# Steps towards a CLIC detector concept
# Define version 0

1. Start with latest SiD baseline detector concept

2. Modify for CLIC:
   - With B = 5 T need 20 mrad crossing angle

Barrel
- VDET inner radius = 4 cm, outer radius = 9 cm,
  keep 5 layers and barrel length
- Add time-stamping in one separate barrel layer:
  r ≈ 20 cm, thickness: 100 μm Si (modify first tracker layer)
- Increase HCAL thickness to $\lambda_{int} \leq 10$?
  (1.65 m Fe, 99% @ 110 GeV )
  What is new SiD HCAL size?
- Increase coil radius accordingly

Endcap increase only HCAL

## Cont.: Steps towards CLIC detector concept

3. Forward region.

- CLIC mask from z = 1-3 m, (SiD @ 2-3 m),
  - $r_{outer}$ = 25 cm, $\Theta_{min}$=80 mrad, $\Theta_{max}$=120 mrad, hole < 10mrad .
  - Add 10 cm of low-Z material to reduce backscattering
  - (use Andrey's work)

- LumCal 36mrad – 113mrad, (use Andrey's numbers)
- BeamCal < 46mrad, useful at 3 TeV ? Ignore for time being.

**We should meet (this week) to agree on a set of numbers for V0!**

# SiD Starting Point
# Details & Dimensions

**Flux return / muon**
**$R_{in}$ = 333 cm**
**$R_{out}$ = 645 cm**

**Solenoid: 5 T; $R_{in}$ = 250 cm**

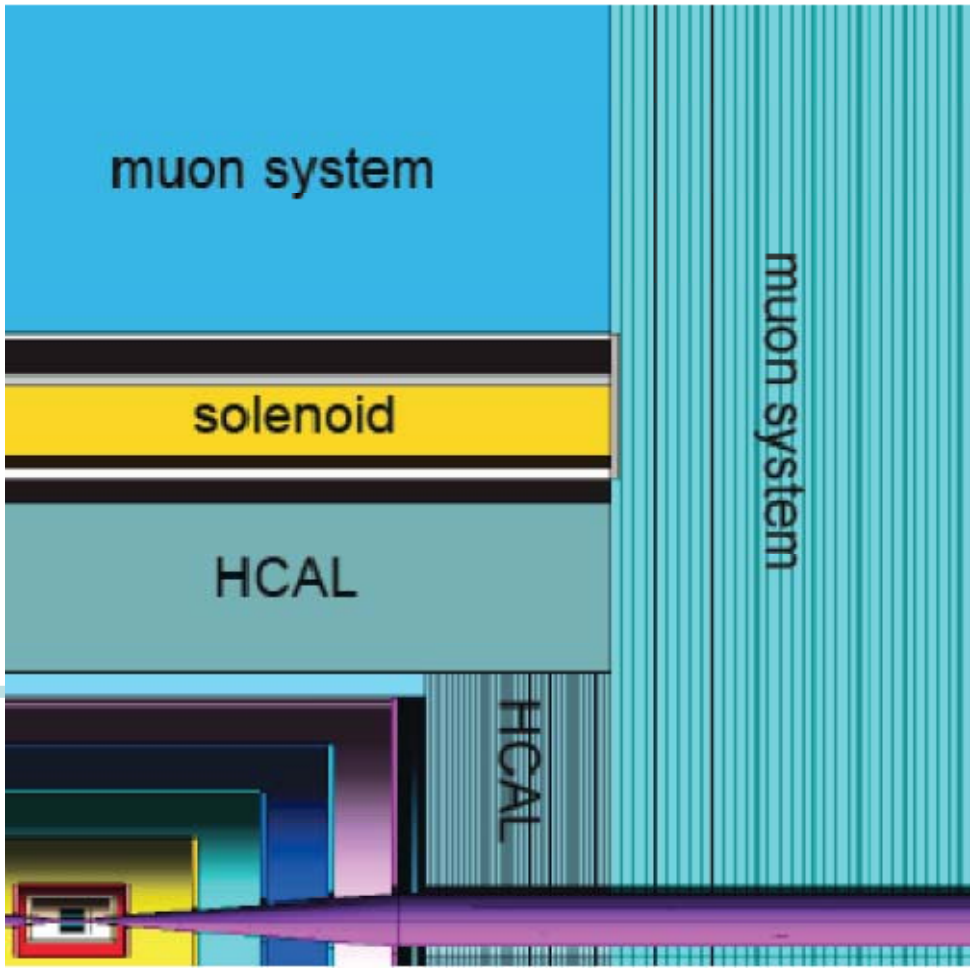
PFA

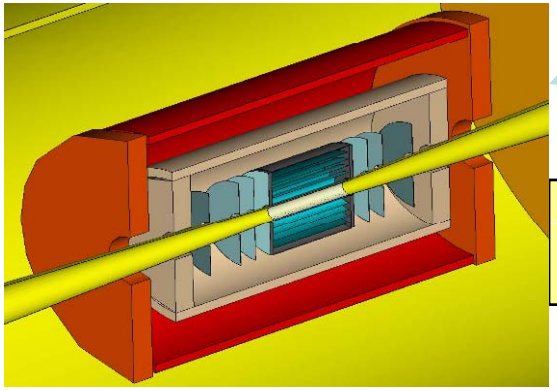
**HCAL Fe: 34 layers; $R_{in}$ = 138 cm**

**EMCAL Si / W: 30 layers $R_{in}$ = 125 cm**

Si

**Si tracking: 5 layers; $R_{in}$ = 18 cm**



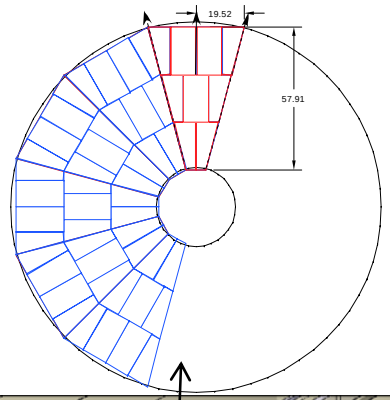



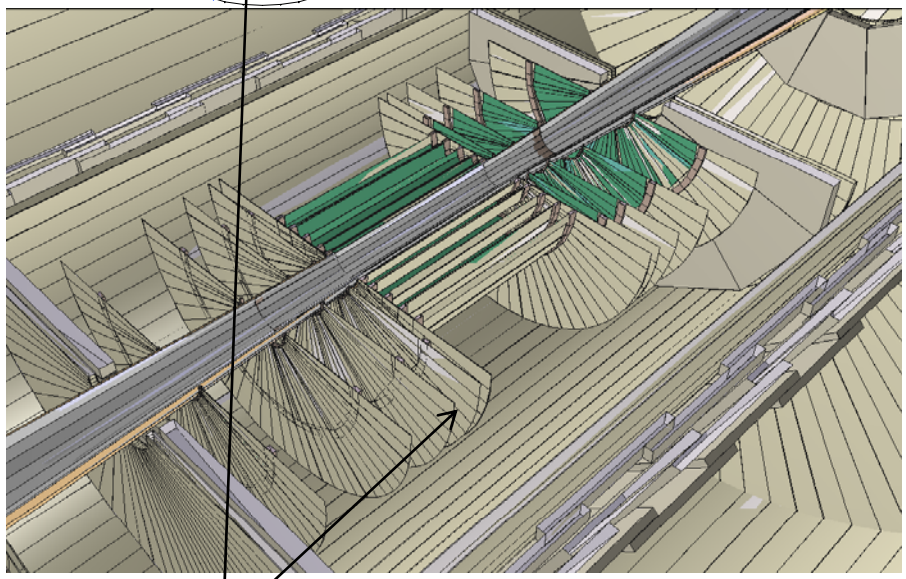
**Vertex detector:**
**5 barrels, 4 disks; $R_{in}$ = 1.4 cm**

