

RHIC SPIN

Brahms

presented by F. Videbaek

RHIC SPIN meeting

October 1, 2001

Earlier discussions

- FV "RHIC spin physics, Apr 27-29,98, Riken Vol 7
- A.Bravar "Future transversity measurements"

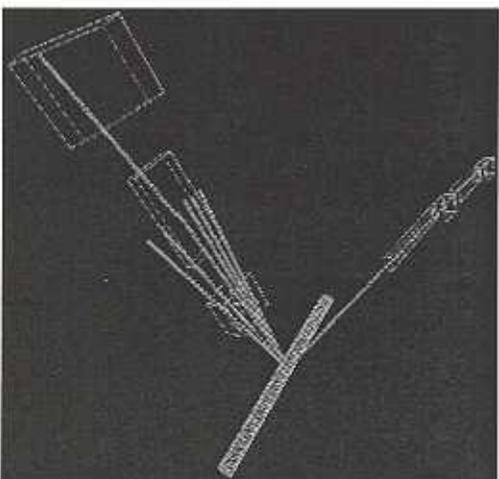
Transverse Asymmetries

Experimental issues

Acceptances

Rates

Resources.



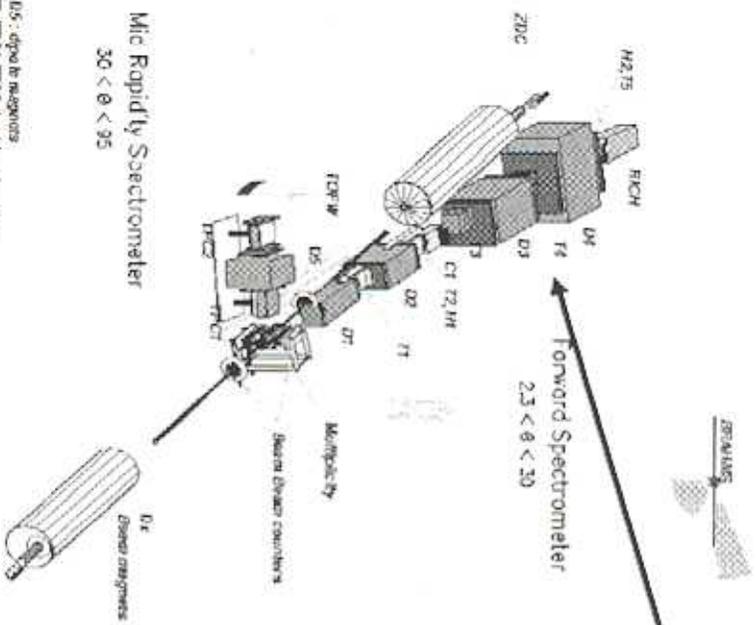
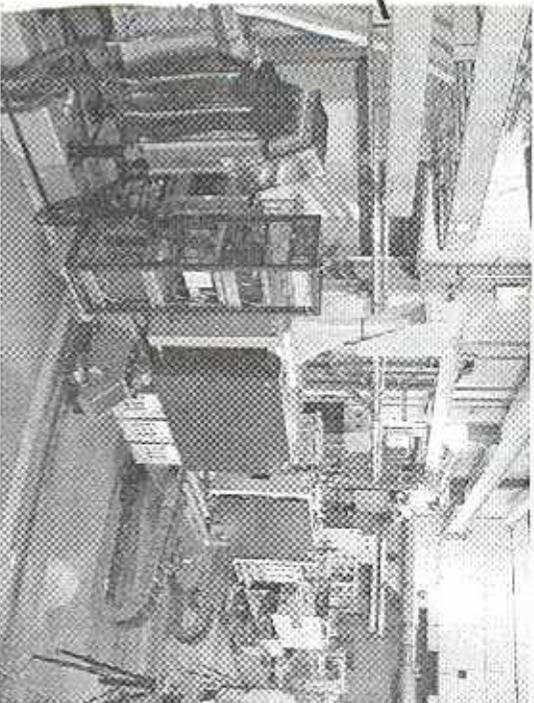
pp Running in Run-2

- 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 $\sim 1.5 \text{ pb}^{-1}$, but will require a longer period for high statistics later.

