Track reconstruction in MPD

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for the MPD collaboration

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Outline

1. Track reconstruction method and results
2. Future developments

Related materials: 2nd MPD-BM@N Collab. Meeting
https://indico.jinr.ru/event/610/contributions/5206/attachments/4079/5269/02_MPD_AZ-Oct-2018.pdf

Object design

Main tracking engine: singleton MpdKalmanFilter

track reconstruction in TPC:

FairTask MpdTpcKalmanFilter, …

Reconstructed track: base class MpdKalmanTrack

derived: MpdTpcKalmanTrack, …

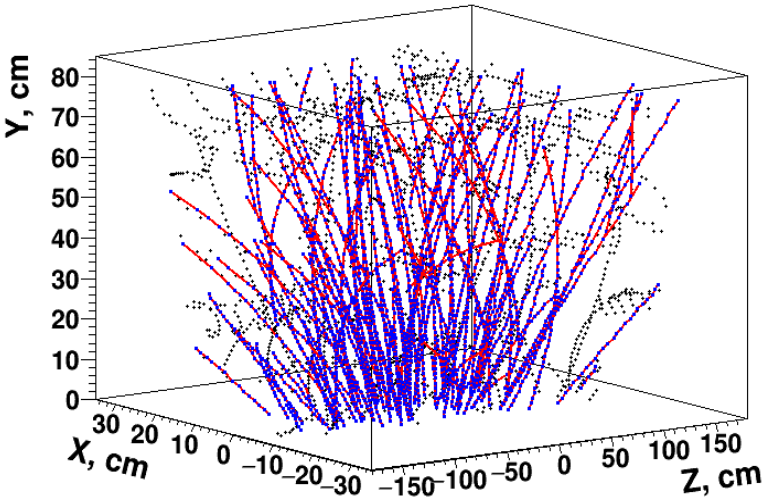
Track reconstruction

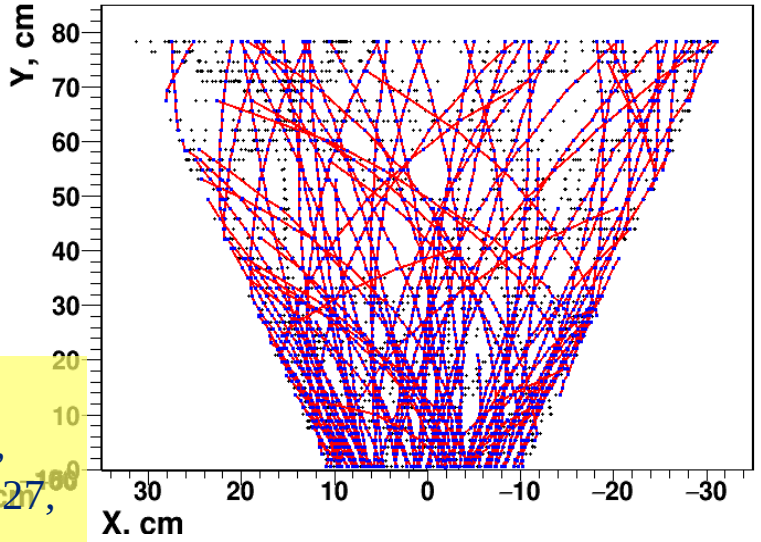
Two-pass Kalman filter with track seeding using outer hits (1st pass) or leftover inner hits (2nd pass)

Primary vertex estimator

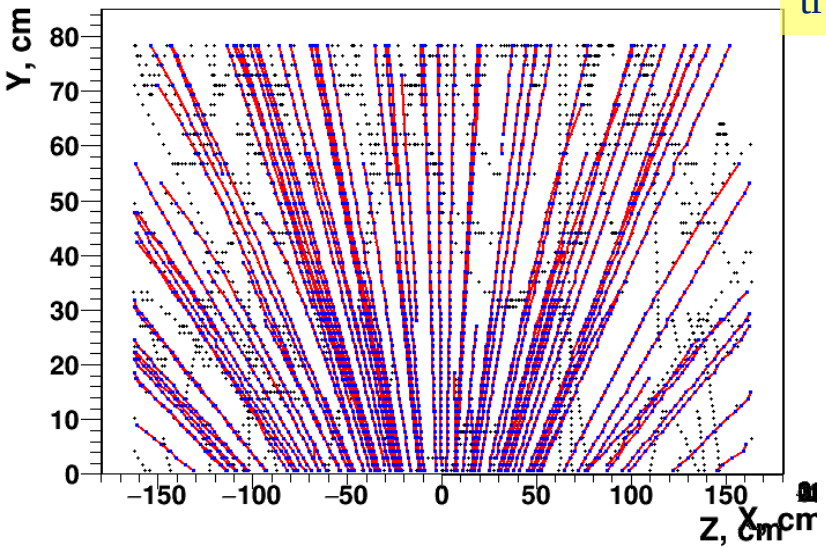
To estimate Z-coordinate of the primary vertex: uses histogramming of extrapolated to the beam line combinations of hit pairs

