Mid-rapidity K_0 and Λ anisotropy parameters from Au+Au collisions at RHIC

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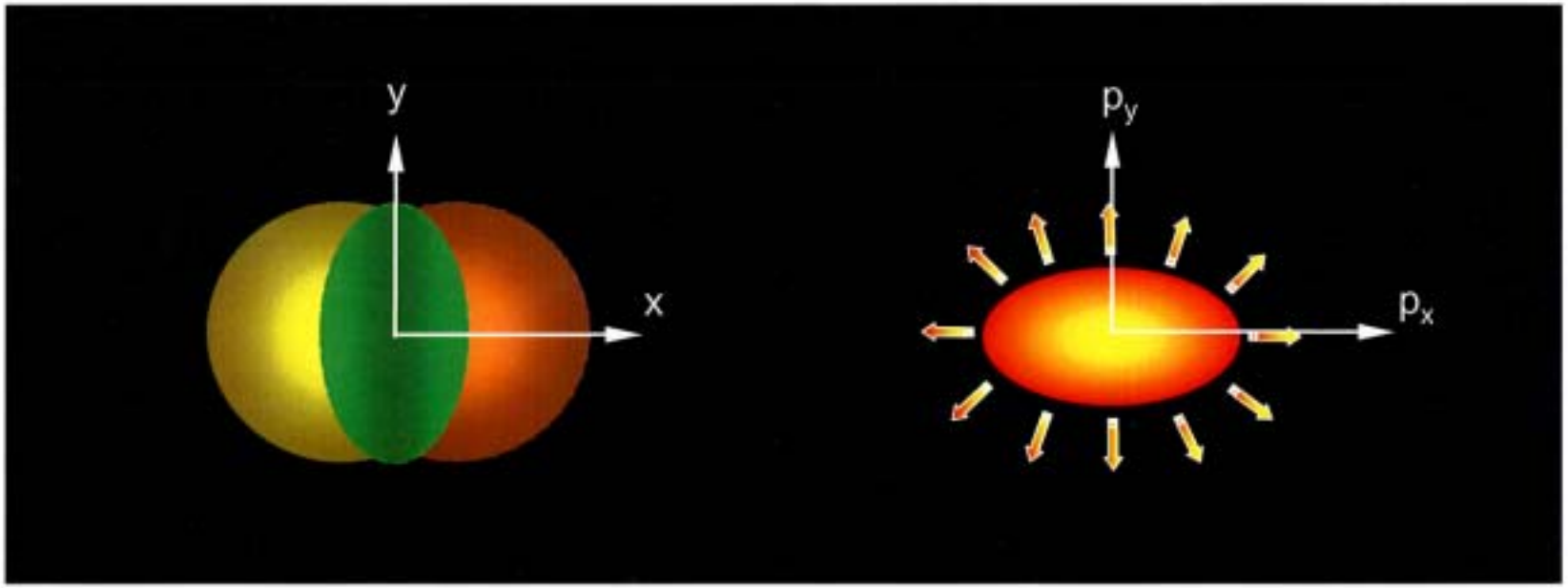
IOPP/LBNL

1. Motivations
2. Theoretical predictions
3. Analysis method
4. Result

Azimuthal anisotropy v_2

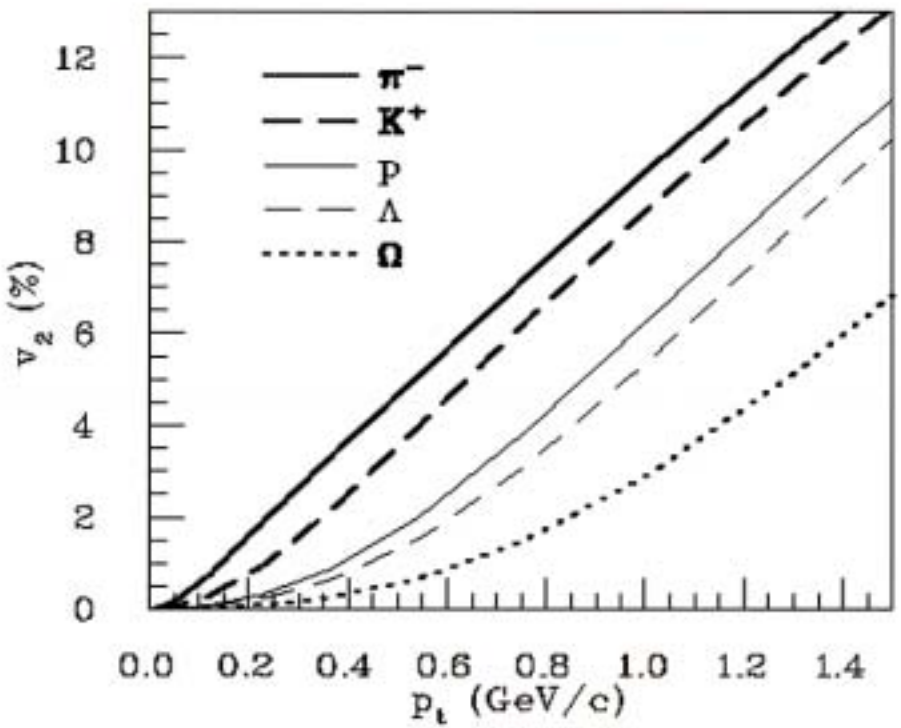
Sensitive to initial/final conditions and equation of state (EOS) !

