

PHENIX Spin: Outlook & Aspirations

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On the contents of this talk...

- This is not a formal PHENIX talk
- This talk includes my impressions of various discussions in PHENIX based on what we see developing in terms of the data
- The last serious discussion within PHENIX on future spin running occurred during the Run-7 planning and deliberations

PHENIX Spin program

- Understanding nucleon helicity
 - Polarized gluon distribution in the proton
 - Quark-Anti-Quark flavor separated measurements
- Transverse spin measurements
 - Transversity and family to explore aspects of non-perturbative & perturbative (?) QCD

Gluon Spin

- Program developed with luminosity & polarization
- $A_{LL}(\pi^0)$ presented: Run3, Run4, Run5, Run6
- Other channels (present & future): **charged π , η , direct photons**, single leptons, J/Ψ ,
- With Si VTX upgrade operational in 2009/10 (DOE funded FY2007): γ -Jet, open charm....

200 GeV CM program

- 200 GeV CM program expected to run until 2009:
 - ~270 pb⁻¹ delivered, ~70 pb⁻¹ recorded luminosity
 - Driven by the accuracy of measurements based on ΔG coming from NLO fits at pQCD around 2001
- In view of recently acquired data inclusive π^0 and Jet we may need to revisit the luminosity plans and also the time lines
- If the x-range associated with these measurements is the wrong x range (high side), why not probe the low x range by going to 500 GeV CM early? --*Something to consider*

Quark/Anti-Quark Flavor

- What is needed?
 - Needs 500 GeV operation of RHIC
 - Being developed
 - Muon Trigger upgrade
 - Approved and funded (NSF and JSPS)
- Time line?
 - Research Plan: 2009 and beyond
 - Constraints? Formal only from RIKEN, JSPS to indicate success by 2009-11.
- Going to 500 GeV CM for ΔG earlier than 2009 does NOT hinder this program, in fact, perhaps it will prepare the beam and detectors ready to render physics earlier.

Transverse Physics

- Clearly an “emerging” field!
 - Unappreciated when RHIC was proposed
- PHENIX has measured
 - central rapidity A_N for π^0 , charged hadrons
 - Forward rapidity A_N for μ
- No asymmetries have been seen, but STAR has in different acceptances, clearly, there is physics that needs to be understood and measured
- PHENIX plan to upgrade the forward acceptance with calorimeter and tracking:
 - Muon Piston Calorimeter (ready)
 - Nose cone calorimeter (proposal being written, >2010(?))
 - Forward VTX tracker (proposal being written, >2010(?))

Transverse Physics Issues

- PHENIX always assumes we run $\sim 25\%$ of the time in transverse mode. The fraction assumed to be the fraction of total spin operations, not necessarily a year-by-year operation
- Our results show now reason to significantly change this policy/attitude unless Run-6 data on Siver's function force us to reconsider
- What happens if we go to 500 GeV operations early? - Something that needs some careful attention

**If I want your opinion, I will tell you
what it should be!**

Bjorn Wiik (DESY director to AD, jokingly, when AD complained to him in 1998 that communication of the directorate with experimenters was *too* one way at DESY.)