中国科学技术大学
University of Science and Technology of China

Geometry description and management in OSCAR

Dong Liu for STCF software group

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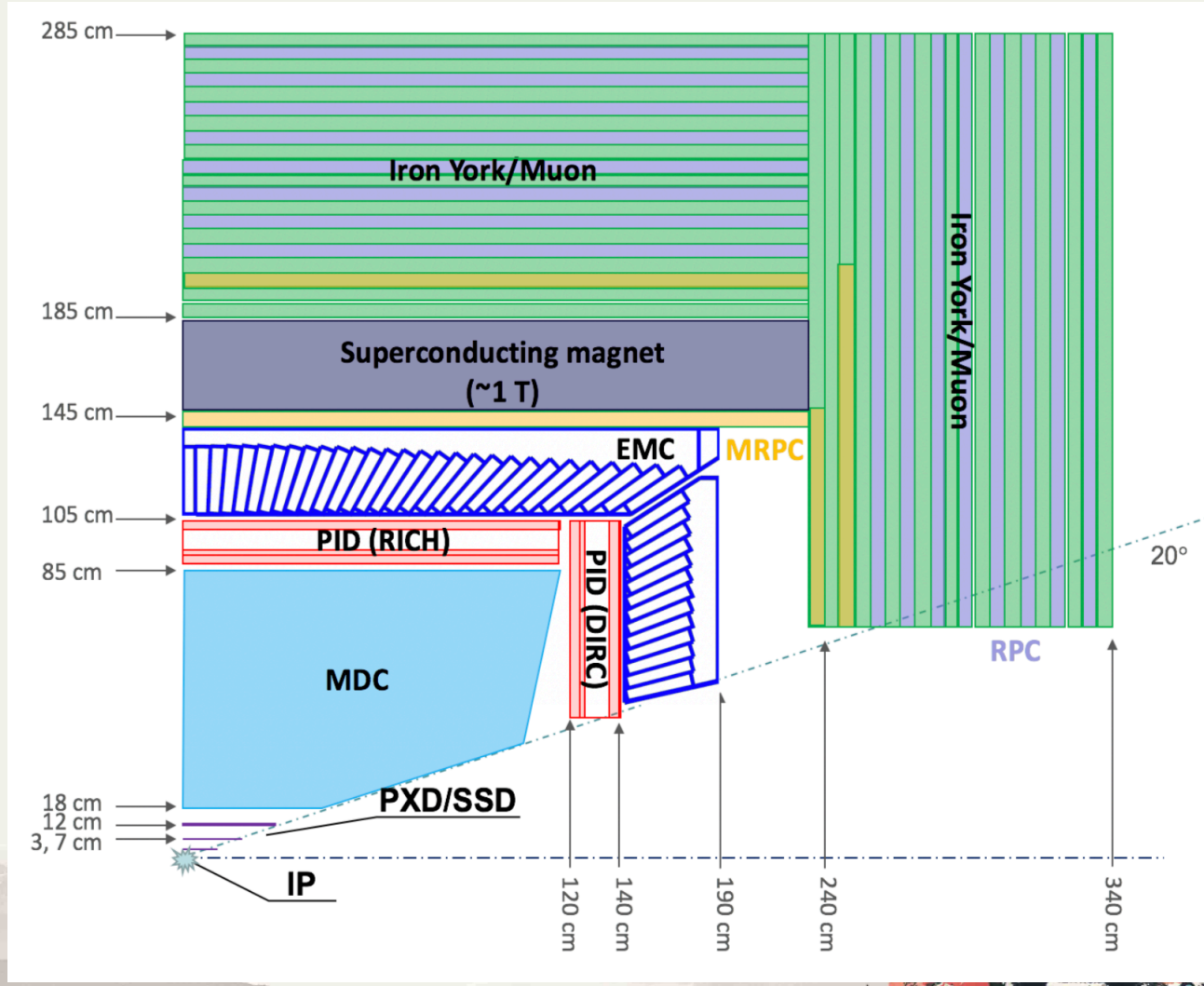
Joint meeting