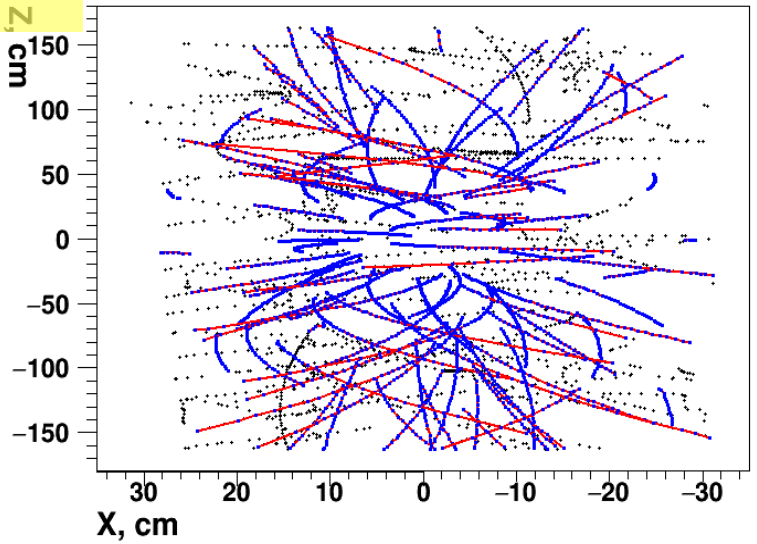
Track reconstruction





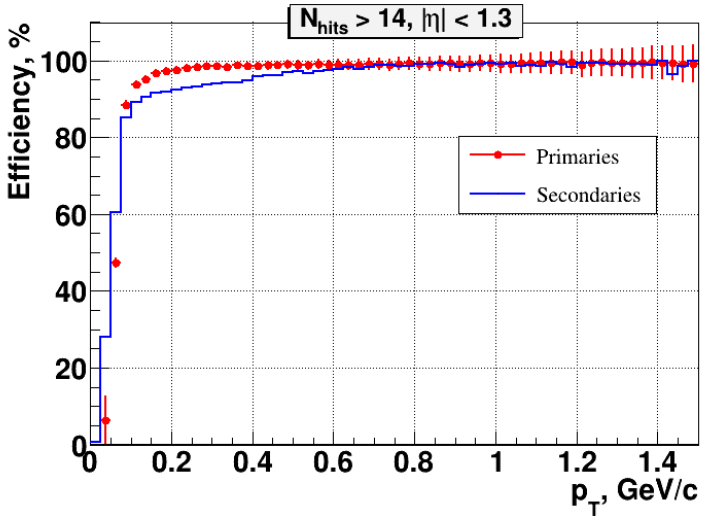
Some stats:
rec. points = 4867,
hits on tracks = 3127,
tracks = 102

