Disappearance of back-to-back high p_t hadron correlations in central Au+Au collisions at $\sqrt{s_{NN}} = 200$GeV

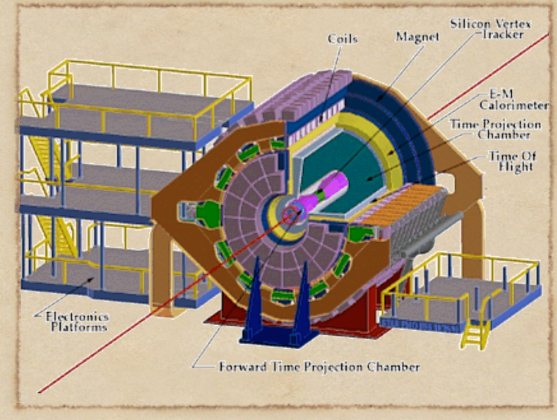
J. Vanfossen

CNR STAR Paper talk 1

9/10/2010

High p_t Hadron Correlations

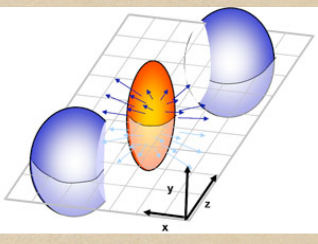
- Brief intro to the STAR experiment
- Collisions
- Pair Selection
- Correlations and Flow
- Summary



A brief overview of the STAR Detector

For Amilkar

Collisions



- When nuclei collide overlap in football shape of 'medium'
- Parton gets kicked out producing jet
- Expect energy loss in jet traversing the medium
- Look at back to back jets

Cuts

- Choose Event with high p_t hadron

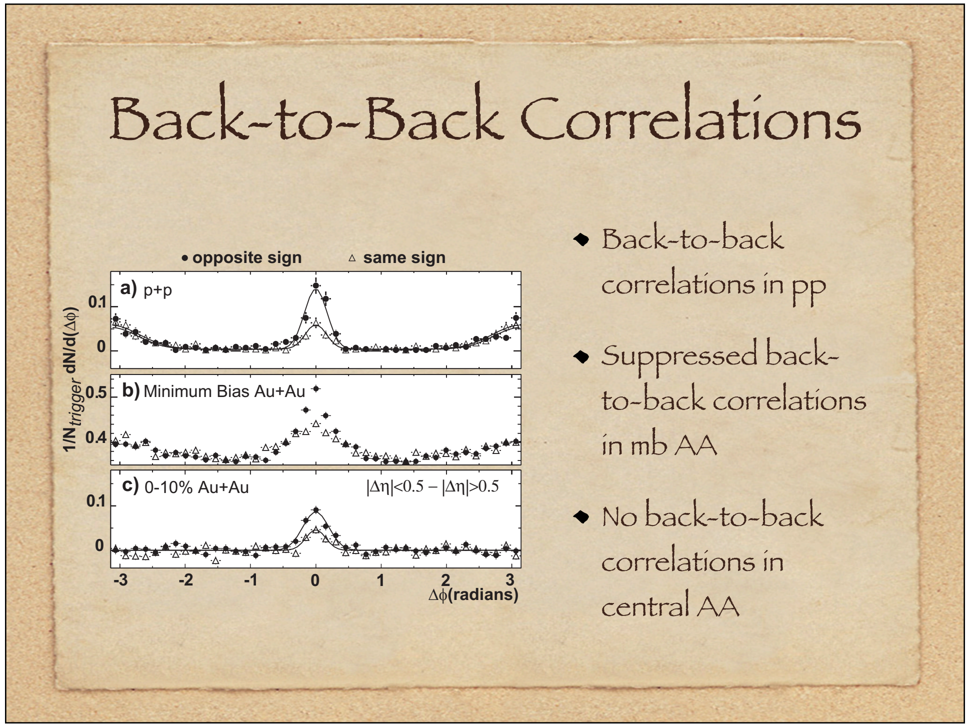
  $(4 < p_T^{trig} < 6 \;\; or \;\; 3 < p_T^{trig} < 4GeV/c)$

- Choose Particles with

  $2GeV/c < p_T < p_T^{trig}$

  $|\eta| < 0.7$

choose associated particles



top two are |eta| < 0.7
bottom is diff between low eta and high eta
no away side correlations

Flow Corrections

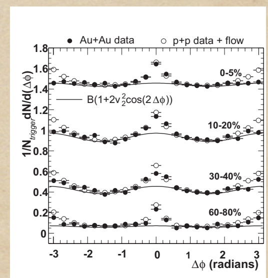
- Perhaps elliptic flow can account for differences
- Elliptic flow dependent on reaction plane angle and v_2
- Use model where v_2 and B are calculated independently for each centrality bin.

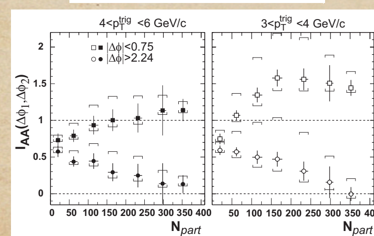
$$D^{model} = D^{PP}(\Delta\phi) + B(1 + 2v_2^2 cos(2\Delta\phi))$$

$$D(\Delta\phi) \equiv \frac{1}{N_{trigger}} \frac{1}{\epsilon} \int d\Delta\eta N(\Delta\phi, \Delta\eta)$$

- Where $N_{trigger}$ is the number of tracks meeting the trigger requirement and ϵ is the efficiency of reconstruction those particles.

Add Flow to PP Data





- Notice that back-to-back correlations still suppressed in Au-Au
- If Au-Au collisions were a linear superposition of P-P collisions I_{AA} would be unity.

$$I_{AA}(\Delta\phi_1, \Delta\phi_2) = \frac{\int_{\Delta\phi_1}^{\Delta\phi_2} d(\Delta\phi)[D^{AuAu} - B(1 + 2v_2^2 cos(2\Delta\phi))]}{\int_{\Delta\phi_1}^{\Delta\phi_2} d(\Delta\phi) D^{PP}}$$

Summary

- In collisions with low N_{Part} back-to-back correlations exist.
- In central Au-Au collisions back-to-back correlations are strongly suppressed due to interaction with the medium

Back-Up

- Elliptic flow dependence on reaction plane angle

$$dN/d(\phi - \Phi_r) \propto 1 + 2v_2 cos(2(\phi - \Phi_r))$$