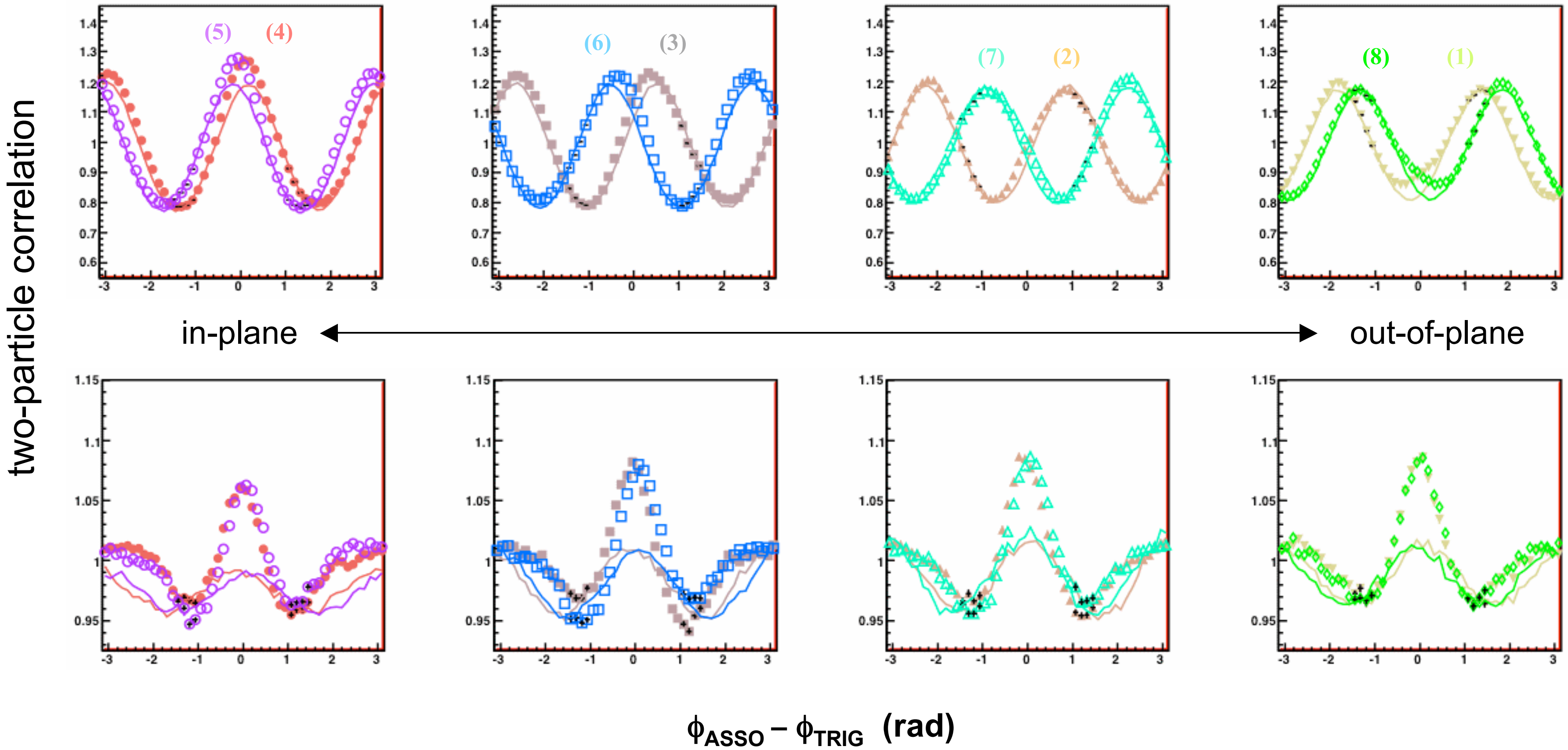


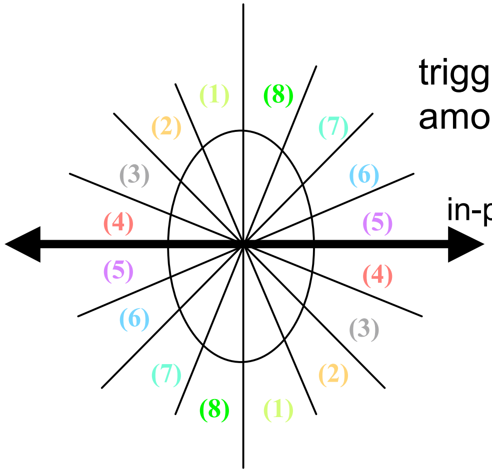
Simulation

trigger angle selection among (1) - (8) regions



* two different ways of mixing
  (top: r.p. random, bottom: r.p. aligned)
* flow subtraction
  (two components flow+jet model,
  with inclusive flow measurement,
  with zyam-like normalization)

