Particle Ratios in $\sqrt{S_{NN}} = 130 GeV$ Au–Au Collisions

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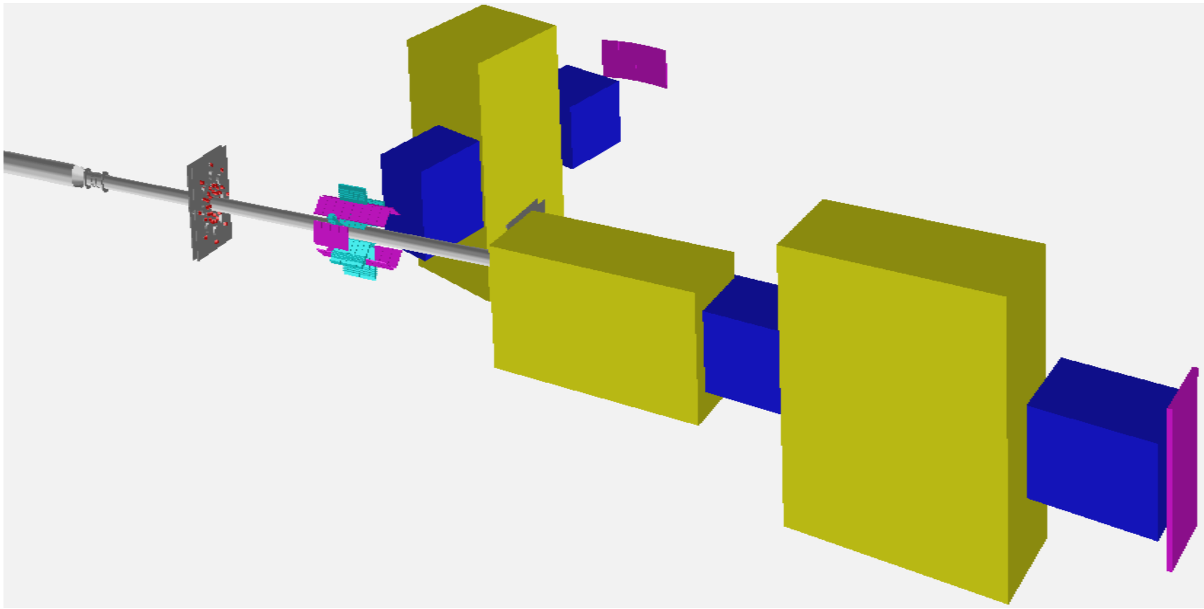
The BRAHMSpectrometers



Two Spectrometers:
Mid–Rapidity Spectrometer MRS(30^o–105^o)
Front–Forward Spectrometer FFS(2.5^o–30^o)
Global Detectors:
Beam–Beam, Scintillator Tile Array,
Silicon Multiplicity Array, ZDC

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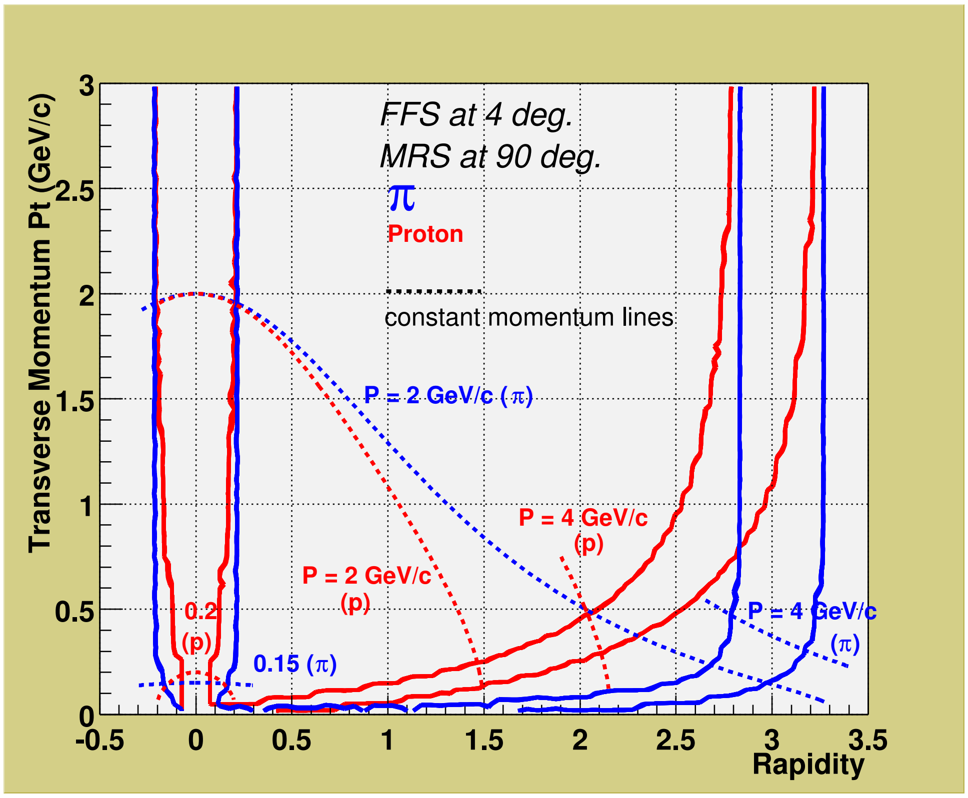
The BRAHMS Acceptance

