

# RHIC Spin $\sim$ Brahms

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

# RHIC SPIN

**Brahms**

presented by F. Videbaek

RHIC SPIN meeting

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**Earlier discussions**

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

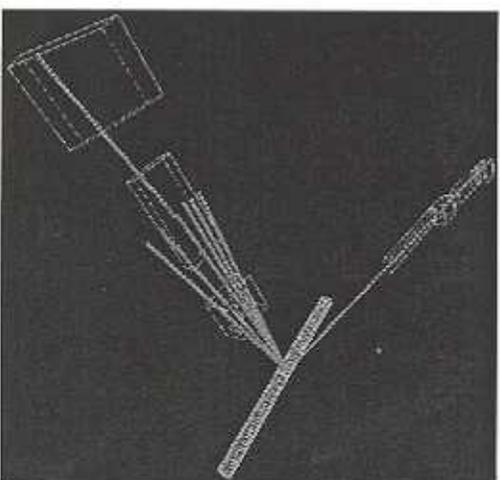
**Transverse Asymmetries**

**Experimental issues**

**Acceptances**

**Rates**

**Resources.**



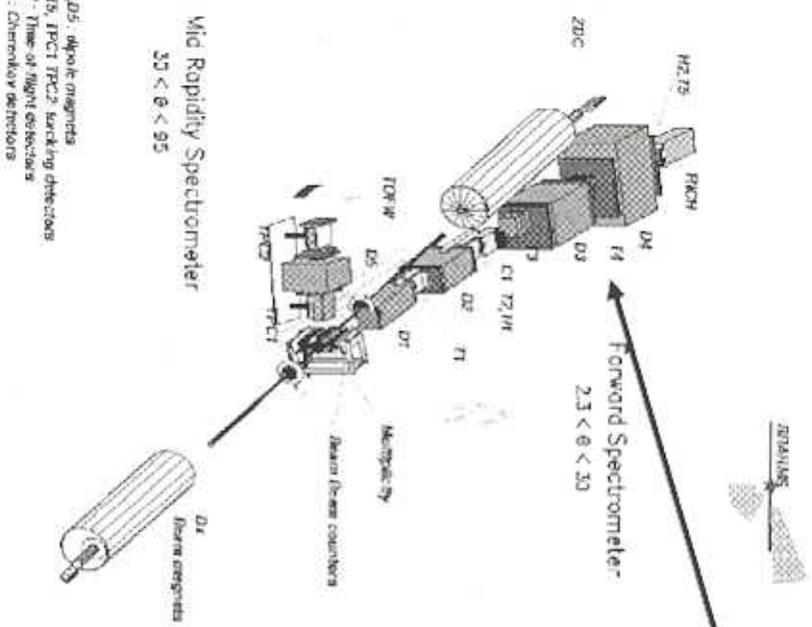
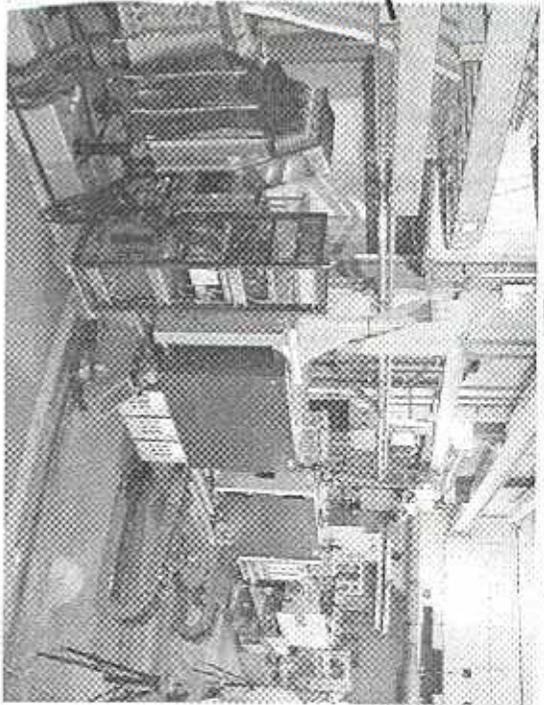
# pp Running in Run-2

- 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  $\sim 1.5 \text{ pb}^{-1}$ , 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.
- $A_{nn} = N(++):N(+):N(++):N(-)$
- $A_{nn}(\text{pi}+) > 0$ ,  $\text{pi}^- < 0$ ,  $\sim 5\text{-}20\%$  depending  $p_t$ ,  $x_F$
- A pi- measurements will complement the STAR  $\text{pi}^0$  measurement. In fact important to map out  $\text{pi}^0$  pi- for range of  $x_F$ ,  $p_t$  – not a single shot measurement.
- Theoretical understanding has emerged.