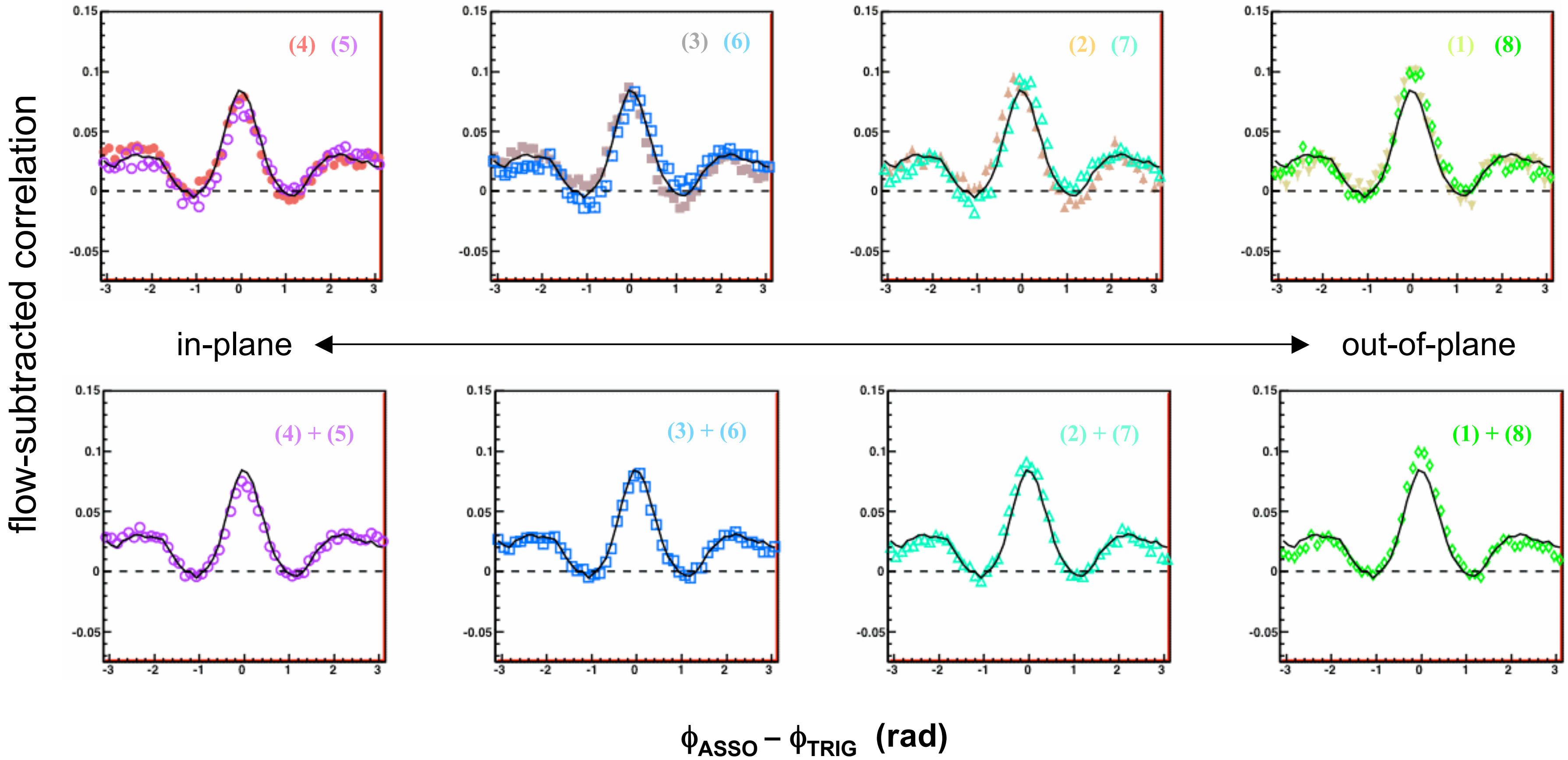




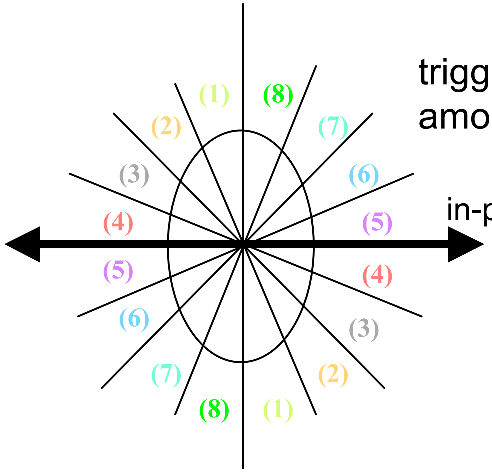
trigger angle selection among (1) - (8) regions

top : left-right separated trigger w.r.t. R.P.
bottom : left-right non-separated
line : average of all (1) - (8)