coordinate-space-anisotropy ⟺ momentum-space-anisotropy



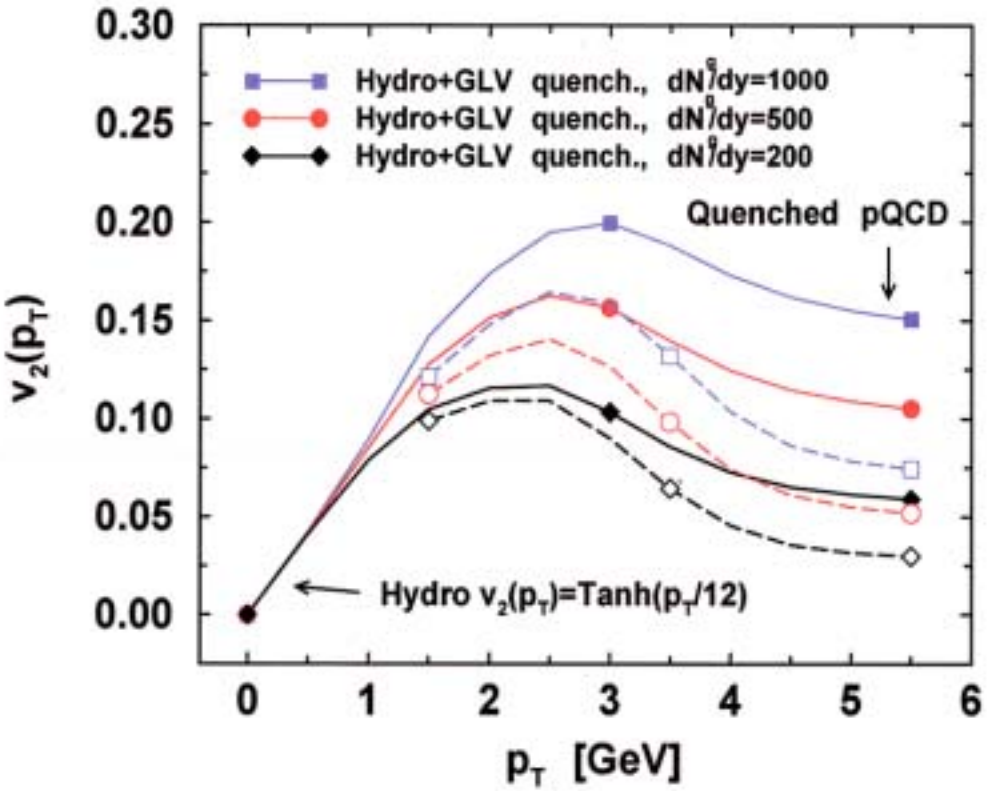
$$\varepsilon = \frac{\langle y^2 - x^2 \rangle}{\langle y^2 + x^2 \rangle} \qquad v_2 = \langle \cos 2\varphi \rangle, \quad \varphi = \tan^{-1}\left(\frac{p_y}{p_x}\right)$$

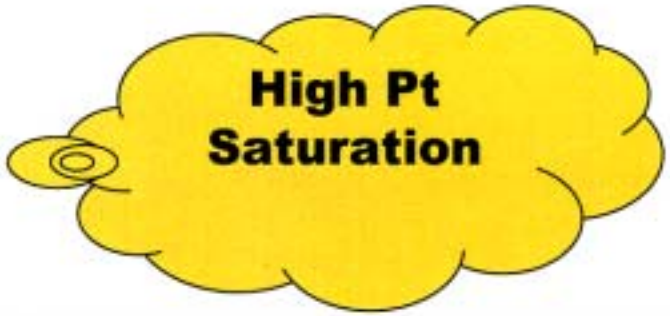
Relativistic Hydrodynamics



P.Huovinen, P.F.Kolb, U.Heinz, P.V.Ruuskanen, S.A.Voloshin Physics Letters B503(2001)58-64