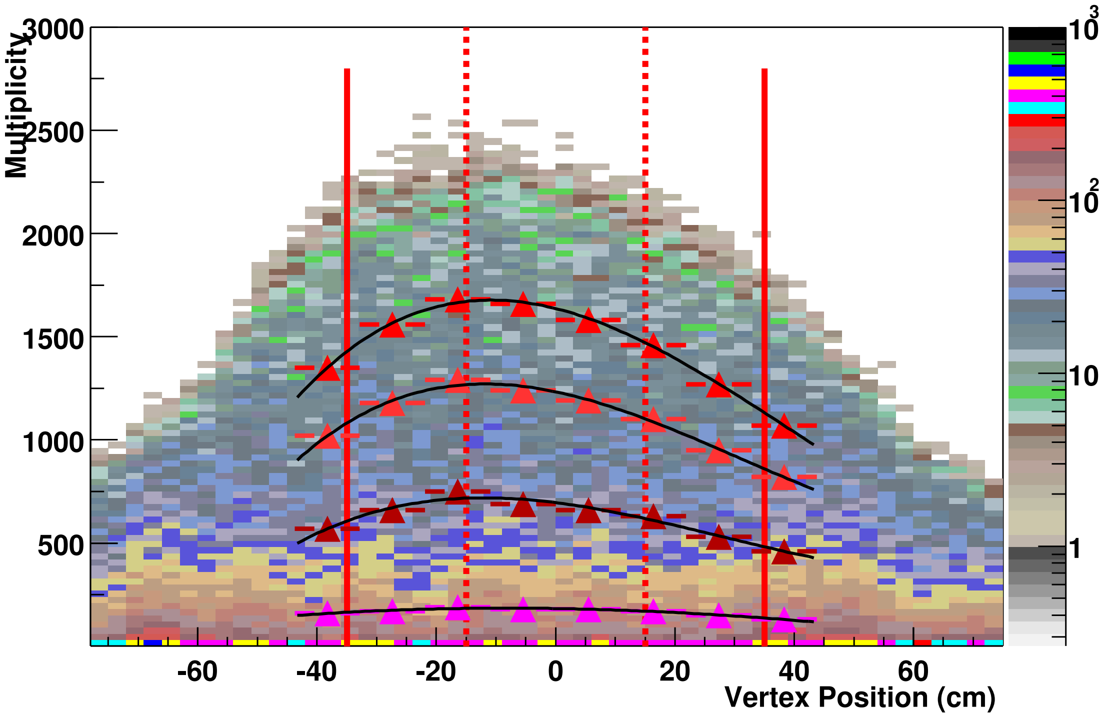
With the Forward spectrometer at 4^o, and the MRS at 90^o, the acceptance for pions and protons is:



dashed lines give momentum range for identified particles.

Centrality Determination

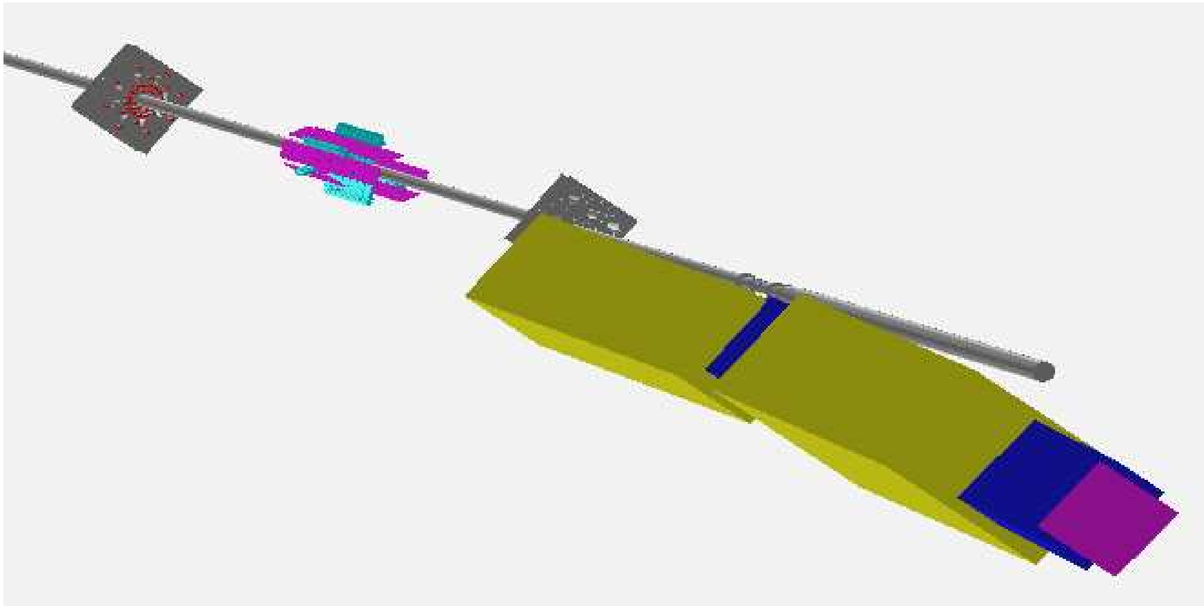
We impose vertex dependent centrality cuts, as shown:



(*cf* poster by Hiro Ito)

Particle ID in the Forward Spectrometer

depends critically upon Vertex determination (*cf* poster by Bjørn Samset)



In the present data, we have restricted the vertex to $V_{nominal} \pm 35cm$, as determined by Beam-Beam counters.
The resolution is $\sigma_{VertexZ} \approx 2.5cm$, corresponding to $\sigma_{time} \approx 80ps$.

