

Status report :
Part I : SymOct 200GeV
Part II : Cumulants Analysis

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University of Rochester

Part I : SymOct 200GeV

Analysis chain

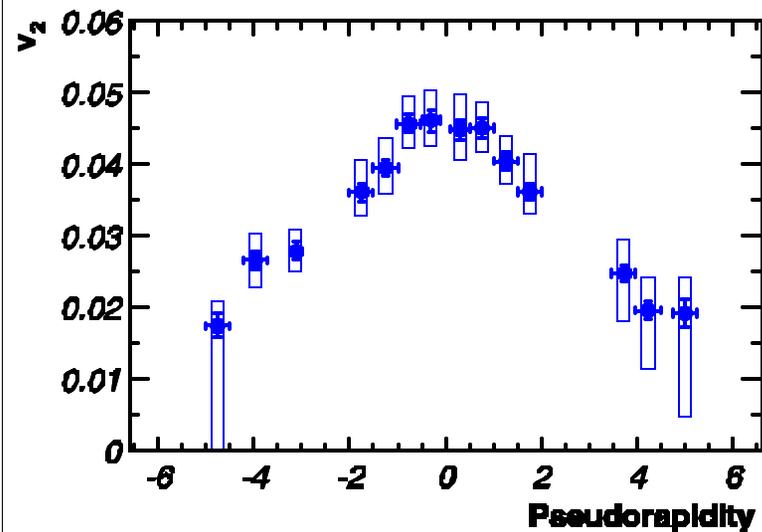
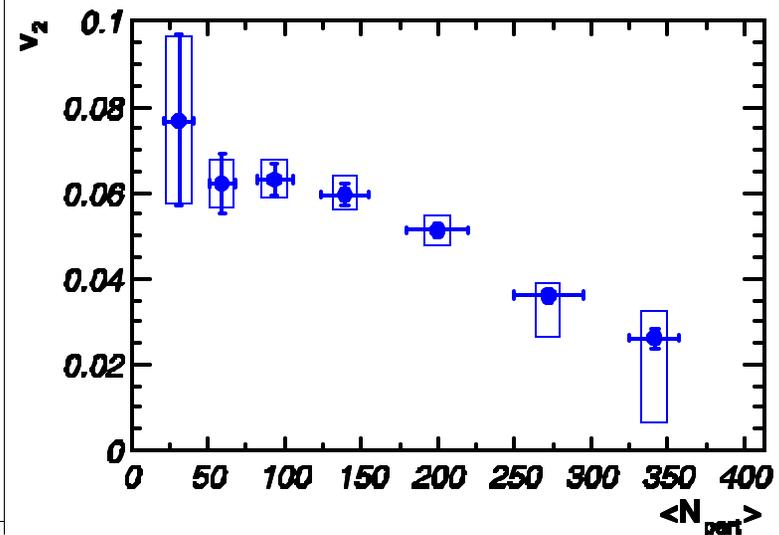
- Select data, and vertex cut at 2s in V_x , V_y and $-38 < V_z < -30$ cm
- SiHit energy calibration in sensor-by-sensor basis
- Make Hit density plot and define Dead/Hot pixels
- Correct Dead pixels by mirroring, or reject whole column
- Calculate Weighting matrix and Poisson weight
- Define sub-events, and get reaction plane resolution
- measure v_2 and correct resolution
- Do MC study and estimate v_2 suppression
- Correct suppression in Data
- Do various systematic error study

