EPIC Geometry Status

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CompSW Meeting
August 10, 2022

Geometry Description and Detector Interface

Summary

We will implement the geometry description and detector interface using DD4hep.

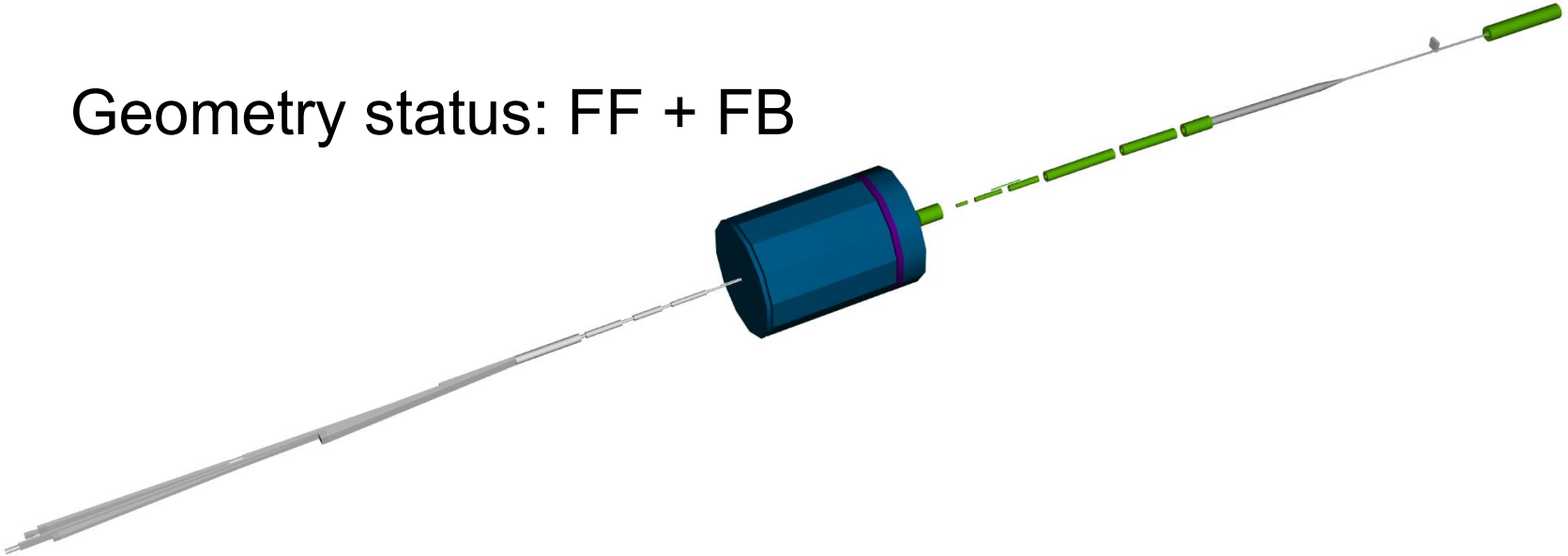
DD4hep

Decision Document:
https://docs.google.com/document/d/16dQ-u2u5CdJIN3_slvcI79vTWJYnQytoQclMu2e-TpY/edit?usp=sharing

Live Notes:
https://docs.google.com/document/d/1C3KuUzRC6nXhCFlvjR2NV1fgqmt6MSuZKjqY-NtffM0/edit?usp=sharing

