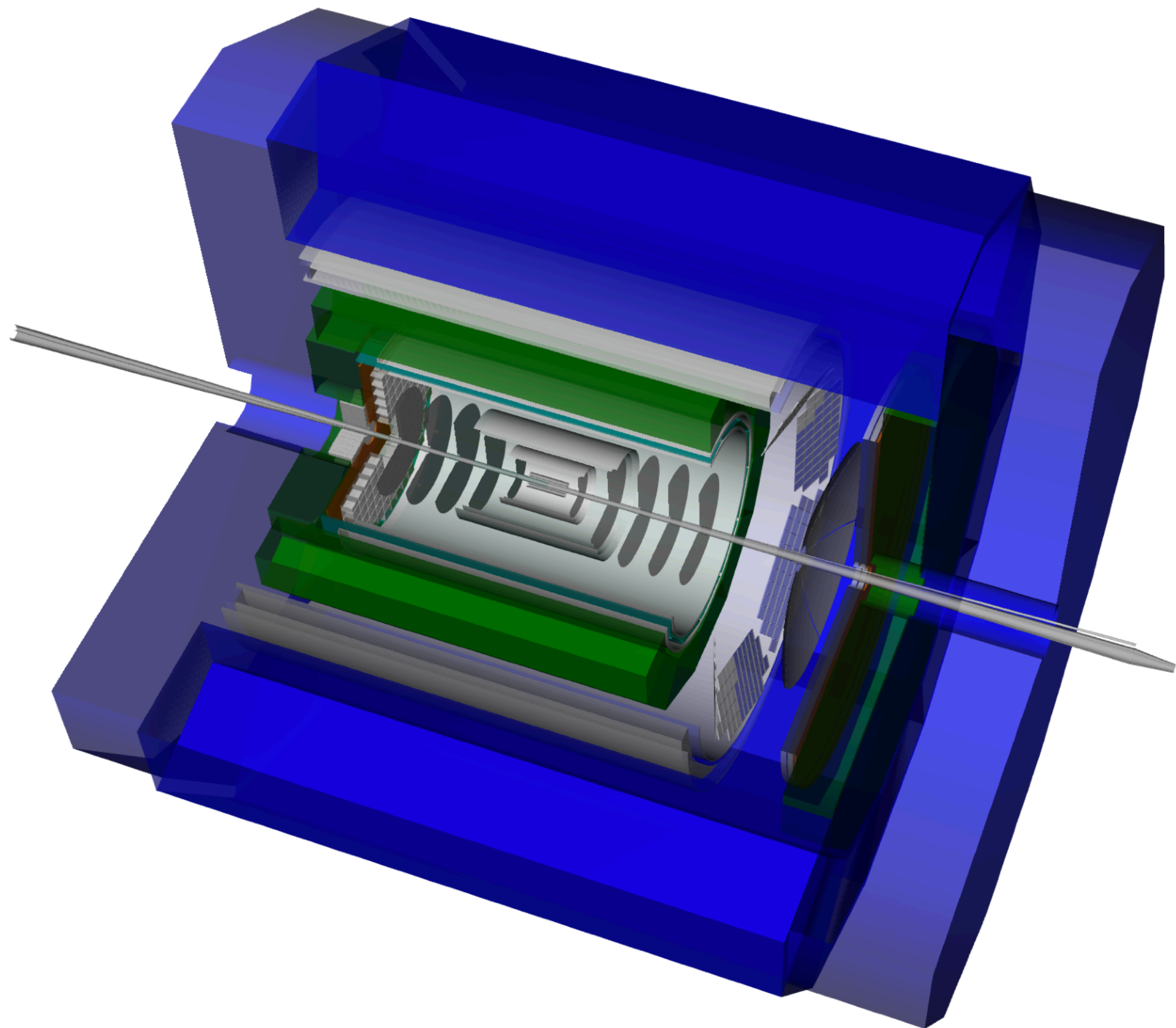


SIDIS Full Simulation

ATHENA Full Detector Simulation



- DD4Hep
- Athena software documentation: <https://eic.phy.anl.gov/ip6/>
- Configurations: [https://wiki.bnl.gov/athena/index.php/Integration#Current Configurations](https://wiki.bnl.gov/athena/index.php/Integration#Current_Configurations)

Field [\[edit\]](#)

- Solenoidal

Barrel B-o.o [\[edit\]](#)

- All-Silicon Tracker (no MPGD)
- HP-DIRC
- EMCAL
- HCAL (Fe/Sc)

Forward P-o.o [\[edit\]](#)

- Si-Disks
- GEM/MMG Layer
- dRICH
- EMCAL (W powder/ScFi)
- HCAL (Fe/Sc)
- B0
- Off-Momentum
- Roman Pots
- ZDC

Backward N-o.o [\[edit\]](#)

- Si-Disks
- GEM/MMG Layer
- mRICH
- iEMCAL (PbWO4)
- oEMCAL (PbWO4*) – SciGlass possible if specs available?
- HCAL (Fe/Sc)
- Low-Q2 Tagger