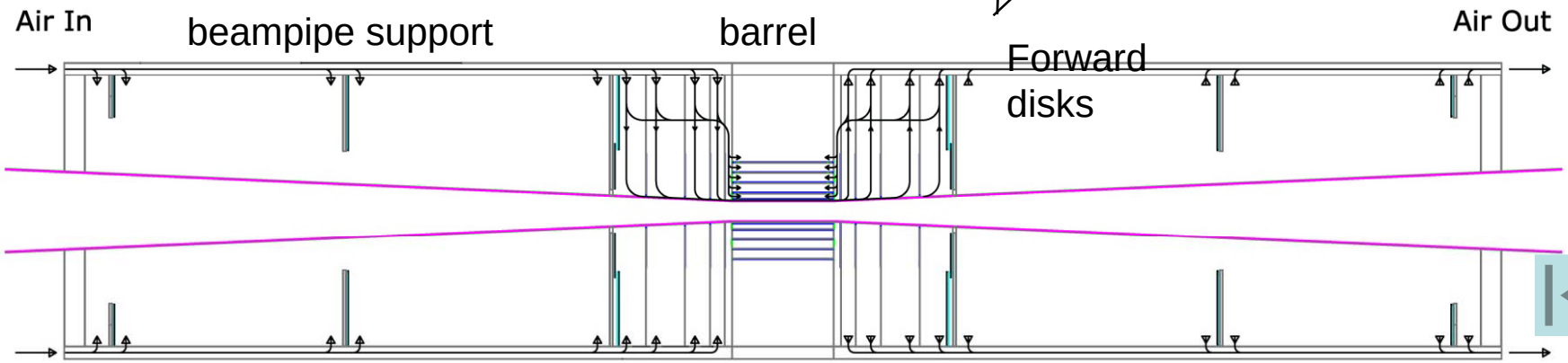
# SiD Vertex Detector

SiD Vertex concept is based on short (12 cm) barrels followed by disks

- Detailed mechanical design including carbon fiber support cylinder and services
- 5T field allows small inner radius
- Sensor technologies considered
  - CCD, DEPFET, CMOS, 3D
  - Final detector can be a mix defined by power consumption and performance





