Full simulation Integration for CDRs

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Full Simulation options

Geant4 based, different framework environment:

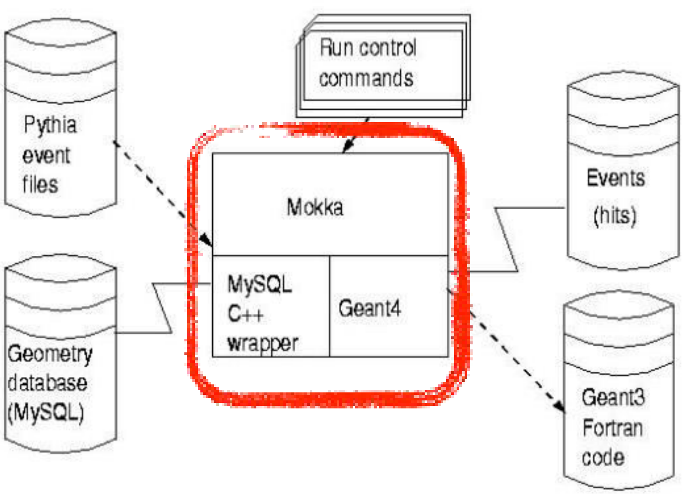
- FCCsw
  http://aidasoft.web.cern.ch/DD4hep

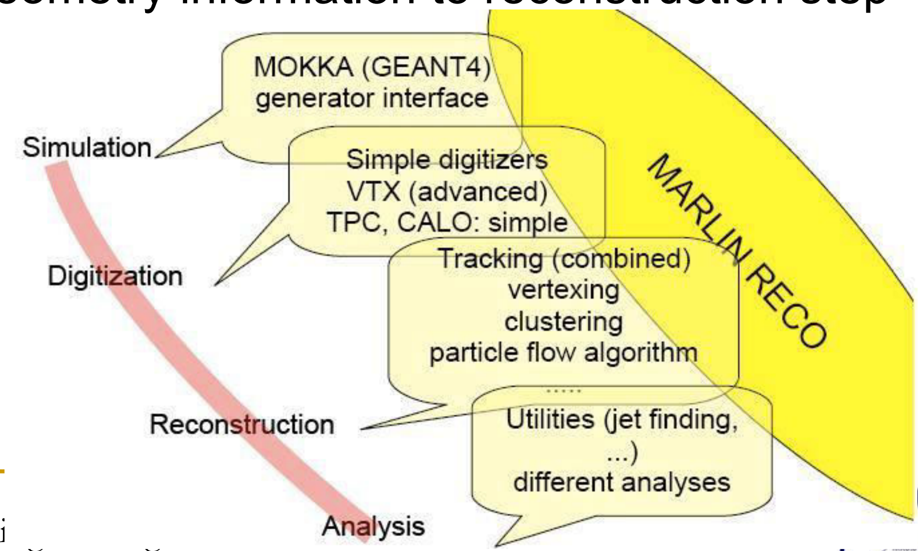
- Mokka
  http://ilcsoft.desy.de/portal/software_packages/mokka

- Full sim used for CDCH test
  available on bitbucket.org git reposiory
  + rome framework: https://midas.psi.ch/rome
  + genfit2: https://github.com/GenFit/GenFit

Mokka

- Mokka can be used as Full Simulation program of a realistic geometry description of the detectors
  - used by ILC, CLIC, CepC
- in the framework of the ILCsoft (used also for CepC) Mokka is a Geant4 application
  - The detector component and material are stored in the mySQL+database
  - Maintenance for Mokka not available anymore in Europe (LLR web site close down) hopefully is maintained on the ihep site
- Mokka integrated in the Marlin ILC framework for further analysis
  - GEAR package used to pass the geometry information to reconstruction step