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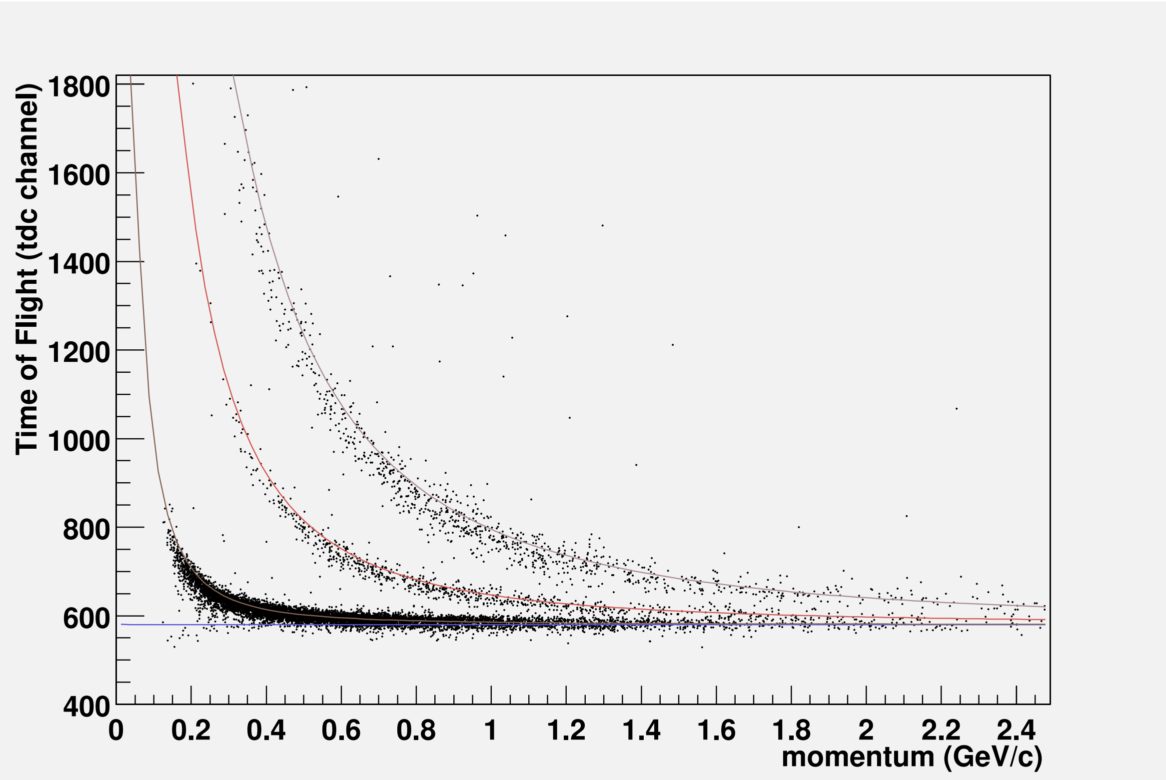
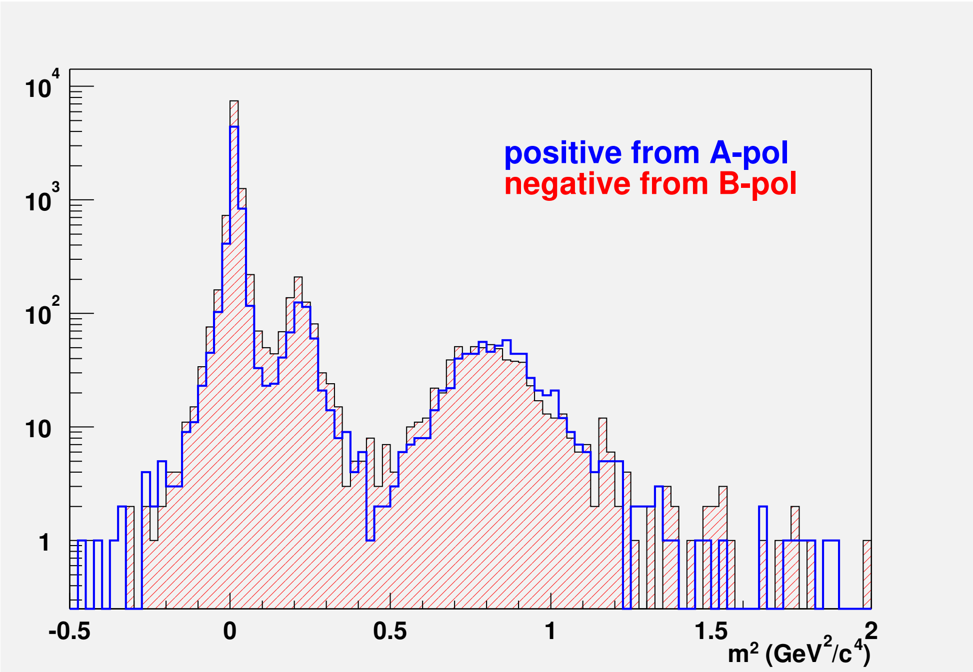
Particle ID:Mid Rapidity Spectrometer

is accomplished via Time of Flight (TOF). The data presented here were taken with the MRS at 90^o, where $p \approx p_t$.