# SiD tracker

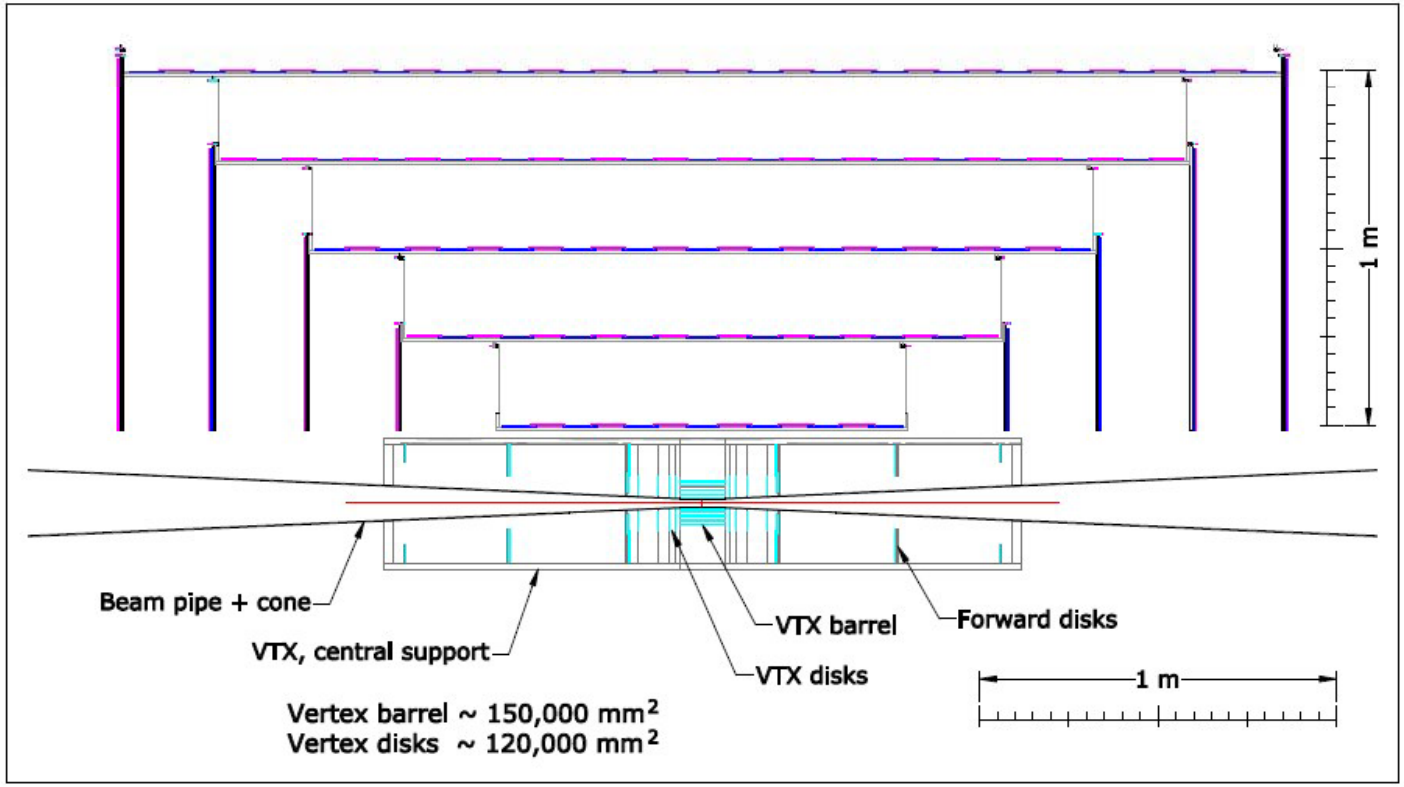



FIGURE 3.2. Mechanical concept for supporting the SiD vertex detector barrel and endcaps, tracker forward disks, and the beam pipe