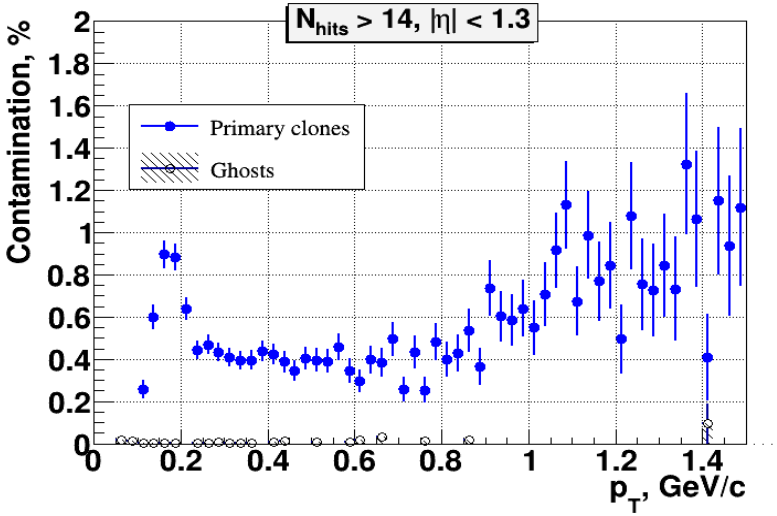


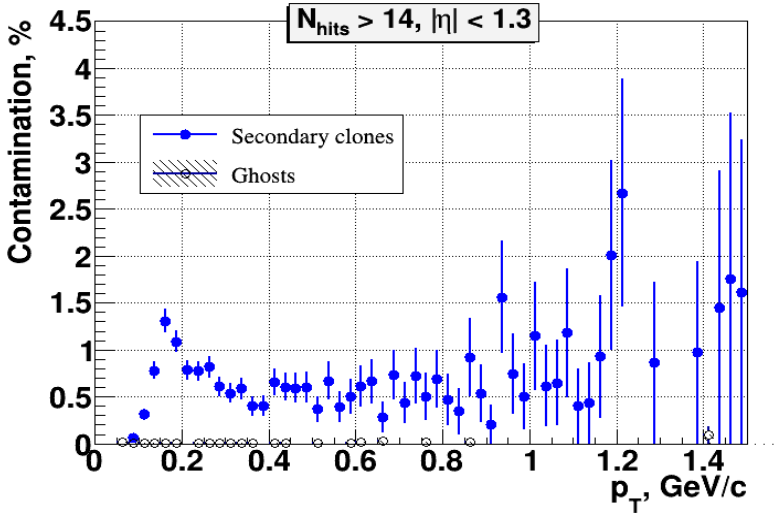


Track reconstruction efficiency

Primary + Secondary







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