See poster by J.H.Lee



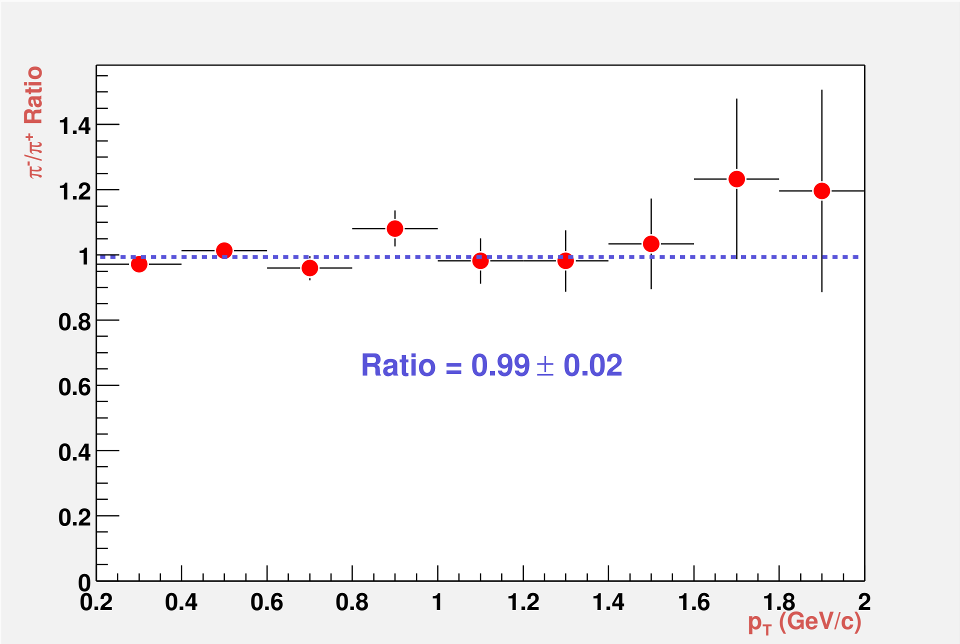
Particle ID:Mass^2 in MRS



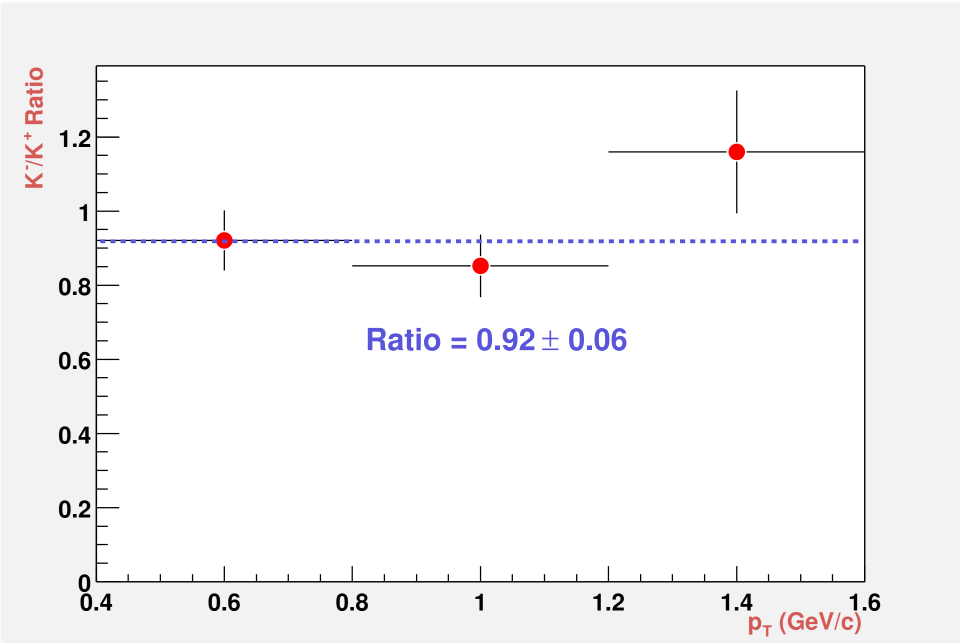
Results: Mid Rapidity Spectrometer

Particle ratios vs. transverse momentum

π^-/π^+



K^-/K^+



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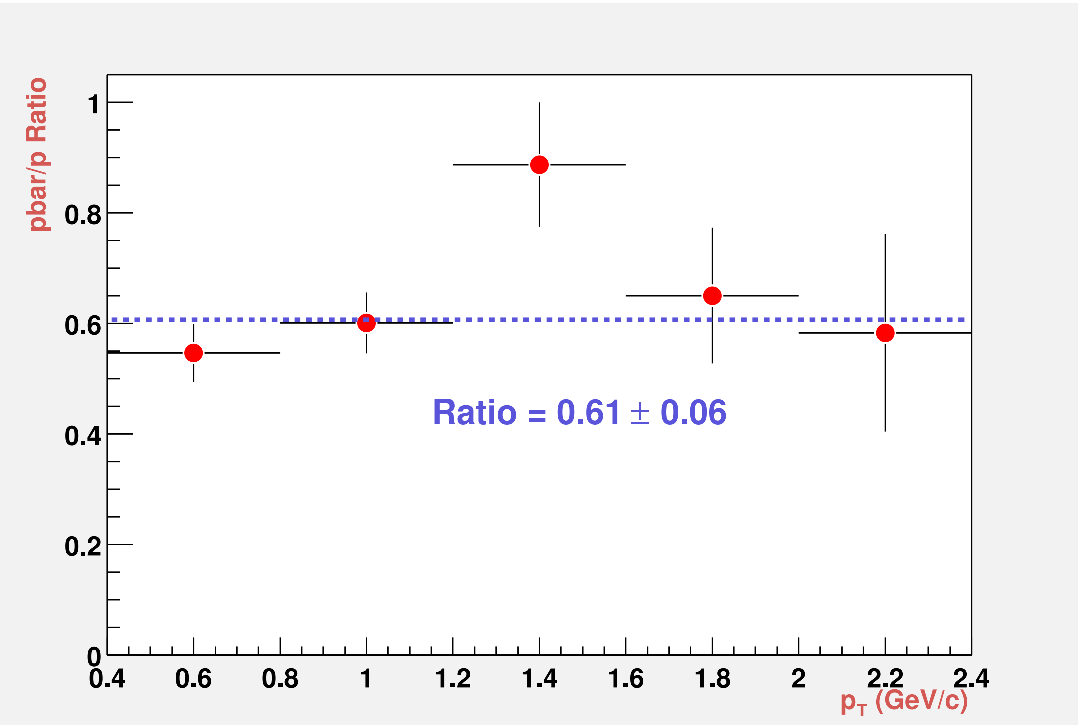
Results:Mid Rapidity Spectrometer

