SoLID Software Framework
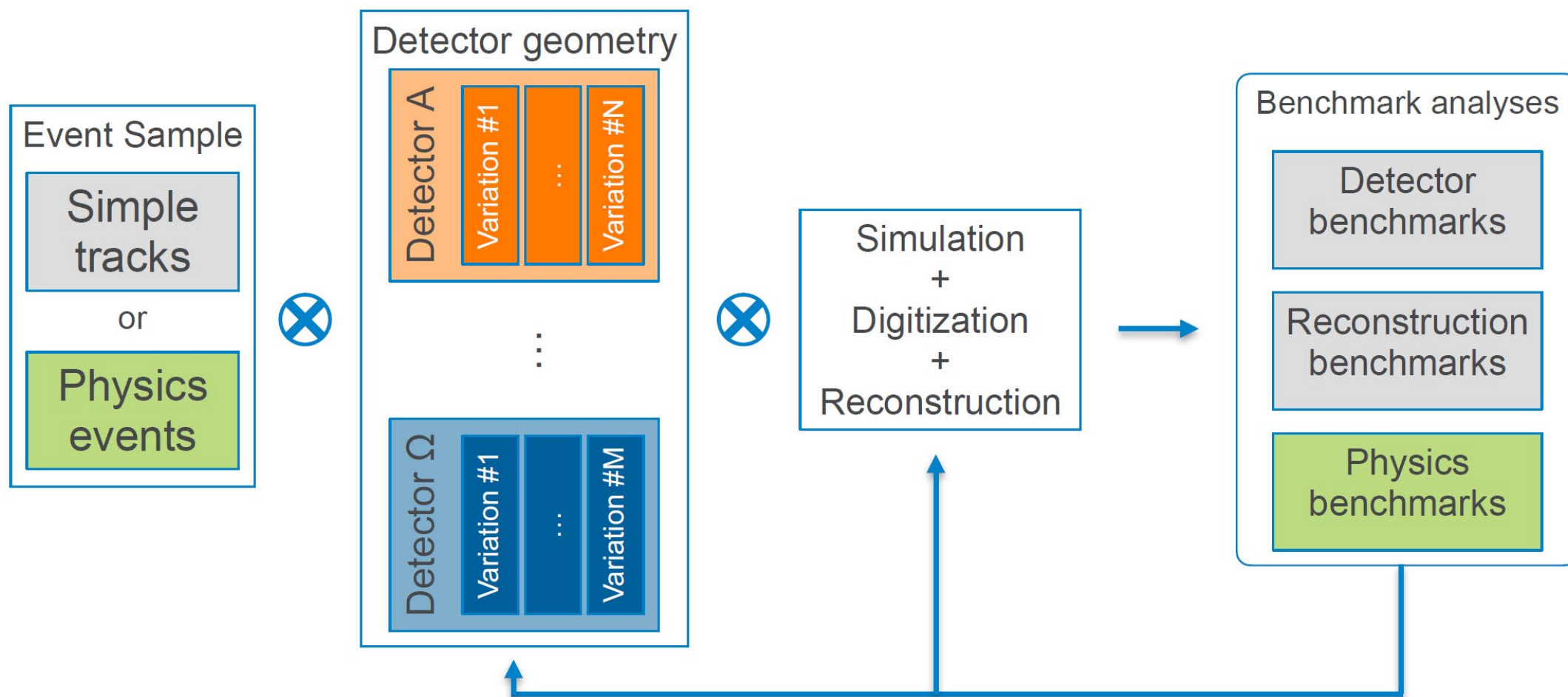
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EIC Software

A modular toolkit for the full chain of simulation – reconstruction - analysis

Using EIC Software for SoLID

- Modern software toolchain
  - Modular, easy for SoLID-specific development
  - Designed to utilize HPC resources

- Mutual Beneficial
  - Share development of digitization/reconstruction
  - Test and implementation of streaming, AI/ML in simulation/analysis

Transition Test to EIC Software

Initiation phase: identify needs of modification

Done

- Geometry description / simulation (DD4Hep)

  It covers all needs, regularly updates the version

- Data Model (edm4eic)

  It most likely covers all needs (calorimeter hits/clusters, tracker hits, Cherenkov hits/clusters, PID info, and etc)

- Reconstruction (eicrecon)

  Need modification to the main branch. SoLIDRecon: using SoLID detectors as the default workflow.

