

Silicon Vertex Upgrade Software Overview

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- 1. Current status of software**
- 2. Plans for the future**

<http://www.phenix.bnl.gov/phenix/WWW/upgrades/silicon/software>

Current status

Simulations

Reasonably realistic detector response
Geometry is very detailed and realistic
Runs within PHENIX simulation package PISA

Large scale simulation projects for general use
Will be used in Mock Data/Analysis Challenges

- Au+Au @ 200 GeV Hijing events – completed
- Single B and D mesons – starts soon
- Merging of single B and D mesons with Au+Au events – starts soon

Ongoing simulation studies

- J/Ψ mass resolution and reconstruction efficiency
- Physics-related simulations: gamma-jet correlations

Current Status

Integration in PHENIX Software

VTX subsystem is now an integral part of the PHENIX offline reconstruction software, VTX hits are used in the PHENIX global tracking.

Two global tracking packages:

- The default global tracking package (CGL)
- Kalman Fit. Allows DCA calculation.

PHENIX database is used to keep realistic VTX geometry and simulation parameters.

Near future plans include optimization of global tracking algorithms (Kalman Fit) and further database development.

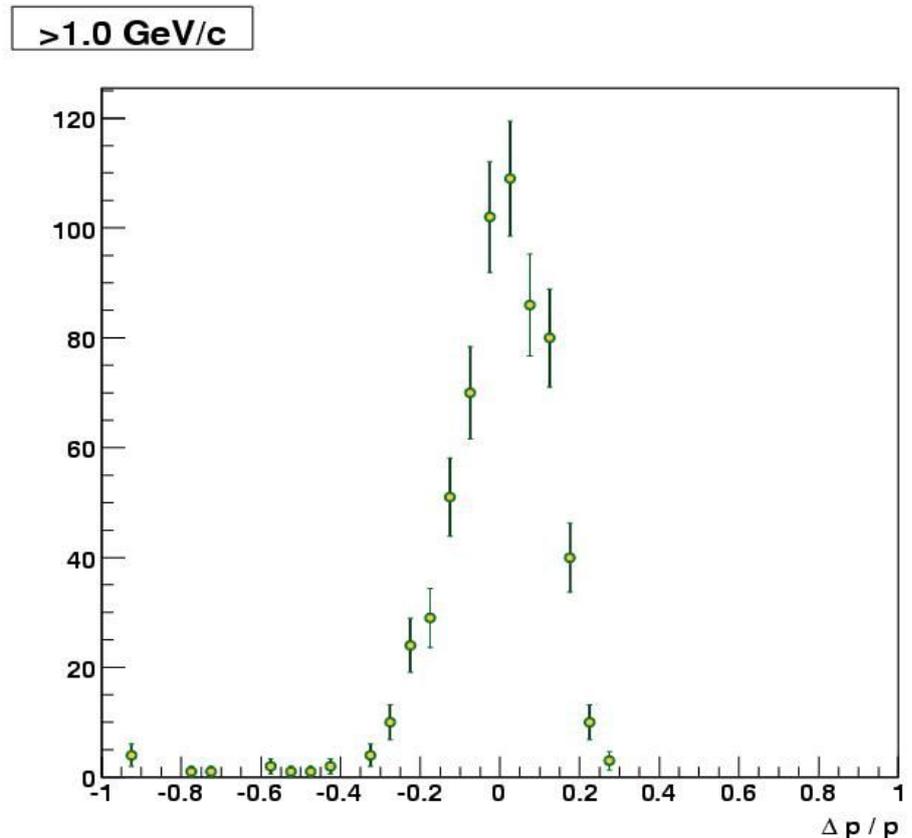
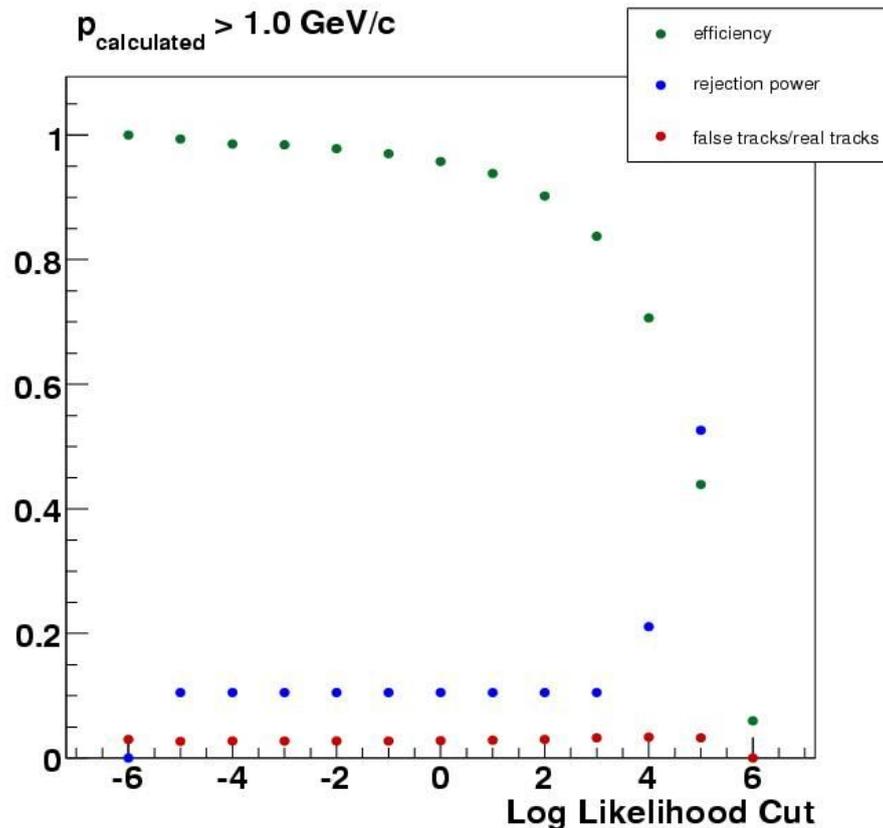
Current Status

