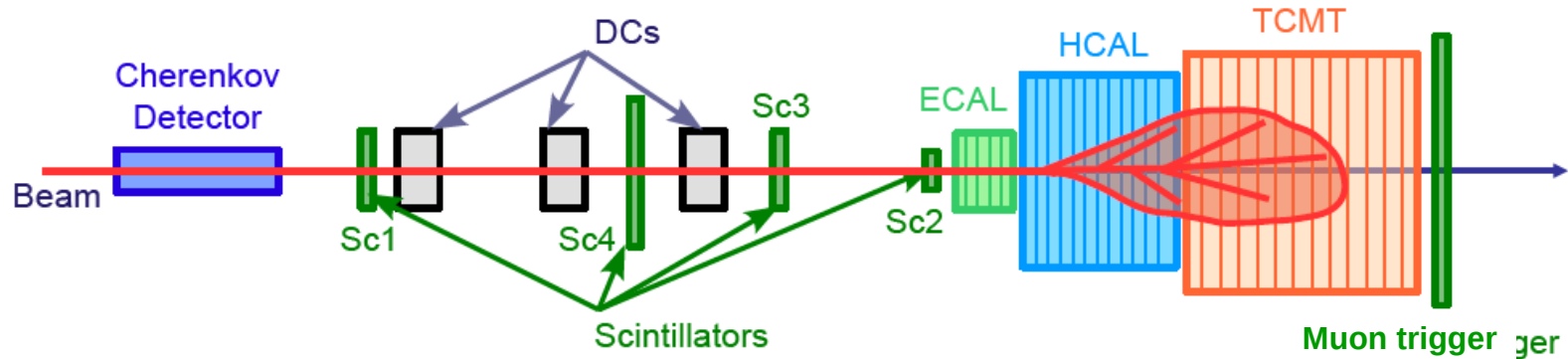


Reconstruction and analysis for digital calorimeters and CALICE off-line computing

Niels Meyer, DESY
DHcal Meeting, Paris
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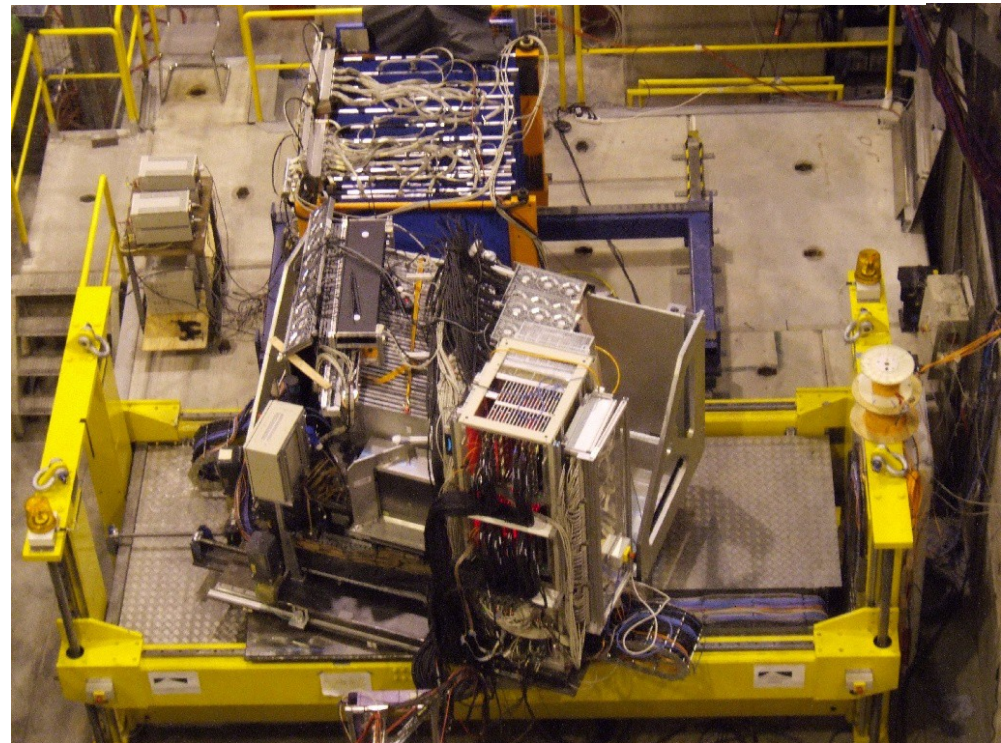
Combined Test Beam