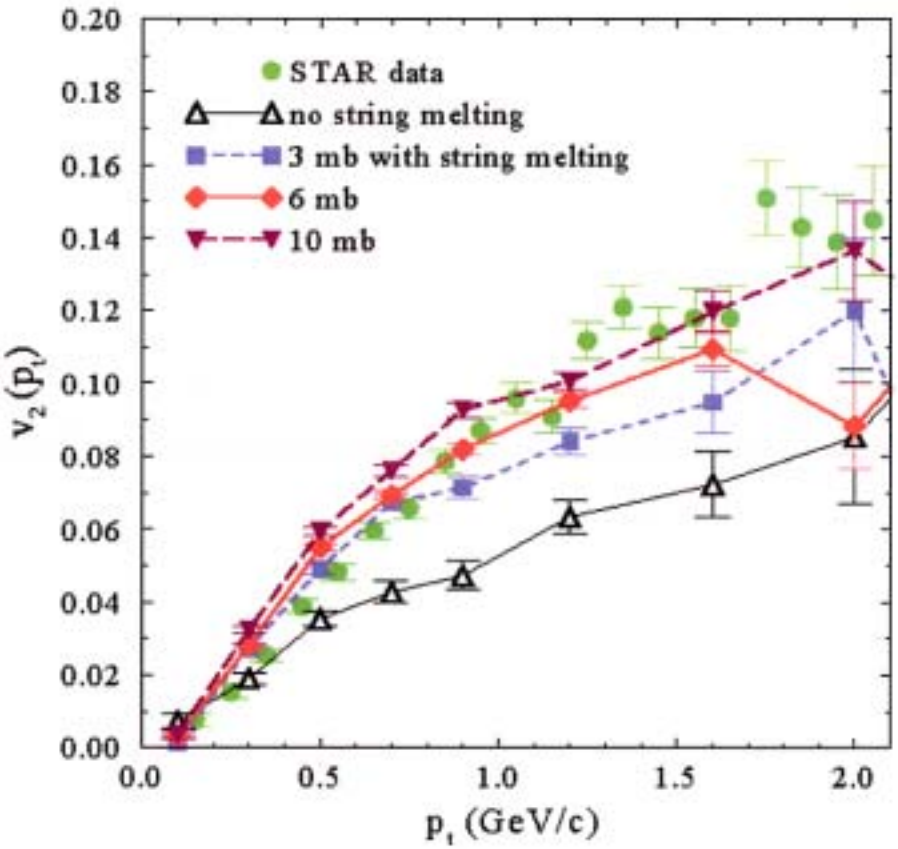
High Pt Azimuthal Asymmetry





M. Gyulassy, I. Vitev and X.N. Wang,
Phys. Rev. Lett. 86, 2537(2001).

Parton cascade & string melting

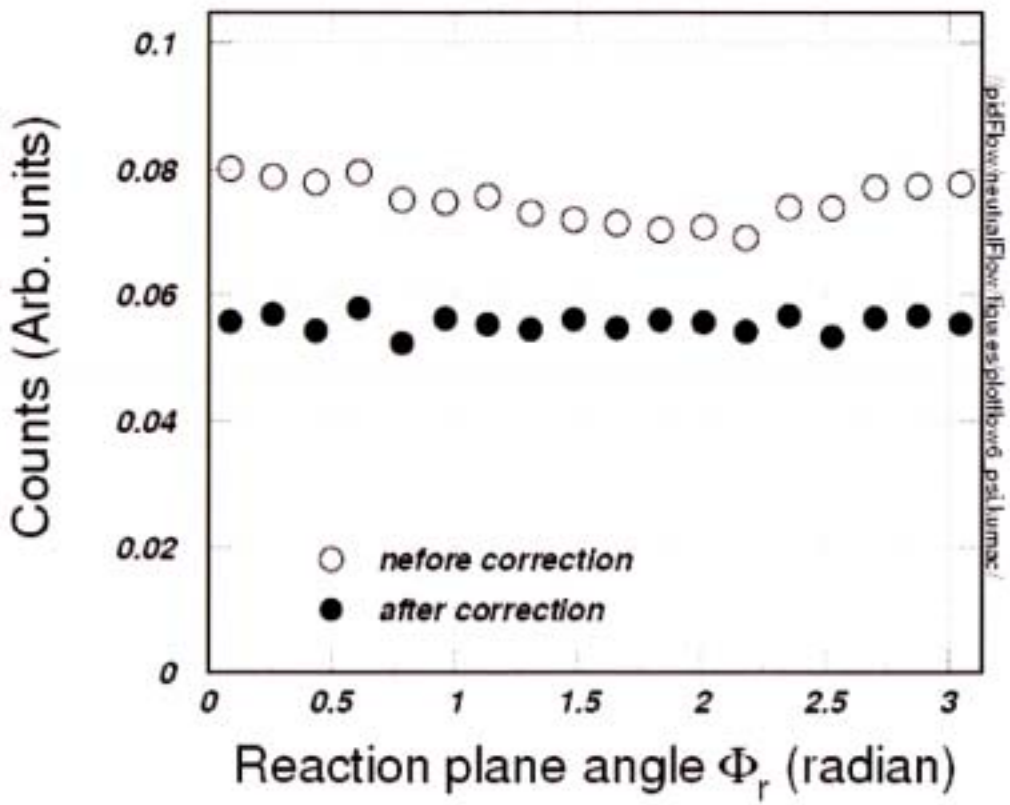


Zi-wei Lin and C.M. Ko,
Phys.Rev. C65(2002), pp034904

Λ and K_s

- Less resonance decay contributions
- Smaller hadronic cross section ---- Sensitive to partonic interaction
- PID up to high pt (~3GeV) (~6GeV)

Reaction Plane Angle Distribution



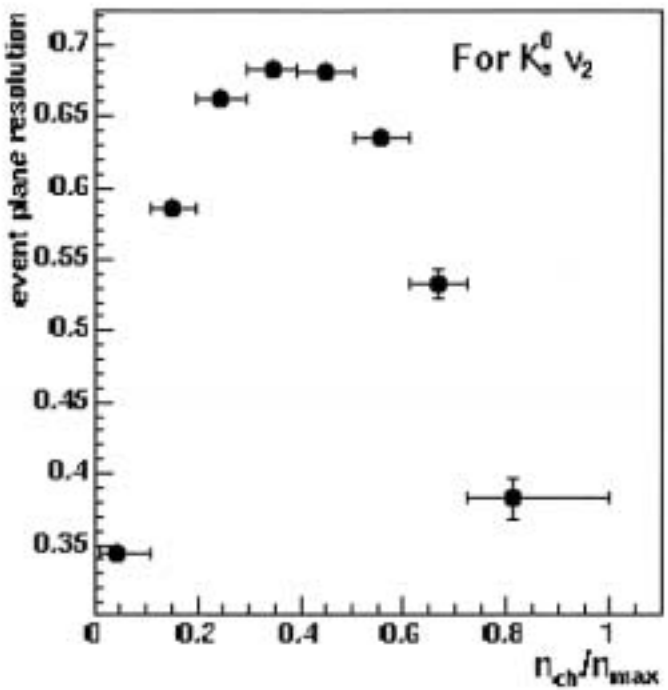
Event and track selection

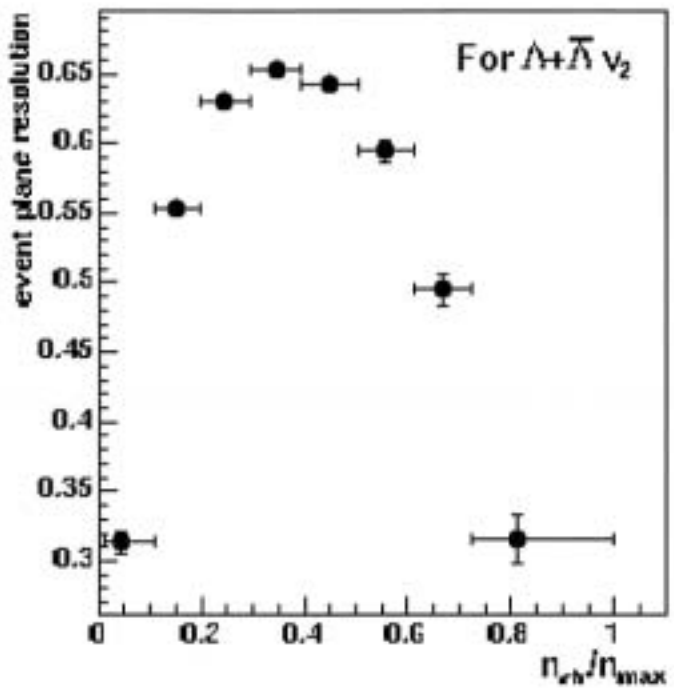
$|V_z|$<75 cm
$0.1<P_t<2$ GeV/c
$|\eta|<1.0$