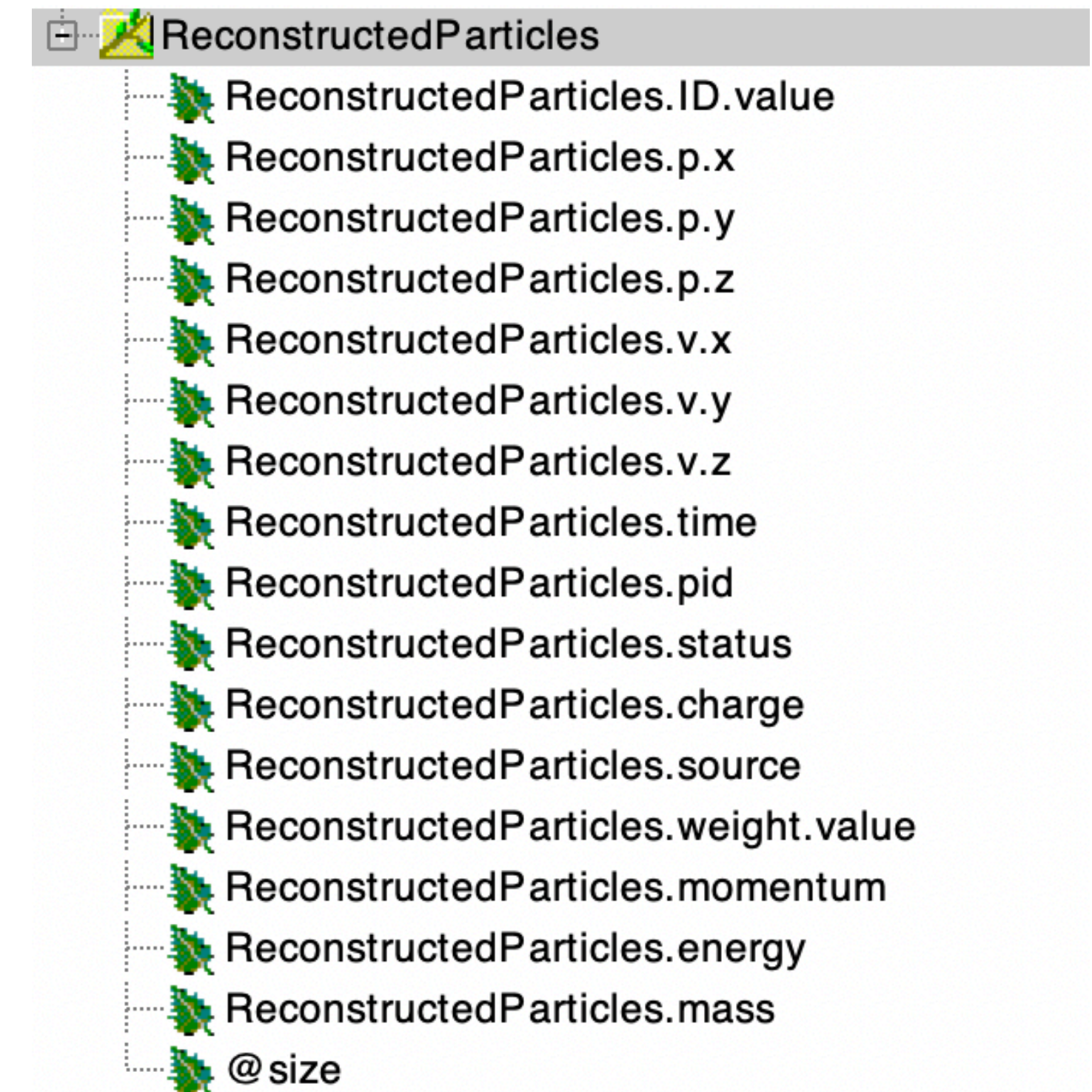
Simulation output

The screenshot displays the MinIO Browser interface. The left sidebar shows the 'eicetest' bucket. The main view shows the directory structure: eicetest / ATHENA / RECO / acadia-v1.0-alpha / DIS / NC / . The right pane shows a list of folders: 10x100/, 10x275/, 18x275/, 5x100/, and 5x41/. A file explorer on the right shows the contents of the 'events;1' folder, including files like mcparticles2, GeneratedParticles, EcalEndcapNClusters, EcalEndcapNClusterInfo, EcalEndcapPClusters, EcalEndcapPClustersInfo, EcalBarrelImagingLayers, EcalBarrelImagingClusters, EcalBarrelImagingClustersInfo, EcalBarrelScFiClusters, EcalBarrelScFiClustersInfo, HcalBarrelClusters, HcalBarrelClustersInfo, HcalEndcapPClusters, HcalEndcapPClustersInfo, HcalEndcapNClusters, HcalEndcapNClustersInfo, outputTrackParameters, and ReconstructedParticles.

- S3 storage: https://eic.phy.anl.gov/ip6/howto/s3_file_storage.html
- (SI)DIS simulation: pythia8 + Detector simulation (DD4hep)
 - currently only tracking and calorimeter information available
 - For different energies and Q2 cuts ($Q2 > 1, 10, 100, 1000$)

AnalysisDD4hep

- Analysis class for the full simulation output, implemented within the common SIDIS software framework
- The idea is to use the existing framework and keep the output format the same (fast simulation, Delphes, DD4hep) for easy comparisons
- Similar to the existing Analysis class (developed for Delphes output), main difference is the event loop.
- Currently:
 - Truth information from mcparticles2 branches
 - Using calorimeter clusters to identify scattered electron (isolation cut, default $R=1$, energy threshold 10% of e beam energy)
 - Other final state hadrons: ReconstructedParticles (PID using truth information)



To be ready for general use:

- Event loop works ok, but debugging the output process (filled the histogram ok if using the simple manual output, see test output in backup slide)
- *fullsim* branch being updated, to be merged into *main* after the output issue fixed
- To-dos:
 - Minor: PID smearing implementation, cleanup, ~~fix hard-coded parameter settings~~
 - Major: track-cluster matching (start with a simple projected position check?)
 - Major: low level distribution sanity checks

Backup

Electron method kinematic reconstruction