Transverse asymmetries

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

Perspective View of BRAHMMS Spectrometer



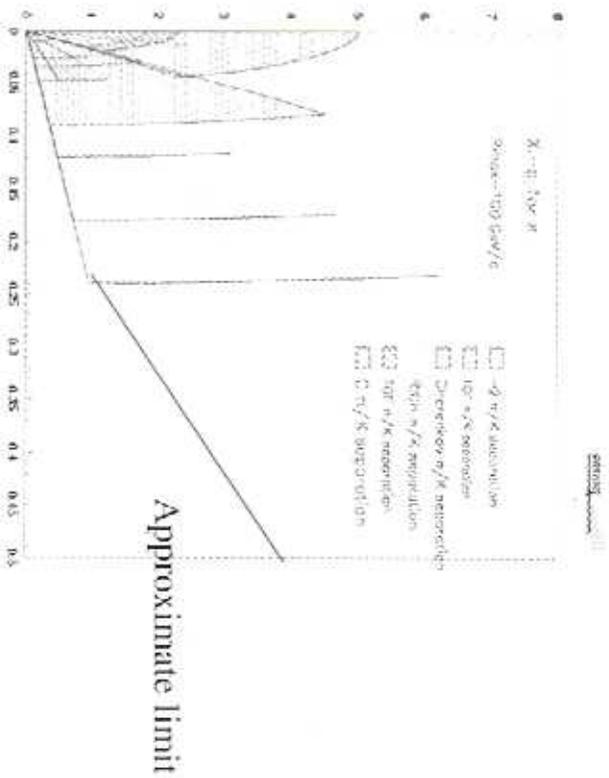
D1, D2, D3, D4, D5 : dipole magnets
 T1, T2, T3, T4, T5 : TPC1, TPC2 tracking detectors
 H1, H2, TOF W : Time-of-flight detectors
 RICH, CASPC : Cherenkov detectors

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, scalars,....

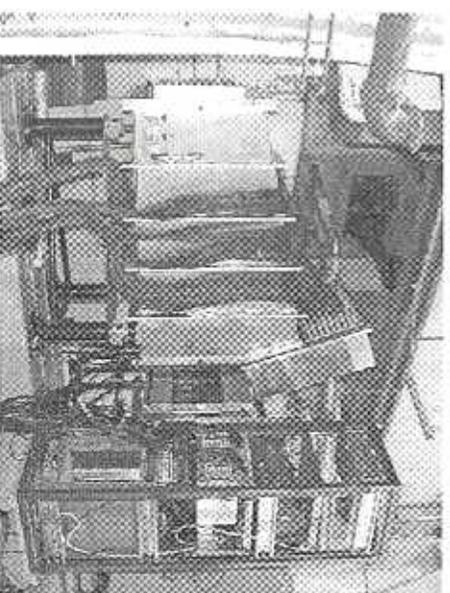
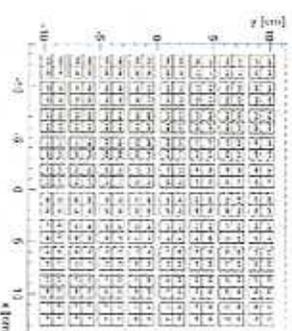
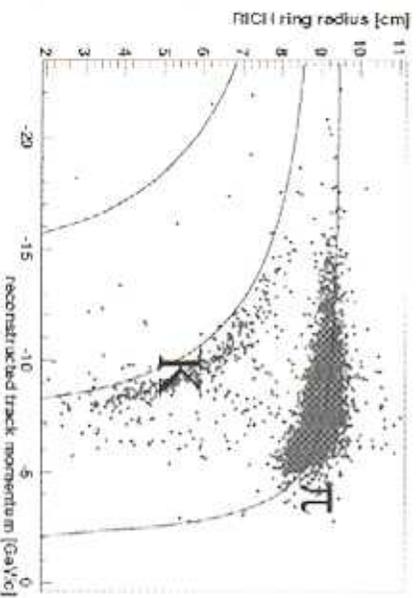
Acceptance & rate

- 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.



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 $\sim 45*35$ 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.