global dca cut
Ks v2: gDca<1cm
Λ v2: gDca<1cm and no proton like track

201K minbias events

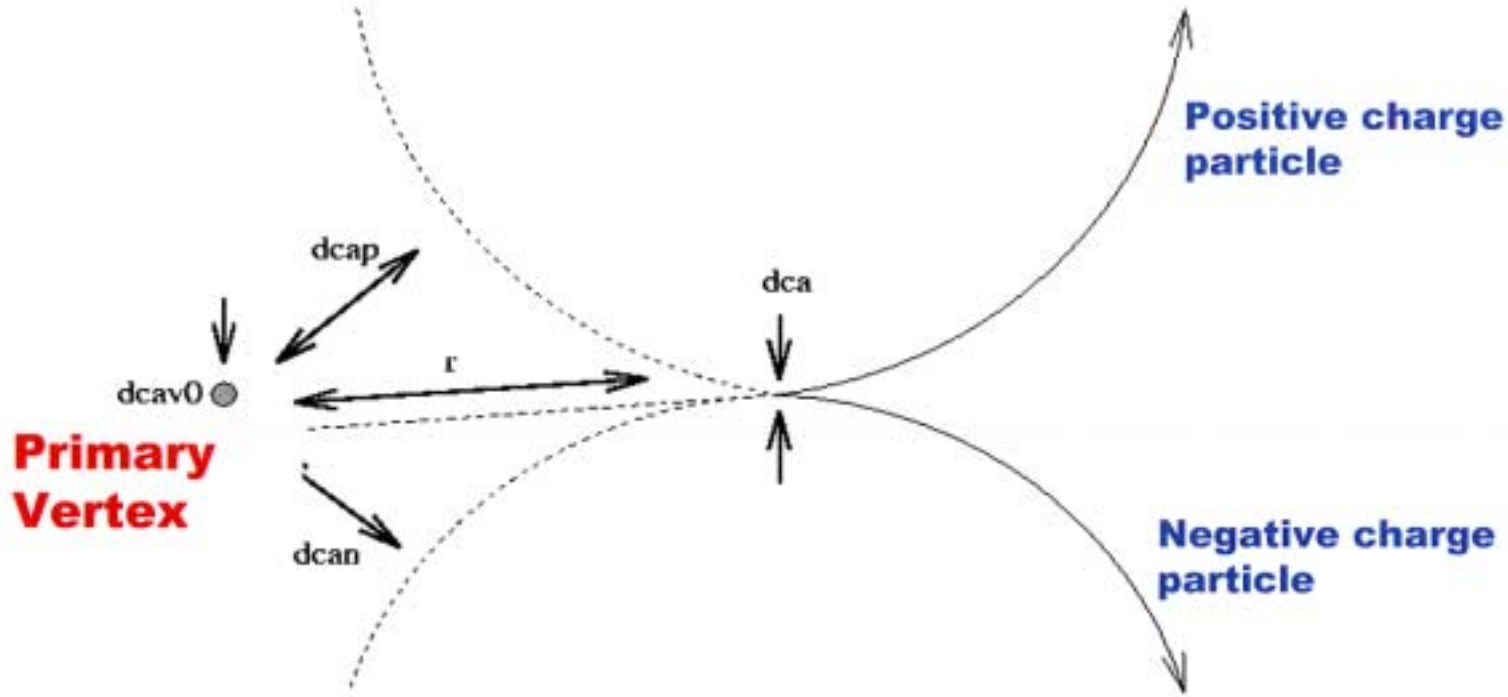
Reaction Plane Resolution





Maximum resolution : 0.68 for Ks v2
0.65 for Lambda v2

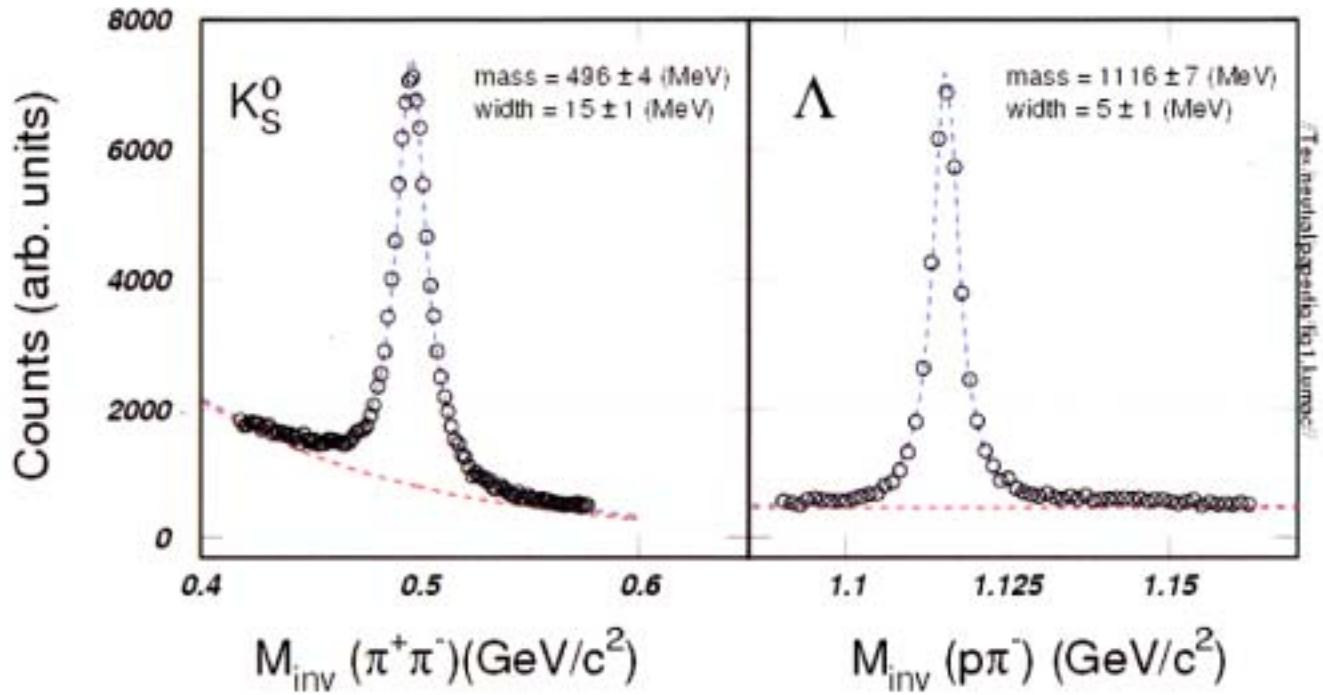
V0 Vertex Reconstruction



$$K_s^0 \rightarrow \pi^+ + \pi^-$$