Standalone Tracking

Large acceptance for jet correlations, etc.

Use multiple scattering to improve momentum resolution.

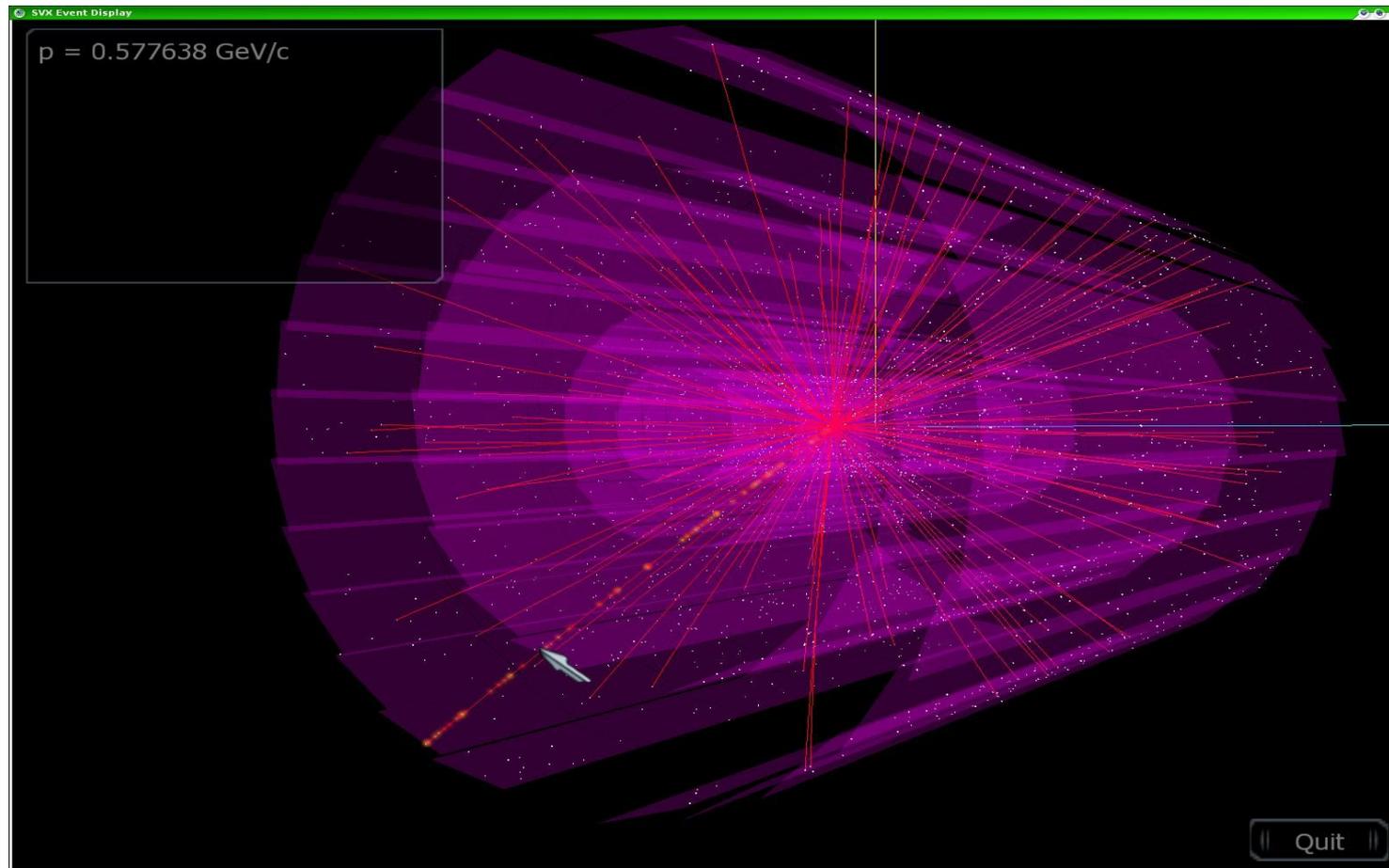
- Use two pixel layers to reconstruct the vertex.
- Use all four layers and the vertex to determine multiple scattering,
- Uses that information to find the probability that the candidate is a true track.