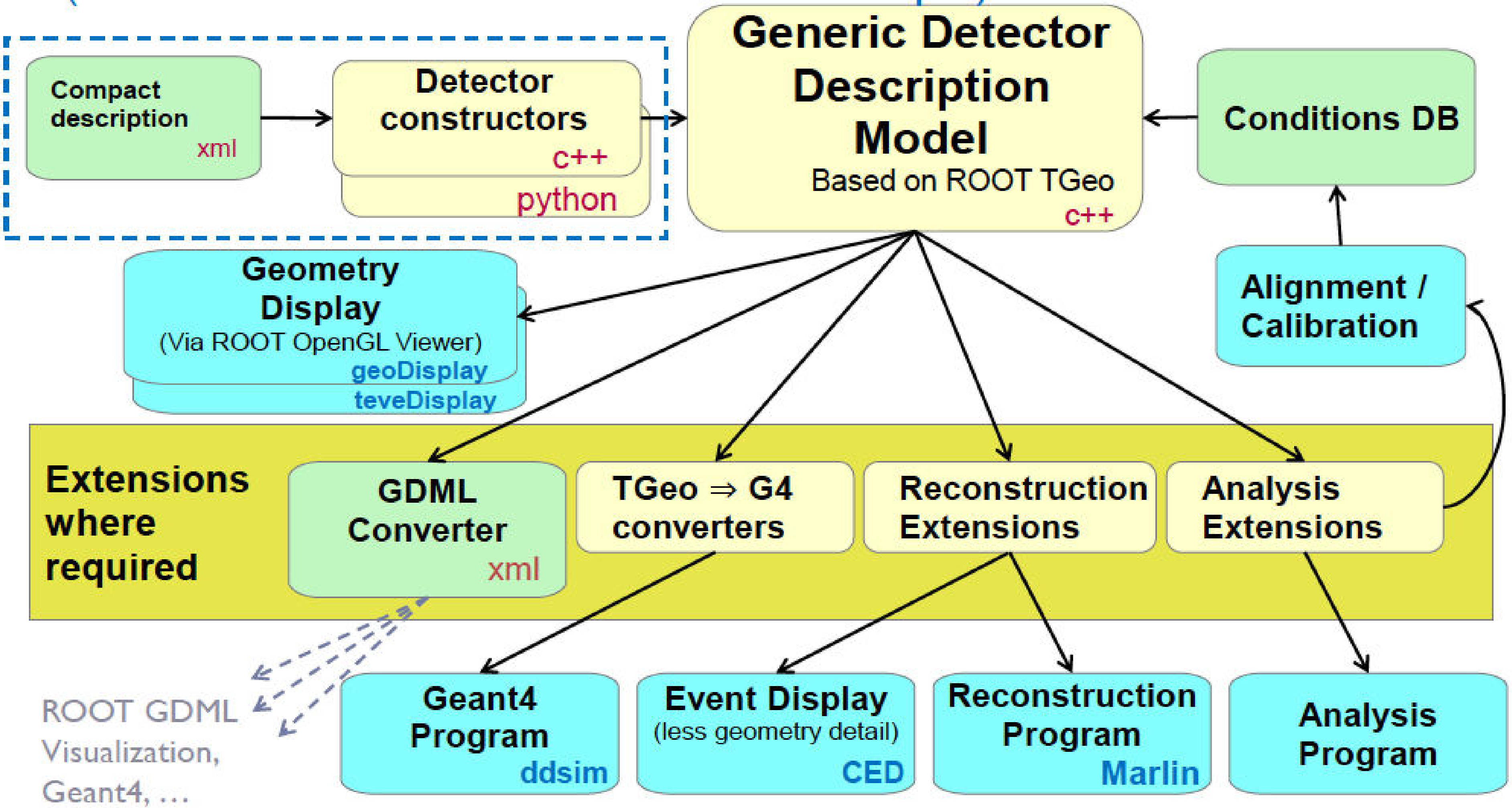
DD4Hep (detector description for High Energy Physics)

- CERN DD4Hep was born out of the AIDA project to deliver a common tool that could follow the complete lifetime of an experiment:
  - concept development, detector optimization, construction, operation
  - includes: geometry, materials, visualization, readout, alignement, calibration, etc
- Components: DDG4, DDRec, DDCond, DDAlign
- Being a new concept the DDG4 is still in validation
  - for the FCC-ee for instance the ILD geometry has been just inserted and it is being tested now

