

Self Introduction

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Advisor : Dr. Stephen Pate

Undergraduate studies - University of Colombo, Sri Lanka (Physics)
Curtin University of Technology, Australia (Computer Systems and Networking)

Research

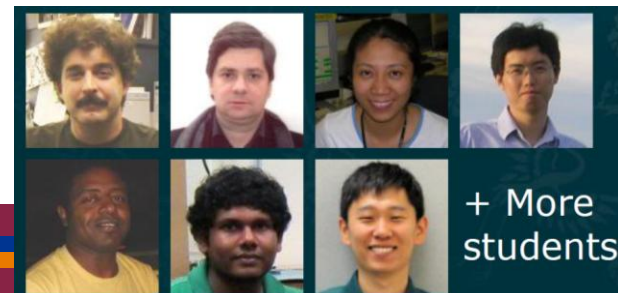
Undergraduate Research

- XRD analysis of Cu_2O thin films fabricated using electrodeposition (2009)
- Construction of an Electronic Peak Flow Meter with Remote Access Capability (2010)

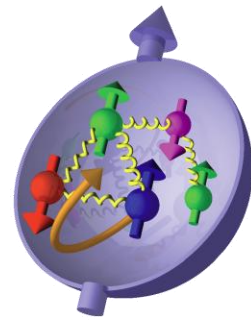
Graduate Research

- Joined NMSU Nuclear Physics group in Summer 2011
- Worked on FVTX Assembly (2011 Summer)
- Worked on FVTX Metrology (2012 Spring)
- Started working on Drell – Yan analysis in longitudinally polarized P+P collisions at RHIC (2012 Fall at SPIN FEST at UNM)
- Worked on fast production for Run 13 with Chris Pinkenburg and Mike Beaumier

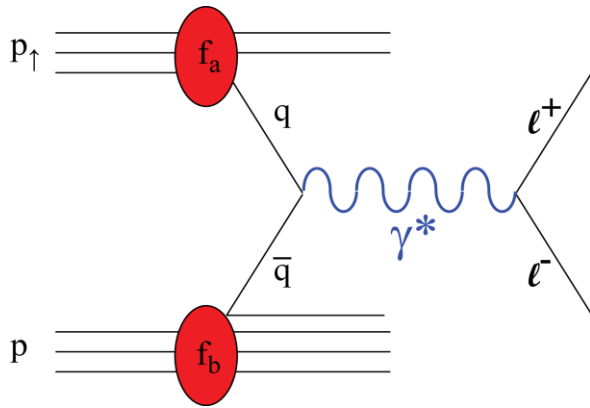
Our Research group at NMSU



Motivation for Drell-Yan analysis



- Drell-Yan process is an electromagnetic effect in which a quark and antiquark from a pair of interacting hadrons annihilate to give a lepton pair.

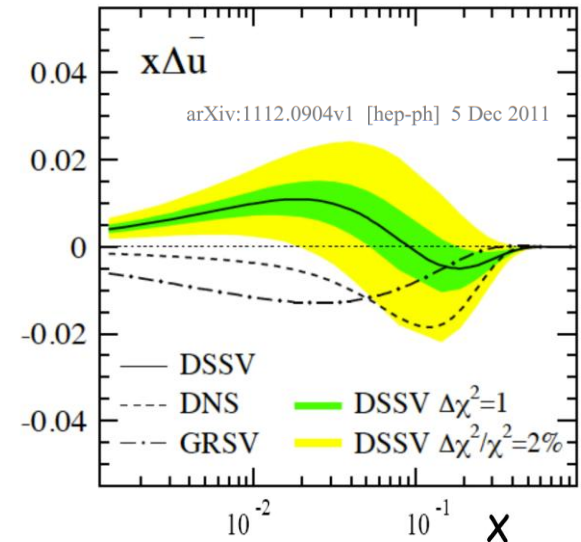


$$A_{LL}^{DY} = - \frac{\sum_q e_q^2 \{ \Delta q(x_1) \Delta \bar{q}(x_2) + \Delta \bar{q}(x_1) \Delta q(x_2) \}}{\sum_q e_q^2 \{ q(x_1) \bar{q}(x_2) + \bar{q}(x_1) q(x_2) \}}$$

$$\approx - \frac{\Delta u(x_1)}{u(x_1)} \cdot \frac{\Delta \bar{u}(x_2)}{\bar{u}(x_2)}$$

**u-quark
dominates in p+p**

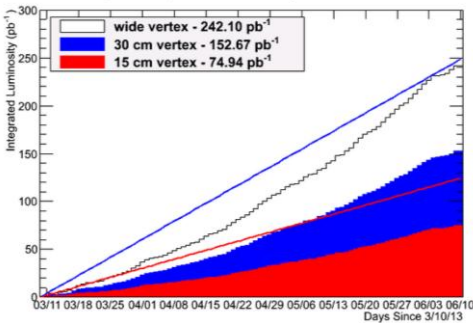
- Drell-Yan A_{LL} can cleanly access $\Delta \bar{u} / \bar{u}$ which gives the anti-quark helicity distributions in the nucleon sea



Motivation ...

