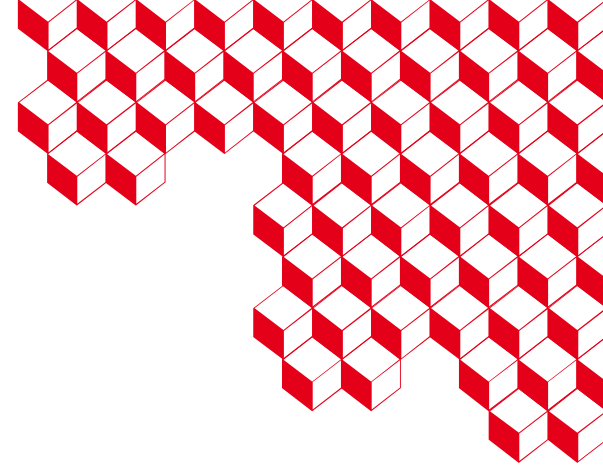


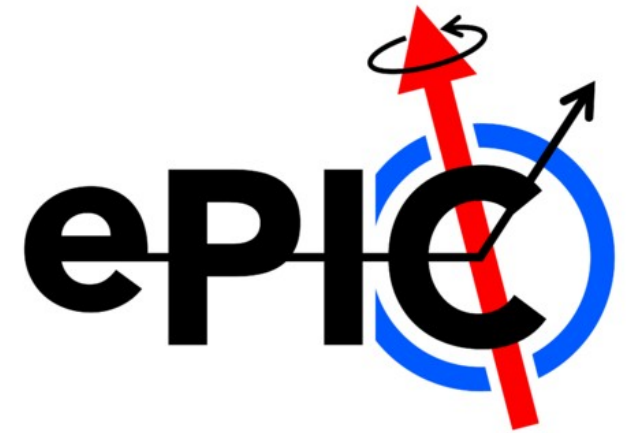


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CyMBaL – status

F. Bossù for the Saclay group



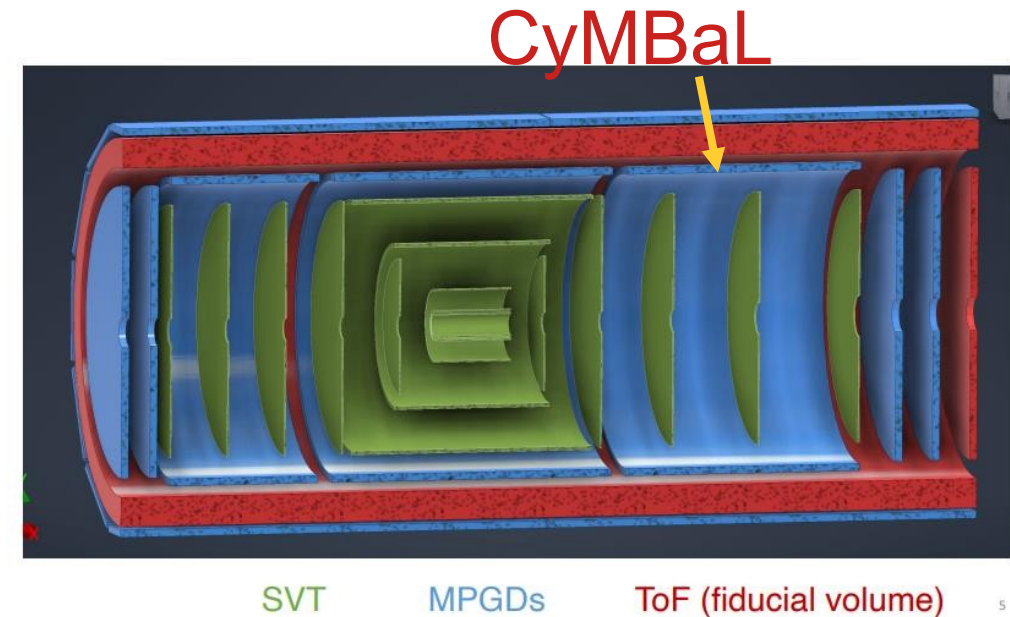
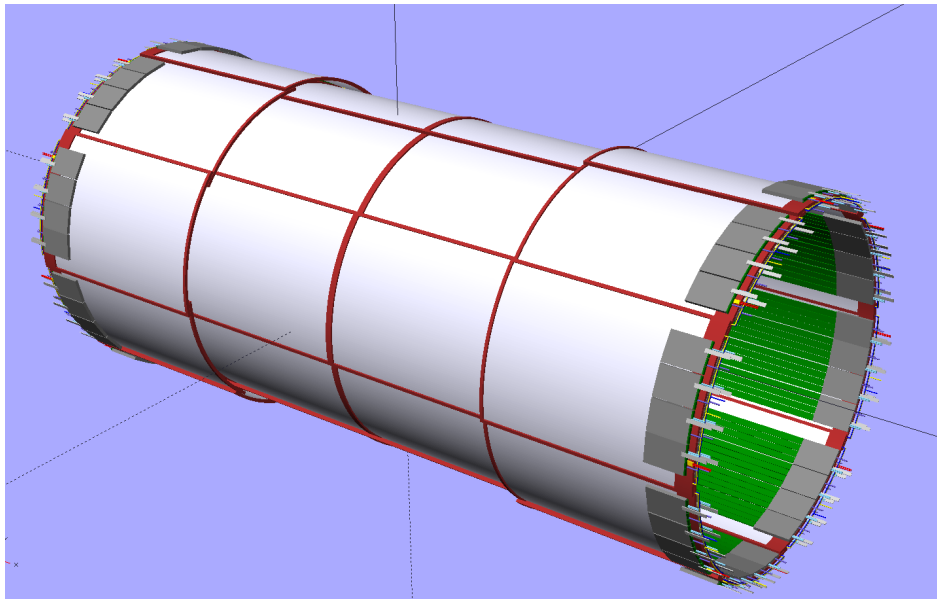
Inner detector support structure and cooling workshop
Feb 20th 2024