with experimental E.P. resolution ~0.7



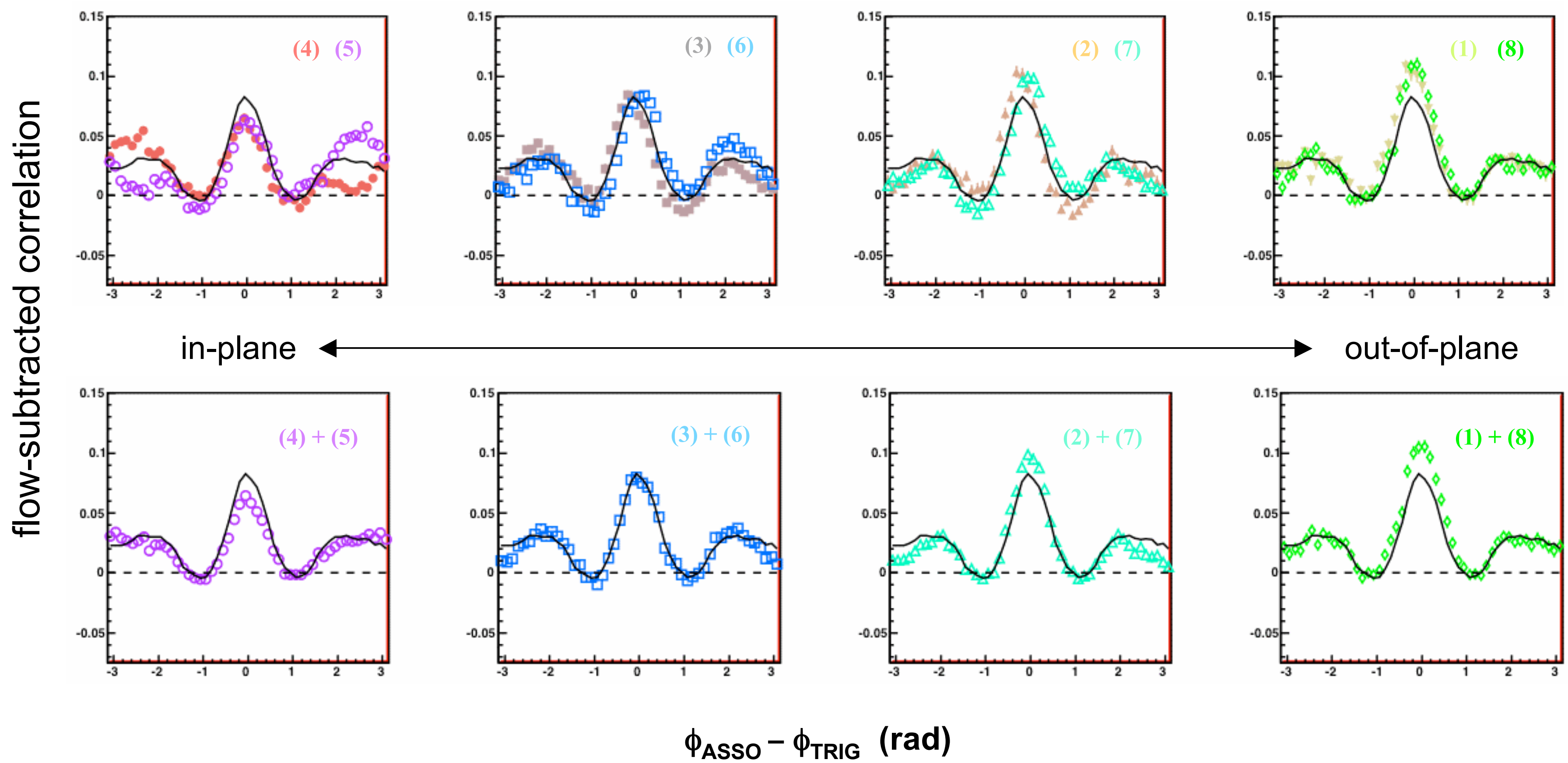
Simulation