Data set

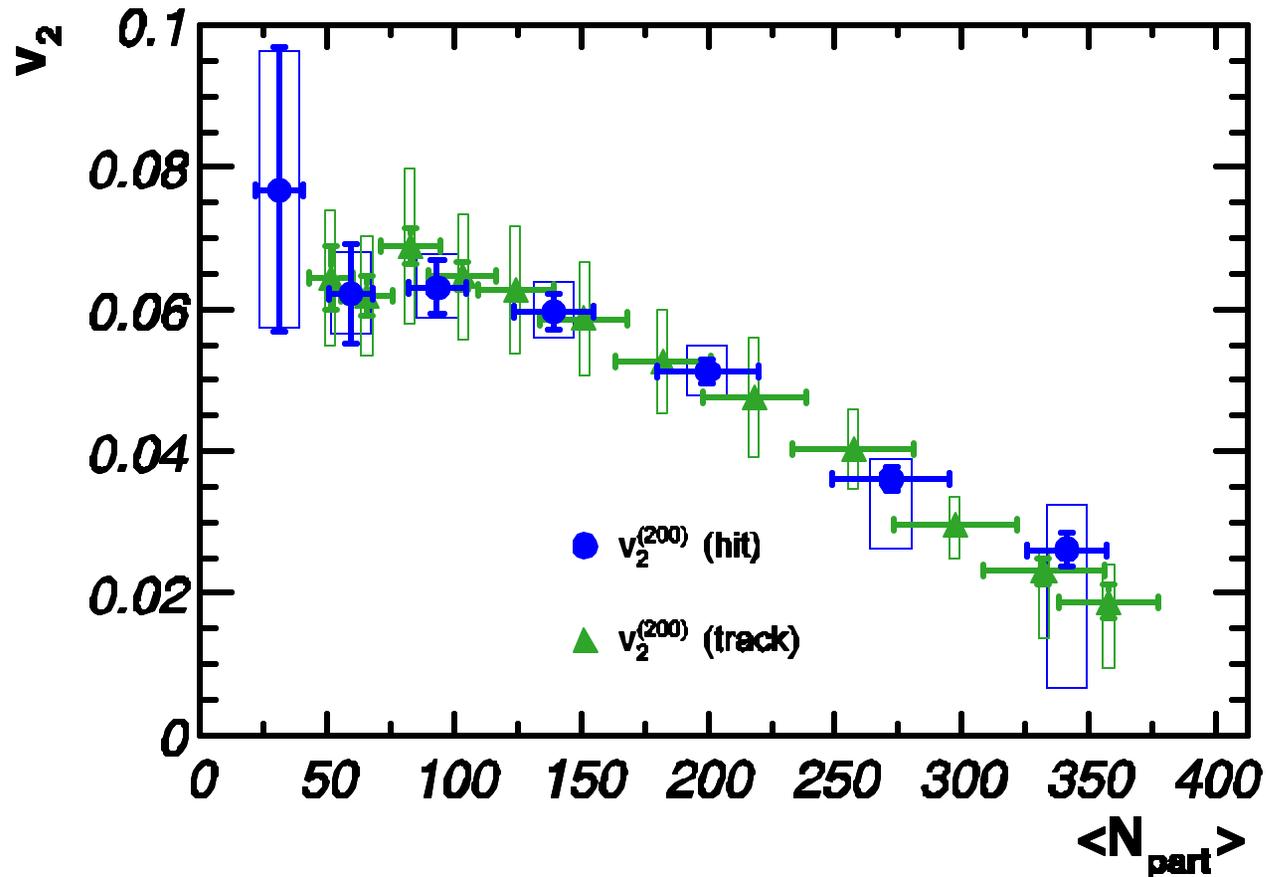
- 200GeV Data : OFFZ vertex events ← dedicated runs, 35K
 - B0 : 9051-9056
 - B- : 9057-9060
 - B+ : 9063-9065
- 200GeV MC 5% : 6K events (B-,B+ not requested)
 - B0 : 5731, 5732
- 200GeV MC Triangular : 35K events
 - B0 : 5706, 5707, 5708
 - B- : 5721, 5722
 - B+ : 5719

QM2002 Plots / Systematics

- 1) SiHits vs MultHits
- 2) Hit definition
(40keV, 50keV, 60keV)
- 3) Sub-event definition
(0.1, 0.5, 1.0, 1.5 <math> < h < 2.0 </math>)
- 4) Beam orbit (1.5s, 2s, 3s)
- 5) Alignment ($V_x = V_y = 0$)
- 6) Suppression (Triangular, 5%Flat)
- 7) Dead channel correction ON/OFF
- 8) Weighting matrix ON/OFF
- 9) CMN fix ON/OFF