- PHENIX experiment provides powerful detection for di-muon in the forward region ($1.2 < |\eta| < 2.4$) through Muon Trackers. For di-muons detected in same arm $x_1 = 0.02 - 0.06$, $x_2 = 5 \times 10^{-4} - 2 \times 10^{-3}$.
- Run 12 and Run 13 data will provide sufficient statistics for Drell-Yan analysis
- If anti-quarks carry no spin we expect Drell - Yan A_{LL} to be zero

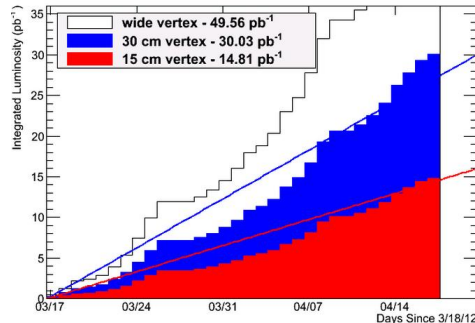
PHENIX Integr. Sampled Lumi vs Day Mon Jun 10 09:00:33 2013



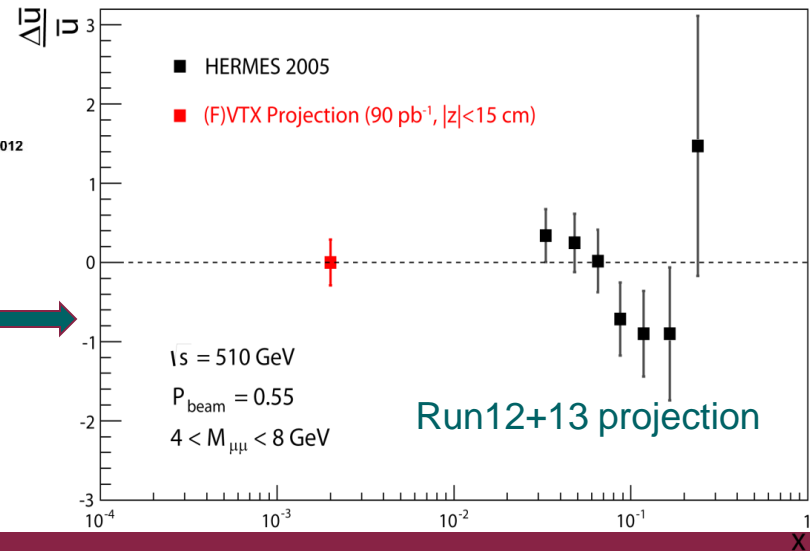
Run13

+

PHENIX Integr. Sampled Lumi vs Day Thu Apr 26 22:09:41 2012

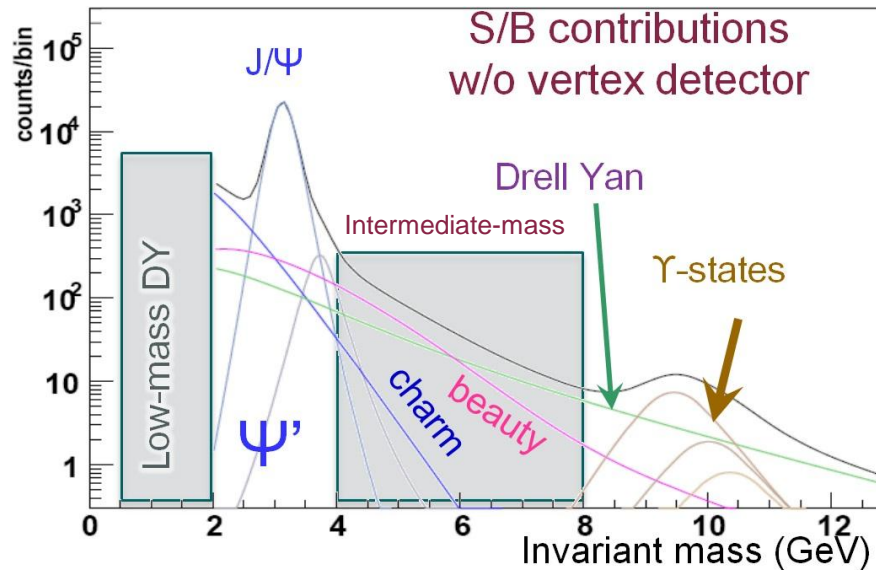


Run12



Intermediate-mass Drell-Yan

- The Drell-Yan process between $4 \text{ GeV} < M < 8 \text{ GeV}$ of invariant mass is called Intermediate-mass Drell-Yan process