Cylindrical Micromegas Barrel Layer (CyMBaL)

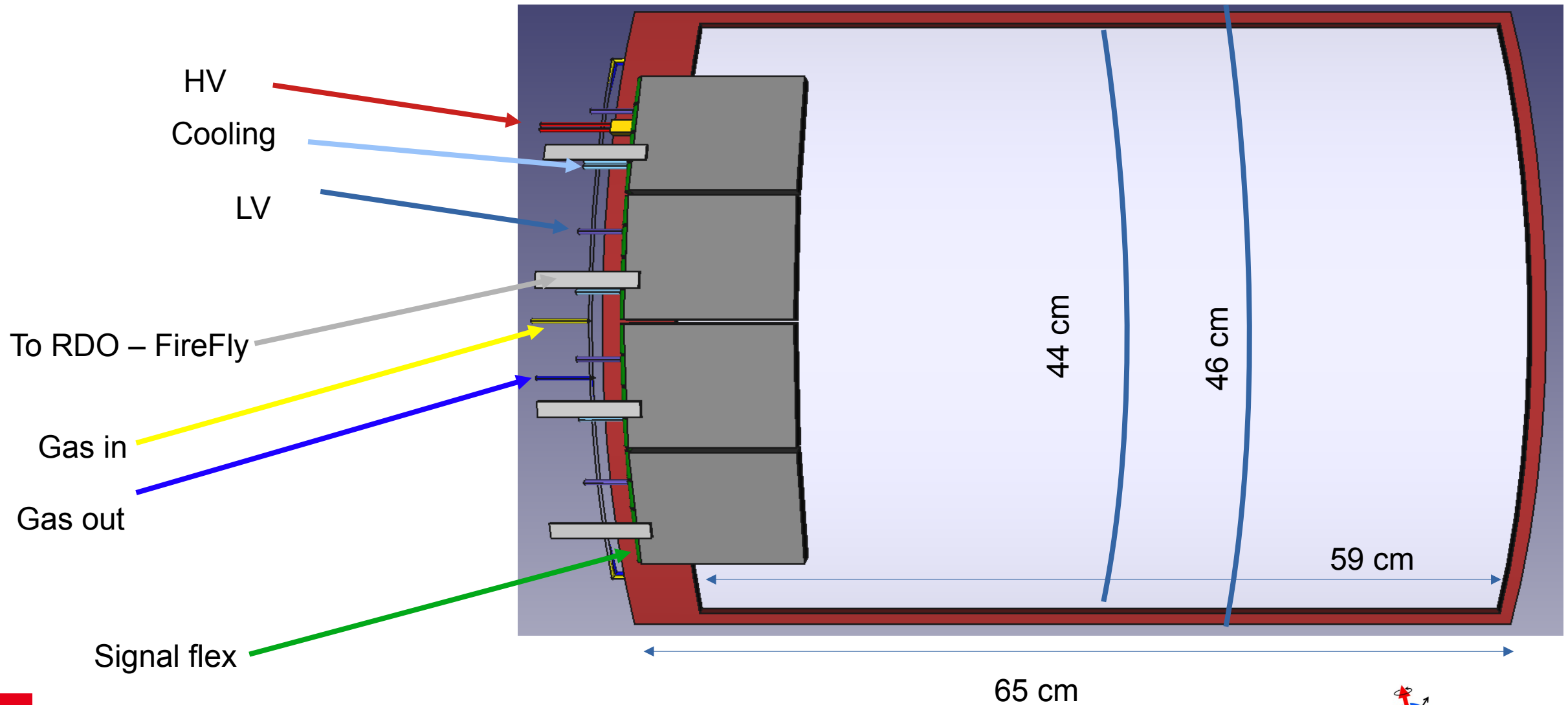
CyMBaL : a single layer of curved 2D Micromegas modules

