RHIC Spin ~ Brahms

F. Videbaek

RHIC Spin Collaboration Meeting
October 1, 2001
RIKEN BNL Research Center, Brookhaven National Laboratory

RHIC SPIN
Brahms
presented by F.Videbaek

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Earlier discussions

•FV "RHIC spin physics, Apr 27-29,98, Riken Vol 7

•A.Bravar "Future transversity measurements"

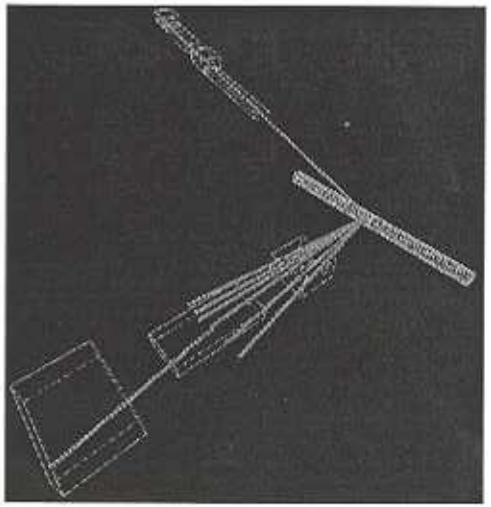
Transverse Asymmetries

Experimental issues

Acceptances

Rates

Resources.



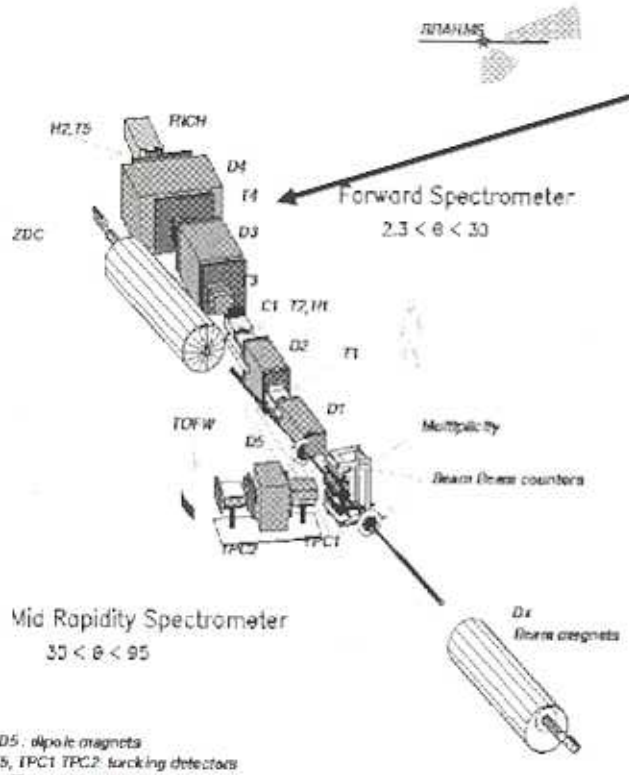
pp Running in Run-2

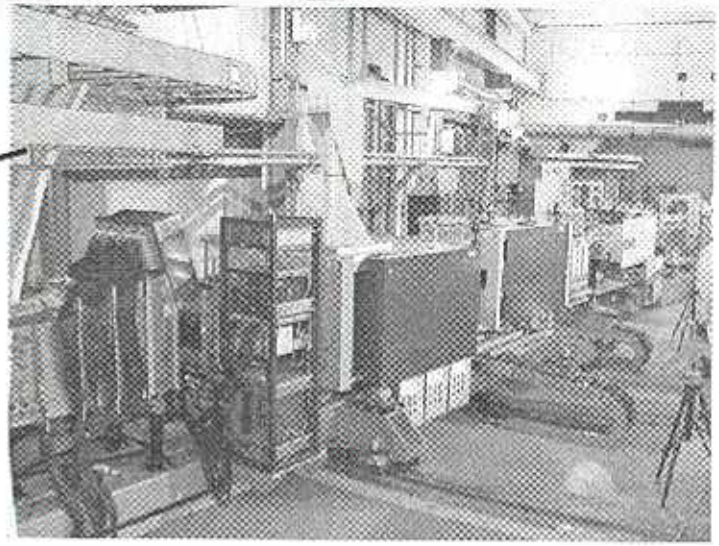
- Commissioning of detector system
  - Comparison to pp as a reference for AA will be useful.
  - Implement the common in-elasticity detectors shared with pp2pp.
  - Spectrometers need time-start counter for spectrometers for TOF PID. Resource limited for implementing this, but could be achieved for FS, certainly not for MRS.
- Exploring possibilities for a spin program (high x_F, transverse polarization) for transversity measurements with the RHIC spin group. This could be initiated in Run-2 with the one week of ~ 1.5 pb^{-1},but will require a longer period for high statistics later.

Transverse asymmetries

- Inclusive meson measurements mainly at large xF (.3-.7) and small pt (1-4 GeV/c)
- Most existing data at lower energy.
- A_{nn} = N(++)-N(+-)/(N(++)-N(--))
- A_{nn} (pi+) >0 (pi-)< 0, ~5-20% depending pt, xf.
- A pi- measurements will complement the STAR pi0 measurement. In fact important to map out pi0/ pi- for range of xF, pt – not a single shot measurement.
- Theoretical understanding has emerged.