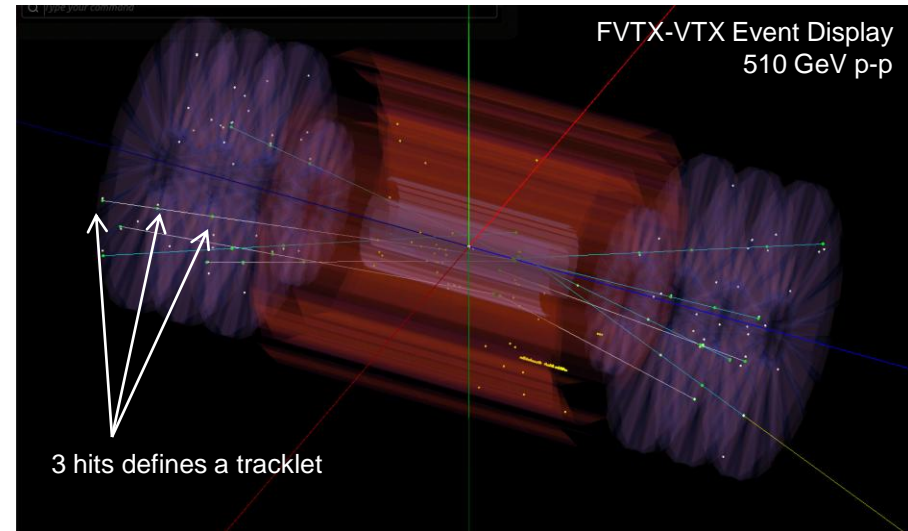
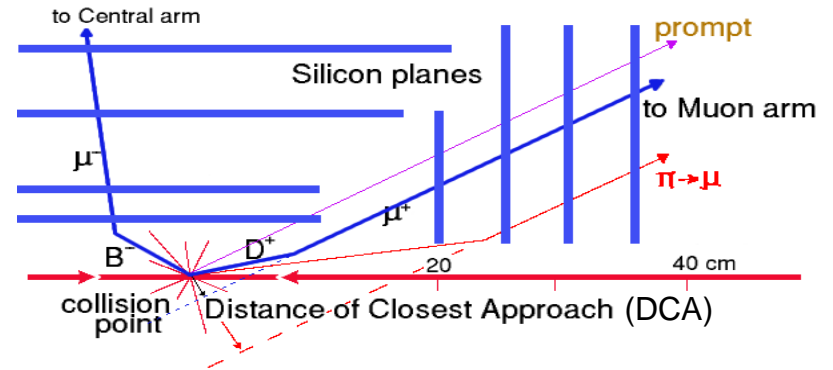


Simulation for $p\text{-}p \sqrt{s} = 200 \text{ GeV}$ (from the study for muon arm)

- The PHENIX FVTX can help to reduce the dominant background from beauty decays
- Prompt muons from DY
- Displaced tracks from heavy quark decays

Cuts use for Drell-Yan analysis

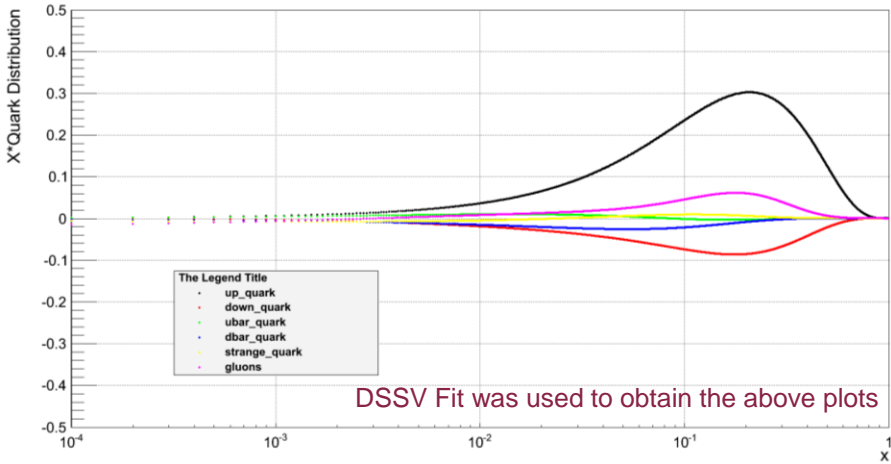
- Differentiate primary vertex from secondary decay using DCA
- Comparison of the overall tracklet activity in FVTX
- Isolation Cone Cut



Thank you ...!!!

Backup

Polarized Quark Distributions



Unpolarized Quark Distributions