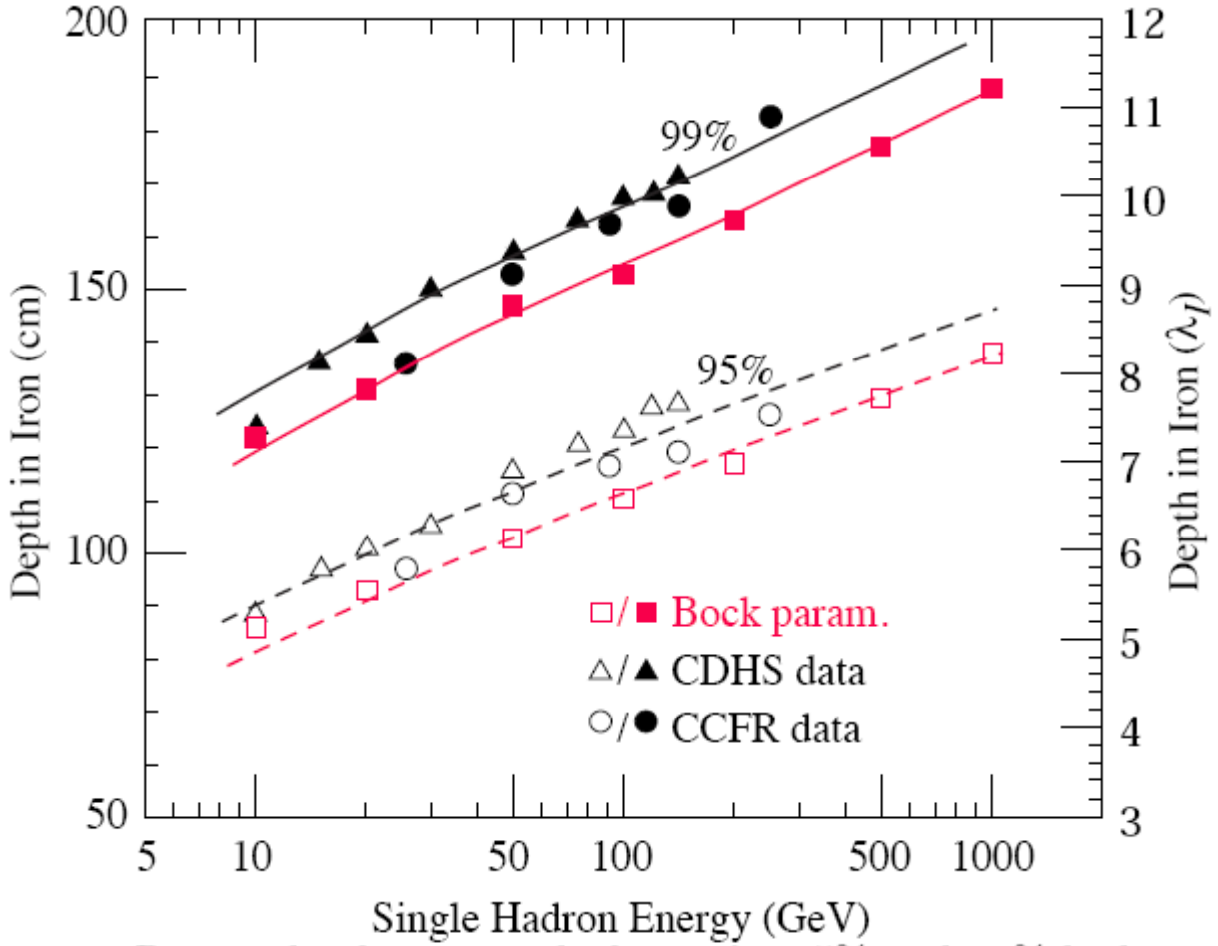
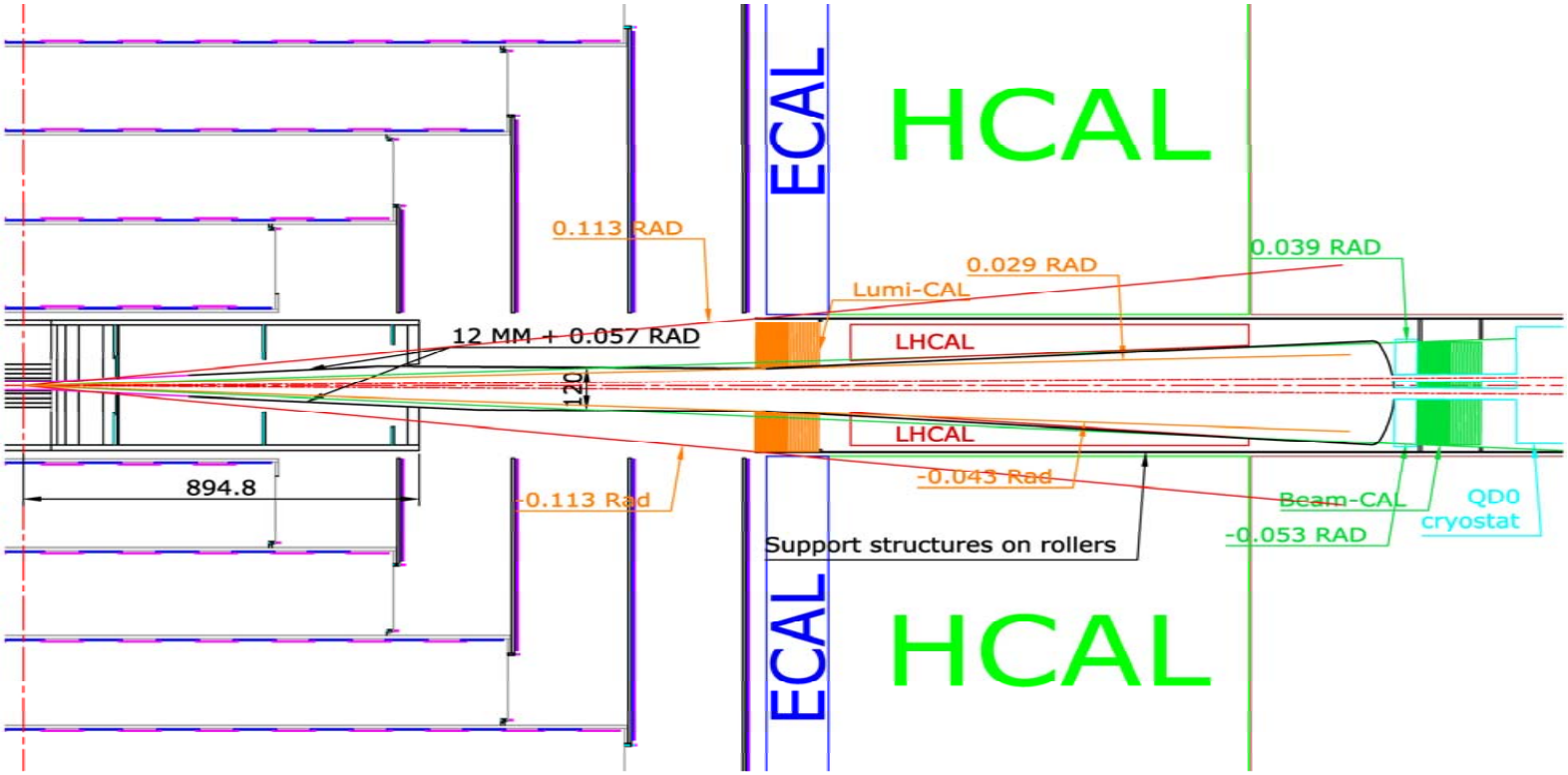



**Figure 28.22:** Required calorimeter thickness for 95% and 99% hadronic cascade containment in iron, on the basis of data from two large neutrino detectors and Bock's parameterization [143].