  SoLID specific algorithms/factories can be added as an external plugins.

Transition to EIC Software

Geometry and subdetector simulation/reconstruction
Expect 3-5 months of dedicated work

- DD4hep description of SoLID detector
- Simulation/digitization/reconstruction for each subdetector

Calorimetry: test eicrecon clustering; combine info from preshower and shower

Tracking: test ACTS tracking; benchmark ACTS tracking with the current SoLID tracking

Cherenkov: test eicrecon Cherenkov PID algorithms.

Transition to EIC Software

Integration of subdetectors, full physics simulation
- Integrated reconstruction
- Physics simulation with various event generators
- Noise/background implementation

EIC software is currently at this stage (still an ongoing work)

Light Gas Cherenkov Simulation

https://eicweb.phy.anl.gov/EIC/detectors/solid

Front view

- Detailed geometry description

- Simulation of optical photon tracks and detection
  - Study the mirror setup

- Clustering of the detected optical photons
  - Reconstruction of Cherenkov events
  - N.P.E., and possibly ring shapes
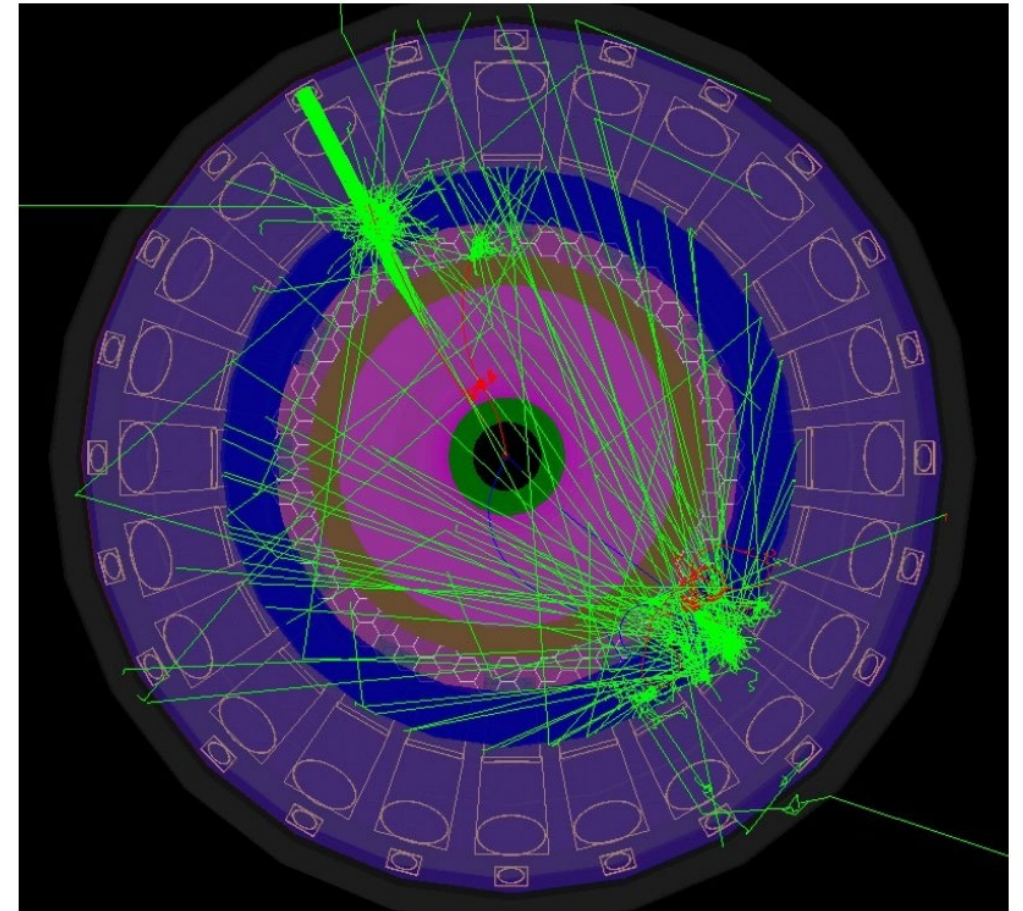
Optical photon simulation

Summary

- Transition to EIC software initiated
  Benefit from the fast development of EIC software
  Modern framework to utilize HPC resources

- Current focus: Geometry description and subdetector simulation/reconstruction
  Calorimeters
  Cherenkov detectors
  Tracking detectors