Outline

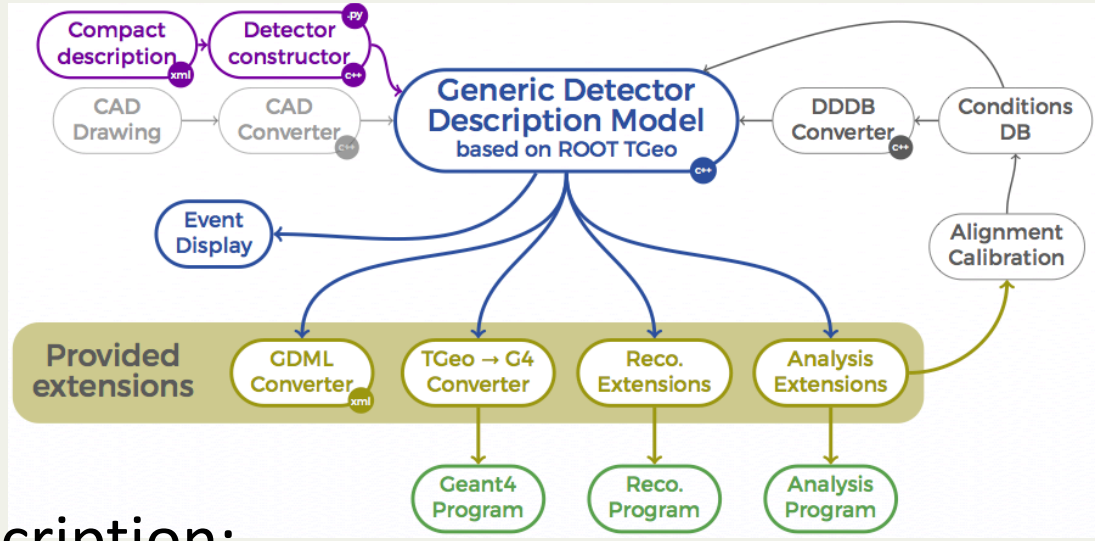
- Geometry description
  - STCF layout
  - Description tool
  - Implementation
- Geometry management
  - Full and sub detectors
  - Between different applications
  - Geometry construction service

STCF detector

- Layout and parameters
  - 6 subdetectors
    - Inner TRK
    - MDC
    - RICH
    - DIRC
    - EMC
    - MUC
  - SC Solenoid