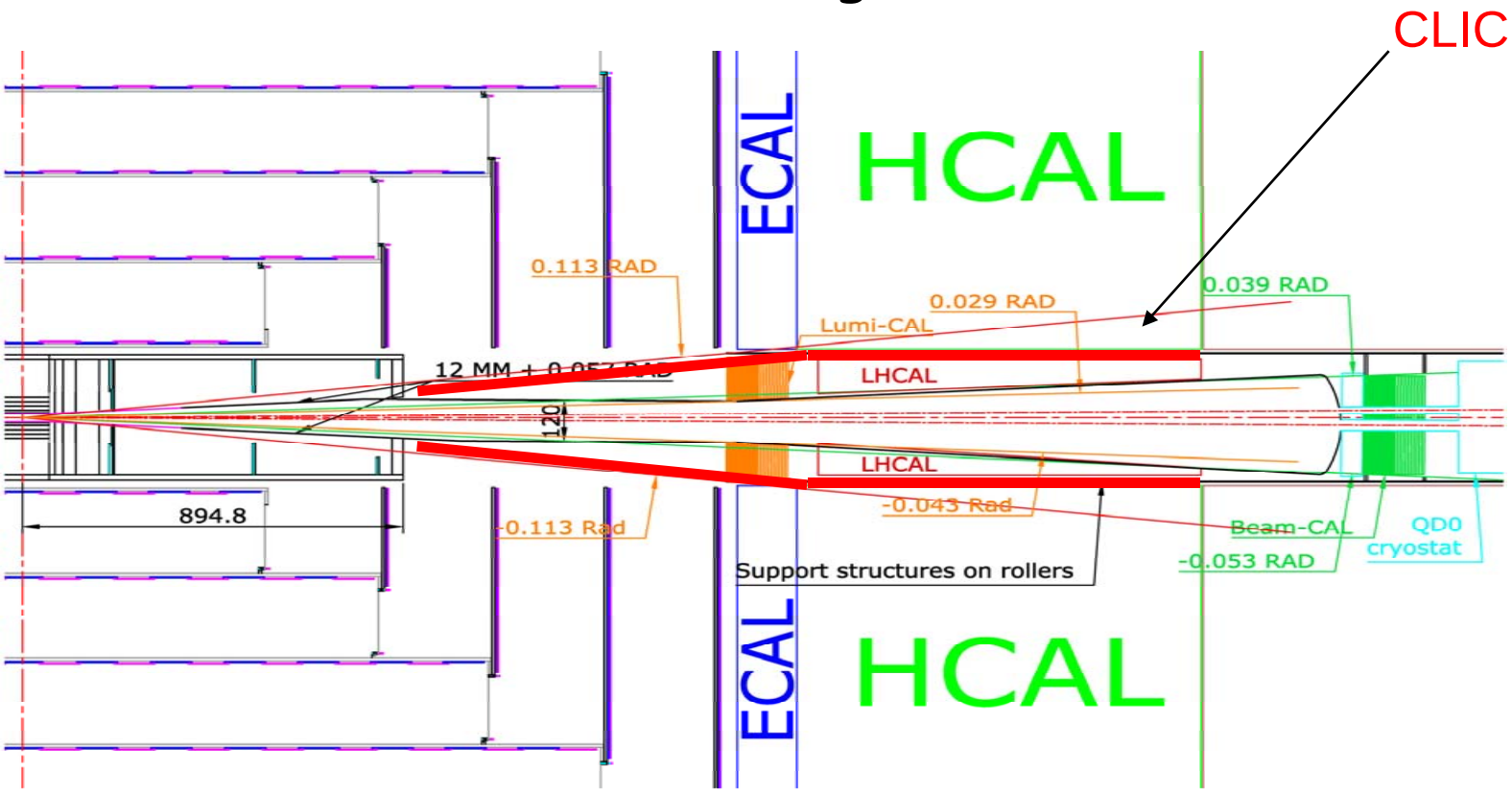
# SiD Forward region




In close cooperation with FCAL collaboration

| | |
|---|---|
| LumiCal inner edge | ≈36mrad about outgoing |
| LumiCal outer edge | ≈113mrad about 0mrad |
| LumiCal fiducial | ≈46-86mrad about outgoing |
| BeamCal outer edge | ≈46mrad about outgoing |
| LumiCal | $30X_0$ Si-W |
| BeamCal | $30X_0$ rad-hard Si,diamond.... |

# Forward region

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