

Key4hep/EDM4hep and DPHEP

DPHEP Preparatory Discussion

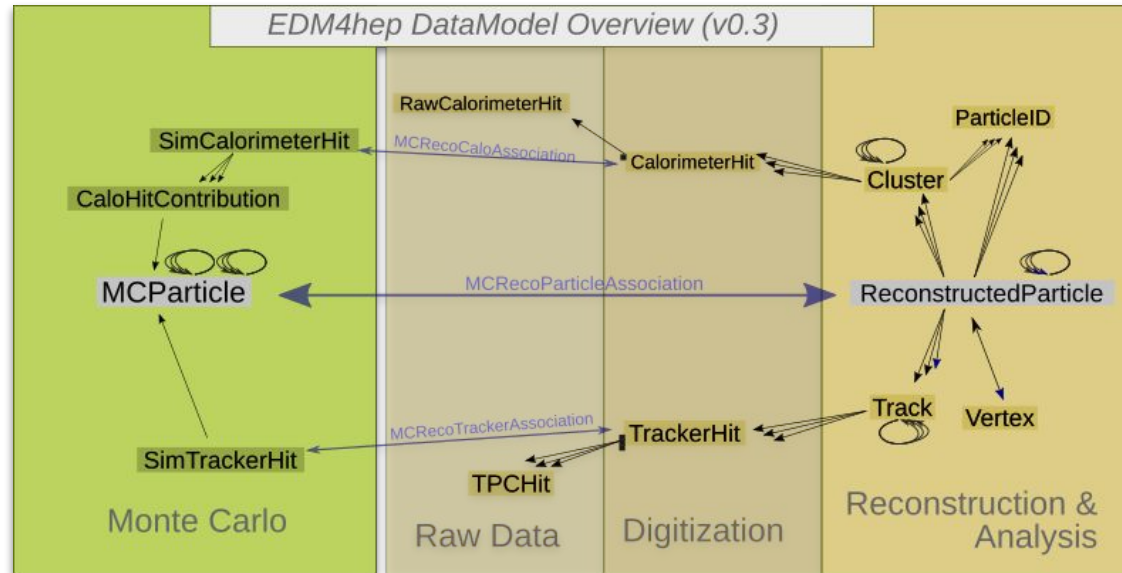
March 2, 2021
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Key4hep: Turnkey Software Stack

- Projects rely/benefit more and more on/from well structured software
 - Frameworks gluing together differently customized tools for specific tasks
 - Scattered but recurring landscape with (often) lots of similarities
- Consensus reached among computing representatives of ILC, CLIC, FCC, CEPC, SCTF (and also LHC) communities to develop a low maintenance, customizable, common turnkey software stack
 - Bologna 2019, Hong Kong 2020; under the HSF umbrella
 - Part of the CERN EP R&D initiative and AIDAInnova
- Key4hep design goals: easy to use, set up, deploy, extend
 - One framework (Gaudi)
 - Connection to all relevant HEP (ROOT, Geant4, ...) and external packages (Boost, ...)
 - Use already developed common tools (Podio, DD4hep, ...)
- Organic interoperability requires common Event Data Model
 - Not just a bunch of packages

EDM4hep: the common language

- The Event Data Model describes the structure of the data
 - Challenge: can we have the same for all HEP experiments? LCIO shared by ILC and CLIC
- Heavily inspired by LCIO and FCC-edm



key4hep / EDM4hep status

- **Actively developed: key4hep GitHub project, doc**
 - Tagged versions distributed with Spack (on /cvmfs/sw.hsf.org) and part of LCG stacks
 - Regular weekly meeting, 10-15 participants, co-chaired CERN/DESY
 - At CERN hosted in SFT: 2 full time EP R&D fellows, fraction of staffs
- **Core components progressively available**
 - k4FWCore: Gaudi package providing data service
 - k4SimDelphes: fast parametrized simulation with EDM4hep output
 - Heavy used for early FCC-ee design and physics potential studies
 - Port of physics, full sim and reco modules on-going
 - k4Gen, k4SimGeant4, k4RecCalorimeter, ..., k4ActsTracking, k4Pandora, ...
- **Concrete progressive migration plan for all major stakeholders**
 - Rebasing of FCCSW, CEPCSW
 - Initial use of MARLIN-Gaudi wrappers for ILC, CLIC
- **Three contributions to vCHEP2021**

key4hep / EDM4hep and DPHEP?

- Key4hep / EDM4hep: framework with longer perspective than a single experiment
 - Not just *another data format*, but one that might become a standard
- Requires “migration”, which may be a pain or not even possible
 - Workpower / Experts missing
 - *Encapsulation* may help here, both for migration and validation
- For LEP data, FCC-ee may provide a unique opportunity
 - Share to center-of-mass energies: 91.2 GeV, 160 GeV
 - Clear advantage in looking at what real data look like to understand bottle necks and limitations
 - Possible student projects
 - ALEPH: early investigations promising
 - ALPHA++ provides the relevant code for migration
 - Several ALEPH *experts* involved in FCC-ee studies