# Perspective View of BRAHMS Spectrometer

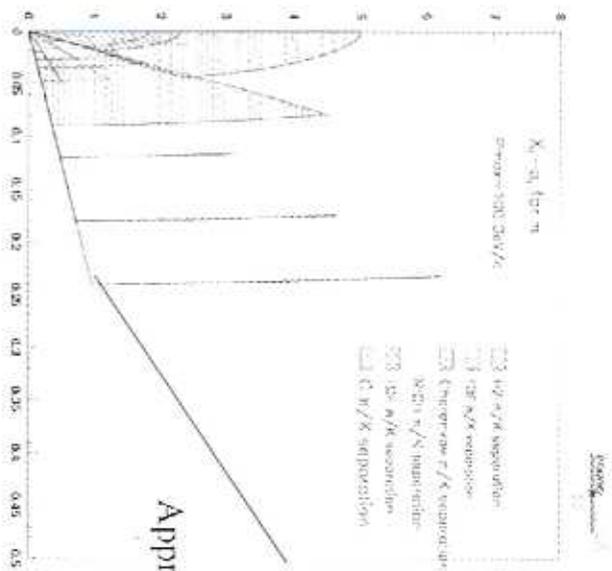


# Experimental issues

- 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 A.A)
  - ~500/sec with DC, RICH, Hodoscopes and no TPCs.
- Polarization counting, scalars,....

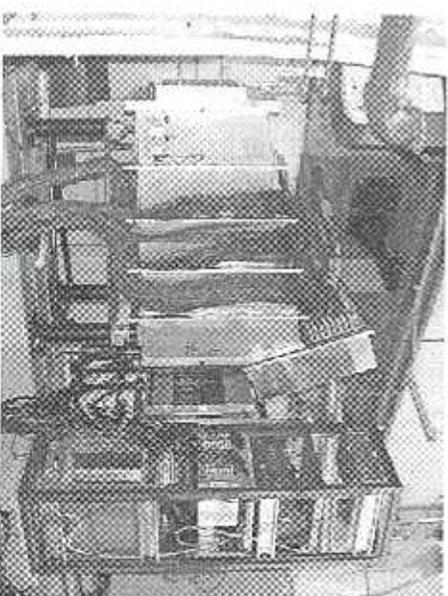
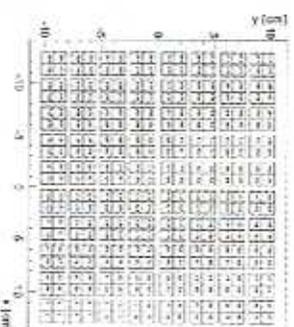
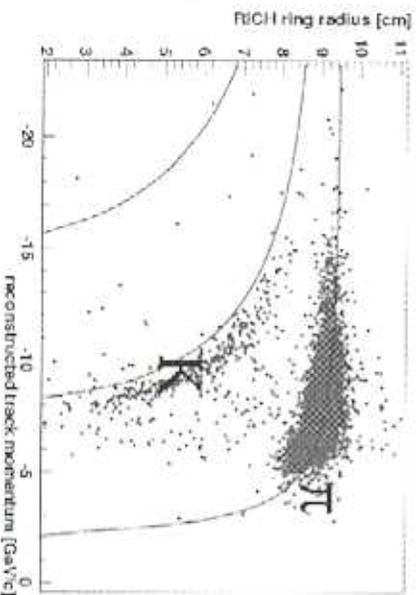
# Acceptance & rate

- The acceptance is comes from the lowest angle at 2.3 degrees, and at  $x_f \sim .25$  the  $p_t$  is  $\sim 1.0 \text{ GeV}/c$
- At higher  $X_f$  the  $p_t$  gets relative higher since the magnets is at fixed field.
- At the lum of  $\sim 5\%$  the rate at  $x_f \sim .20$  is 1-2 pion per sec. At  $x_f \sim .5$  it is lower by at least 1/1000.



# Particle Identification in current setup

- The High momentum PID is exclusively from the RICH situated at  $\sim 20$  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  $\sim 1$  wk of transverse polarization.