

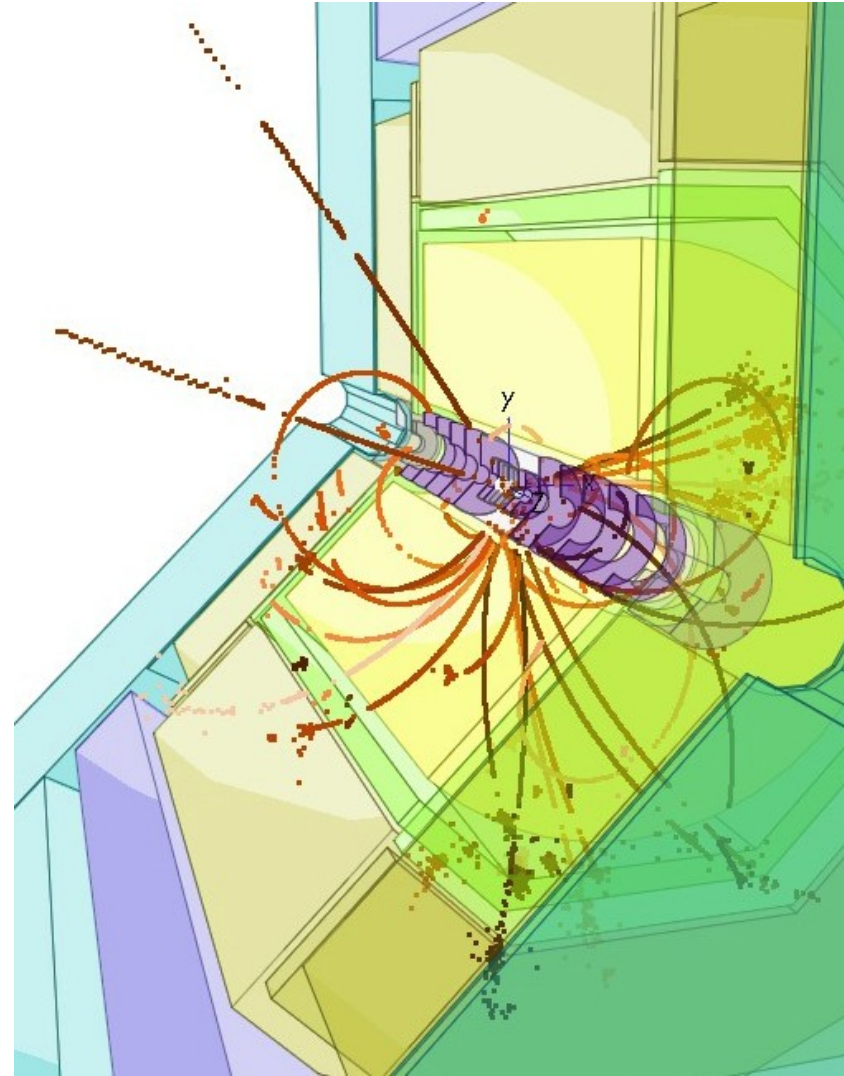
# iLCSoft

## Status and Plans

Frank Gaede, DESY  
ILD Workshop 2013  
Krakow, Sep 24-28, 2013

# Outline

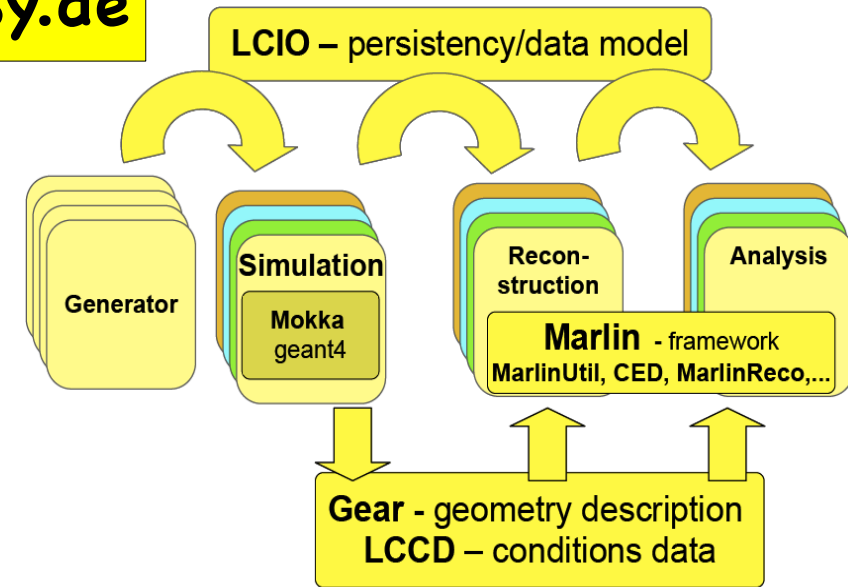
