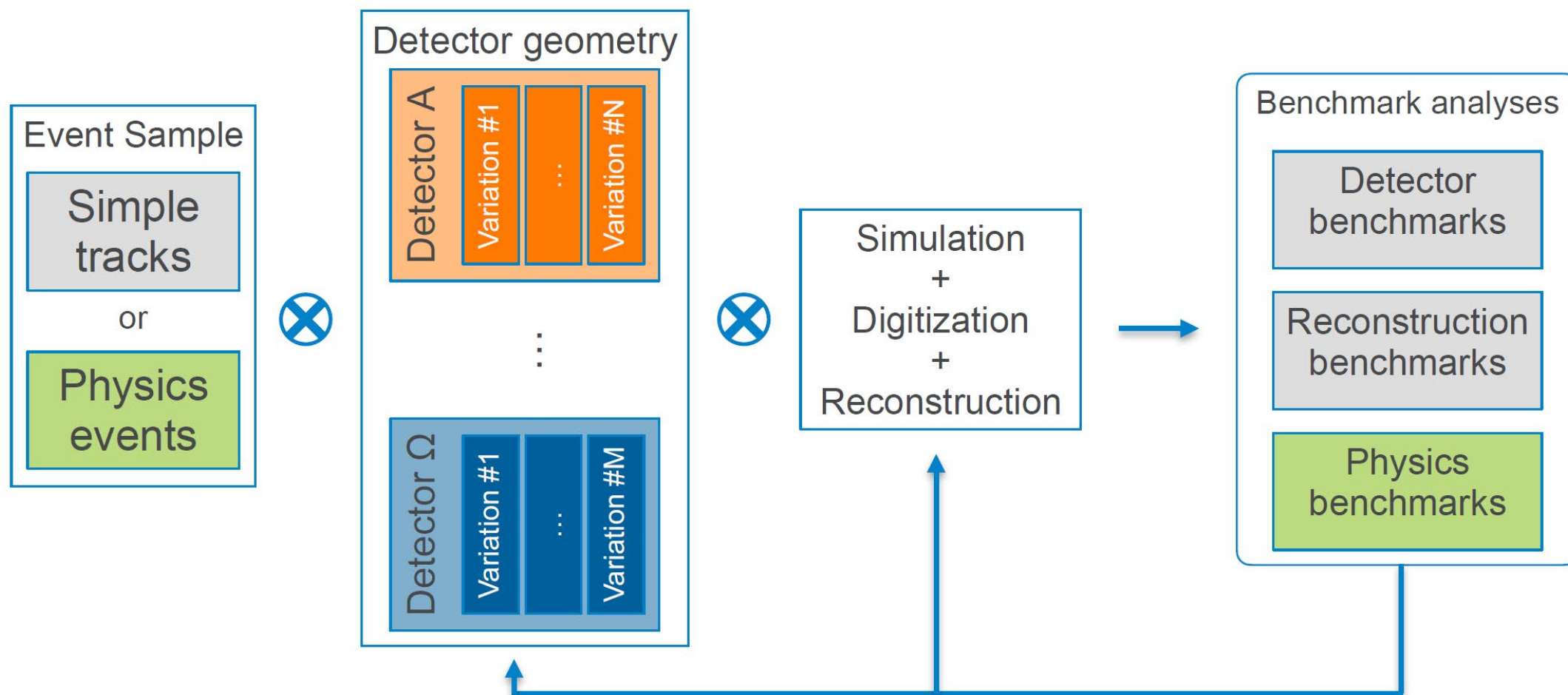


# Using EIC Software for SoLID

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05/09/2023

# 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

Ongoing, with help from Zhiwen Zhao (1 – 2 months)

- Geometry description / simulation (DD4Hep)

Most likely covers all needs

- Data Model (edm4eic)

Includes calorimeter hits/clusters, tracker hits, Cherenkov hits, PID info, and etc

- Reconstruction (eicrecon)

Clustering/ACTS tracking/Cherenkov ring imaging, and etc.

SoLID specific algorithms/factories can be an external plugin.