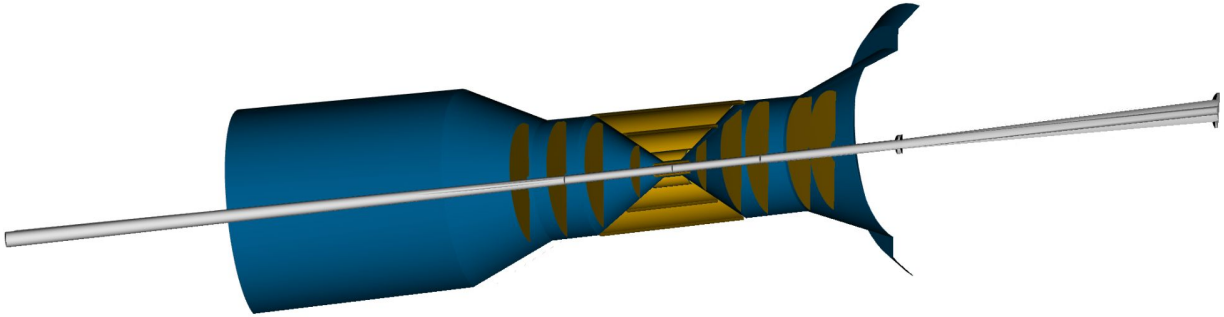
Indico:
https://indico.bnl.gov/event/16154/

Geometry status: FF + FB



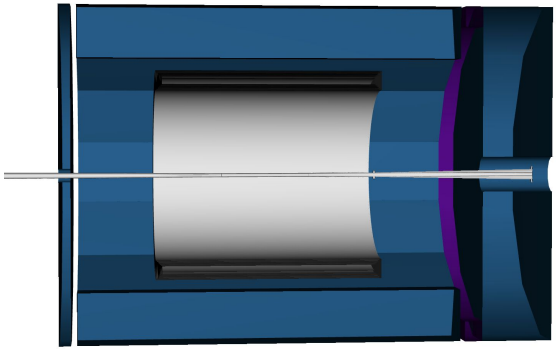
- ✅ Main elements for FF + FB present
- ❌ TODO1 identify FF (Alex?) and FB subsystem liaison.
- ❌ TODO2 identify accurate task list for additional implementation and validation

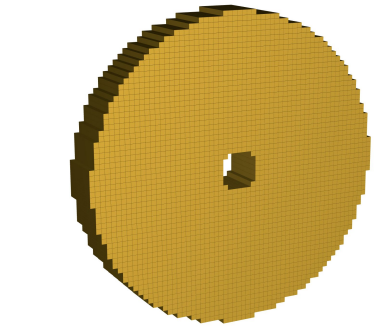
Geometry status: tracking

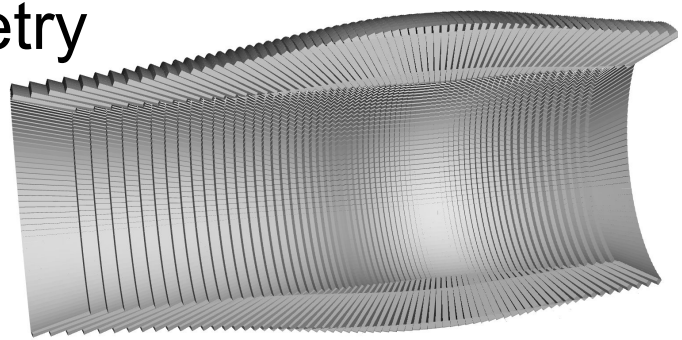


- ✅ Silicon barrel elements according the the latest tracking WG numbers
- ✅ Tracker support based on ECCE proposal, fully parameterized
- 🚧 Silicon disks need reconfiguring according to latest WG design (due today)
- 🚧 Basic MPGDs need to be re-enabled (due today)
  - ❌ Proper implementation of strips (with associated digitization and clustering)
- ❌ Tracker material map for ACTS (Shujie will do once previous tasks complete)
- ❌ Need formal liaisons for silicon and MPGD components
- 🚧 Background merging in digitization stage
- ❌ Need new field map and updated magnet design for 1.7T magnet!