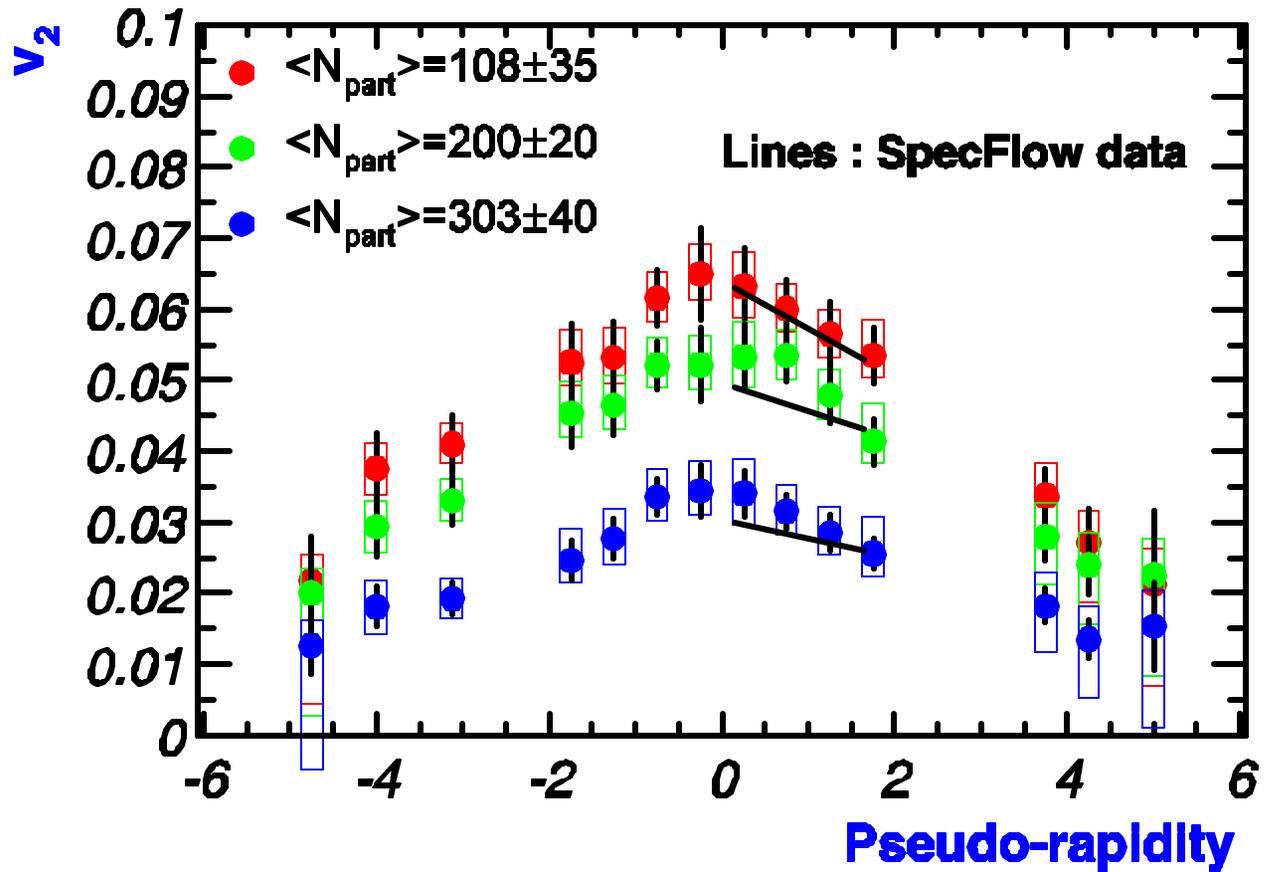


V_2 vs cen with SpecFlow



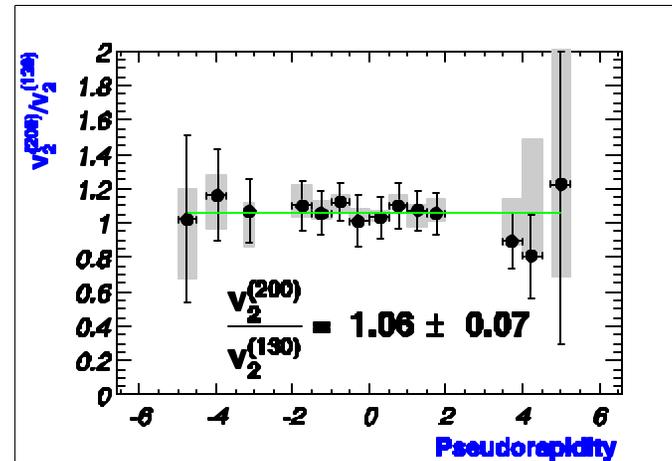
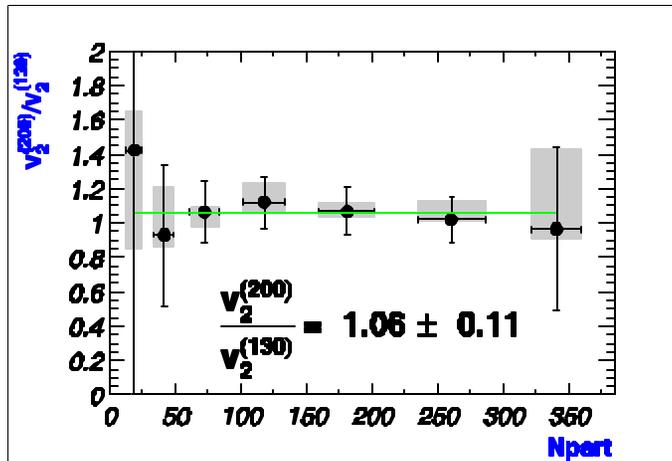
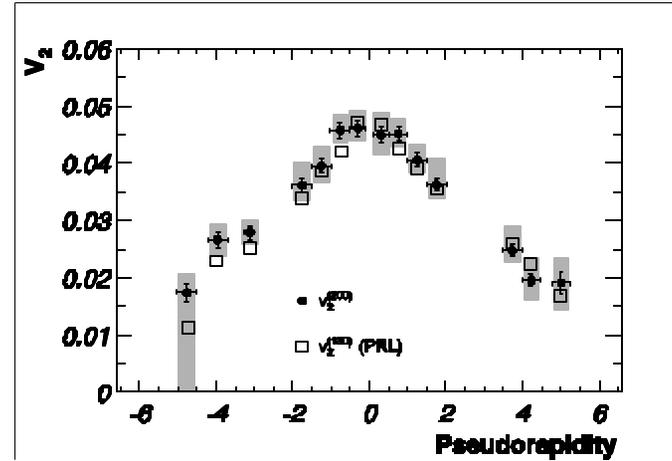
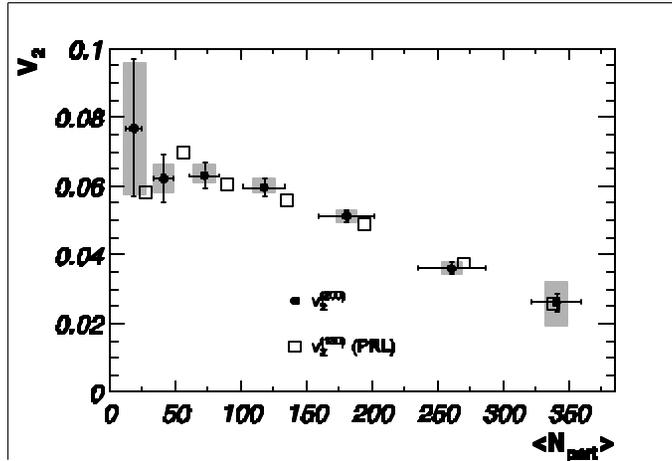
SpecFlow points are taken from QM2002 results

$V_2(\eta)$ vs three bins of centrality



SpecFlow lines are obtained from Carla's June 13 Web page

Ratios



What should be done for QM2004?

- Numbers are pretty much settled down and shall not be easily changed unless we found any missing systematic sources.
- What systematics should be studied more?