$$\Lambda(\overline{\Lambda}) \rightarrow P + \pi^-(\overline{P} + \pi^+)$$

K_0 and Λ identifications



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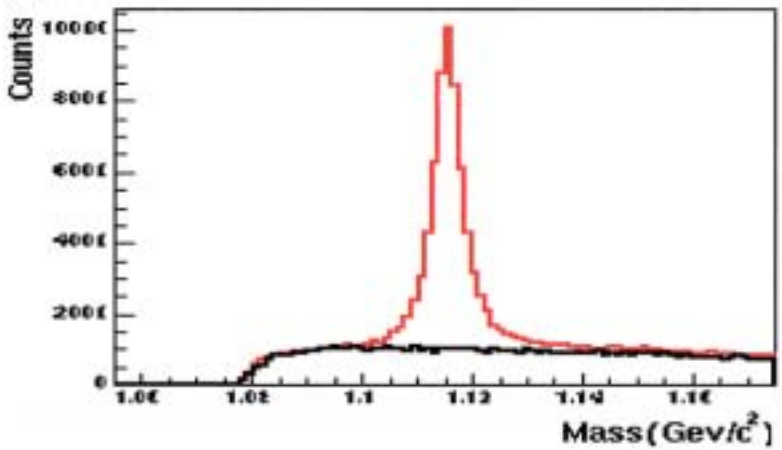
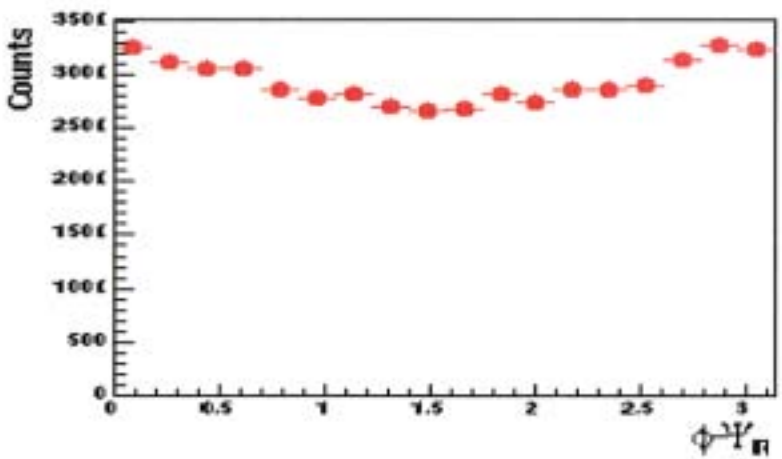
Background subtraction



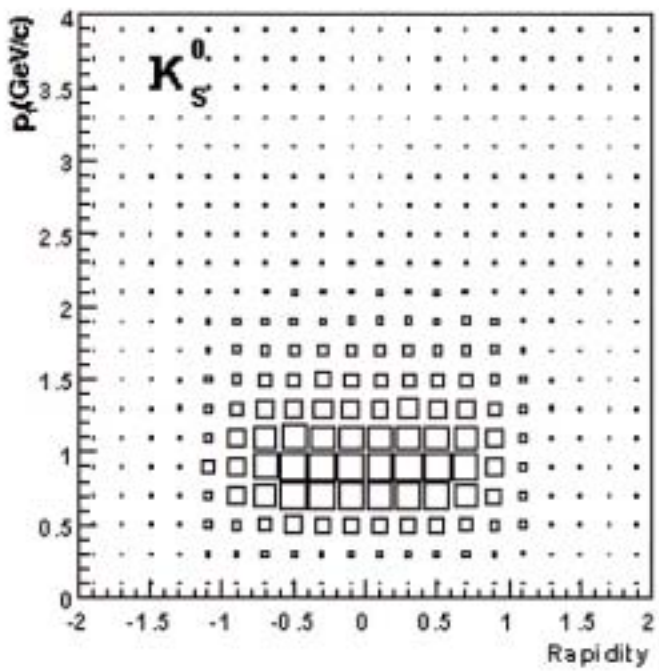


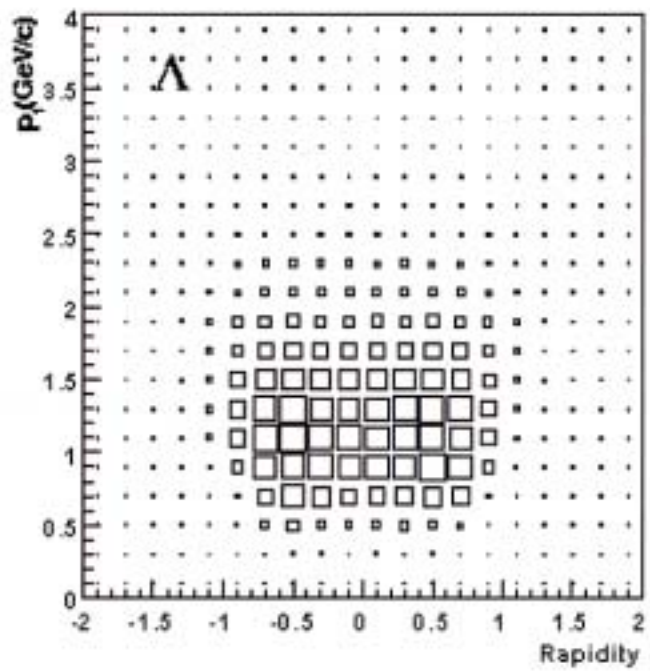
Subtract background in each pt and φ bin

