A SINGLE SOLUTION TO DETECTOR DESCRIPTION IN HEP

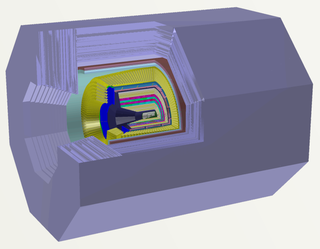
DD4hep

Detector Description Toolkit for High Energy Physics

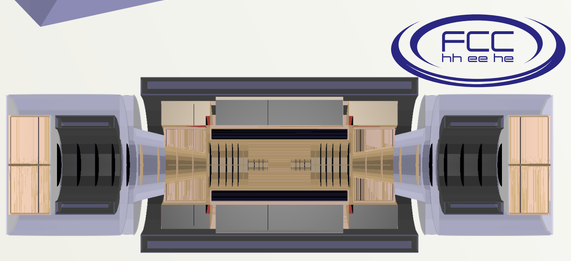
http://dd4hep.cern.ch

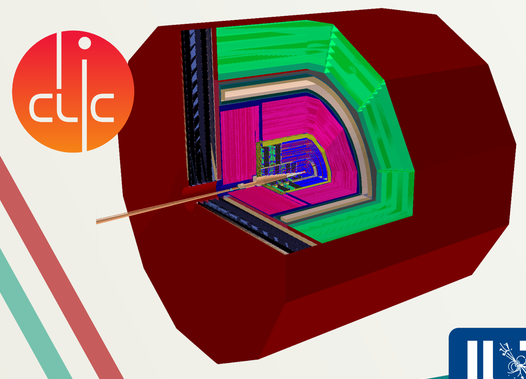
Introduction

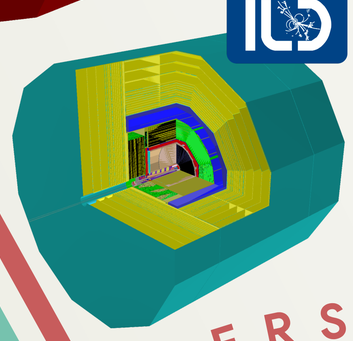
- Complete Detector Description
  Providing geometry, materials, visualization, readout, alignment, calibration...
- Supports full experiment life cycle
  Concept development, optimization, operation – easy transition stages
- Single source of information
  → consistent description
  Use in reconstruction, simulation and analysis, etc.
- Licensed under:
  LGPL Free Software
  Free as in Freedom



SCT@China



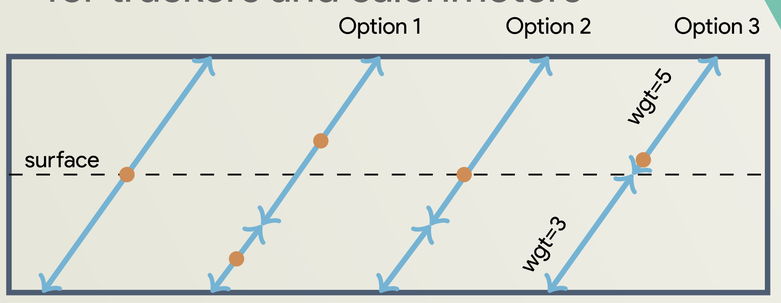




USERS

Plugins

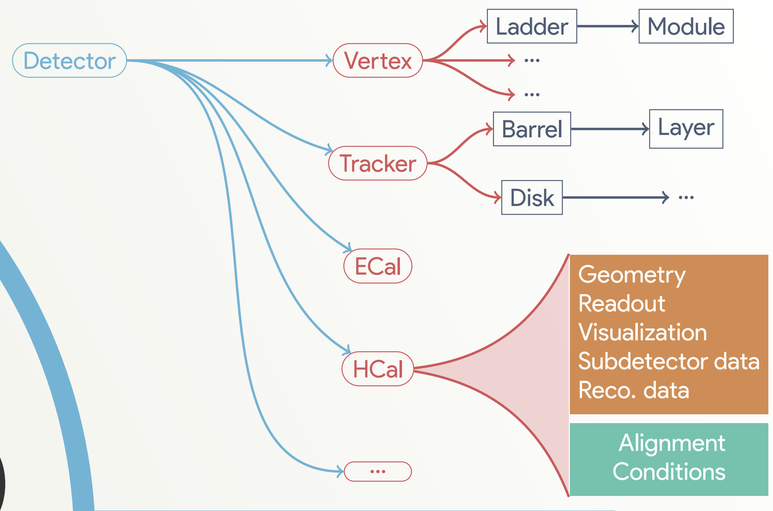
- Factory mechanism to instantiate implementations of abstract interfaces
  Providing palette of most 'common' sensitive components for trackers and calorimeters