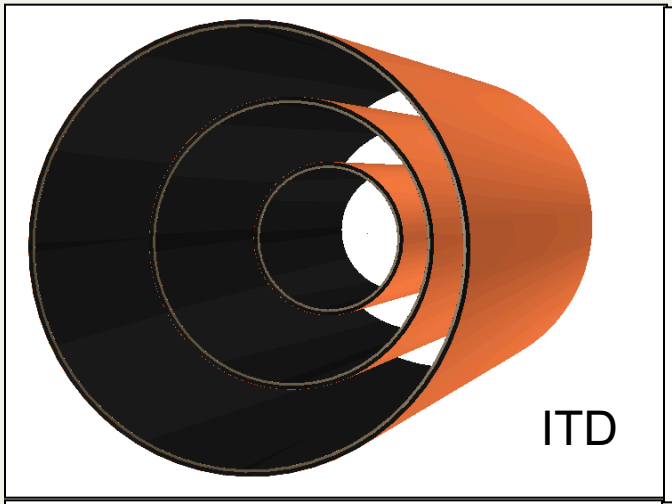
Description

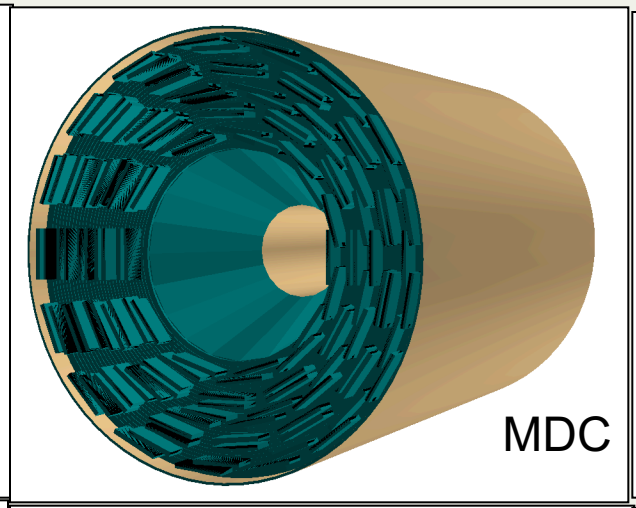


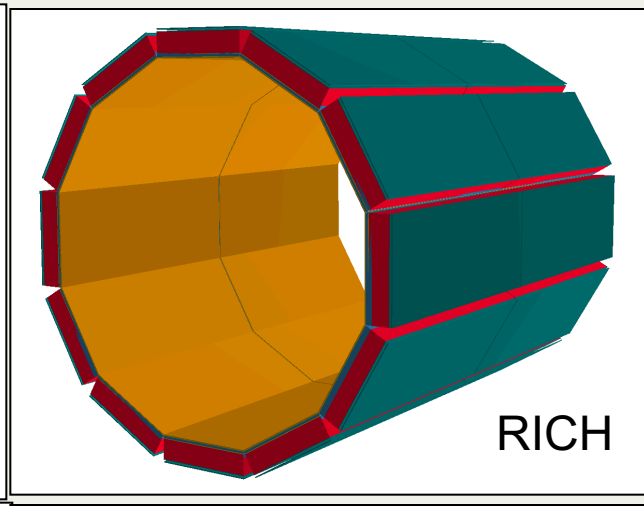
- Tool: DD4hep
  - Complete Detector Description:
    full detector geometry, materials, visualization attributes, detector readout, alignment, calibration and environmental parameters.
  - Coverage of the full life cycle of the experiment:
    all stages from detector concept development, detector optimization, construction, operation and at the same time enables easy transition from one stage to the next.
  - Single source of information:
    provides a consistent detector description, for simulation, reconstruction, analysis.
  - Ease of Use:
    delivers a simple and intuitive interface, with minimal external dependencies.