Perspective View of BRAHMS Spectrometer



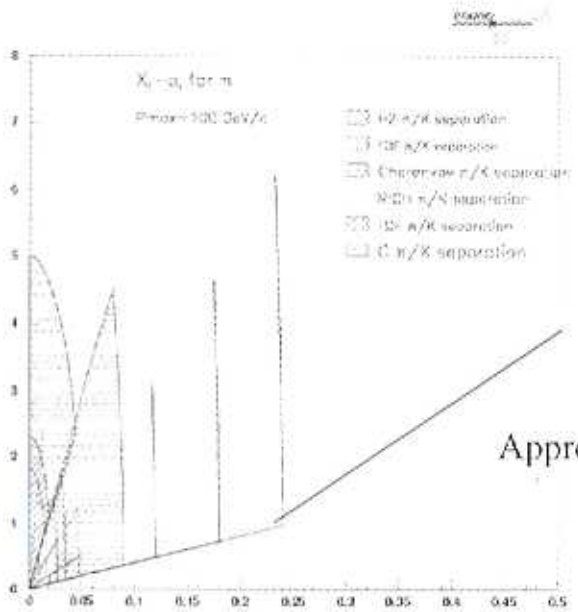


Experimental issues

- Coverage xF-Pt
- Solid angle, rates
  - BFS ~ .6 msr; P-theta acceptance.
  - At xf~.25 pt~1
- DAQ is event driven
  - Effective data-rate will depend on trigger setup (using sets of hodo-scope in FS
  - Background issues (already present in AA)
  - ~500/sec with DC, RICH,Hodoscopes and no TPCs.
- Polarization counting, scalers,...

Acceptance & rate

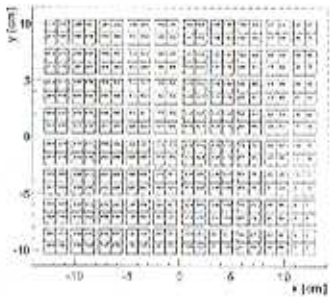
- The acceptance is comes from the lowest angle at 2.3 degrees, and at xf~.25 the pt is ~ 1.0 GeV/c
- At higher Xf the pt gets relative higher since the magnets is at fixed field.
- At the lum of ~5% the rate at xf~.20 is 1-2 pion per sec. At xf~.5 it is lower by at least 1/1000.

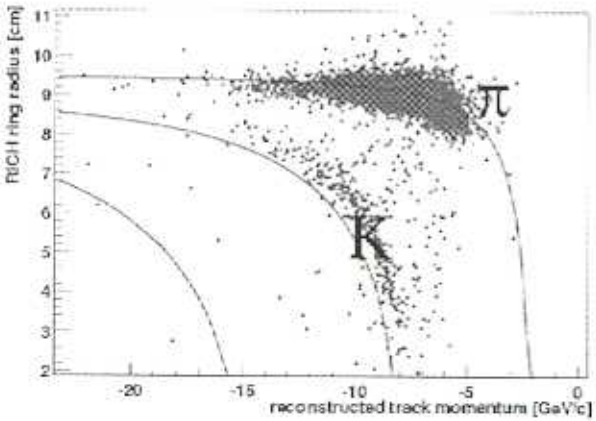


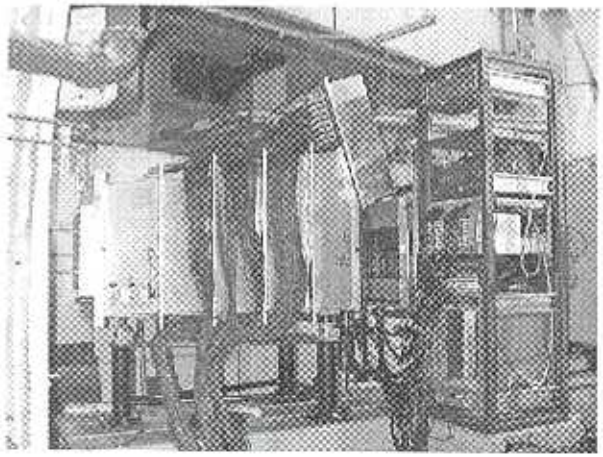
Approximate limit

Particle Identification in current setup

- The High momentum PID is exclusively from the RICH situated at ~20 m.
- C_4F_{10}-C_5F_{12} mixture at 1-1.25 atm.
- Could be replaced in future runs with different gas for lower index, that could give pi/K/p sep at higher p.
- Designed for few tracks. 2*2 segmented focal plane.
- 150cm Focal length
- - Entrance window ~ 45*35 cm at 20m







Issues for pp running

- Implement the polarization counting (scalers, bunch information)
- Setup of triggering.
- Determine optimum angles, field setting for short run
- Add FS hodoscope (both tof+triggering)
- Include pp2pp (inelasticity counters in setup)
- Resources for, preparing setup, running exp and analyzing data.
- Aim if sufficient interest to have a feasibility run, and first look at data in the ~ 1 wk of transverse polarization.