Current Status

Event Display

Allows to view pixels and sensors, show hits and tracks from any angle, display track information. The code is based on OpenGL



Current status

Database

VTX reconstruction of simulated events relies on realistic geometry and simulation parameters kept in the PHENIX database.

Tools for saving/retrieving information are ready.

Still need code for keeping calibration/alignment in the database (should be rather simple to do it by modifying existing code).

Test-bench database to hold information about tests, assembly, etc.
Based on PostgreSQL, just like the PHENIX database
More human-friendly web interface

Prepare for the data taking

The focus of our efforts will be shifted to preparation for the data taking and analysis.

Reconstruction software is already in good shape (standalone tracking, global tracking, etc.)

We need:

- Data decoding and hardware/software map in the database
- Calibration and alignment tools
- Online monitoring
- Clustering algorithm

Plans for the future

Continue infrastructure development

Database code for keeping alignment and calibration results.
Test-bench database.

Clustering algorithm; several available, need to choose the best.
Get more realistic detector response in simulation first.

Mock Data/Analysis Challenges using simulated events.

Improve documentation, tutorials.

Plans for the future

Simulation efforts

Simulation projects:

- single D and B mesons
- merging single D and B mesons to AuAu events

Improving detector response

Continue simulation studies in order to optimize VTX performance.

Plans for the future

Manpower

We have now:

3 Grad Students:	Alan Dion (SUNYSB) 25%
	Ermias Tujuba (Ecole Polytechnique) 25%
	Hua Pei (ISU) 25%
1 Postdoc:	Patricia Liebing (RBRC) 25%
2 Staff:	Alexandre Lebedev (ISU) 50%
	Hubert Van Hecke (LANL) 25%

Total: 1.75 FTE

This will increase to 2-3 FTE as the project nears completion.

Schedule and Milestones

Start data taking end of 2009

- Mock Data Challenge - early 2009
- Online monitoring - 2009
- Calibration and alignment tools - late 2008
- Data decoding - late 2008
- Clustering algorithm - early 2008
- More realistic detector response - late 2007
- Database (calibration) - late 2007
- Database (hardware/software) - mid 2007
- Test-bench database - late 2006
- Event display - early 2007
- Standalone tracking - late 2006
- Simulation efforts
- Code optimization and improvement

Conclusions and outlook

Offline software in good shape

VTX subsystem is an integral part of the PHENIX offline software.

Global and local tracking works, simulation efforts ongoing.

Still a lot to do!

Need more manpower

Concentrate more on data taking preparations