

Modern Software Environments for the Electron-Ion Collider

The Electron-Ion Collider requires highly performant and forward-looking software for simulation, digitization, reconstruction, and analysis. The software environment we are designing now will benefit from modularity and abstraction to allow for evolution over the next decades, as heterogeneous computing on new hardware (GPUs, TPUs) becomes widely accessible. The ATHENA Collaboration has developed and put into production a modern software environment for full simulation, digitization, and reconstruction that builds on several community-supported components developed for the HL-LHC era. The software environment is aligned with the key4HEP project but includes several significant additions for detector types planned at the EIC. As a consistent source of geometry definitions for simulation and reconstruction we have selected DD4hep. Standard output from full simulations in geant4 is stored using the EDM4hep data model based on PODIO. Digitization and reconstruction algorithms are written for the Gaudi scheduler developed for LHCb. Track finding and fitting is performed within the Gaudi algorithms using the combinatorial Kalman filter of the Acts project that originates within ATLAS. This software environment was developed to be easily generalizable to other EIC experiments.

Submitted on behalf of a Collaboration?

Yes

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