



# MVD Software and Simulation Status

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| Tobias Stockmanns

# Monte Carlo Generation – Event Gen

- Available in the code:
  - Background generators: DPM, UrQMD, (Fluka)
  - Signal generators: EvtGen, Pythia
  - Generic generators: particle gun, box generator, flat generator
- Simulations done:
  - Angular and momentum distribution of particles from background generators → check if they are still valid with latest versions of generators
- What has to be implemented in the code?
  - Event mixing
- What simulations should be done?
  - -

# Monte Carlo Generation – MC Points

- Available in the code:
  - MC code development finished
  - Most realistic detector model within PANDA
- Simulations done:
  - Hit rate studies
  - Radiation length
  - Radiation damage
- What is missing in the code?
  - Thinner sensors in geometry description
  - More realistic model for additional disks
- What simulations should be done?
  - Redo radiation length and hit rate studies with new geometry

# Digitization

- Available in the code:
  - Charge distribution in pixel/strip based on linear model between entry and exit point
  - Triangular model of preamplifier
  - Generator for noisy hits
  - Time structure of readout (in development branch)
- Simulations done:
  - Count/data rates
  - Charge resolution
  - Time resolution
- What is missing in the code?
  - Charge diffusion (is basically there but still sits on Ralfs local disk) and magnetic field effects
  - More realistic model of preamplifier
- What simulations should be done?
  - Redo simulations with updated models and geometry

# Reconstruction - Clusterizer

- Available in the code:
  - Ideal Cluster Task
  - Simple Pixel Cluster Task
  - Simple/Advanced Strip Cluster Task
- Simulations done:
  - Test of functionality
- What is missing in the code?
  - Time information in cluster finder task
- What simulations should be done?
  - Time based clusterization

# Reconstruction – Point Reconstruction

- Available in the code:
  - Ideal Reconstruction Task
  - Charge weighted back mapping
- Simulations done:
  - Point resolution of single hit
  - Energy resolution of cluster
- What is missing in the code?
  - Different reconstruction algorithms (e.g. eta-Distribution)
- What simulations should be done?
  - Hit resolution studies with many events

# Reconstruction – Additional tools

- Available in the code:
  - TimeWalk correction
  - PID with MVD
  - DAQ-Interface for testbeam data
- Simulations done:
  - Time resolution after TimeWalk correction
  - PID capabilities of MVD
  - Analysis of testbeam data
- What is missing in the code?
  - More advanced PID algorithms
- What simulations should be done?
  - PID capabilities with thinner sensors
  - Time based reconstruction

# Reconstruction – TrackFinding

- Available in the code:
  - Ideal Track Finder
  - Riemann Track Finder
  - LHE Track Finder
- Simulations done:
  - Track finding efficiency with different parameter settings for track finders
- What is missing in the code?
  - Different algorithms for track finding
  - Improvement of speed for Riemann Track Finder
- What simulations should be done?
  - Test of new algorithms / parameter sets



# Reconstruction – TrackFitting

- Available in the code:
  - Riemann (Pre-)Fit
  - LHE (Pre-)Fit
  - Kalman Fit
- Simulations done:
  - Track fitting efficiency
  - Momentum resolution
- What is missing in the code?
- What simulations should be done?

# Reconstruction – Vertex Finding / Fitting

- Available in the code:
  - Vertex Fitter as part of Beta
- Simulations done:
  - First preliminary tests done
- What is missing in the code?
  - Improve performance of vertex fitter
  - Different (faster) algorithms (WIP)
- What simulations should be done?
  - Simulation of vertex resolution for different decay points
  - D-tagging, strangeness-tagging

# Reconstruction – Event Reconstruction

- Available in the code:
  - Riemann (Pre-)Fit
  - LHE (Pre-)Fit
  - Kalman Fit
- Simulations done:
  - Track fitting efficiency
  - Momentum resolution
- What is missing in the code?
  - Different algorithms for track finding
  - Improvement of speed for Riemann Track Finder
- What simulations should be done?
  - Test of new algorithms / parameter sets