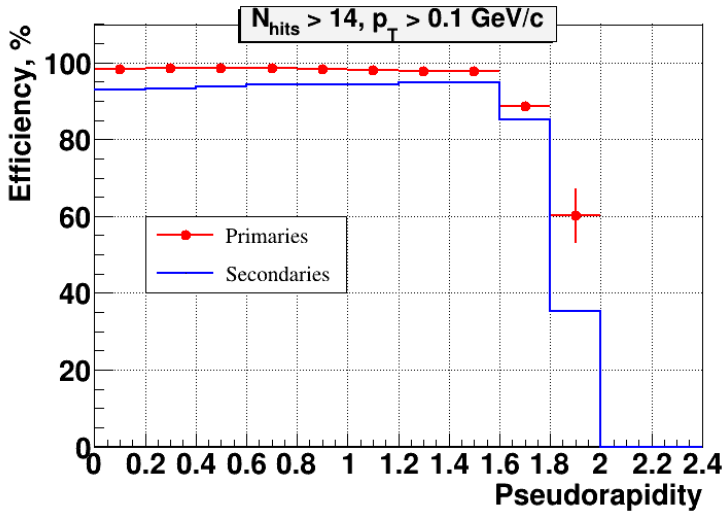
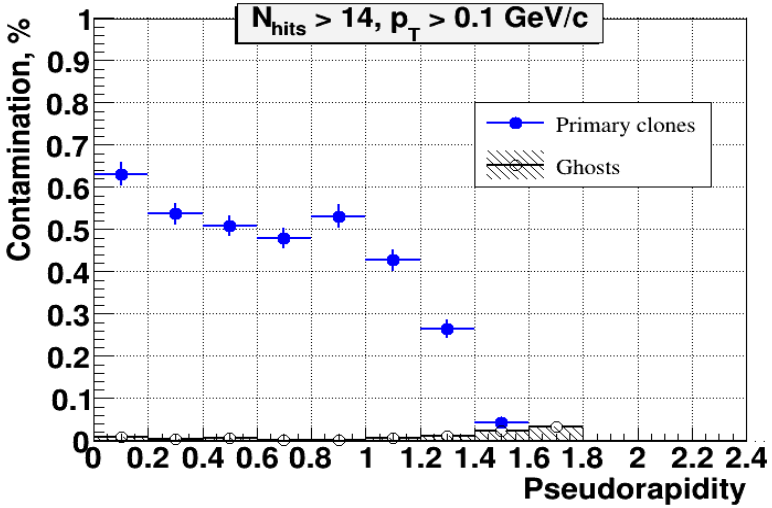
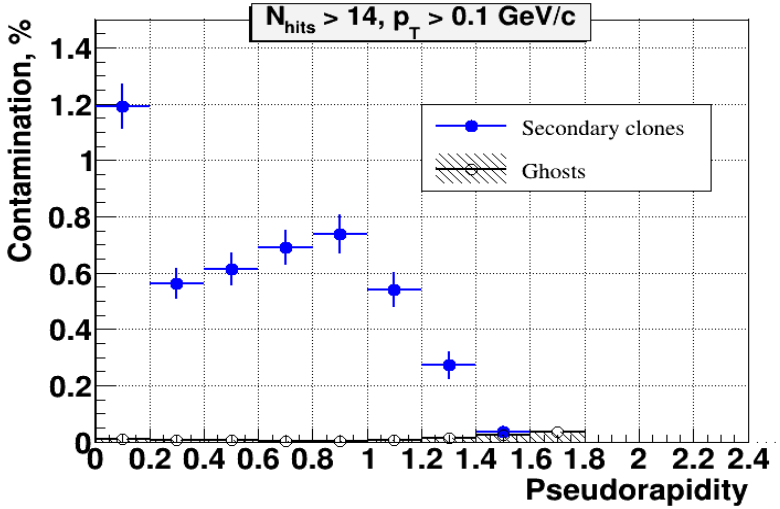
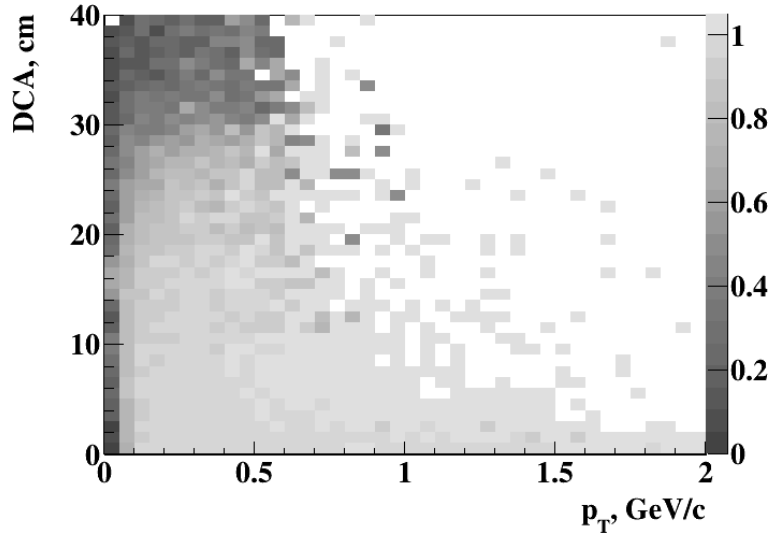
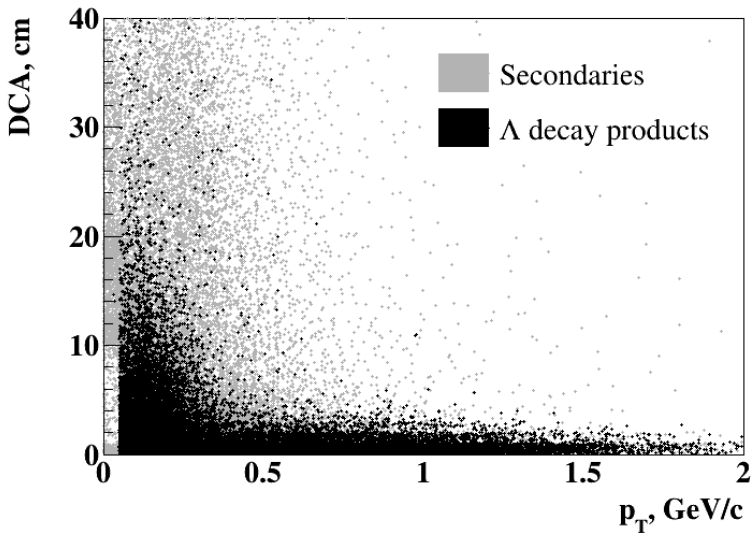