$\bar{p}/p$ ratio vs. transverse momentum



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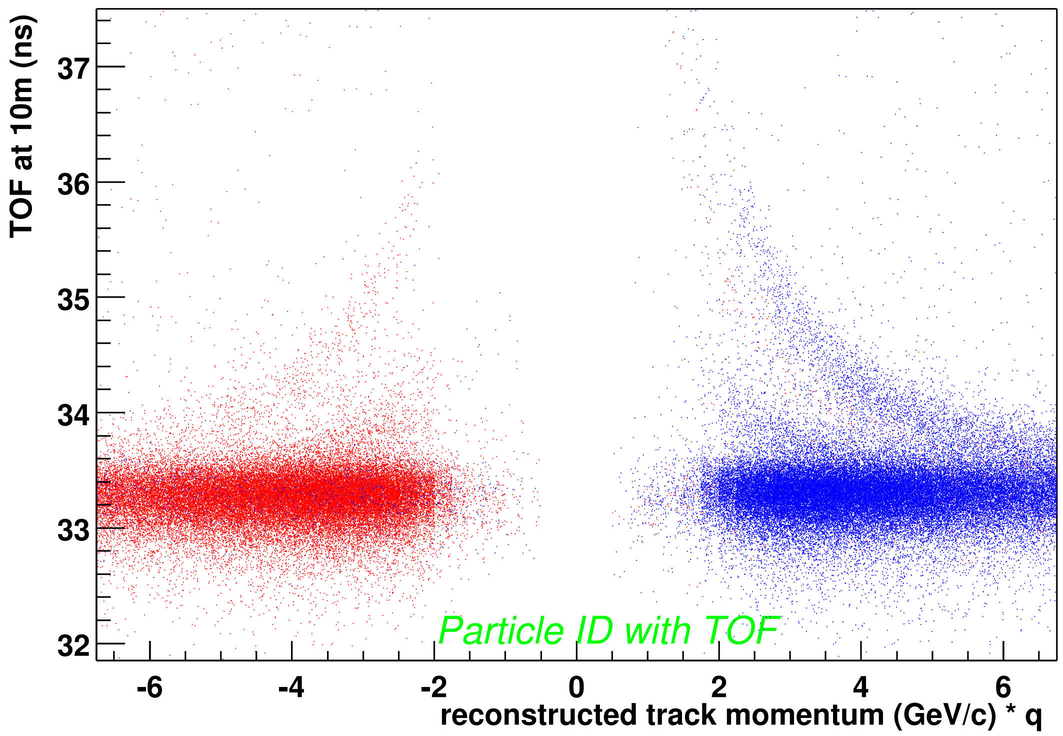
Particle ID in the Forward Spectrometer

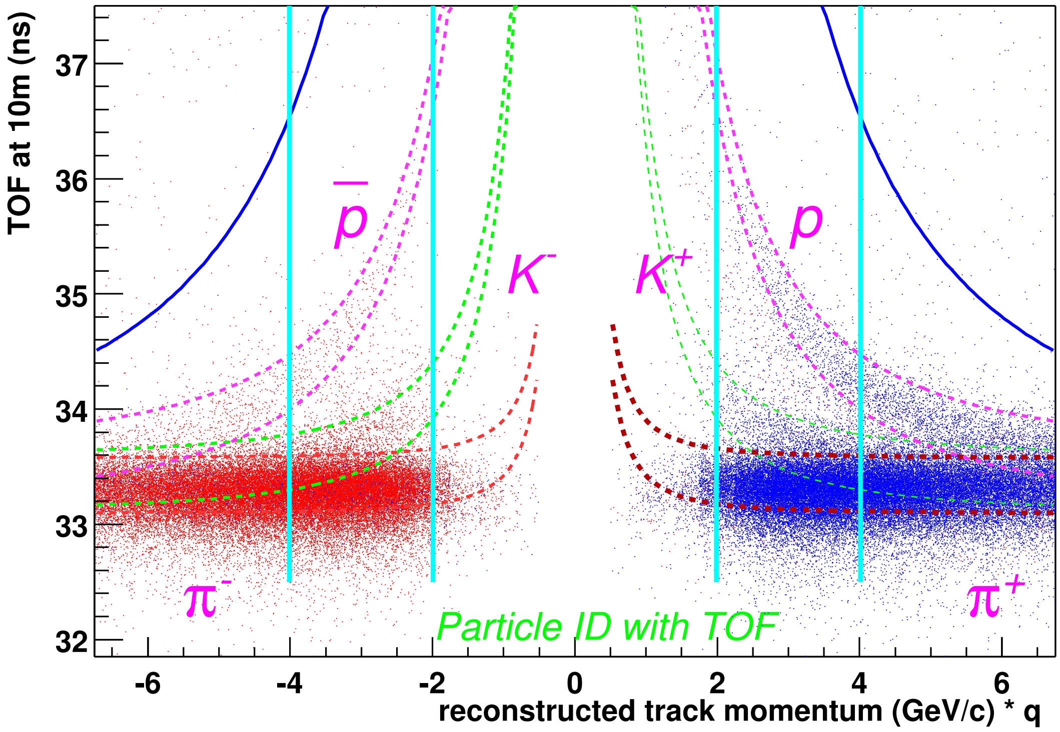
Due to the moving vertex, we measure
$velocity = \frac{PathLength}{TimeofFlight}$
and find $TOF(10m) = \frac{10m}{velocity}$
All data, from **Positive** and **Negative** runs:



Particle ID in the Forward Spectrometer

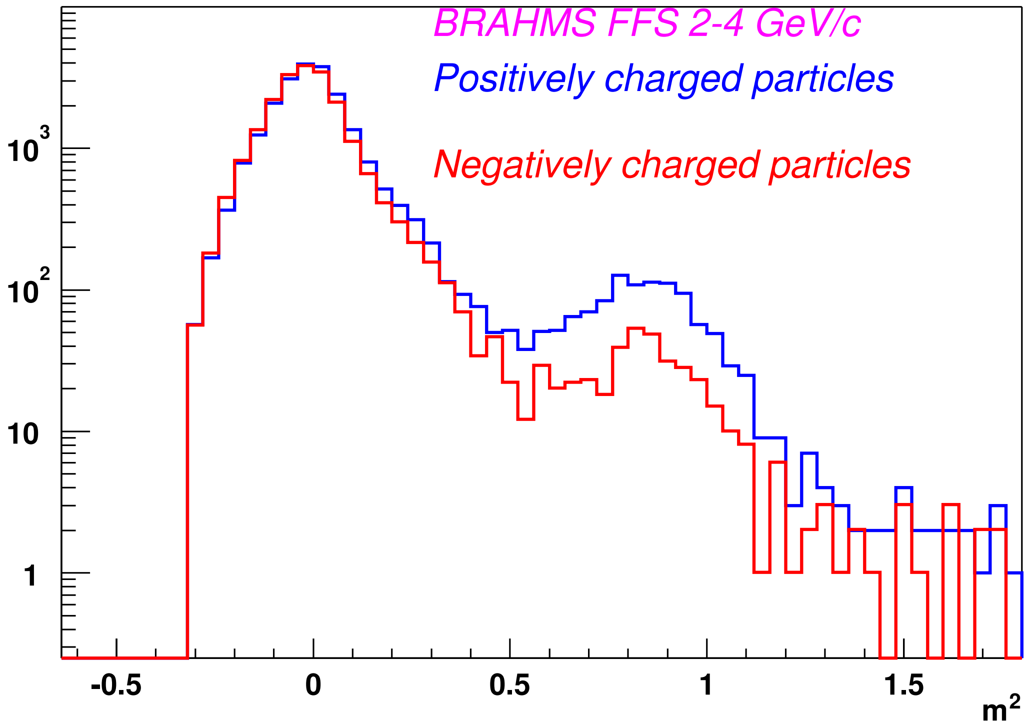
Particles are selected on the basis of time of flight. We require the measured particle within $\pm 2\sigma_{TOF}$ (dashed lines) of expected TOF. The present analysis includes only particles in the range

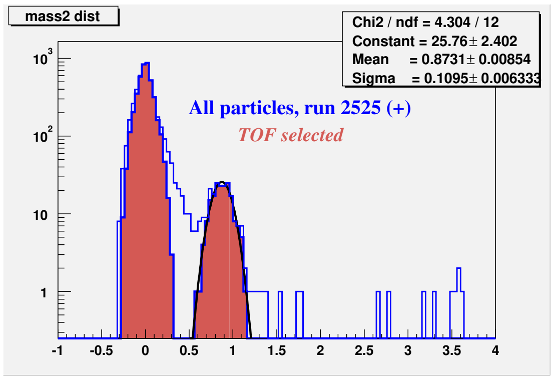
2GeV/c $\leq$ momentum $\leq$ 4GeV/c.

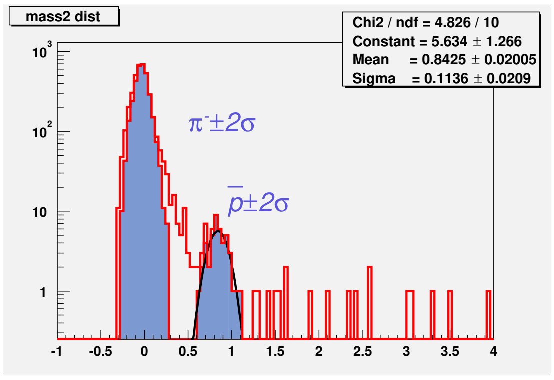


BRAHMS FFS PID

Mass squared spectrum measured in the FFS spectrometer. The background under $\bar{p}$ and p peaks is estimated to be $< 5\%$.

