Data Quality Analysis of 200 GeV Center of Mass Energy p-Au Collisions from STAR

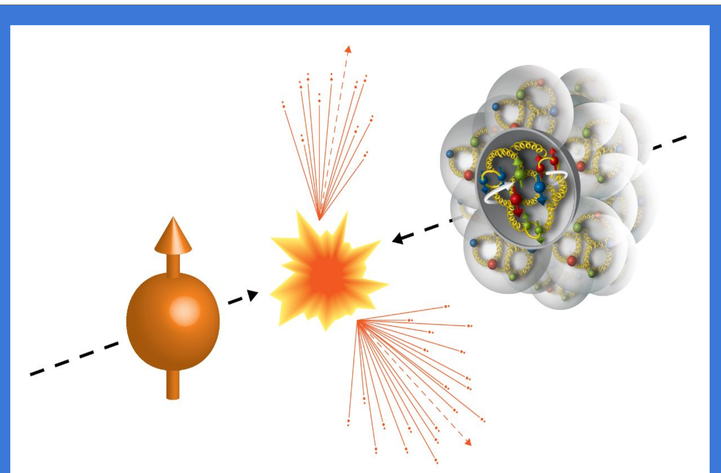
Keaghan Knight, Dr Kevin Adkins

In proton collisions, fragmentation functions describe the probability that a given parton in the initial state creates a particular hadron in the final state. Understanding fragmentation is essential for a theoretical description of measured asymmetries that provide a glimpse of the proton's spin structure. Proton-gold collisions from the STAR detector at Brookhaven National Laboratory will provide a complementary result, using reconstructed jets, to the global data which comes mostly from electron-positron annihilation experiments. A first step in extracting fragmentation functions is to perform a quality analysis (QA) of the data. This poster shows a look at the data and our method for identifying and rejecting detector runs which are bad in an effort to have a clean sample for physics analysis.

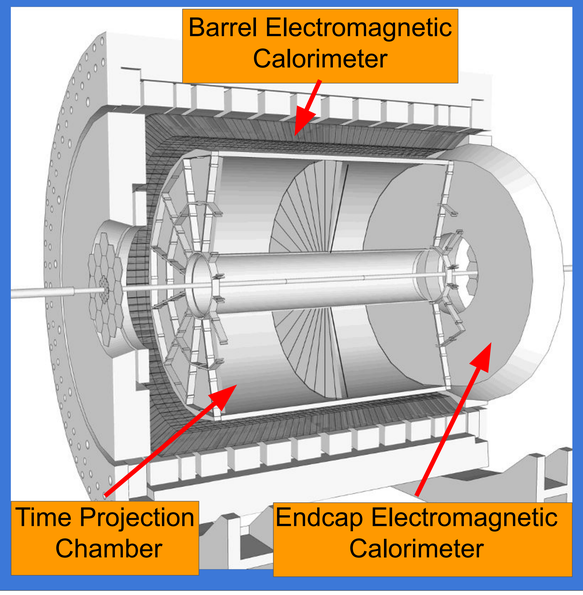
Motivation and Background

Collisions between nucleons are described by:
- Parton distribution functions (PDFs) that describe the initial state
- Fragmentation functions (FFs) that describe the probability of an initial state parton producing a particular final state hadron

A full theoretical description of the behavior of nucleons must involve understanding fragmentation. Extracting FFs from polarized proton-gold collisions using jets will give insights on the behavior of cold nuclear matter and provide new data for theoretical predictions.



Solenoidal Tracker At RHIC



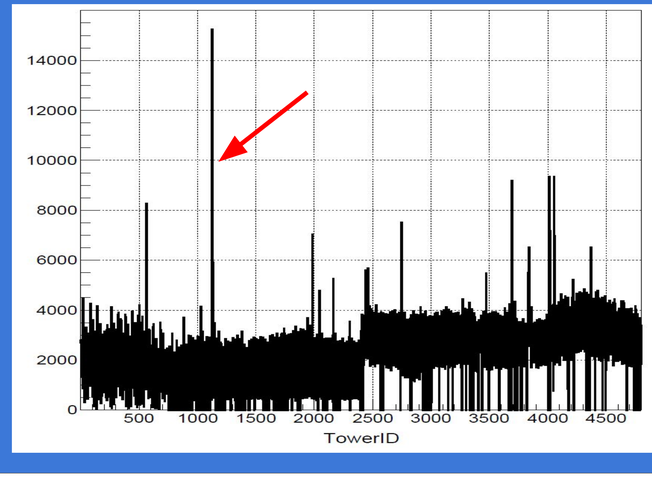
Methods for Data Quality Analysis

Quality analysis (QA) is a process that involves:
- Finding problematic data runs
- Figuring out why the problems arose
- Deciding whether each run should be removed or kept

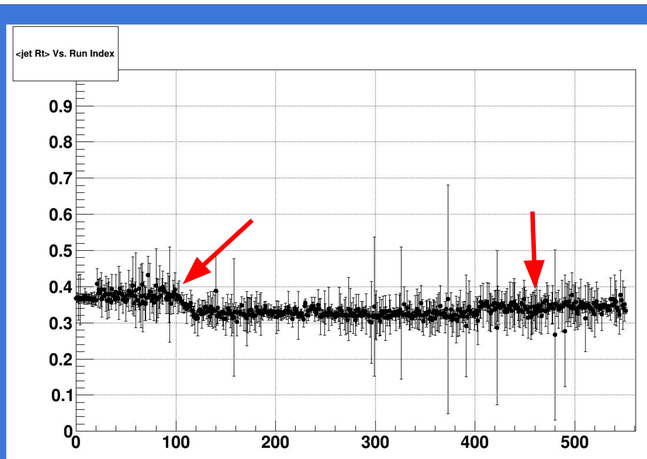
This is necessary for finding detector errors not noted during active running. Data containing errors should be removed so they do not impact physics results.

The strategy for QA is to:
- Plot kinematic observables combined over the entire collection period and also averaged over each data run
- Look for inconsistencies such as
  - Calorimeter towers collecting more hits than others (hot towers)
  - Breaks or jumps in average values that should be consistent across all runs

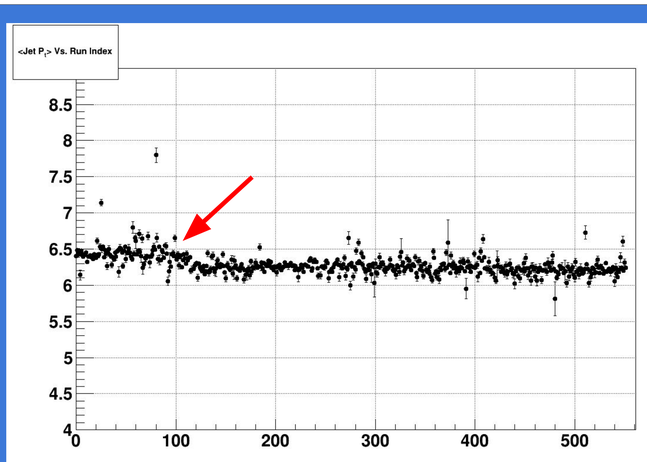
BEMC Tower ID



Jet Neutral Energy Fraction



Jet Transverse Momentum



Future Goals

- Remove the identified hot tower from the data
- Reproduce the QA and look for additional issues
- Finalize the data that will go into the physics analysis
- Begin physics analysis of fragmentation functions using the data that results from QA