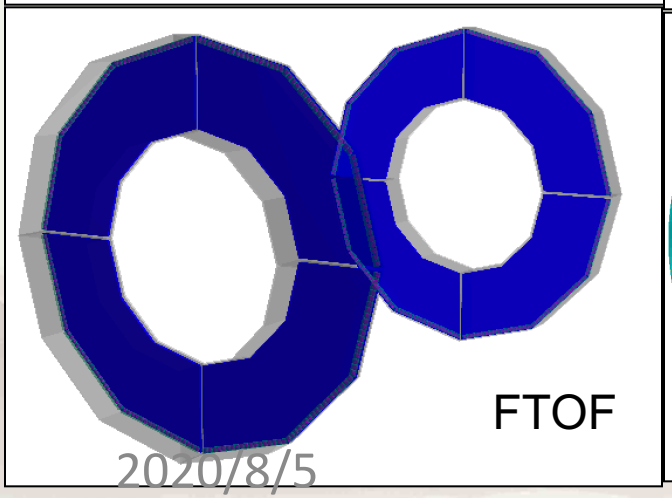
Description

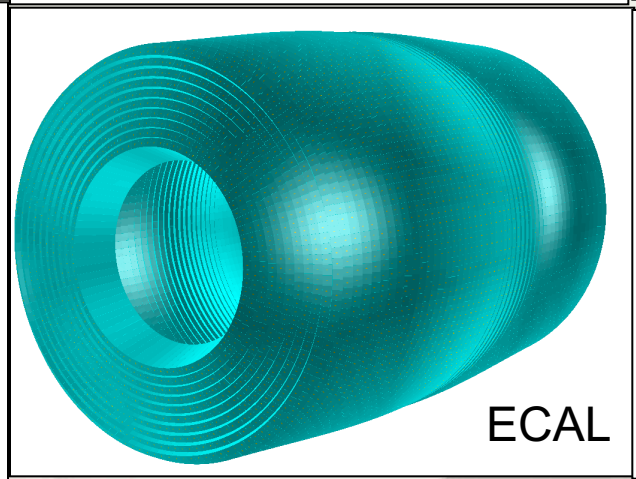
- Subdetectors

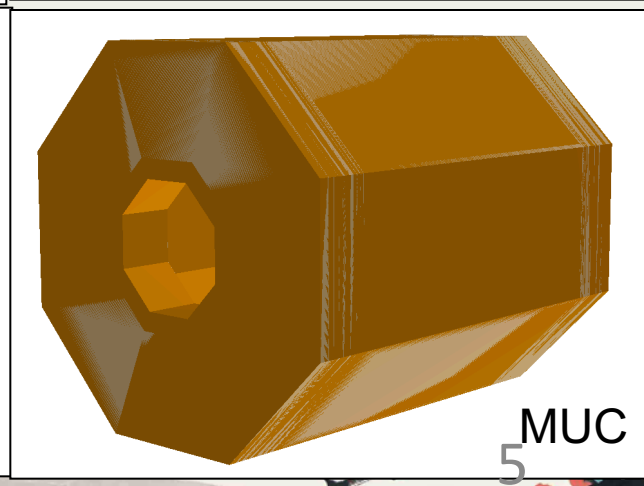






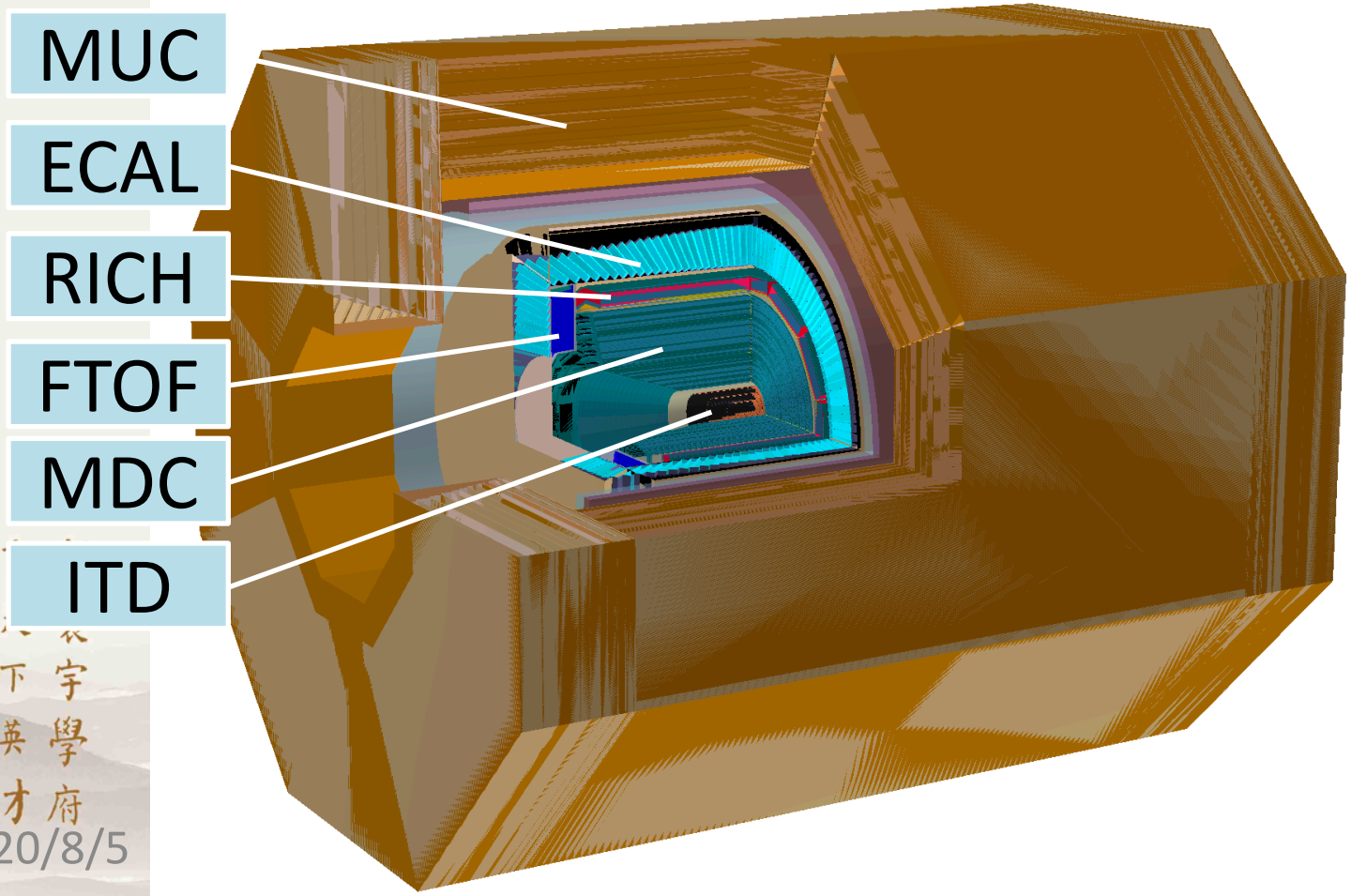


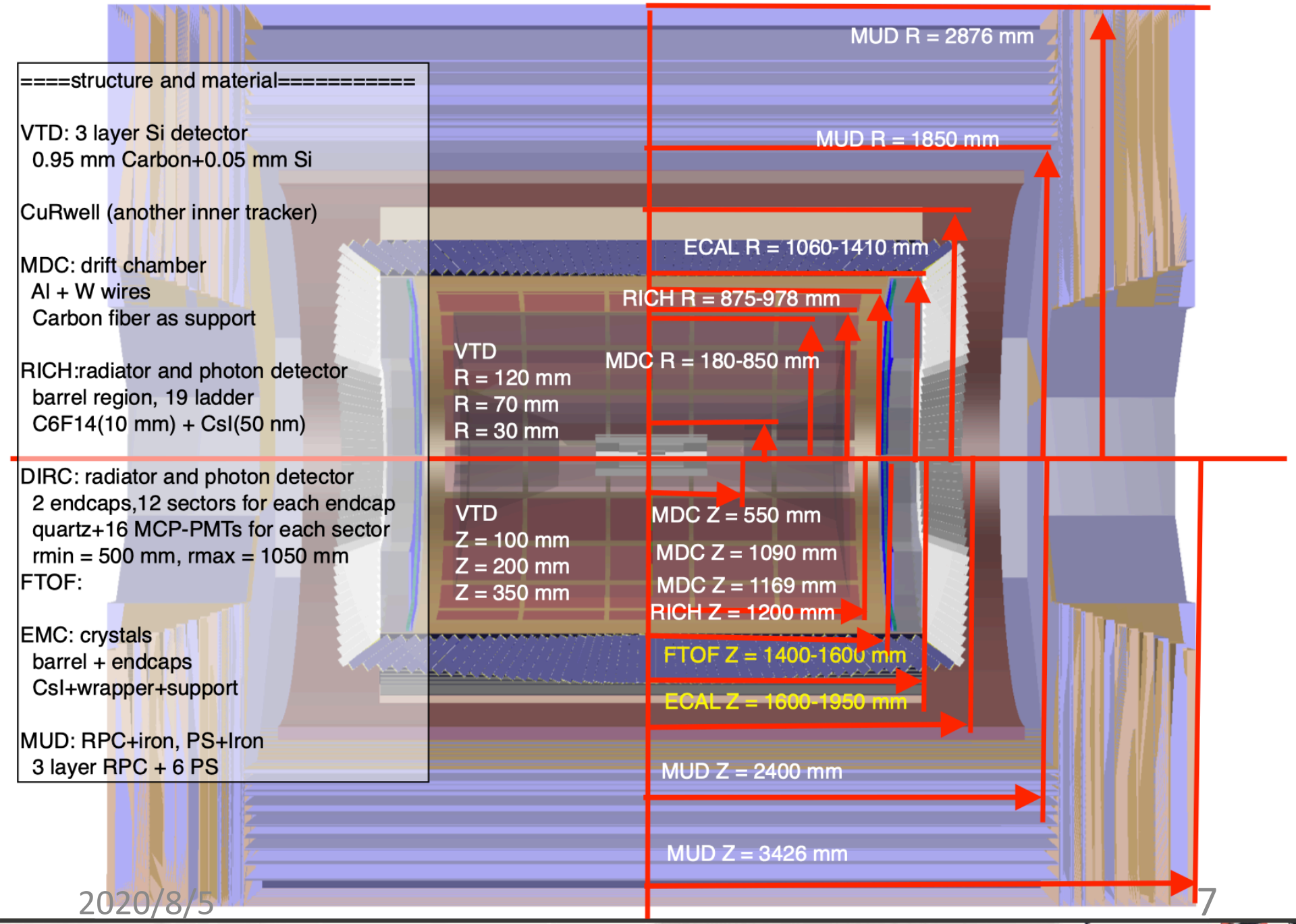




Description

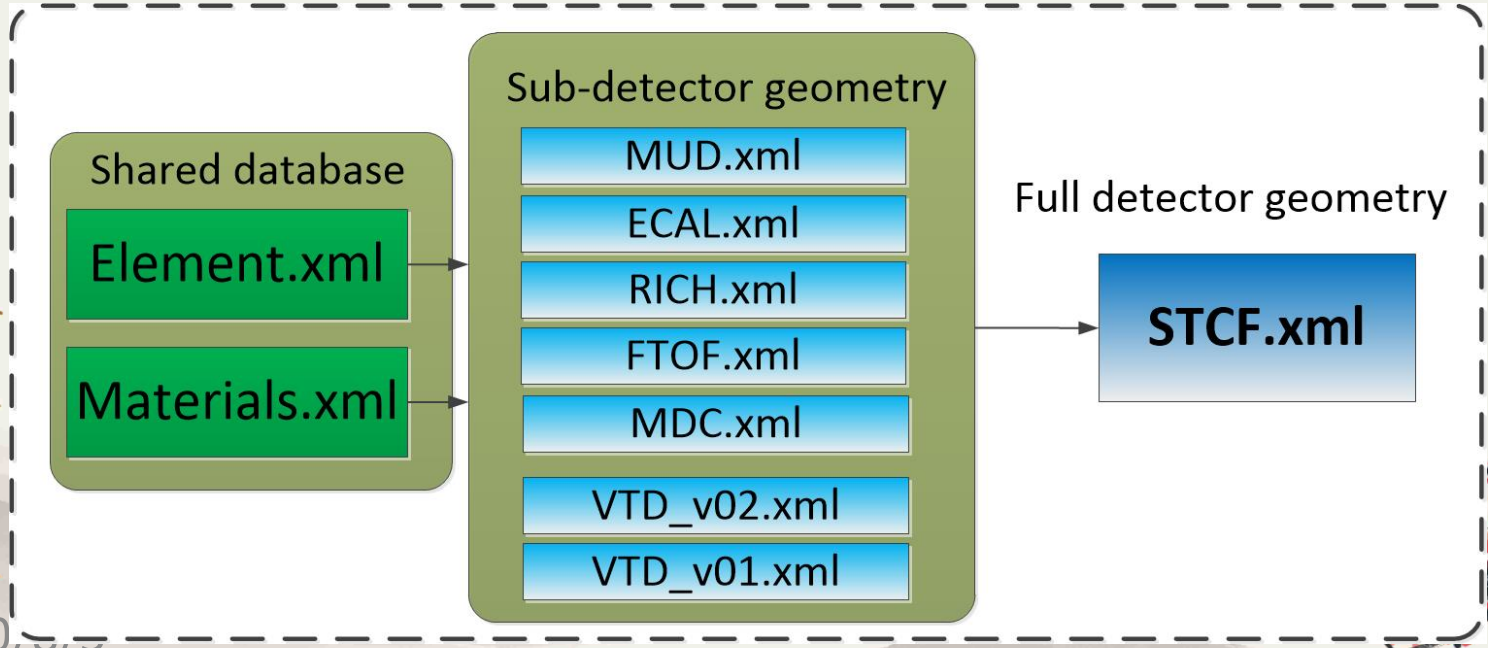
- Full description




====structure and material==========
VTD: 3 layer Si detector
0.95 mm Carbon+0.05 mm Si
CuRwell (another inner tracker)
MDC: drift chamber
Al + W wires
Carbon fiber as support
RICH:radiator and photon detector
barrel region, 19 ladder
C6F14(10 mm) + CsI(50 nm)
DIRC: radiator and photon detector
2 endcaps,12 sectors for each endcap
quartz+16 MCP-PMTs for each sector
rmin = 500 mm, rmax = 1050 mm
FTOF:
EMC: crystals
barrel + endcaps
CsI+wrapper+support
MUD: RPC+iron, PS+Iron
3 layer RPC + 6 PS
MUD R = 2876 mm
MUD R = 1850 mm
ECAL R = 1060-1410 mm
RICH R = 875-978 mm
VTD
R = 120 mm
R = 70 mm
R = 30 mm
MDC R = 180-850 mm
VTD
Z = 100 mm
Z = 200 mm
Z = 350 mm
MDC Z = 550 mm
MDC Z = 1090 mm
MDC Z = 1169 mm
RICH Z = 1200 mm
FTOF Z = 1400-1600 mm
ECAL Z = 1600-1950 mm
MUD Z = 2400 mm
MUD Z = 3426 mm