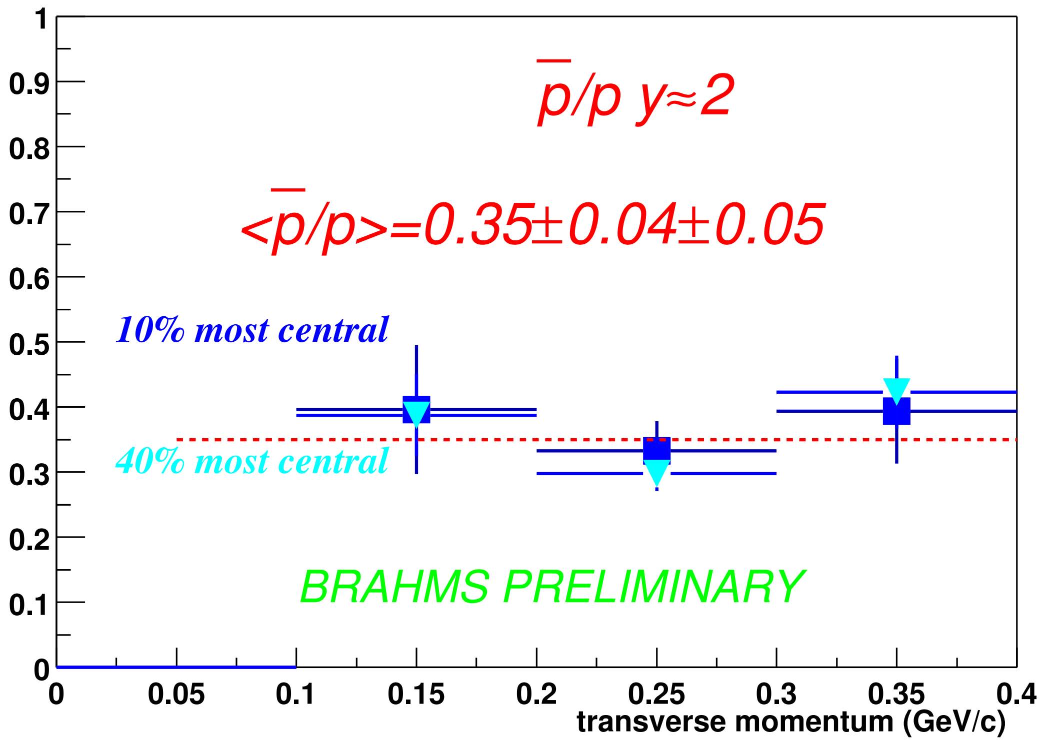






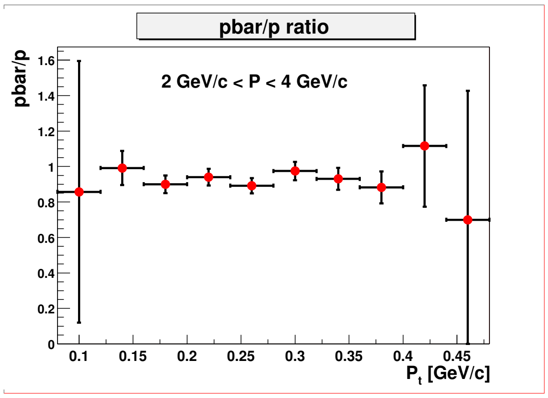
Positively charged particles Negatively charged particles

BRAHMS Forward rapidity $\bar{p}$ to p ratio:



$\bar{p}/p$ ratio for 10% most central
$0.35 \pm 0.04 \pm 0.05$

Geant simulations show that acceptance for $\bar{p}$ is identical to that for p:



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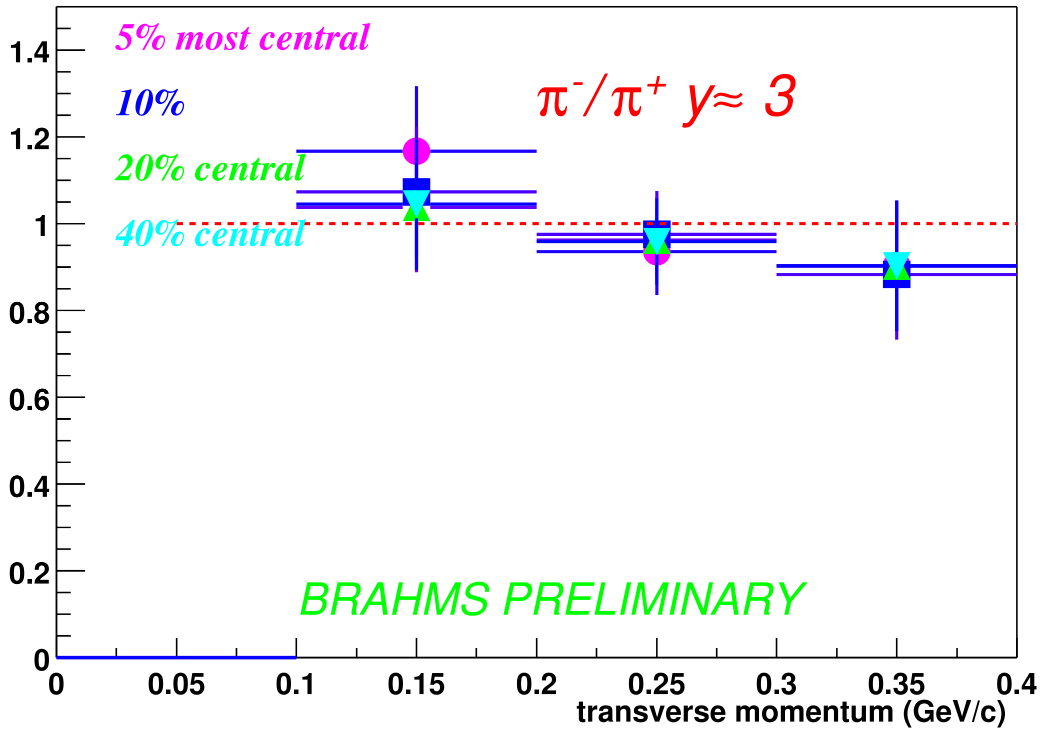
BRAHMS Forward rapidity results:

π^- to pi^+ ratio, from 2-4GeV/c. π–K separation up to 2.5 GeV/c, so for larger values of p (and thus higher p_t) the K contribution is large.



