1 Introduction

1.1 Introduction

1.2 Early Experiments: An Overview

2 Nuclear Matter: Hot and Cold

2.1 Hot versus Cold Nuclear Matter

2.2 The Cronin Effect

2.2.1 Initial State Multiple Scattering

2.2.2 Final State Multiple Scattering

2.3 Hot Nuclear Matter: QGP

2.3.1 Baryon Enhancement

2.3.2 Theoretical Models of Baryon Enhancement

2.3.2.1 Recombination

2.3.2.2 Fragmentation

2.4 Flow at the LHC (section finished by Aug 24)

2.5 Recombination for All? (added Aug 26)

Might add strangeness production/enhancement historical results section

3 Experimental Apparatus (MOVED TO 3 from 5)

3.1 The Relativistic Heavy Ion Collider

3.2 From Start to Finish

3.3 The PHENIX Detector

3.3.1 Central Arm

3.3.1.1 Drift Chamber (added Aug 29)

3.3.1.2 Pad Chamber (added Aug 29)

3.3.1.3 TOF: Time Of Flight Detectors

3.3.1.4 ACC: Aerogel Cherenkov Counter

3.3.1.5 EMCal and RICH (added Aug 29)

3.3.2 Forward Detectors (whole section finished by Aug 29)

3.3.2.1 BBC: Beam Beam Counter

3.3.2.2 ZDC: Zero Degree Calorimeter

3.3.2.3 MPC: Muon Piston Calorimeter

3.3.2.4 RXNP: Reaction Plane Detector

3.4 DAQ (added aug 29)

4 Heavy Ion Collisions: A Primer (MOVED from 3 to 4, rearranged)

4.1 Measurable Quantities

4.2 Event Characterization

4.2.1 Centrality

4.2.2 Event Vertex

4.3 Track Reconstruction

4.3.1 Variables for Track Selection (rest of section finished by Aug 24)

4.3.1.1 Track Matching: DC and PC1 (Added Aug 30)

4.3.1.2 Track Matching: TOF and PC3 (Added Aug 30)

4.3.2 Particle Identification

5 Anisotropic Flow

6 Event Plane (whole chapter finished by Sept 1)

6.1 Determination of Event Plane

6.2 Event Plane "Flattening"

6.3 Event Plane Resolution Correction

7 Results (whole chapter finished by Sept 5)

7.1 Charged Track v2

7.2 Separating Particle Signals

7.2.1 Single Gaussians

7.2.2 Gaussian Mixing

7.2.3 ACC as a Pion Discriminator

7.2.4 High pT: Fixed Width and Mean

7.4 Identified Particle v2

8 Error Analysis and QA (Chapter completed by sept 7)

Event Plane resolution

Centrality resolution

Momentum resolution (short)

Detector acceptance (short)

PID QA

Timing calibration QA

9 Summary and Conclusions

9.1 Discussion

-flow / number of quarks

-kaon/strangeness enhancement?

9.2 Conclusions

Appendices

A PHENIX Coordinate System

~~B Calibration of Time of Flight Detectors (finished by Aug 25) PUSHED TO Sept 2~~ MOVED TO QA chapter

B Event and Track Cuts Summary (added aug 30)

C Nuclear Modification Factor Moved from chapter subsection to Appendix

D Data Tables