φ distribution after background subtraction

$$V_2 = \langle \cos[2(\phi - \Psi_R)] \rangle$$

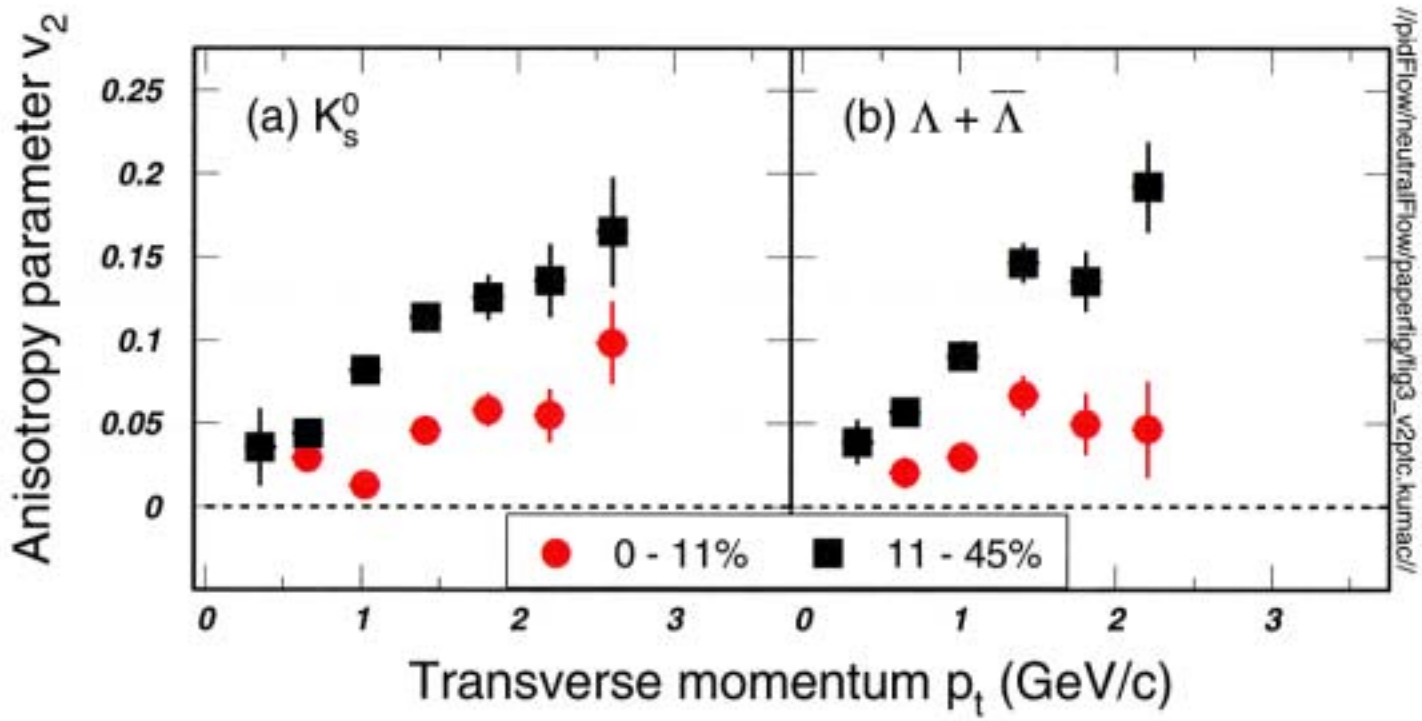
Phase Space Coverage





-1<y<1 and 0.2<Pt<2GeV/c