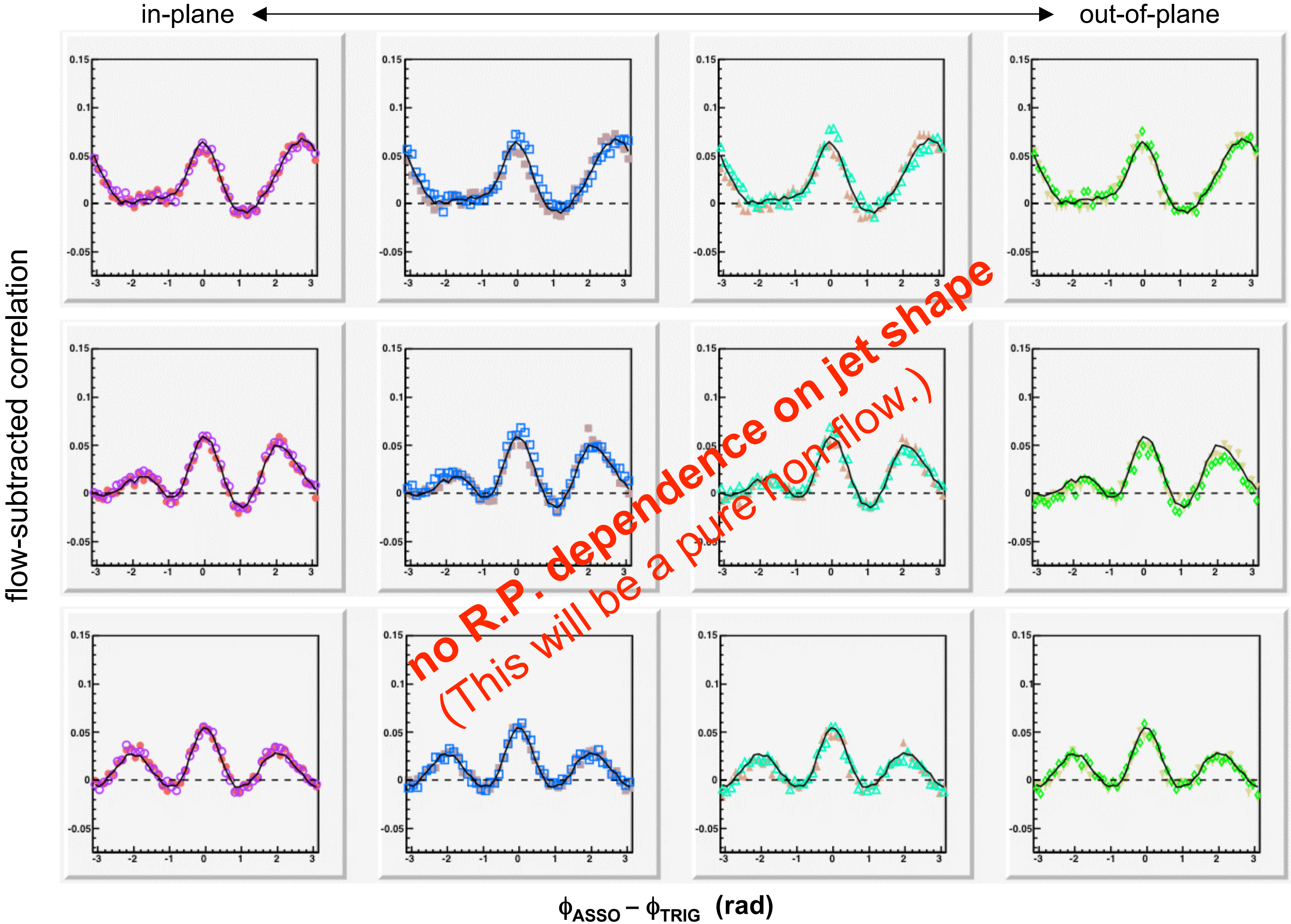
trigger angle selection
among (1) - (8) regions