Geometry status: calorimetry

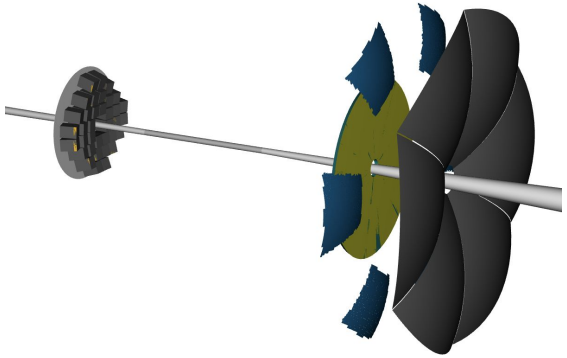


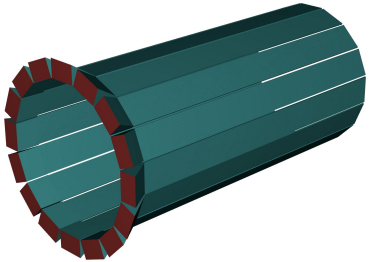


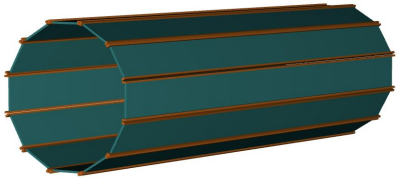


- ✅ Basic geometrical parametrization for calorimeters
- ✅ Forward endcap ECal in two versions (detailed and homogenous effective)
- ✅ Basic backward endcap ECal
  - ❌ Realistic services, support, and gaps
- ✅🚧 Both barrel ECal options present, need services and support. I believe Dmitry Kalinkin working on SciGlass, and Maria on Imaging.
- ❌ HCals are still in ATHENA configuration, need dedicated workforce
- 🚧 Integrate optional forward insert in main repository
- ❌ Need formal liaisons for backward ECal all HCal systems