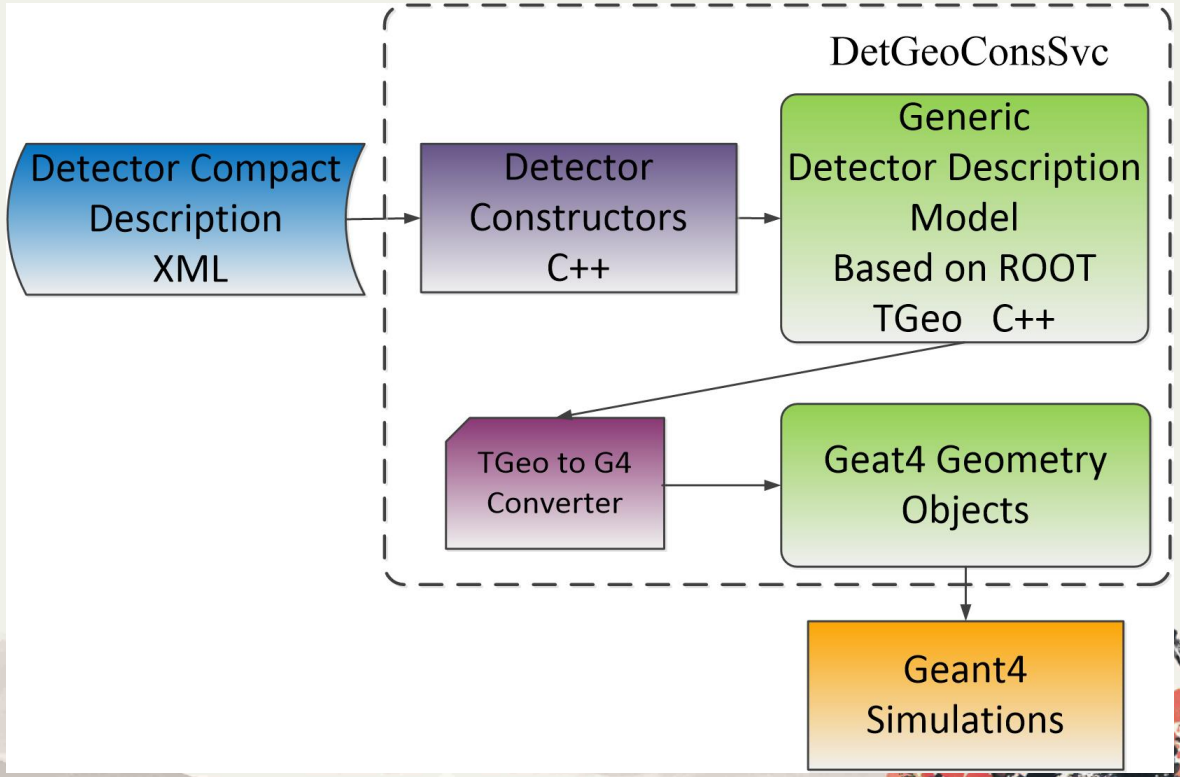
Geometry management

- Relation between Full Geometry and subdetectors
  - One compact description for each subdetector
  - Share materials
  - Combination in STCF.xml (include sub detectors)