		DD4hep	DDG4
ILD	F. Gaede et al., ported complete model ILD_o1_v05 from previous simulation framework (Mokka)	✓	✓
CLICdp	New detector model being implemented after CDR, geometry under optimization	✓	✓
FCC-eh	P. Kostka et al.	✓	✓
FCC-hh	A. Salzburger et al.	✓	

DD4hep – The Big Picture

(With the CLIC/ILD use case as an example)



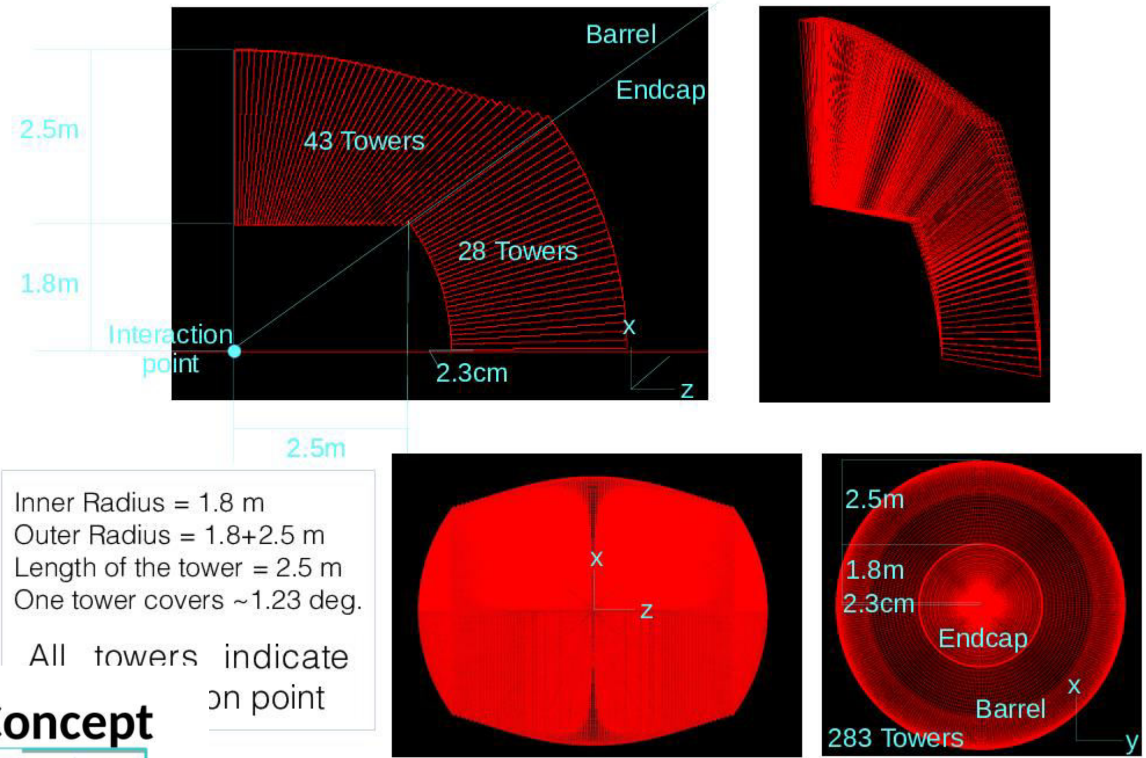
M. Frank

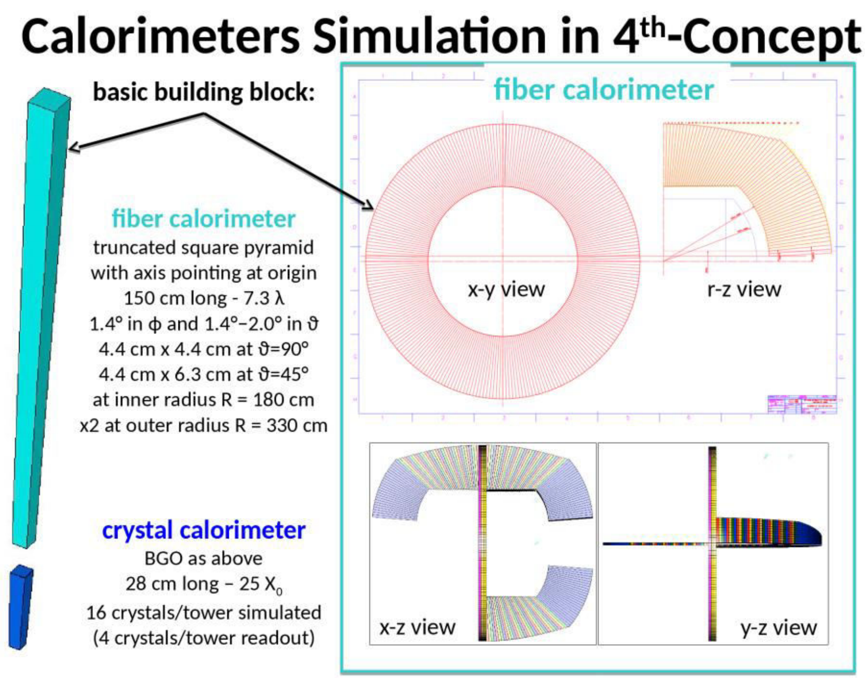
Status and possible choices

- A full simulation of the CDCH integrated with simplified VTX and PSHW detectors works. It can be used to study expected performance and some physics events.
- To study the background events effects there are two possibilities:
  - Move the simulation inside a framework (FCCsw or Mokka)
  - Using the current available simulation generate background particle coming out of the Beam Pipe if distributions are available
- The full calorimeter simulation must be integrated (built):
  - We can start form Seh Wook code
  - We can start from 4-th Cocept DR calorimeter

Status and possibl
(DR calo code)

Seh Wook code →