Geometry status: pid

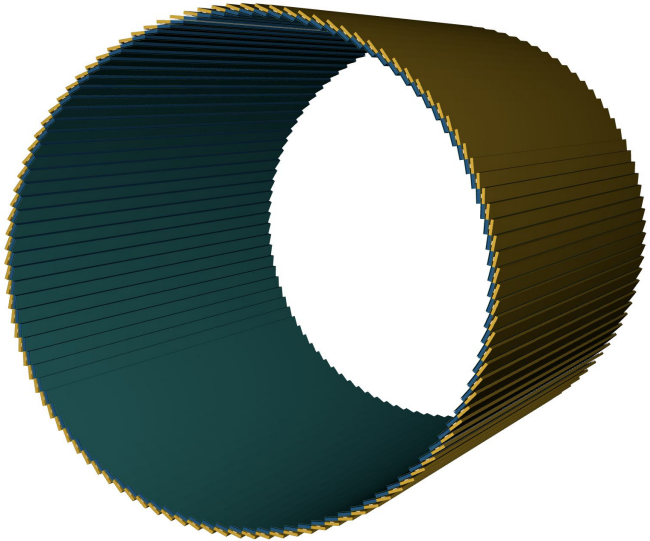






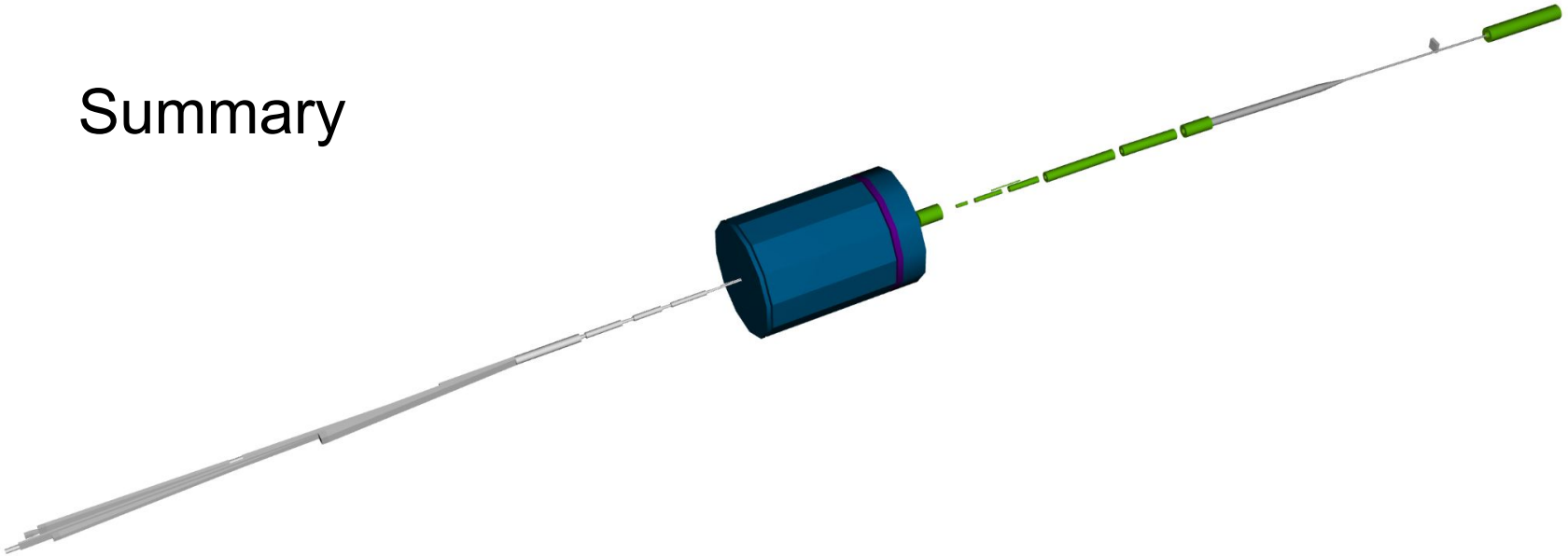
- ✅ dRICH design rapidly evolving, liaison Chris Dilks? (TBC)
- ✅ Currently running simulations with stand-in for DIRC
  - 🚧 Have detailed implementation (without support) from August 2021, needs rescaling, fixing, and re-validation with experts.
  - ❌ Need formal software liaison
- ✅ Basic implementation of mRICH and pfRICH
  - ❌ Need validation, in particular services and support
  - ❌ Need subsystem liaisons

Geometry status: TOF



- ✅ Barrel TOF in ATHENA version
  - ❌ Needs updating to ECCE design
- ✅ Basic TOF disks available as starting points for forward/backward TOF system
  - ❌ EPIC forward/backward TOF needs to be fully implemented
- ✅ Zhenyu offered to be liaison for TOF

Summary



- We have varying levels of implementations for all subsystems
- Urgently need to identify official liaisons for all subsystems
  - Better identify task list
  - Identify potential workforce
  - Need to start filing issues for all imminent TODOs. Avoid too much stand-alone development (we *need* the overview)
- Aim to have full-featured detector before the end of the month.

A word about training (tentative)

Now that major decisions in the single software stack have been taken, we understand the need for training and propose the following:

- In recognition of August vacations and in recognition of new students starting in September, the CompSW and SimQA are planning to make September a training month. This gives the working groups some time to prepare the materials for synchronous delivery, so they accurately reflect the changes since the start of the single software stack decision.
- Over the course of September, we will have several training sessions on the various topics of the new software stack, which we invite all EPIC researchers to attend (and in particular the software liaisons should make every effort to attend).
- A detailed schedule will be released at the August 19 conveners meeting, but it will likely look something like this (tentatively there will be two sessions for each topic to accommodate multiple time zones, maybe Friday morning and Friday afternoon):
    - September 2: Setting up your environment for collaborative EPIC development
    - September 9: Geometry development using DD4hep: how to modify or add detector description?
    - September 16: Simulation of single particles or physics events using geant4 and ddsim
    - September 23: Reconstruction algorithms in JANA2: from geant4 output to reconstructed quantities
    - September 30: Writing physics benchmarks that run automatically and reproducibly

There are also people asking for documentation at a shorter time scale, so related to this training plan we could promise to give a zeroth order review to existing documentation by two weeks from now for asynchronous and self-guided consumption (things like replacing eicweb with github where required).

EPIC **Questions?**