Part II : Cumulants Analysis

Cumulants Math

for the integrated flow

$$G_n = \prod_{h=1}^M \left(1 + \frac{1}{M} (2x \cos(nf) + 2y \sin(nf))\right)$$

for the differential flow

$$g_n(x) = \sum_{h=1}^M \cos(nf) \cdot G_n$$

$$g_n(y) = \sum_{h=1}^M \sin(nf) \cdot G_n$$

For each event,
loop over hits
and calculate
a generating
function

$$C_n^{\{k\}} = M (\langle G_n^{\{k\}} \rangle^{1/M} - 1)$$

Cumulants
generating
function

$$v_2^{\{2\}} = \sqrt{(3C_1 - \frac{3}{2}C_2 + \frac{1}{3}C_3) / r_0^2}$$

$$v_2^{\{4\}} = \sqrt[4]{2(5C_1 - 4C_2 + C_3) / r_0^4}$$

$$v_2^{\{6\}} = \sqrt[6]{6(3C_1 - 3C_2 + C_3) / r_0^6}$$

Data set

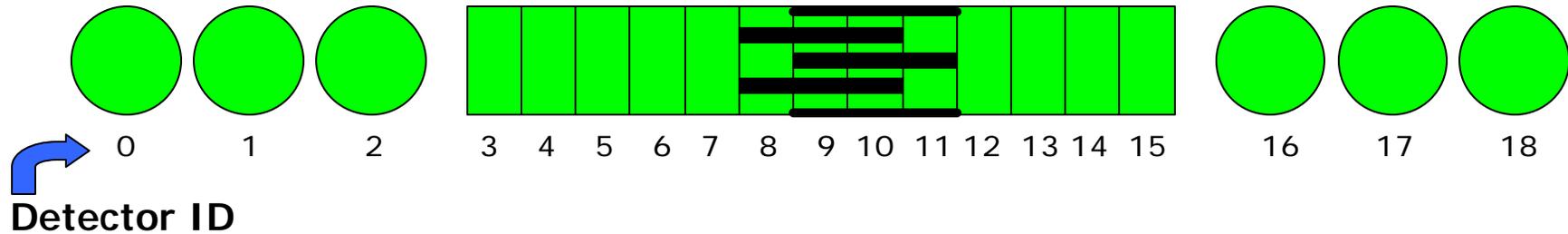
We use only

- 130GeV Data : /phobos/data2001/pr00/COLLISION/PR00/BZEROMB
- 130GeV MC 5% : BZERO → 5735, 5736 (SMV0_4)
- 130GeV MC Triangular : BZERO → 5448 (SMV0_5)

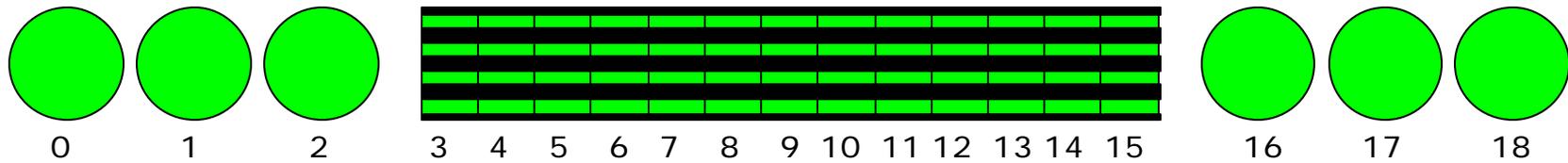
200GeV data are not yet analyzed...