# 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

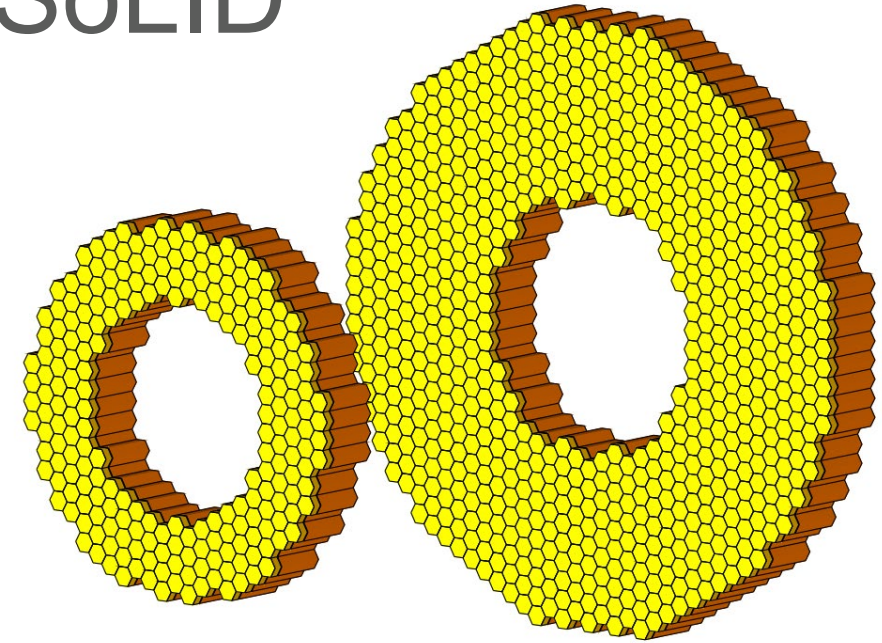
- Integrated reconstruction
- Physics simulation with various event generators
- Noise/background implementation

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

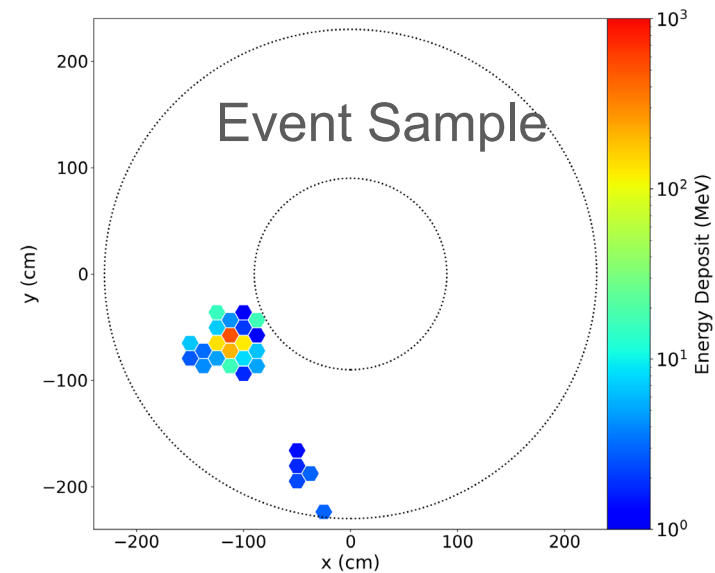
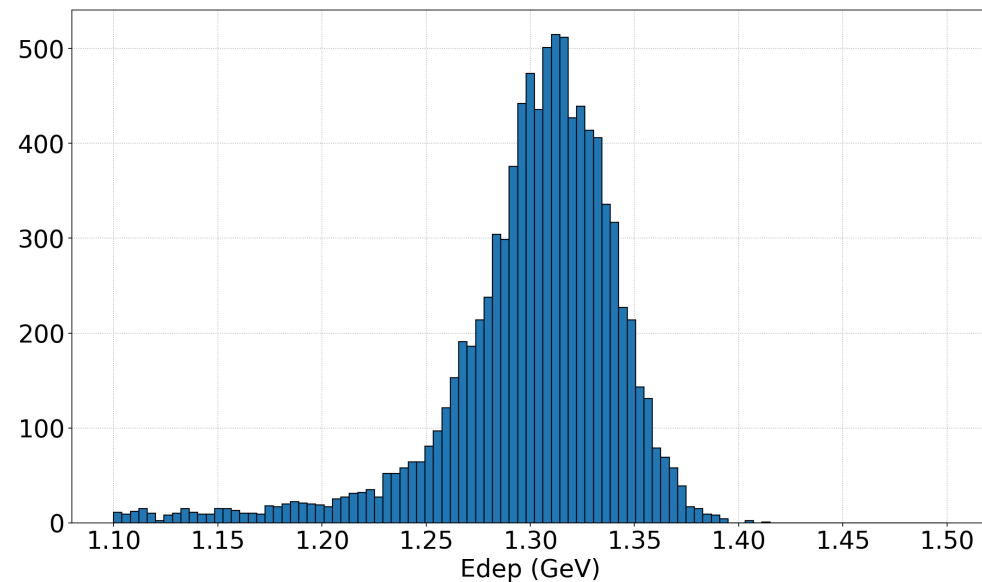
# An Example of EIC Software for SoLID

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

- LAEC + FAEC geometry in DD4Hep
- 5 GeV electrons on FAEC
- Island clustering



Reconstructed Cluster Energy (fsamp = 0.26)



# Summary

- Transition to EIC software initiated  
Benefit from the fast development of EIC software  
Modern framework to utilize HPC resources
- Short-term goal: Geometry and subdetector simulation/reconstruction (start with calorimeters)  
**Calorimeters**  
Cherenkov detectors  
Tracking detectors