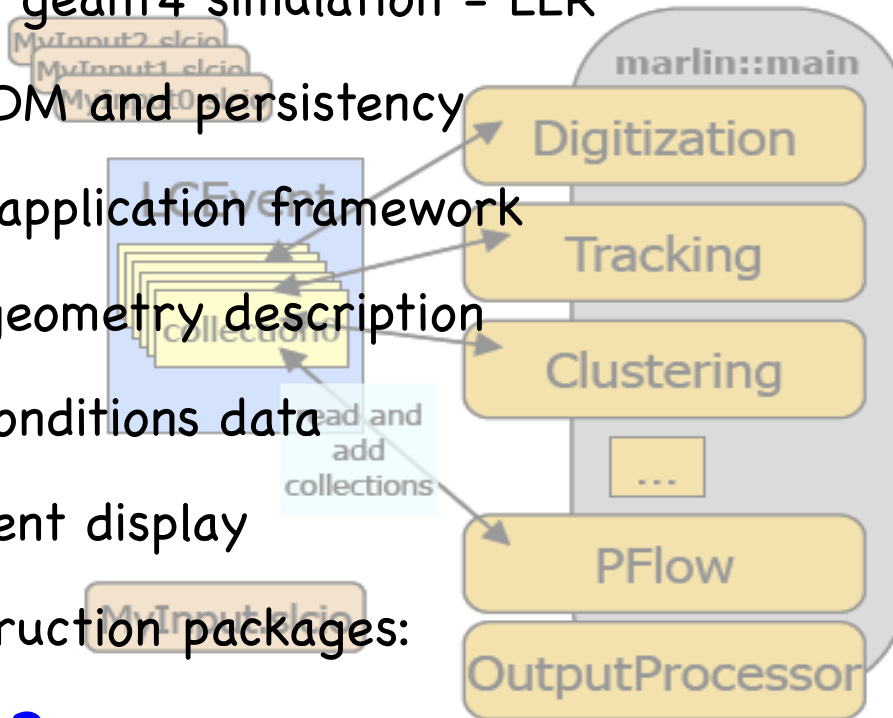
- Overview of iLCSoft
- Recent Developments
- broader (non-ILD) context
- new geometry description
- Summary & Outlook