(probably ready for Mokka)





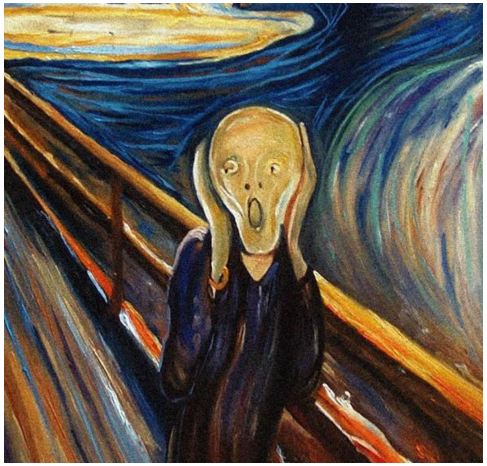
← ILC 4th Concept code
(probably easier to implement in FCCsw)

Status and possible choices: (Manpower)

- CERN
  - Niloufar Alipour Tehrani
  - Mark …
- (China CEPC)
  - RUAN Manqi
  - Seh Wook Lee
  - Xu Yin (coming in Pavia)
- Lecce
  - Gianfranco Tassieilli
  - Fedor Ignatov (BINP)
- Pavia/Como
  - Lorenzo Pezzotti
  - +1 - 2 ?

Most of us can't work full time

Status and possible choices (first goal)



Goal: Having an integrated full simulation (SVX+CDCH+PSHW+DRCalo) for the end of July (2018?)!!!

Two possible solution:

- Using the actual working simulation for the the IDEA tracking and, with the help of 1 people, insert of the available geometry code. (*probably 1 or 2 weeks could be enough*)
- Waiting for Yin and then start to work to the integration of the CDCH and DRCalo inside Mokka. (Yin already started to look at the integration of the CDCH geometry in Mokka).
  - Probably additional time will be needed for a working Kalman filter for the Drift Chamber inside Mokka.