Sub-detector setup

Method I



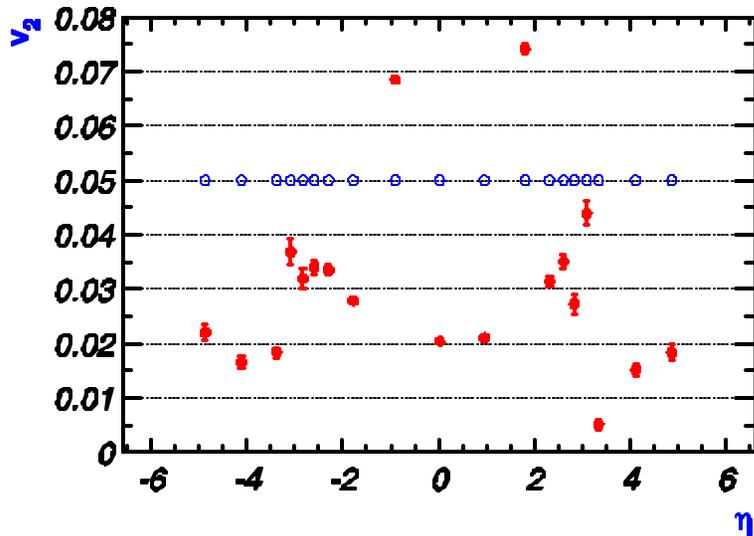
Method II



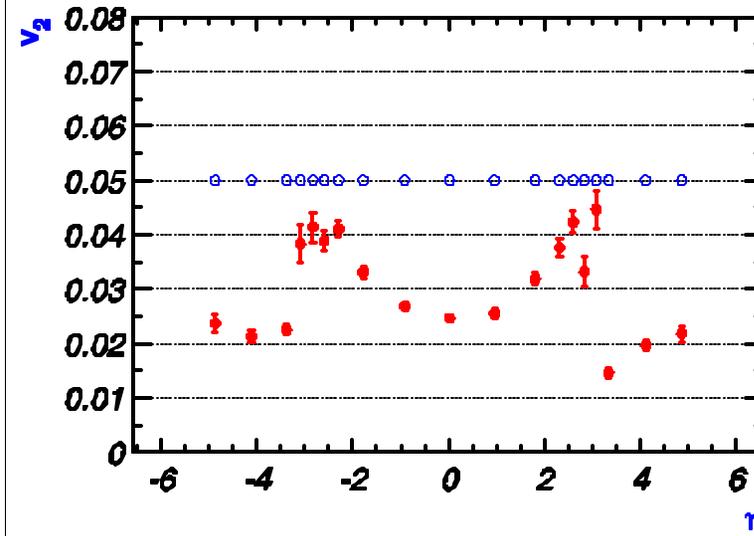
19 sub-detectors work independently in Cumulants
Integrated Flow comes from Octagon

Problem with 6-sensor configuration

Method I

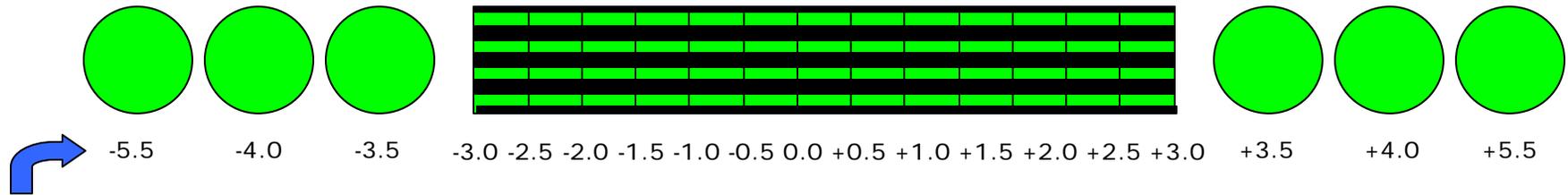


Method II



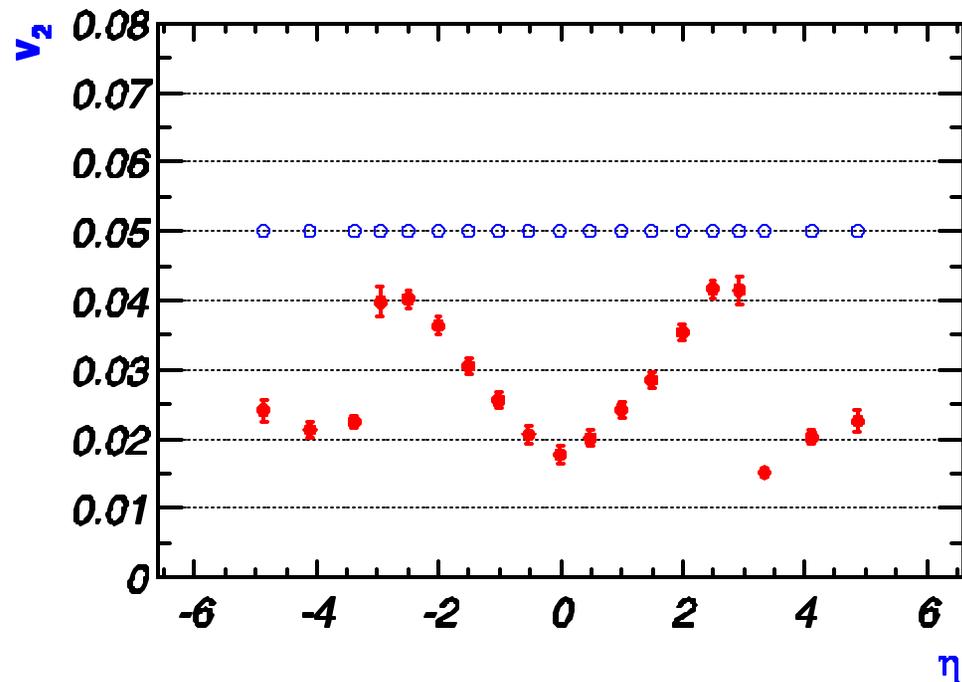
- When two holes exist, ie, 6 and 9, we have problems.
- Jean-Yves doesn't yet understand what's wrong with our plots
- For now, we can only accept Method II