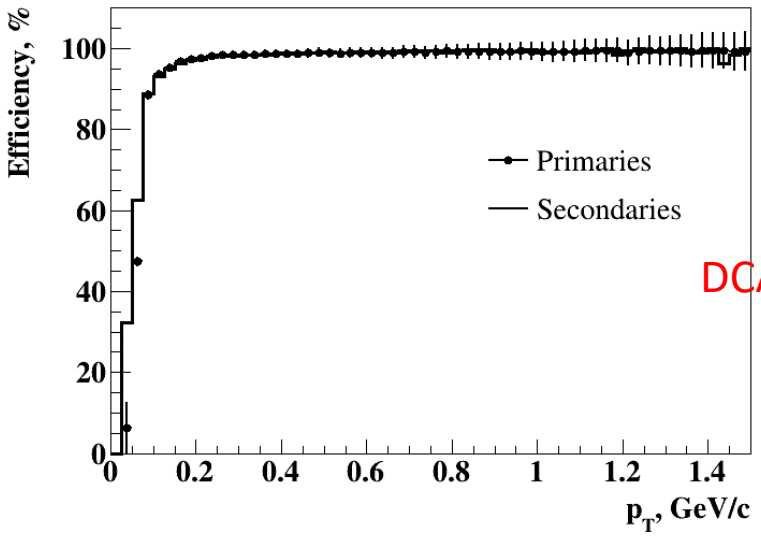




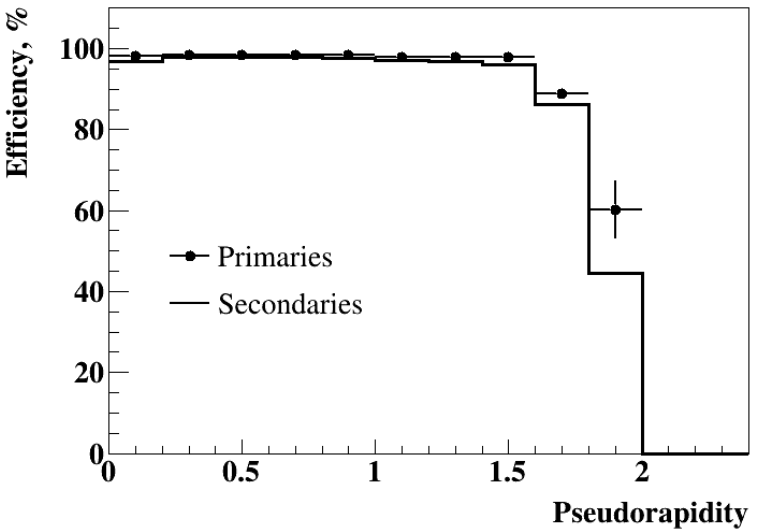
Track reconstruction efficiency



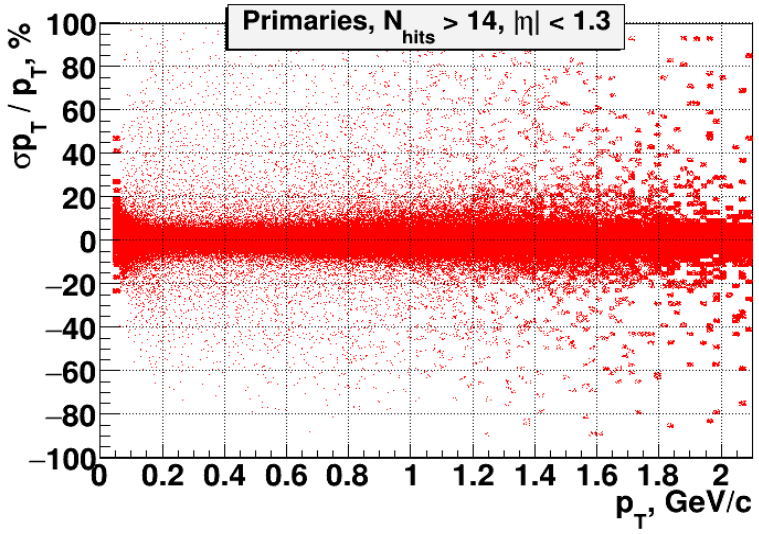


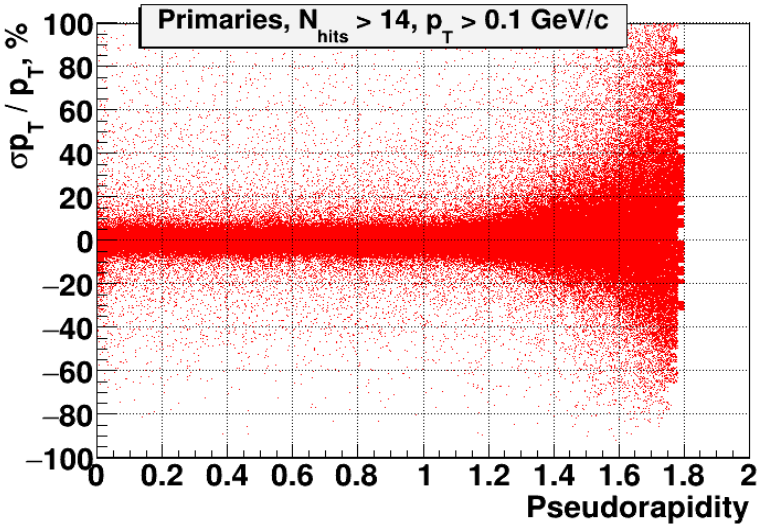


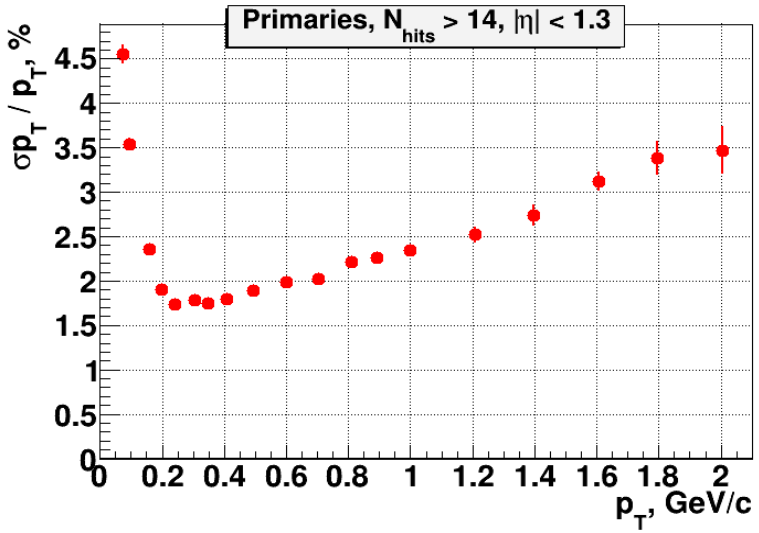
DCA < 20 см

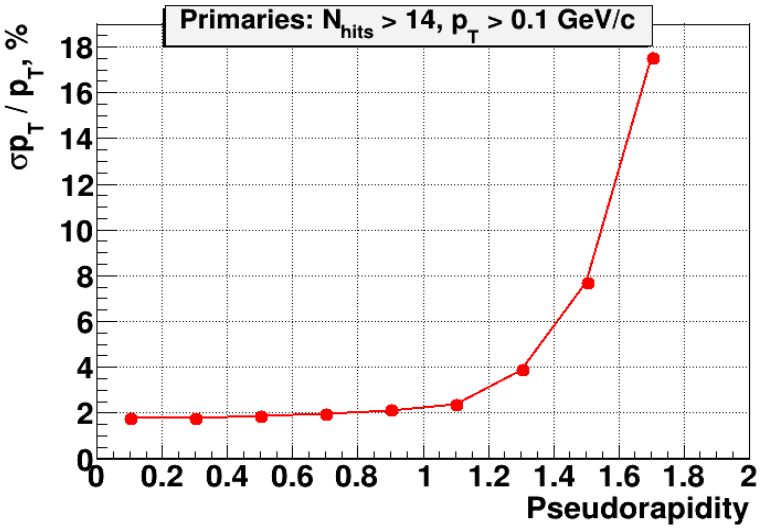