- Several IO handlers: LCIO, ROOT StdHep, HepEvt, HepMC

Detector Description

- Description of a tree-like hierarchy of detector elements
- Detector Element describes:
  Geometry, environmental conditions... and **extensions**



Conditions Alignment

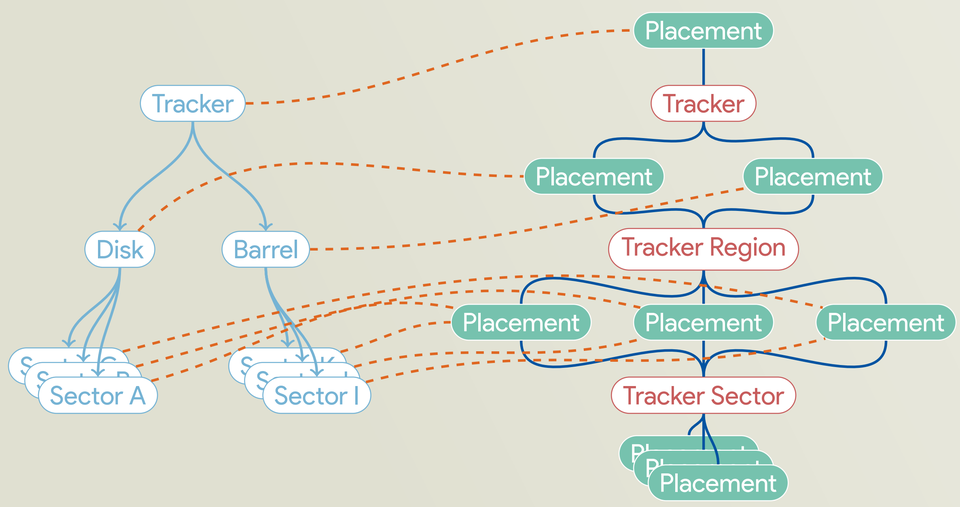
- Provides access to consistent set of values to a given time and accompanying data
- Supports for hosting alignment results and application to geometry
  Global and Local (mis-)alignment
- Supports multi-threading

DDG4

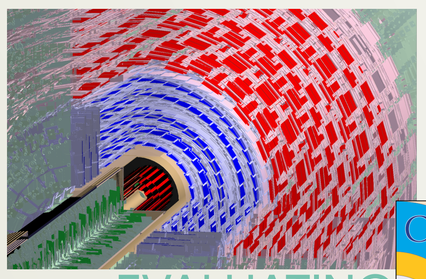
- In-memory translation of geometry TGeo → Geant4
  Materials, solids, limit sets, regions, logical volumes, placed volumes and physical volumes
- External configuration via plugin mechanism
  Supports configuration via XML, Python or ROOT-AClick
  Property mechanism to configure plugin instances
- Use plugin mechanism to configure: Generation, Event Action, Tracking Action, SensDetector, PhysicsList...
- Provides out of the box MC truth handling w/o record reduction

Detector Element Tree vs. Geometry Hierarchy

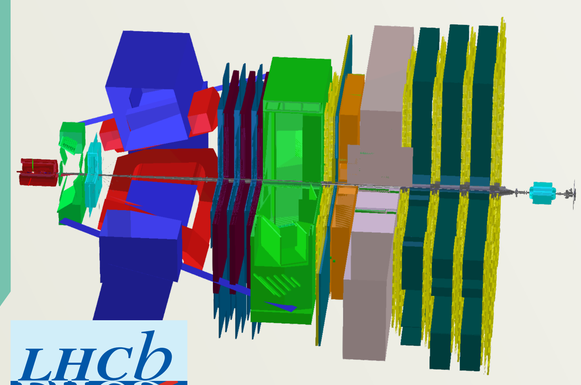
- Logical Volumes used to build geometrical hierarchy
  geometry part delegated to the ROOT classes
- Relationship between DetElement and placements through full path from top of geometry
- DetElement tree is fully expanded
  each DetElement is placed only once in the DetElement tree



LHC USERS



EVALUATING



LHCb APPROVED

FOR SIM RECO ANALYSIS AND VISUALIZATION

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