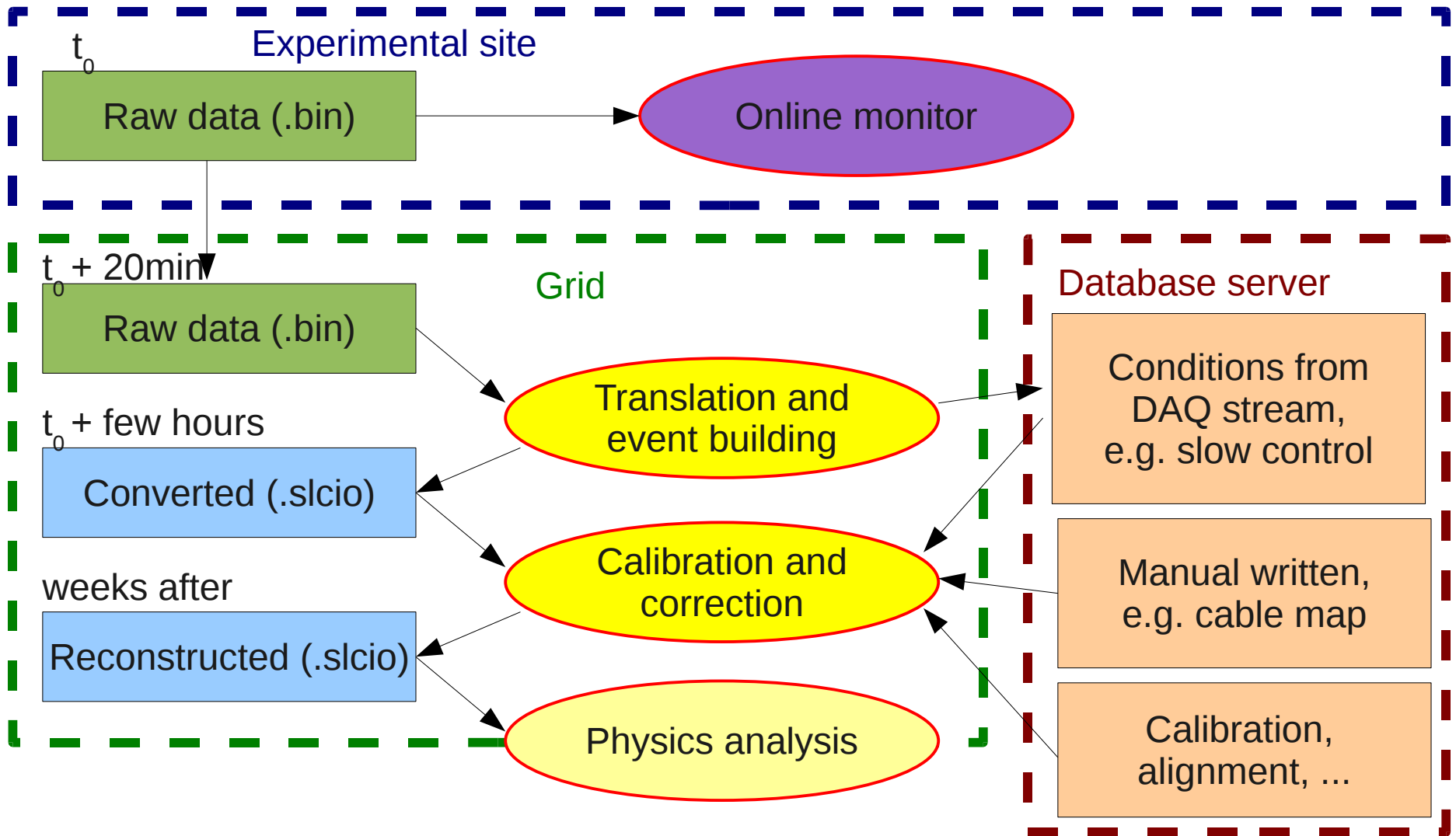
Combination of varying sub-detectors at changing beam-lines including trigger and tracking