Centrality dependence of $v_2(p_T)$ at 130GeV



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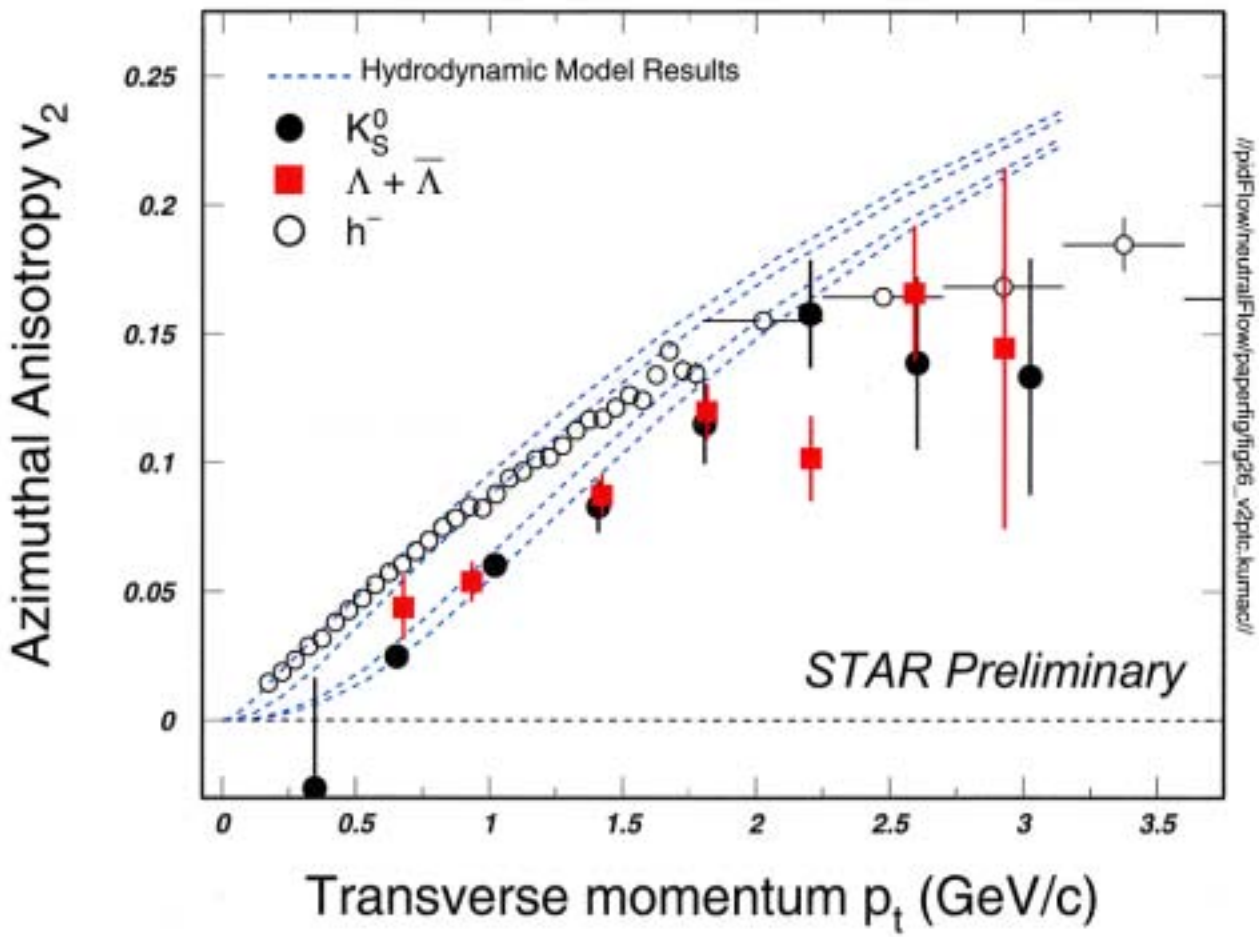
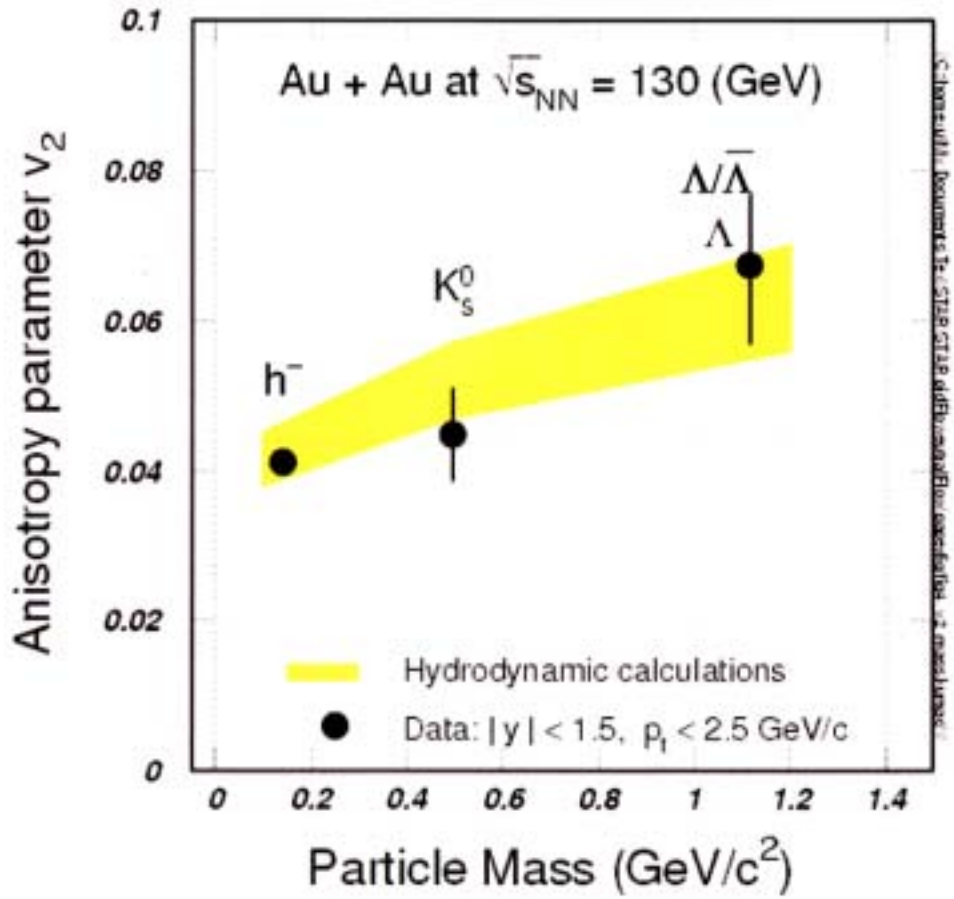
V_2 (p_T,m) for Λ and K^0_S at 130GeV