top : left-right separated trigger w.r.t. R.P.
bottom : left-right non-separated
line : average of all (1) - (8)

with true R.P. (resolution = 1.0)



Simulation


in-plane
out-of-plane
flow-subtracted correlation
no R.P. dependence on jet shape
(This will be a pure non-flow.)
$\phi_{ASSO} - \phi_{TRIG}$ (rad)

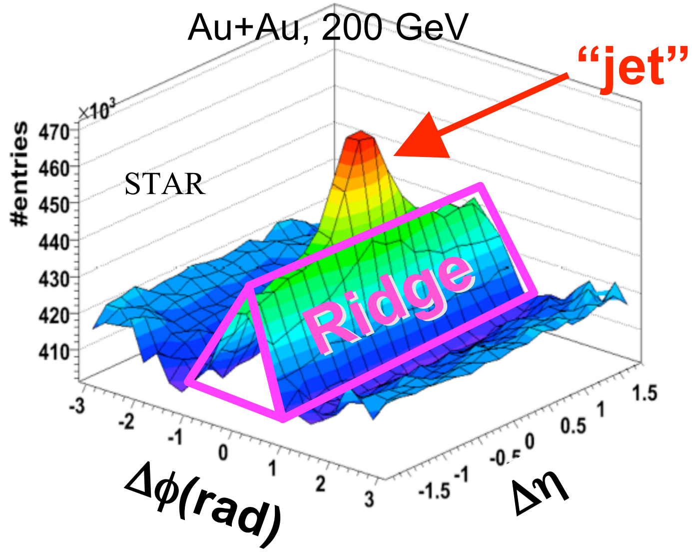
RHIC 200GeV Au+Au, mid-central collisions at mid-p_T region (1-4 GeV/c) with v_2 = 0.1 ~ 0.2

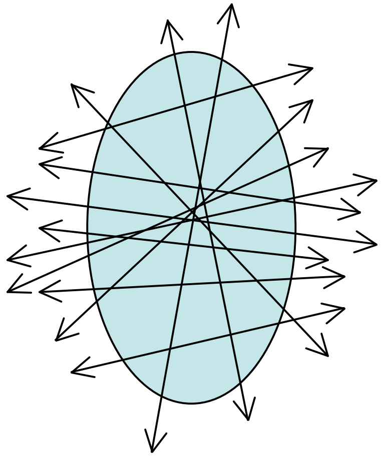
* Significant semi-hard (mini-jet) fraction relative to soft-thermal contribution ~ several*10%