# iLCSoft framework - Overview

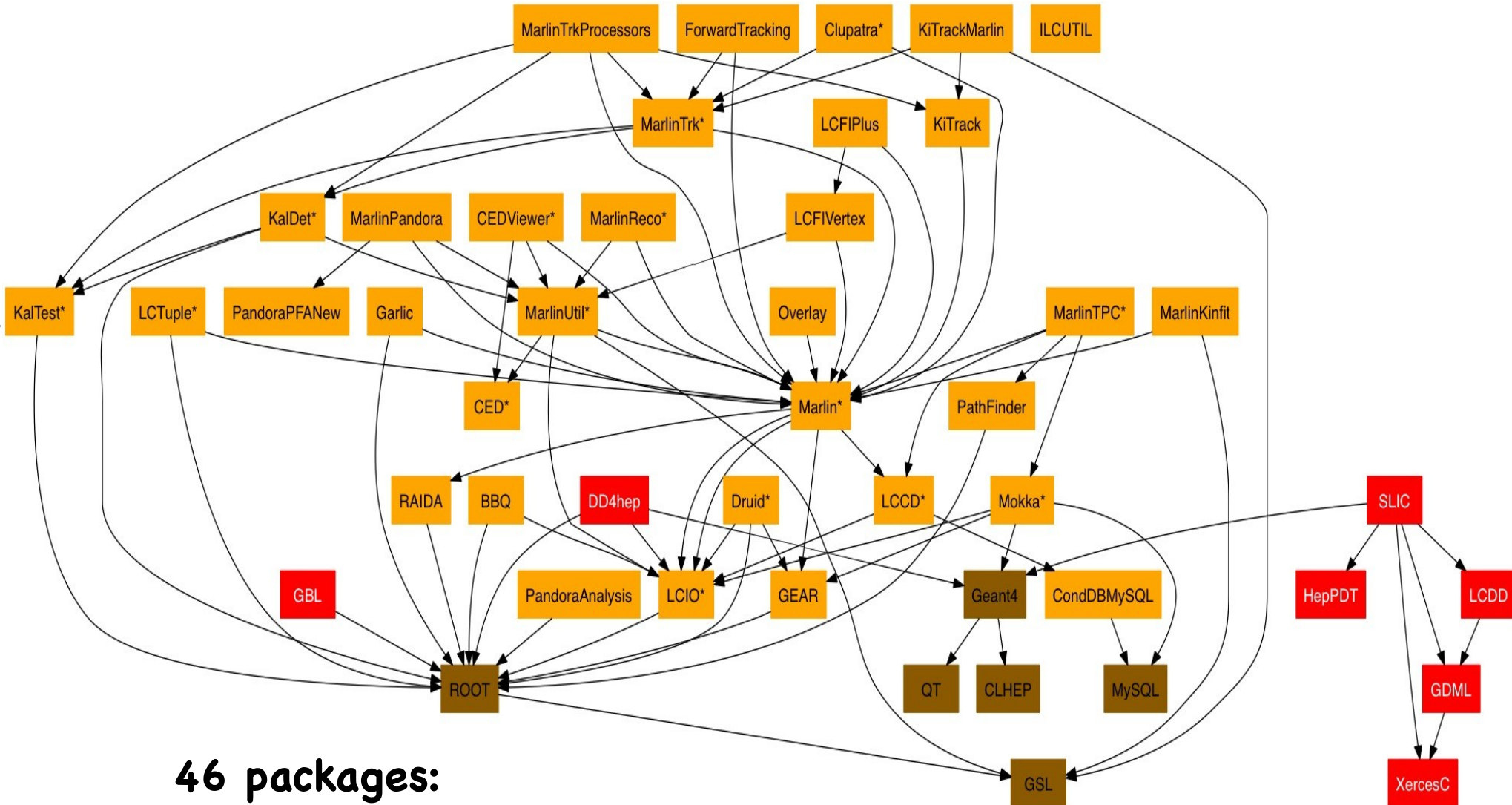
<http://ilcsoft.desy.de>

- **Mokka** geant4 simulation - LLR
- **LCIO** EDM and persistency
- **Marlin** application framework
- **GEAR** geometry description
- **LCCD** conditions data
- **CED** event display
- reconstruction packages:
  - **MarlinReco**
  - **MarlinTrk, Clupatra, ForwardTracking,...**
  - **MarlinPandoraPFA**
  - **LCFIVertex, LCFIPlus**
  - **MarlinKinFit**
- many more (see next slide)



- complete sw framework used in Monte Carlo & 'real experiments':
  - **ILD & CLIC** detector concept studies
  - **Calice, LC-TPC, EUTelescope** testbeams
- partly also used by **SiD**

# iLCSoft packages in release v01-17-03



**46 packages:**

**8 external (non-LC)**

**6 added since v01-16 (post DBD)**

**\*updated since v01-16**

# pre-DBD activities in iLCSoft

- the timeline for iLCSoft developments since LOI (2008) was driven by the requirements for the ILD-DBD
- successfully used to produce  $O(10^7)$  fully simulated and reconstructed Monte Carlo Events

- **improved/adapt core tools**

- LCIOv2, GEAR, CED,...