Momentum resolution

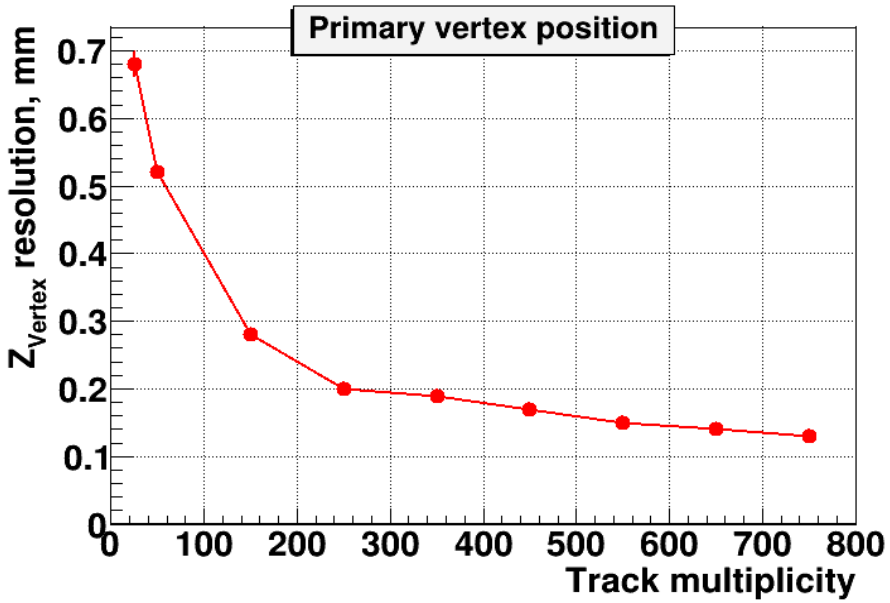


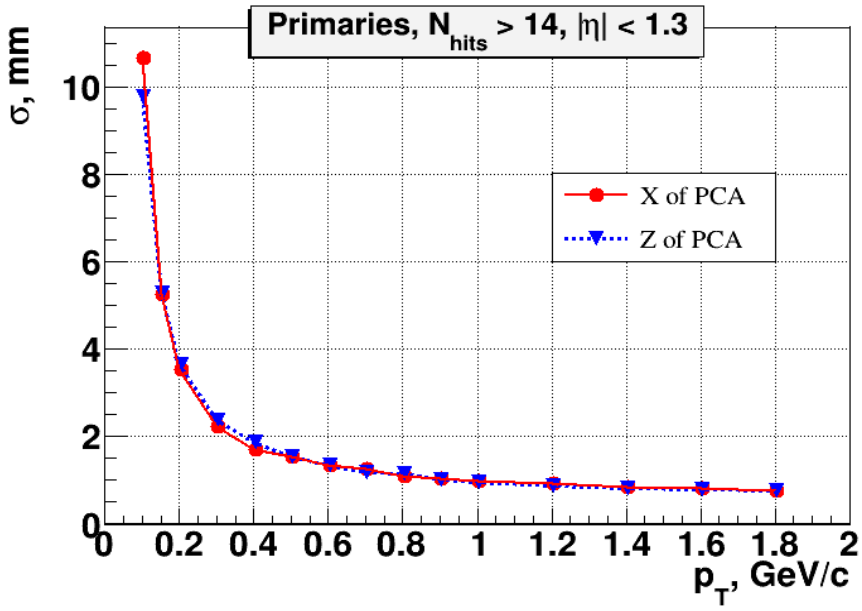




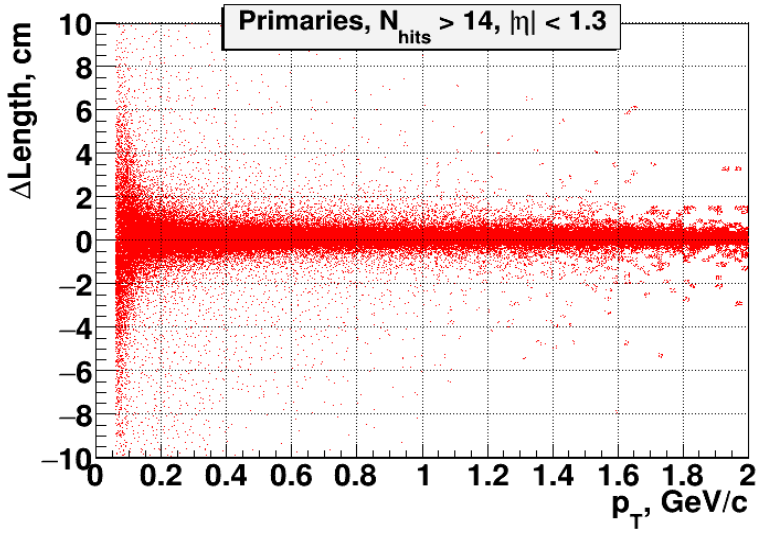


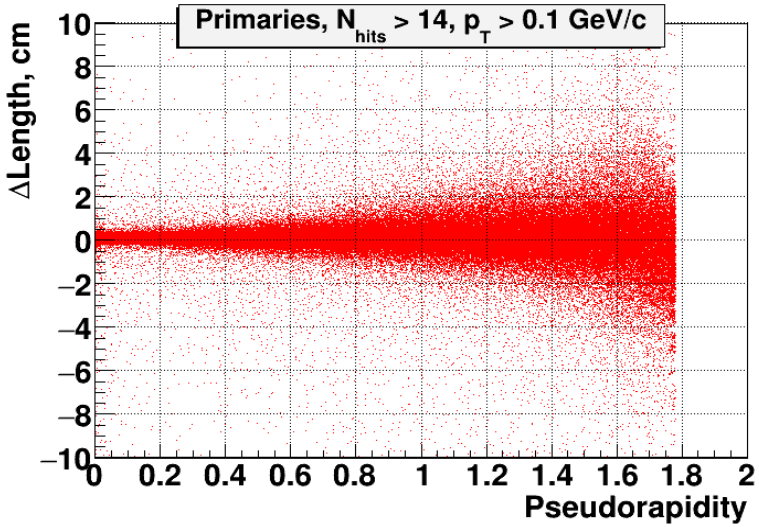
Track pointing accuracy

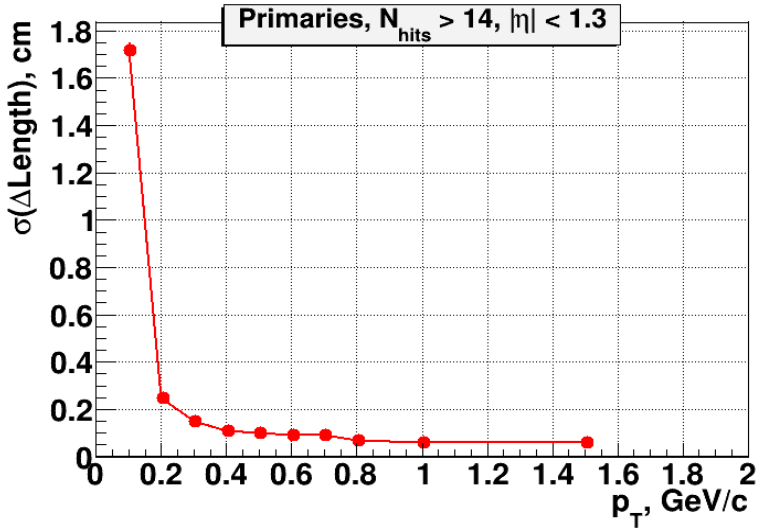


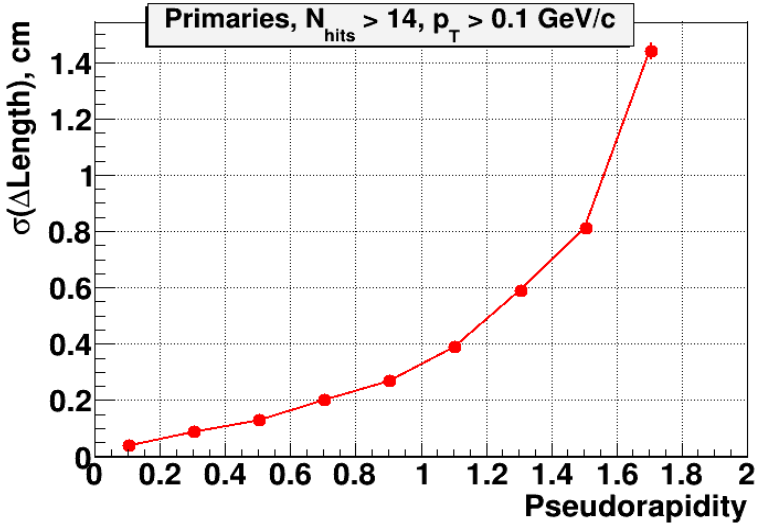


Track length resolution









Other track reconstruction packages

Track reconstruction in End-cap detectors (GEM and Straw tracker and their combination with TPC Kalman filter).

Track reconstruction in ITS – either based on TPC track propagation or stand-alone ITS Vector Finder with subsequent track matching with TPC.

Future developments

- **MPD Global Track:** to combine, e.g., TPC and TOF information and include additional useful variables (more oriented toward physics analysis) – like MpdTrack but better designed and implemented;
- **TPC reconstruction for laser beams and cosmics;**
- **Track seeding for large-DCA tracks (kinks).**