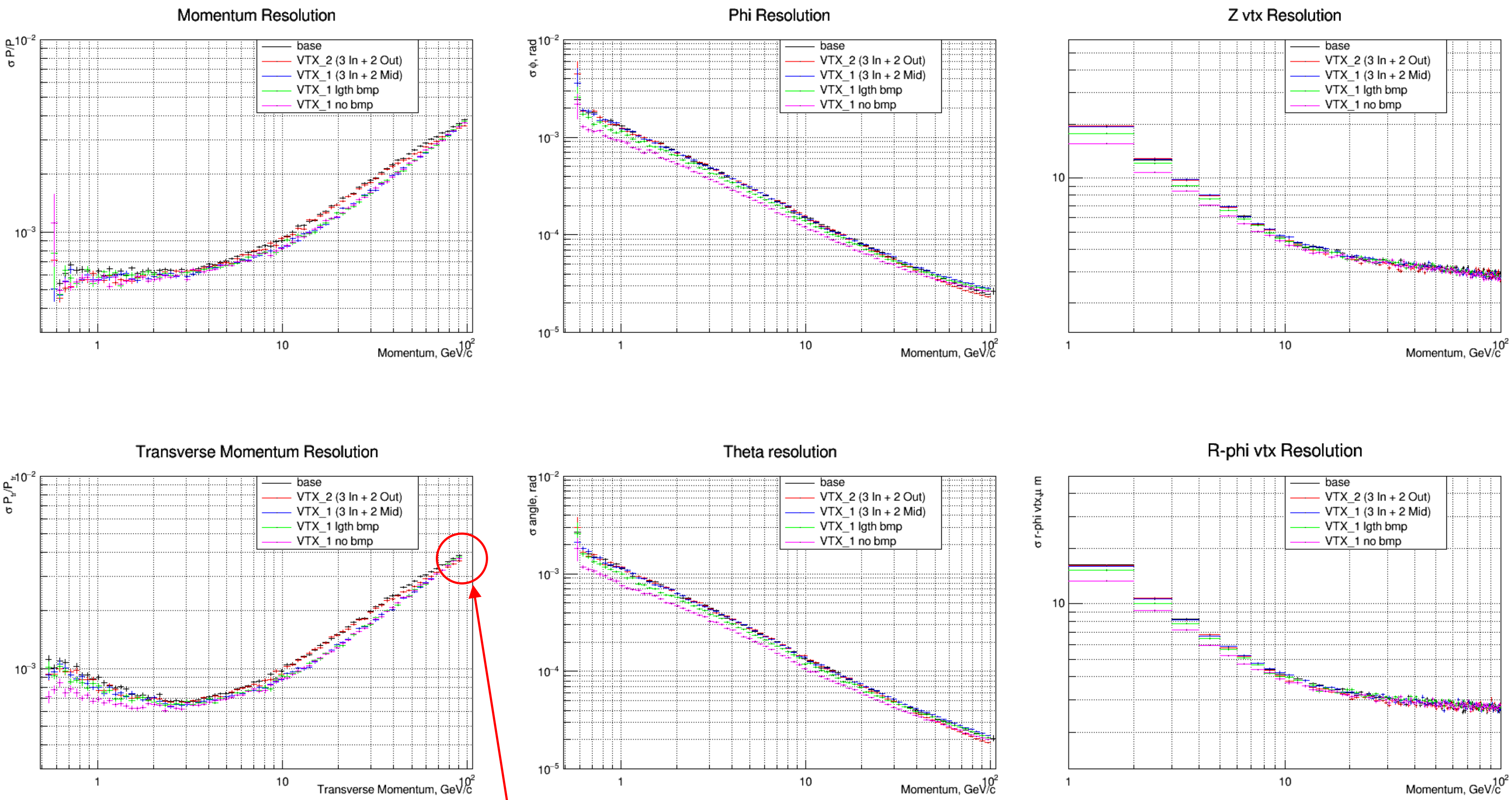
(Currently I can’t estimate the time needed at least for the geometry integration in Mokka)

Summary

- The full simulation integration is started
- Fortunately we have a lot of code/work to recover, we don't start from zero
- We have to deal with a limited manpower and a duplication of work
- There are different technical problems depending on the working environment
- We have to define priorities, milestones and choose the right strategy to reach them
- As medium term time scale, it could be better to use FCCsw, it represents the state of the art and will guarantee a longer lifetime
- We can have access to: Texas Tech University High Performance Computing Center (~ 2000 CPU available) http://www.depts.ttu.edu/hpcc

backup

Resolutions (μ^- at fixed θ=65deg)



$\sigma pt/pt^2$(100GeV) = 3-4 x 10^{-5}