- **improved realism of the simulation**

- include gaps, imperfection and services - (ILD\_oX\_v05 models)

- **complete re-write of tracking code**

- improvements and re-write of reconstruction algorithms

**PandoraPFA** and **LCFIVertex/LCFIPlus**

- developed and used **GridProductionSystem**

- **-> where to go from here ?**

# ...continue to extend & improve iLCSoft

- new packages added to iLCSoft:
  - GBL: General Broken Lines (C.Kleinwort, Ch.Rosemann)
  - **DD4hep**: Geometry description (M.Frank, P.Mato)
  - SLIC, XercesC, HepPDT, GDML, LCDD (J.McCormick)
- many packages updated in recent developers releases v01-17-0x
  - many (small) new features, bug fixes (e.g identified by coverity static code checker)
- some highlights:
  - added python bindings to LCIO (C.Grefe)
  - partial reading of LCIO files ( considerable I/O speed improvement)
  - **pyced**: interactive version of CED event display (t.b.r in v01-17-04)
  - port Clupatra to work w/ real test beam data
  - CED autoshot feature (A.Miyamoto)

# ... put iLCSoft in broader context

- general agreement among LC concept working groups that the only way forward is **to move to common software tools**
- process already started after the LOI with:
  - Software Common Task Group
  - many common tools used by CLIC, ILD and SID:
    - LCIO - common EDM provides base for common tools
    - geant4, PandoraPFA, LCFIVertex/LCFIPlus, Root
- loose series of Linear Collider Software Meetings at CERN with software experts from **CLIC, ILD and SiD**:
  - 2009, 2012 and 2013

# LC Software Meetings

- in closeout of 2012 meeting reached general consensus to work towards
  - a common simulation application based on the geometry description developed in AIDA WP2
  - a common C++ tracking package in the context of AIDA WP2
- meeting in early 2013
  - <http://indico.cern.ch/conferenceDisplay.py?confId=228477>
- discussion focused on the details of how these goals can be achieved
  - interface between geometry description and simulation
  - interface to reconstruction (tracking)
  - -> decision to develop prototypes to investigate options
- agreement to use **DD4hep** as geometry tool



# DD4hep - new geometry tool

- **DD4hep** common detector

geometry description

- developed by CERN

(SFT/LDC groups)

in AIDA WP2

- export of geometry to

- geant4 applications

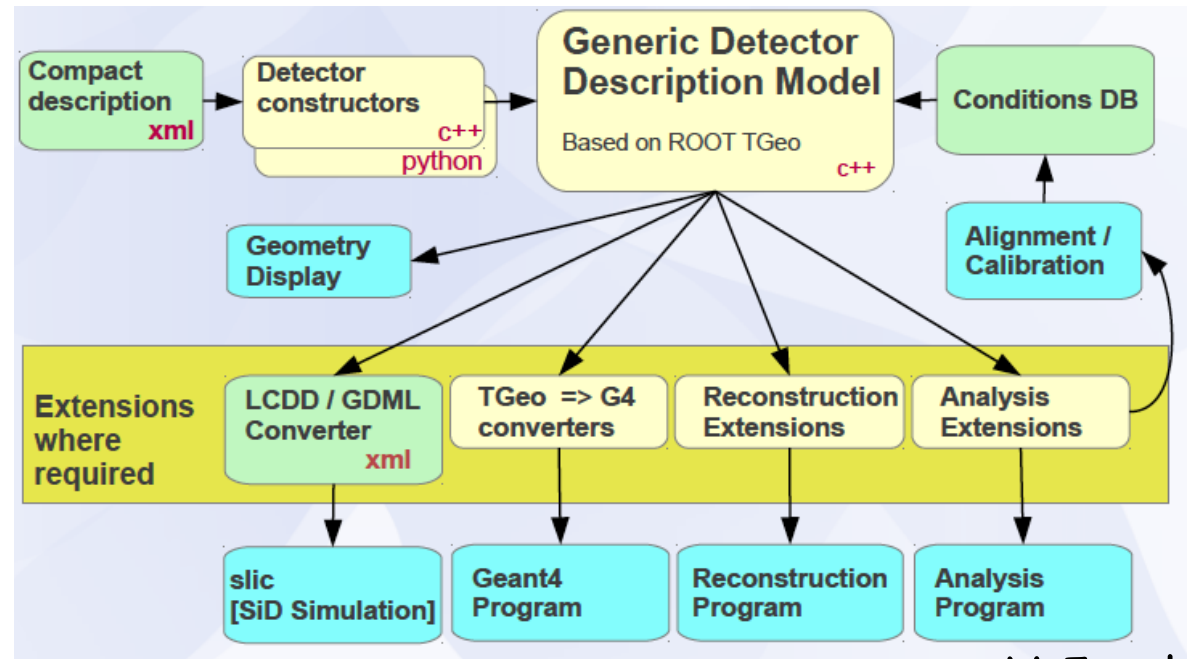
- reconstruction code (API !?)