* Significant v_2 effect from the semi-hard component relative to soft-thermal particle v_2 ~ several*10%

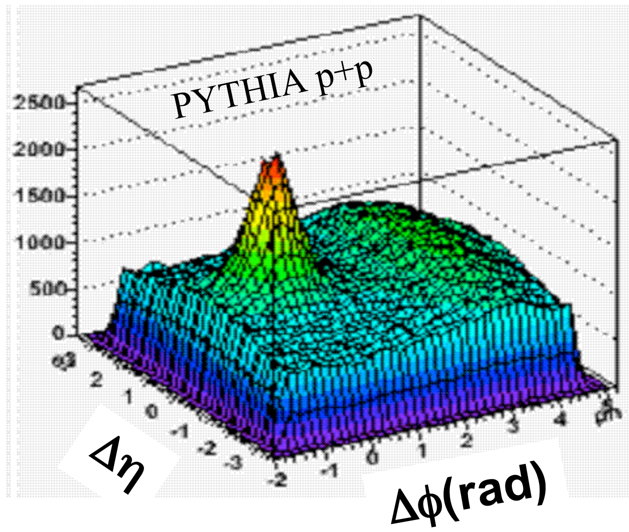
* Significant smearing on jet shape even with $\sigma_{R.P.}$~ 0.7
  But it's not really because of poor accuracy of E.P. angle,
  it's more because mini-jets push up the inclusive v_2
  which is subtracted.

* RHIC data analysis is in progress…
* E.P. can also be biased by correlated pair even with large η gap…