Proposed sub-detector setup

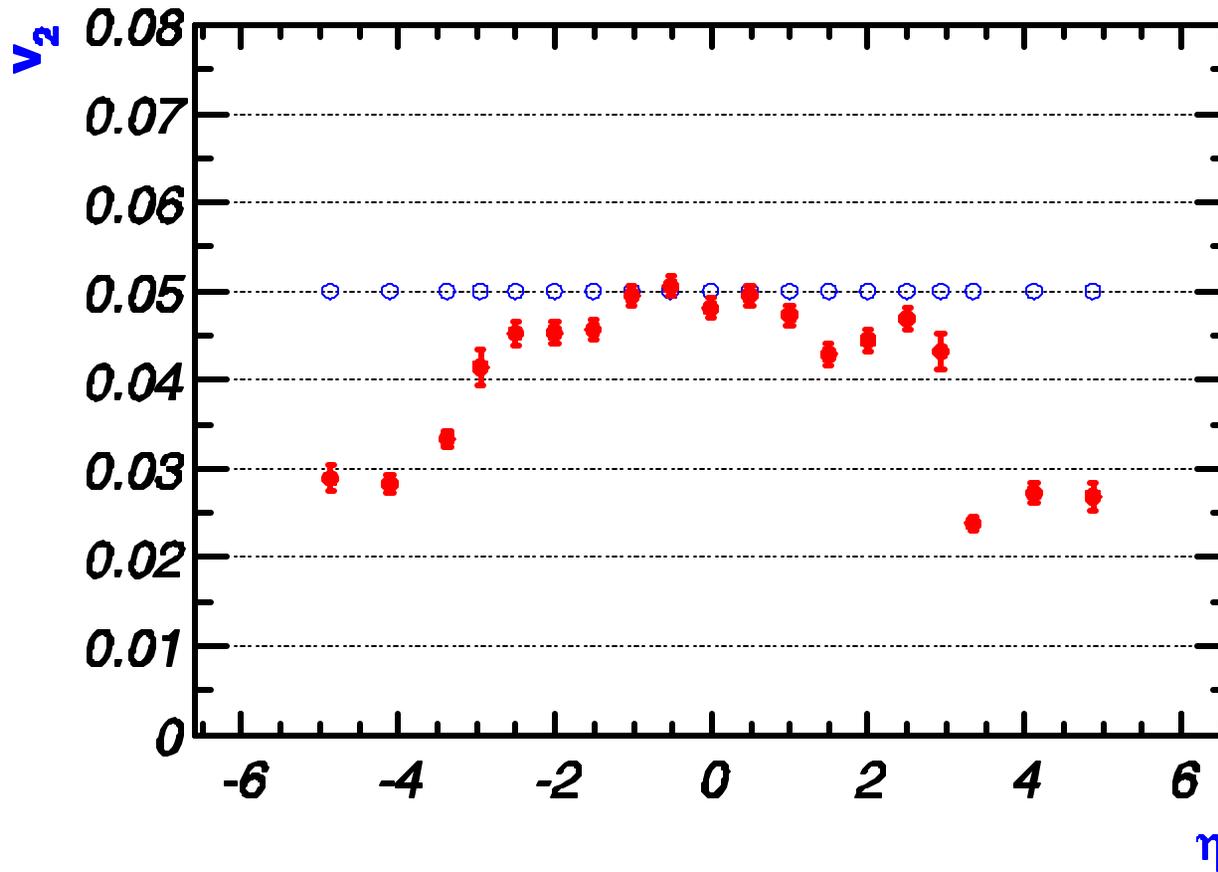


Eta bins

Octagon is homogeneous (4 sensors) along the beam axis, thus we can now define pseudo-rapidity bin instead of sub-detector bin for better eta value representation.

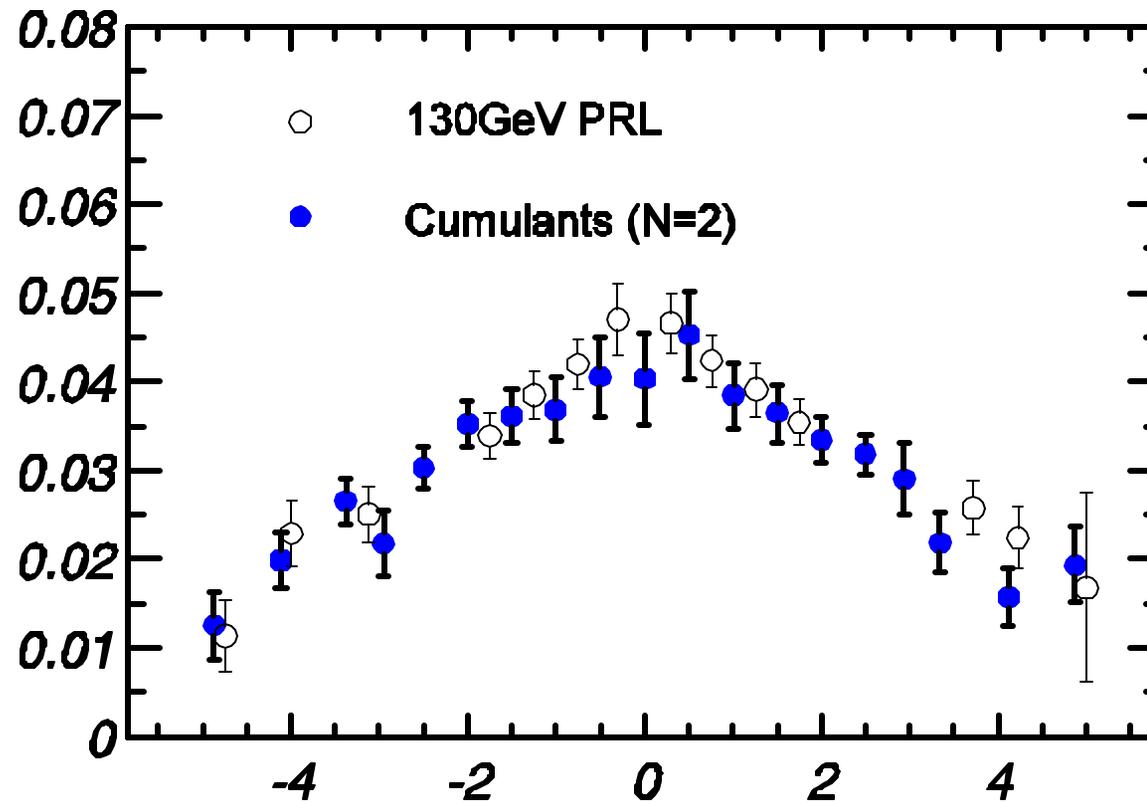


Poisson weighed differential flow



Differential flow with Poisson weighting \rightarrow Seems to work

First look at 130GeV Data



Very similar result to PRL!

To be done

- 130GeV BZERO Triangular MC (Increase STAT)
- Confirm suppression correction
- Confirm 130GeV PRL result
- Apply for 200GeV Data and MC
- v2 3-centrality-bin analysis
- v1 independent check
- hopefully get 4 particle cumulants results → QM2004