Azimuthal anisotropy of K_0, Λ



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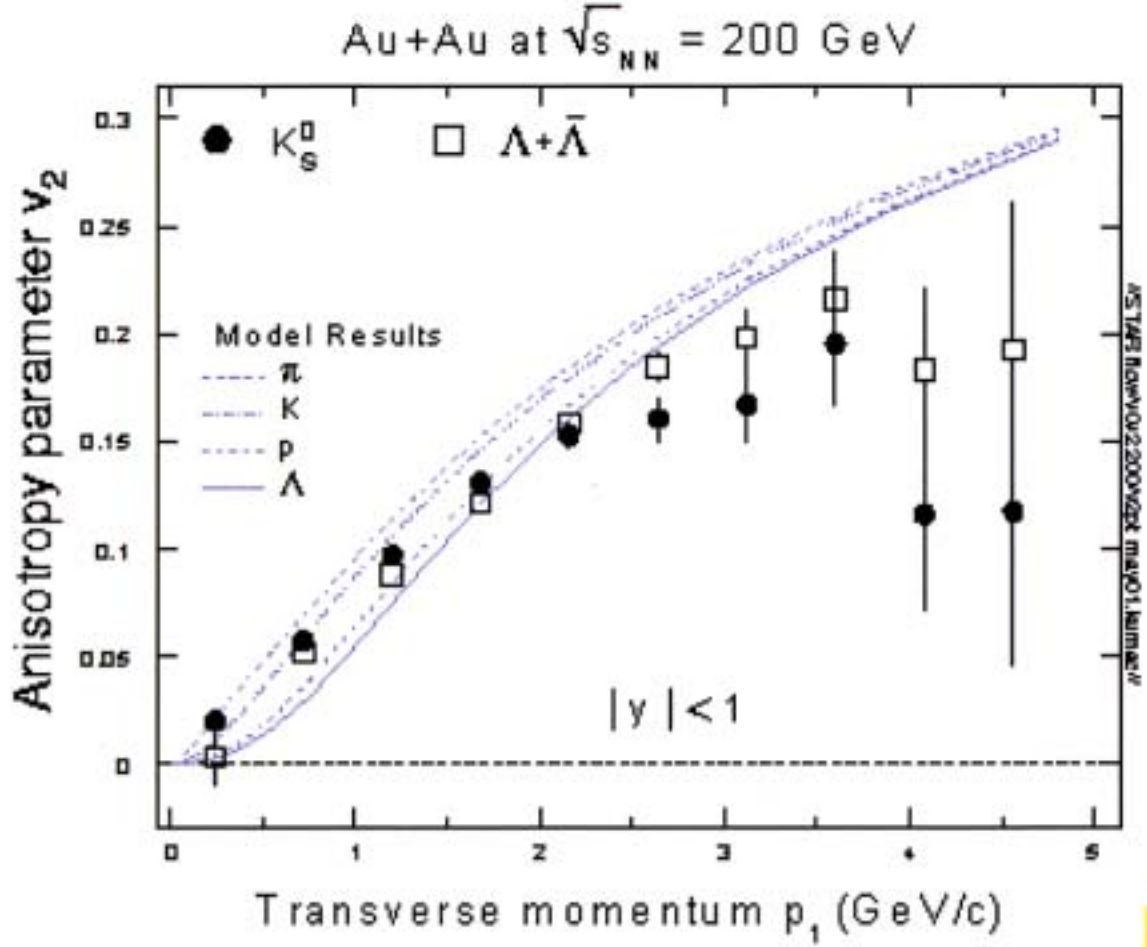
Summary

1) Event anisotropy v_2 of K_0 and Λ increase as a function of transverse momentum within $P_T \leq 1.5$GeV/c and seem to be saturating at higher momentum

2) Stronger Pt dependence is observed in more peripheral collisions

3) The integrated values of V_2 show a mass dependence, hydrodynamic model results are not inconsistent with our measurement

V_2 (p_T,m) from Minbias Events



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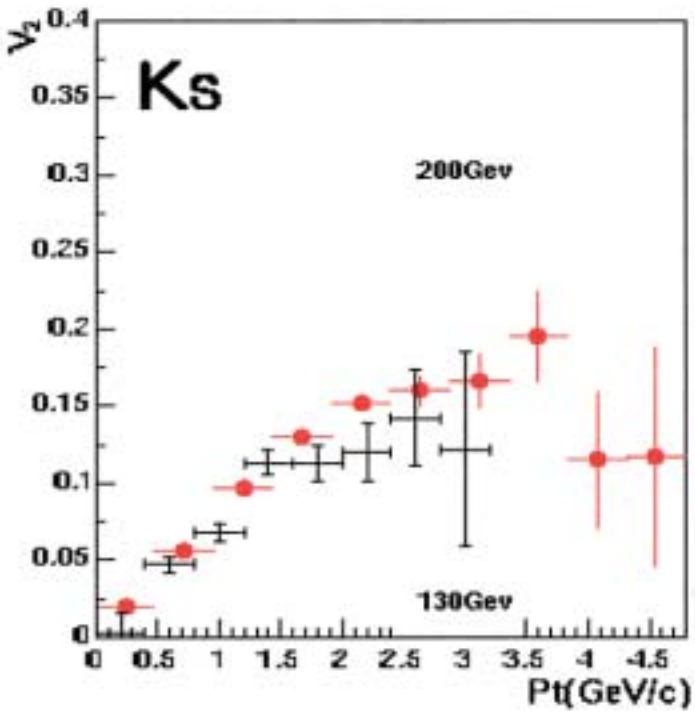
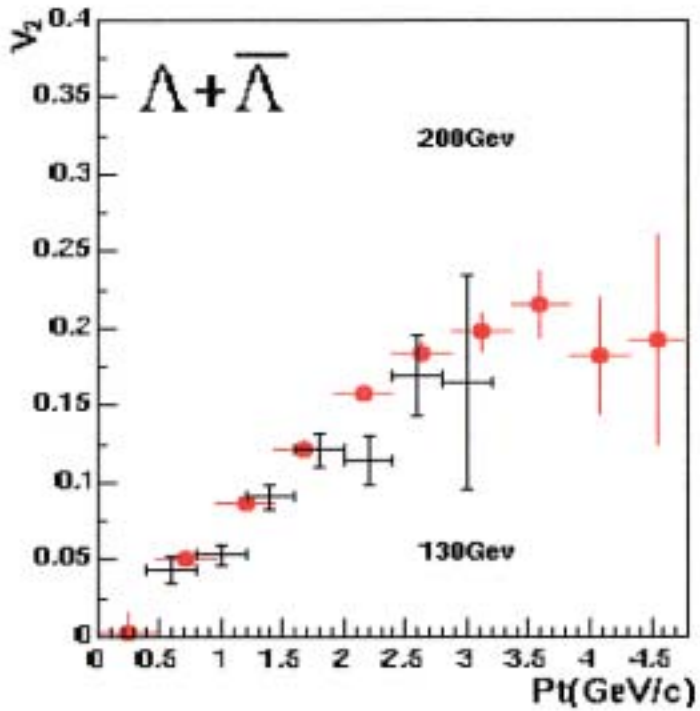
V_2(Pt) from 200Gev & 130Gev





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