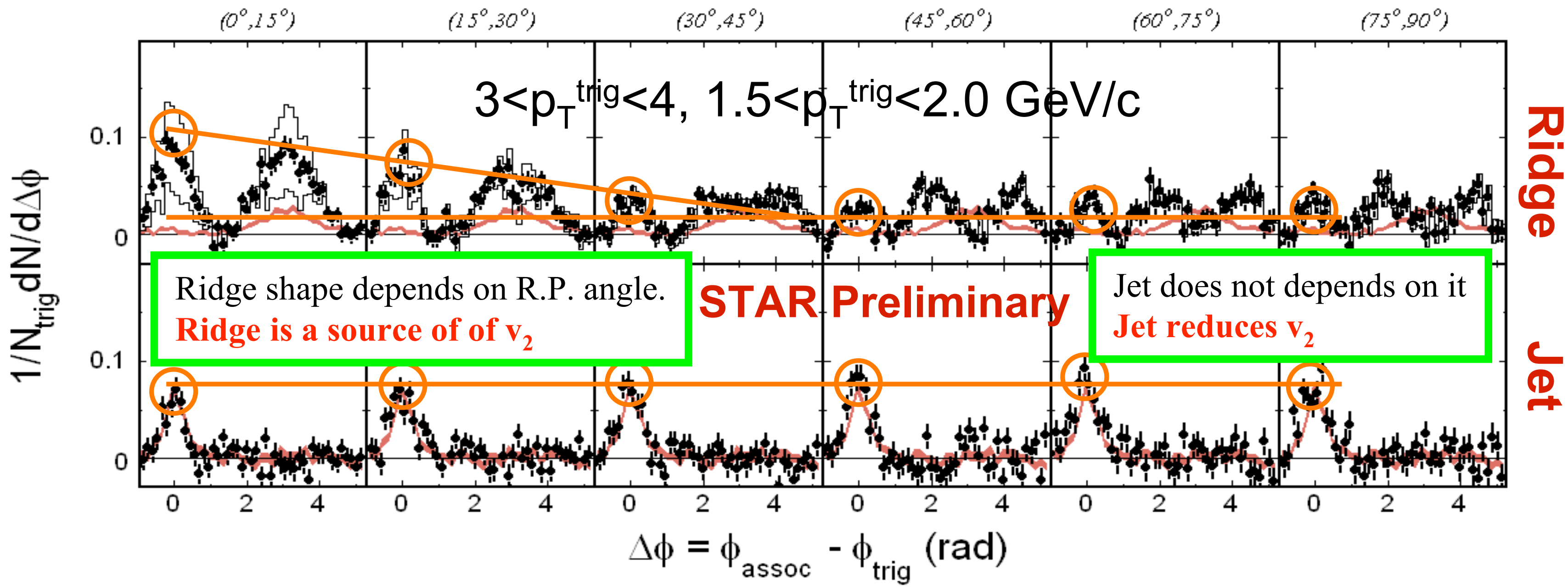


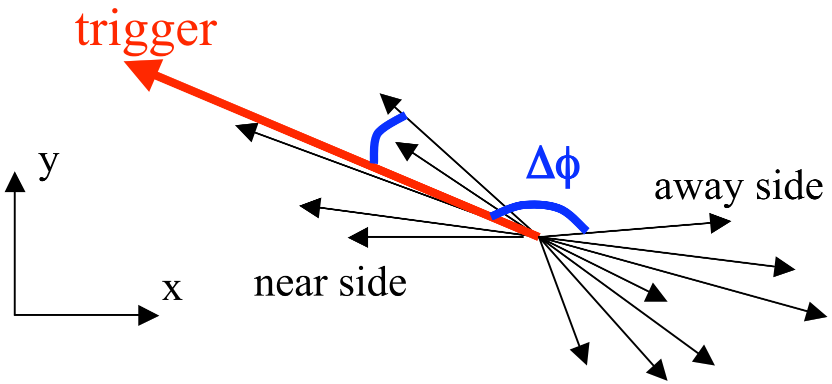


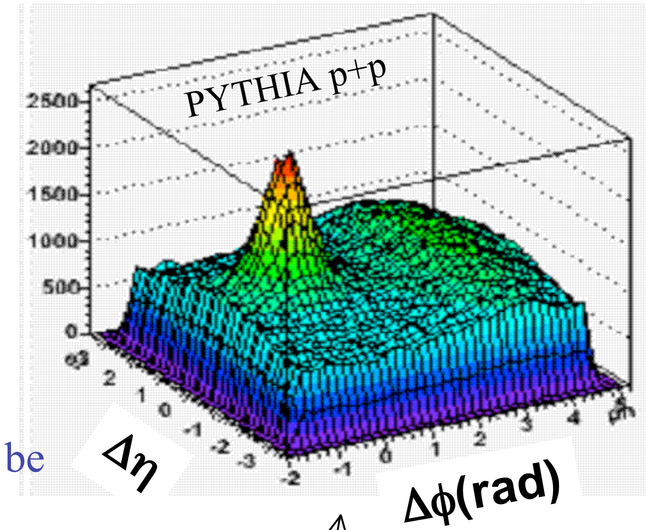
away side (in dφ) of one di-jet can be near side (in dφ) of another di-jet



QM08 STAR







(1) away side of a back-to-back(b-t-b) jet is wider in η than in φ
(2) If there are two parallel b-t-b jets, away side of one b-t-b jet can be near side of the another b-t-b jet.
(3) Suppression as well as modification of b-t-b jet would depend on relative angle w.r.t. almond geometry, we know this from v_2 measurement and believe this is the major source of v_2 at high p_T .
(4) Therefore, there should be inter b-t-b jets correlation give by the geometry from (3), this could make near side ridge like effect, especially if the effect (3) has shaper dependence than $v_2(=\cos 2x)$.
(5) We always measure inclusive v_2, which includes the effect (3). Therefore any modification which could generates the elliptic anisotropy would be included in the measured v_2 .
(6) We subtract BG contribution with this v_2 from (5) by maximizing BG contribution assuming zero jet yield at minimum at any dφ.
(7) If near and away side jets overlap each other, this subtraction underestimates the jet yield and can change the extracted jet shape.
(8) If you extract angular dependence of jet w.r.t. R.P., the results will easily be affected by the choice of v_2 from (5).