No observed dependence on centrality.

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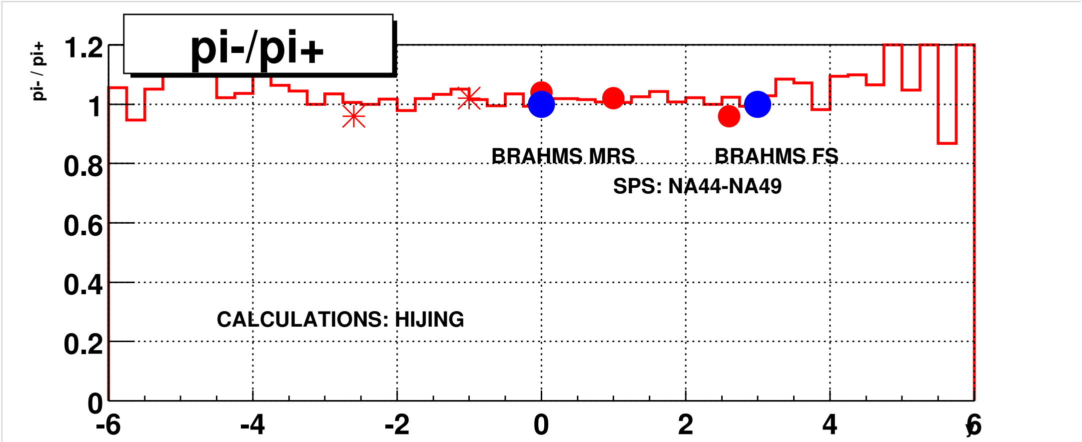
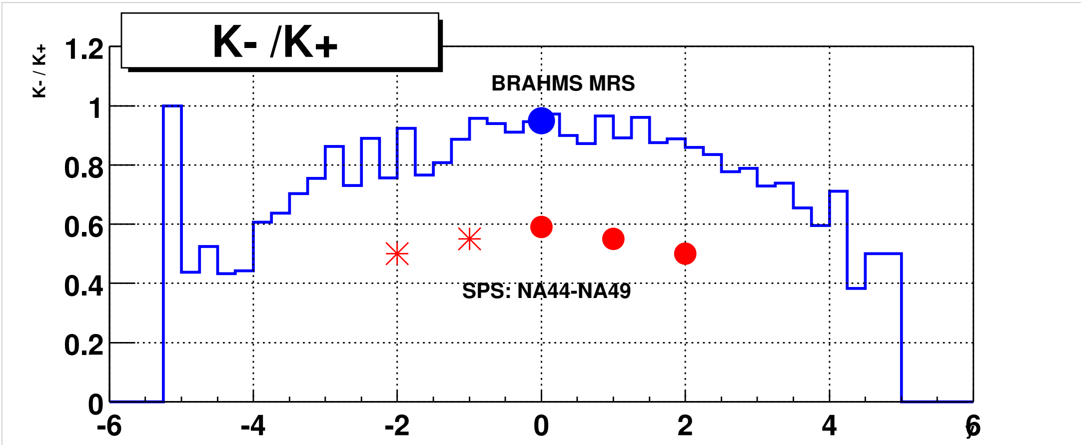
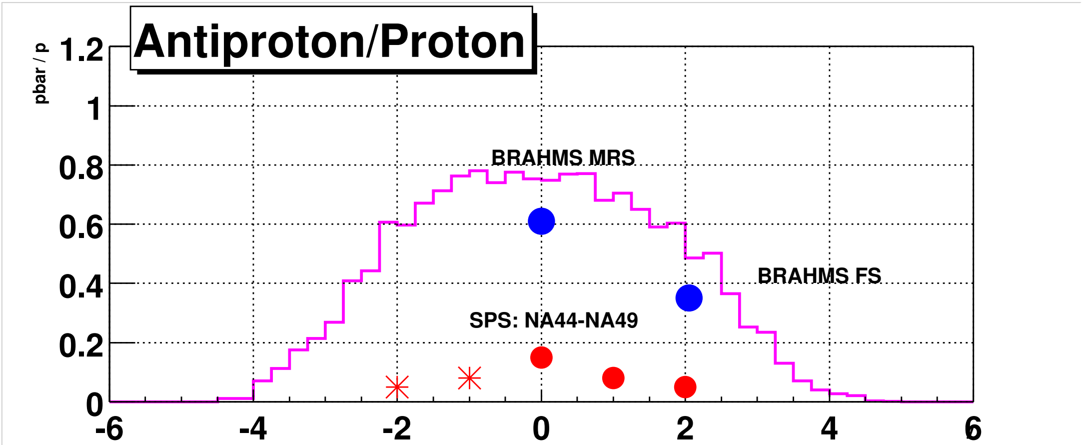


π^-/π^+ versus rapidity



K^-/K^+ versus rapidity



$\bar{p}/p$ versus rapidity

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Summary:

- Ratios not dependent upon p_t
- π and K ratios reproduced by HIJING
- $\bar{p}/p$ below HIJING prediction
- $\bar{p}/p$ well above SPS results
- $\bar{p}/p$ no centrality dependence

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Overview