- event displays

- midterm goal:

all concept working groups use **SLIC** simulation

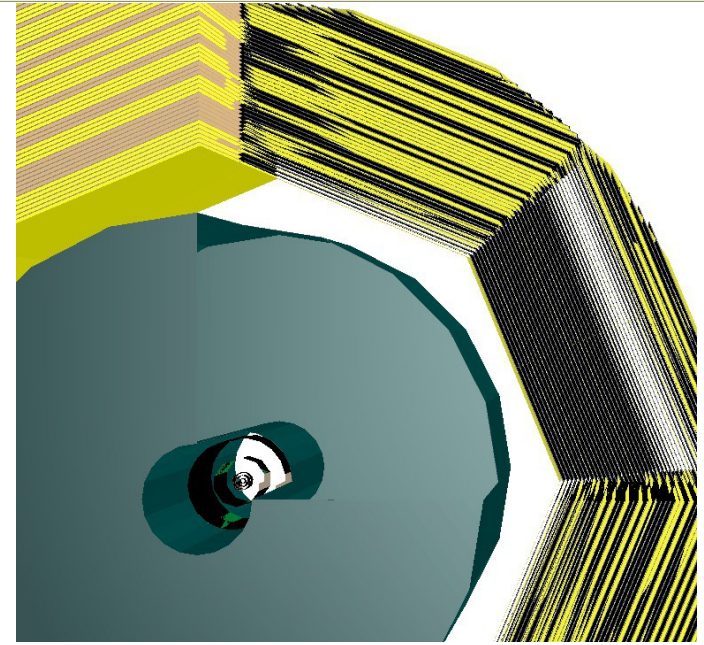
- -> need transition phase for ILD to port current **Mokka** simulation models to DD4hep



M.Frank

# DD4hep overview & status

- goals for DD4hep:
  - full detector description
  - full experiment life cycle
  - consistent description
  - ease of use
- DD4hep is based on best concepts from existing geometry tools:
  - xml files with parameters and compact description
  - C++ drivers per sub detector
  - use TGeo to implement geometry hierarchy and navigation
- releases:
  - v00-04 in ilcsoft v01-17-03
  - since then restructured build system and examples - t.b.r.



- developed simple prototypes:
  - **ILD: VXD, SIT, TPC, AHcal**
  - Calice test beam
  - CLICSiD
- use to study technical issues:
  - cellIDs, detector segmentations, **sensitive detectors**
  - interface to reconstruction

# DD4hep and Mokka

- Mokka support at LLR has been reduced
  - main developers and maintainers moved on to other tasks
  - some continuation of support provided
- considerable work has gone into the geometry description (SubDetectorDriver) of the current ILD (and Calice) models  
-> need to preserve this work

- current idea of transition phase (FG, VB, EB):
  - use limited manpower to *'clean up'* : keep only models currently used
  - replace MySQL data base with DD4hep compact xml files for these
    - possibly auto-generated w/ mysqldump
  - port relevant drivers to DD4hep (replace mysql queries w/ xml parsing)

## • issues

- technical challenges, e.g. sensitive detectors...
- **who will be doing this** ( the R&D - Mokka liaison people !?)
- is this what we really want and need for the planned ILD optimization studies -> see discussion at end of session

# Summary & Outlook

- development activities in iLCSoft framework in the last 2-3 years where driven by preparation for the ILD DBD
  - improved realism in simulation and performance of reconstruction tool
- first developers release(s) since then provide new features in core tools and some new packages
- work towards a **common simulation and reconstruction framework for Linear Collider** studies
- main activity wrt ILD core software framework: move to **DD4hep** and **improved simulation models for ILD**
- non-negligible amount of work given the available manpower
  - -> need to get this right
  - -> discussion at the end of session