Off-line computing aim: provide transparent platform for analysis

Don't forget ILC detector

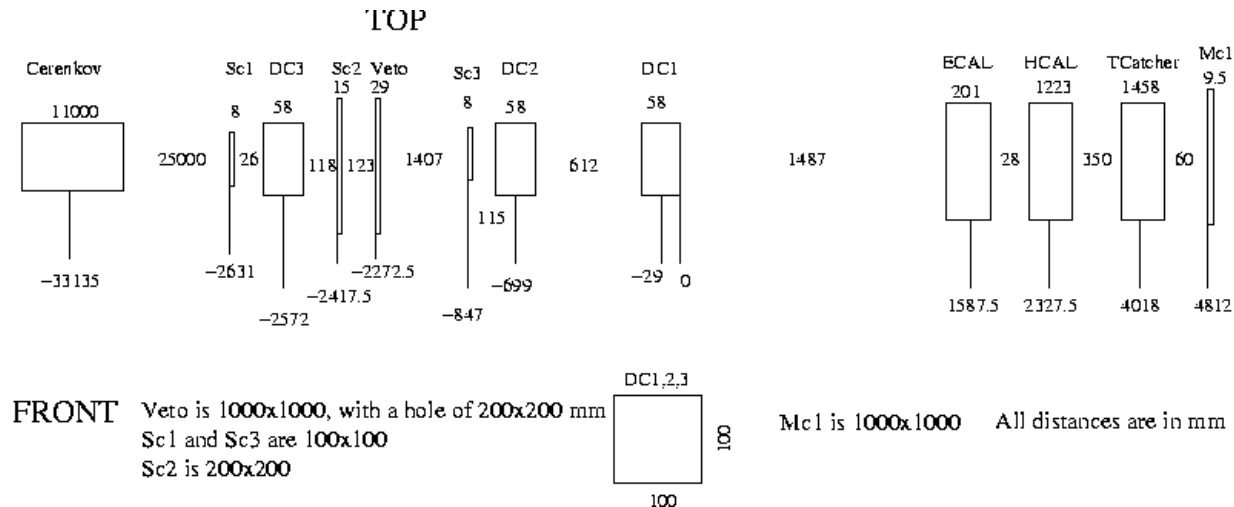


- Most data treatment uses common software tools:
 - Data storage: LCIO
 - Data processing: Marlin
 - Conditions handling: LCCD + MySQL database
 - Grid computing to handle large data volume and to have access to large computing power
- Few aspects implemented 'CALICE-only'
 - Online data format
 - Tracking (two independent coordinates)
 - Geometry (mostly implicit, no general interface)



- Binary data format: DAQ-motivated and time-tagged data containers ('records'), no time ordering
- Raw LCIO files: CALICE-specific classes implementing `lcio::LCGenericObject` corresponding to DAQ data records, bundled to events
- Database: classes similar to those of raw LCIO files, whose information is valid longer than one event
- Reconstructed LCIO files: standard LCIO classes for calorimeter data, CALICE-specific for tracking. Some CALICE conventions apply for units and cell ID encoding

- Detailed shower simulation including beam instrumentation using MOKKA/Geant 4



- Digitization using LCIO/Marlin/LCCD; partially identical reconstruction for data and MC; partially using digiSim
- Hot topic: Independent geometry description in data (LCCD-based conditions) and MOKKA (special database for free parameters)

Learning from the Past

- Reconstruction done independently by sub-detectors to large extent \Rightarrow wasted synergies, no coherent software design
- Geometry description implicit or not general enough \Rightarrow no common tools (e.g. event display), hard to offer synergies to new sub-detectors, hard to transfer knowledge beyond test-beam
- Data stream contains all information, but analyzers have to collect it with expert knowledge \Rightarrow slow progress, unnecessary source of frustration and waste of man-power
- Lack of documentation \Rightarrow s.a. plus loss in experience

- There is a group of contacts for each sub-detector, please consider nominating somebody
- More or less regular meetings, announced over the CALICE-SW mailing list. Open to anybody!
- Tasks: maintain existing code and discuss further developments (hardly enough personnel to cover the prior)
- Plans for general geometry framework; ideas, expertise, and help highly appreciated
- CALICE software web-page:
<https://twiki.cern.ch/twiki/bin/view/CALICE/SoftwareMain>

- Digital is not analog
 - Synergies and comparison between digital and analog
 - # of channels \Rightarrow storage size \Rightarrow new data structure?
- Digital is digital and almost semi-digital
 - Think and talk about similarities and differences between digital HCal, semi-digital HCal, digital Ecal
- Often, this does not matter at all
 - By chance, this applies to most software issues
 - We benefit a lot from general ILC software, but we have few common tools beyond