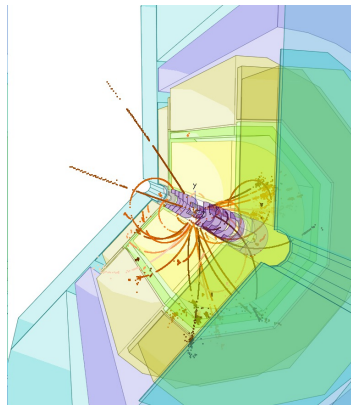


DESY contributions to AIDA++

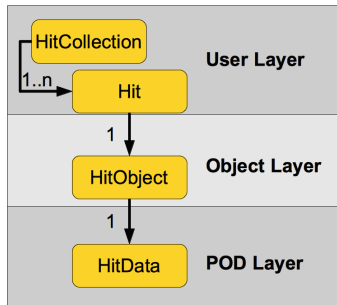
F.Gaede, DESY

AIDA++ WP3 Meeting, CERN, 17.6.19

- should try to have a good mix (~50:50) of continuation and new activities in AIDA++
- continue what worked nicely and has relevance for the community
- we have a number of potential tasks and work items, where DESY would want to participate:
 - might not be able to do all - depends on interest from other partners
- PODIO/EDM4Hep
- ACTS
- DD4hepFastSim
- MarlinMT



- PODIO is the EDM toolkit developed in AIDA2020
 - based on the use of **PODs** for the event data objects (**P**lain-**O**ld-**D**ata object)
 - PODIO originally developed in context of the **FCC** study
 - demonstrated potential application to **LC** with *pLCIO*
- identified as candidate in *turnkey sw stack*
- clearly should be continued in AIDA++
- strong interest also from G.Stewart, CERN

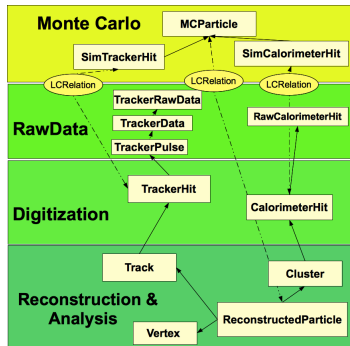


- further optimization of I/O implementation
 - with respect to store data as struct of arrays for GPU et al
 - wrt. actual I/O performance (POD optimized Storage in ROOT ?)
 - investigate use of **Apache Arrow** for this
- add additional I/O formats ?
 - at least need to finalize/optimize HDF5, ROOT and SIO
 - ideally formalize the addition of different backends
- could also think about adding *wire-formats*
 - using *ZeroMQ* ?

- implementation of schema evolution
 - mandatory feature for any realistic implementation
 - needs to be implemented efficiently and transparently for the users

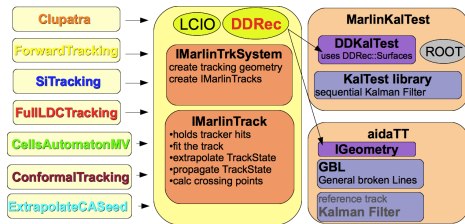
- integration of EUDAQ data in PODIO files
 - would offer nice *cross link* to DAQ-WP
 - interest also from D.Cussans, UBristol

- develop a *common EDM for HEP* as basis of *turnkey software stack*
- need to fulfill the need for most/all of the planned future colliders
- implement **EDM4Hep** in PODIO
- based on a modernized LCIO-EDM
 - LCIO-EDM successfully used for more than 15 years
 - keep what worked well and modify *rough edges*
- integrate in current ILC, CLIC, FCC (and CEPC) software frameworks



<http://lcio.desy.de>

- developed generic tracking toolkit *MarlinTrk* in AIDA/AIDA2020 projects
 - based on the **LCIO-EDM** and **DDRec** geometry description used by ILC, CLICdp and CEPC
- plan to also implement **ACTS** as fitter in *MarlinTrk*



- vital interest to stay involved in development of ACTS and other tracking tools in context of *turnkey software stack*
- potential contributions:
 - porting of existing pattern recognition algorithms
 - interface ACTS to *EDM4Hep*
- other interested partners: LAL, CERN, ... ?

- fast simulation is a promising new topic in AIDA++
 - need for fast simulation increasingly important for LHC experiments but also very useful for future collider studies
- need of a variety of fast simulation tools in *turnkey software stack*

- possible contributions from DESY:
- fast tracking simulation w/ realistic material effects (energy loss and multiple scattering) based on *DDRec* tracking surfaces
 - porting of existing Fortran code in *SGV*
- fast shower simulation with ML techniques (WGANs etc) for highly granular calorimeters
 - recently started a Helmholtz Innovation Pool project (AMALEA) on this
 - nice synergy w/ corresponding task in AIDA++

- have introduced parallelization to the Marlin framework in AIDA2020
- Marlin currently used by CLICdp, ILC, CEPC, and many test-beam projects/collaborations: Calice, LCTPC, EU Telescope, . . .
- agreed to have Marlin as *alternative framework* next to Gaudi in the *turnkey software stack*
 - necessary, at least for a reasonable transition period
- potential work items in a *Framework Task* preparing the transition from Marlin to Gaudi:
 - port Marlin features to Gaudi, e.g.
 - self documenting *module parameters*
 - auto creation of *steering files*
 - consistency check for data collections
 - . . .
- other partners interested in a Framework Task ?

- from DESY we have a number of potential tasks and work items, where we would want to participate:
 - PODIO/EDM4Hep
 - ACTS
 - DD4hepFastSim
 - MarlinMT

- depending on interest from other partner we should try and put together EOIs for these

Comments/Questions ?