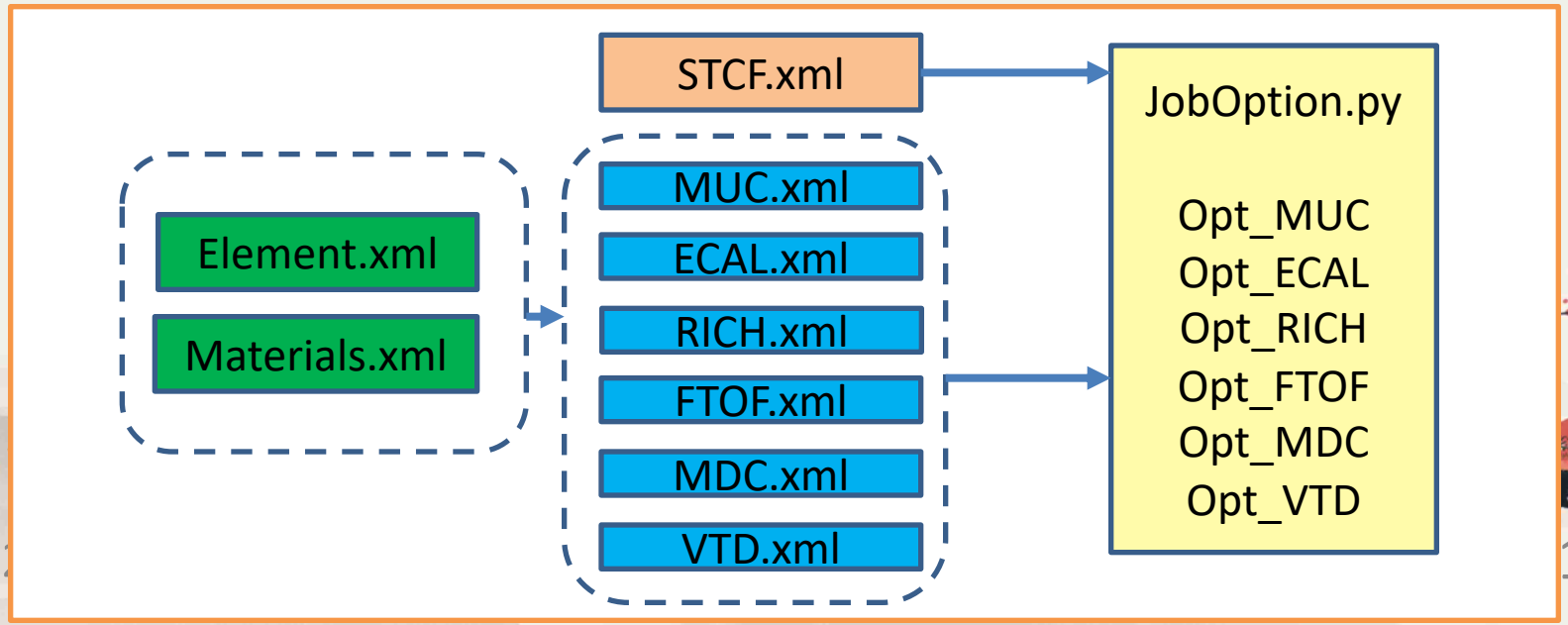
Geometry management

- Geometry construction service
  - From DD4hep TGeo Based Geometry to Geant4 geometry
  - Easy and reliable



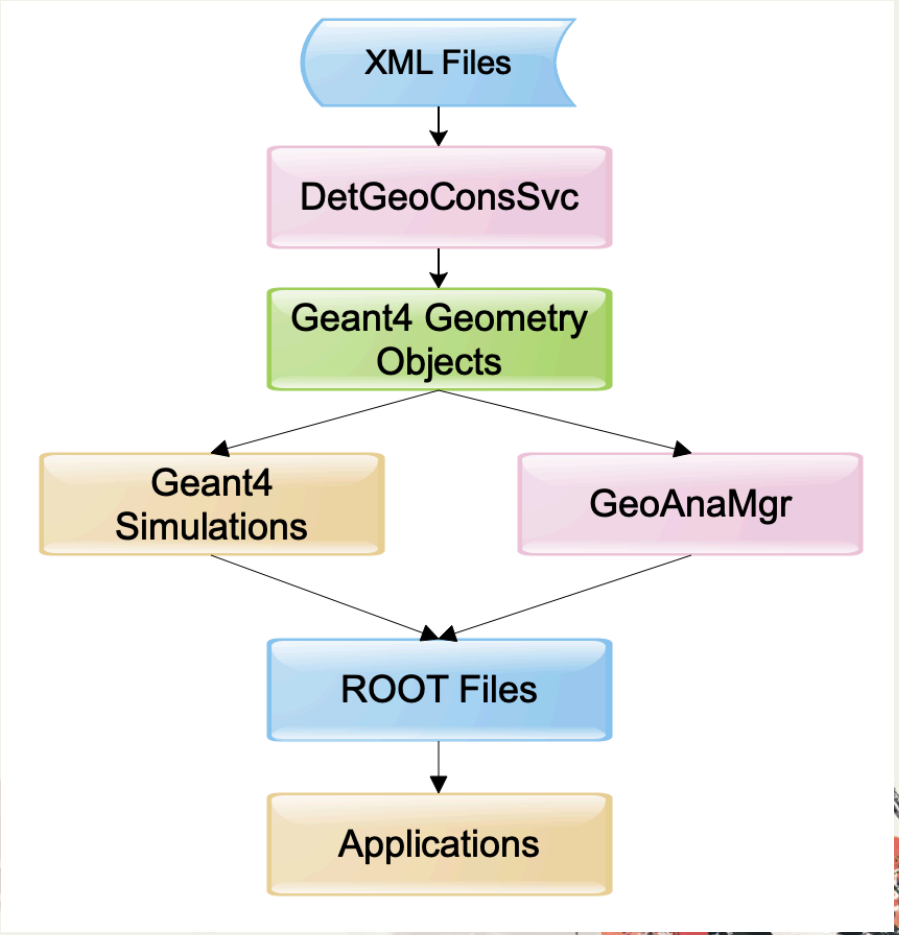
Geometry management

- Relation between Full Geometry and subdetectors
  - One compact description for each subdetector
  - Share materials
  - Managed by python script
    - Need be supported by detector construction service



Geometry management

- Geometry in different applications
  - Single source
  - Stored with simulation
  - Applications access par of Geo from root file
  - Uniform Geo between applications



Summary

- Geometry description
  - STCF layout defines the boundary of subdetectors
  - Description with DD4hep
  - Subdetectors and full detector are described well
- Geometry management
  - Full and sub detectors are managed by xml (or py script)
  - Geometry is consistent between different applications
  - Geometry construction service provides an easy and reliable way to transfer geometry from DD4hep to Geant4

Thank you for your attention