- Technology: evolution of the CLAS12 Micromegas, 1D \rightarrow 2D
- Use a single module design to reduce manufacturing and assembly
- Be hermetic in phi and z

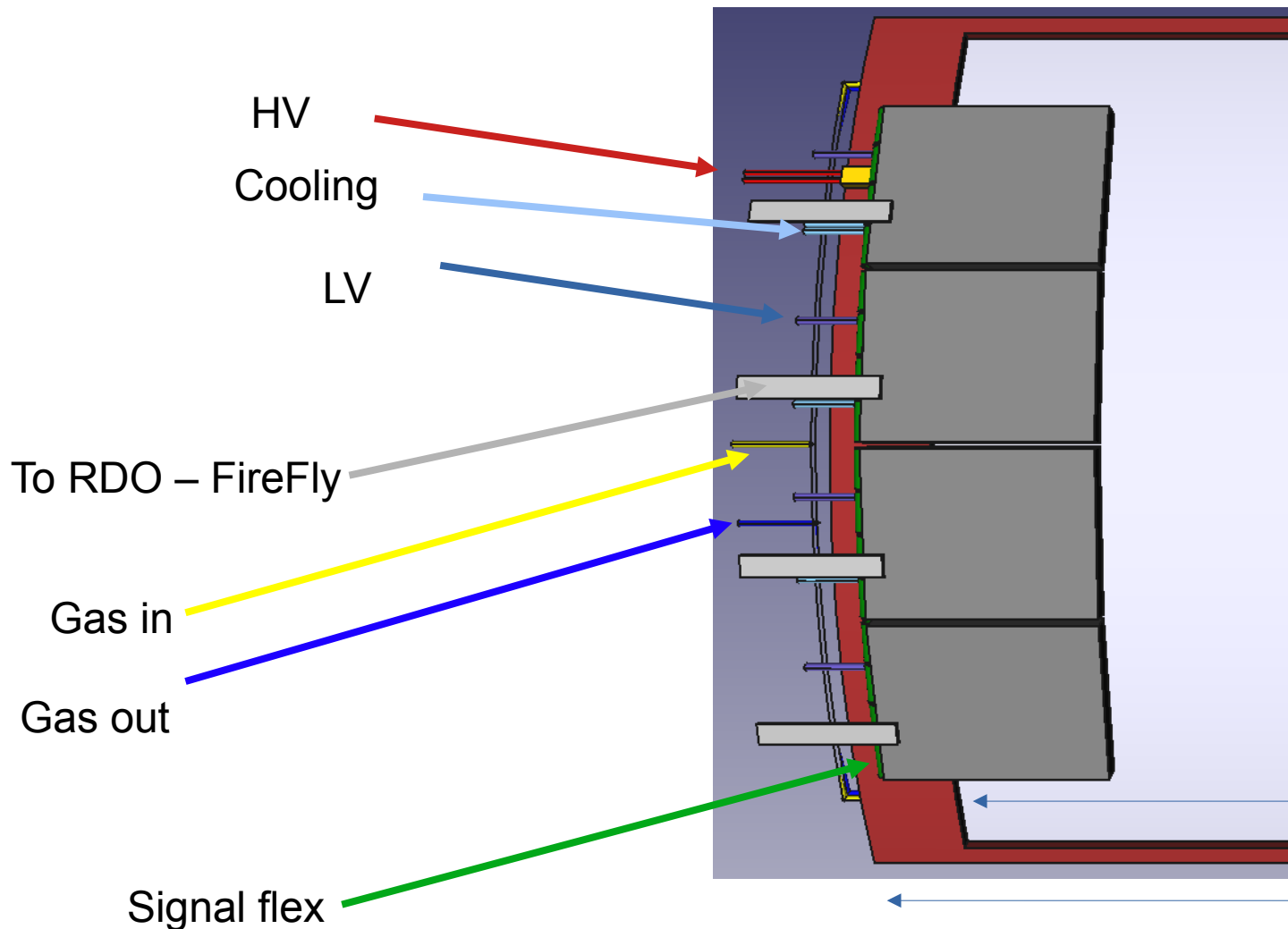


- Almost 2.5 m in length

Basic module: a tile



Basic module: a tile



Dimensions:

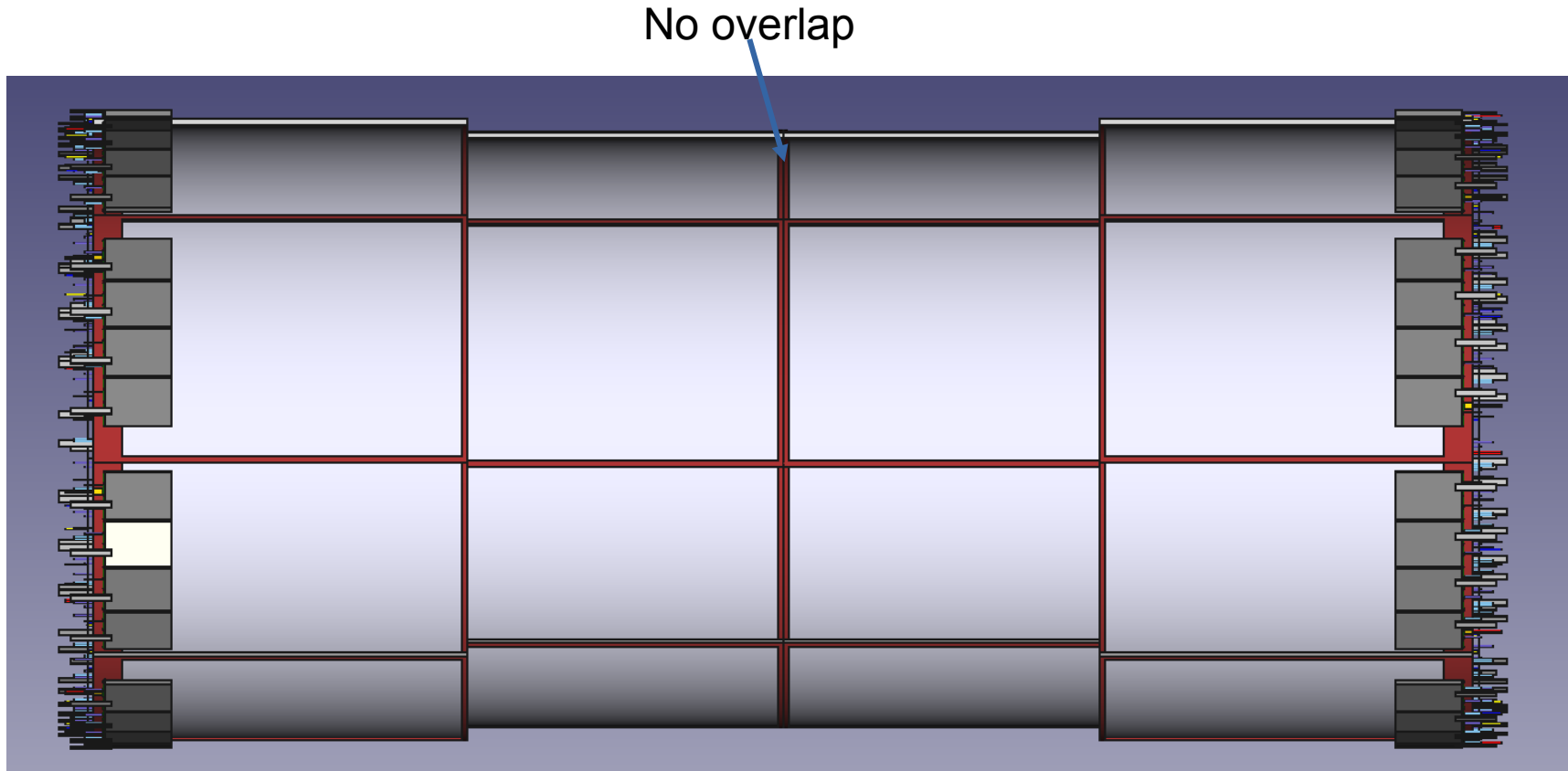
- Size: 65 x 46 cm²
- Active area: 59x44 cm²
- ~1 mm pitch in both directions
- 1024 strips per tile
- 32 channels per connector → 32 connectors

Services:

- HV: 2 channels (drift and resistive layer)
- Gas: 2 tubes (in and out)
 - Two tiles can be in series
- 4 FEB per tile
- If 4 ASICs per FEB:
 - 1x8ch FireFly per FEB to the RDO
 - 2 short flex cables per ASIC
 - LV
 - Cooling in and out, possibly in series

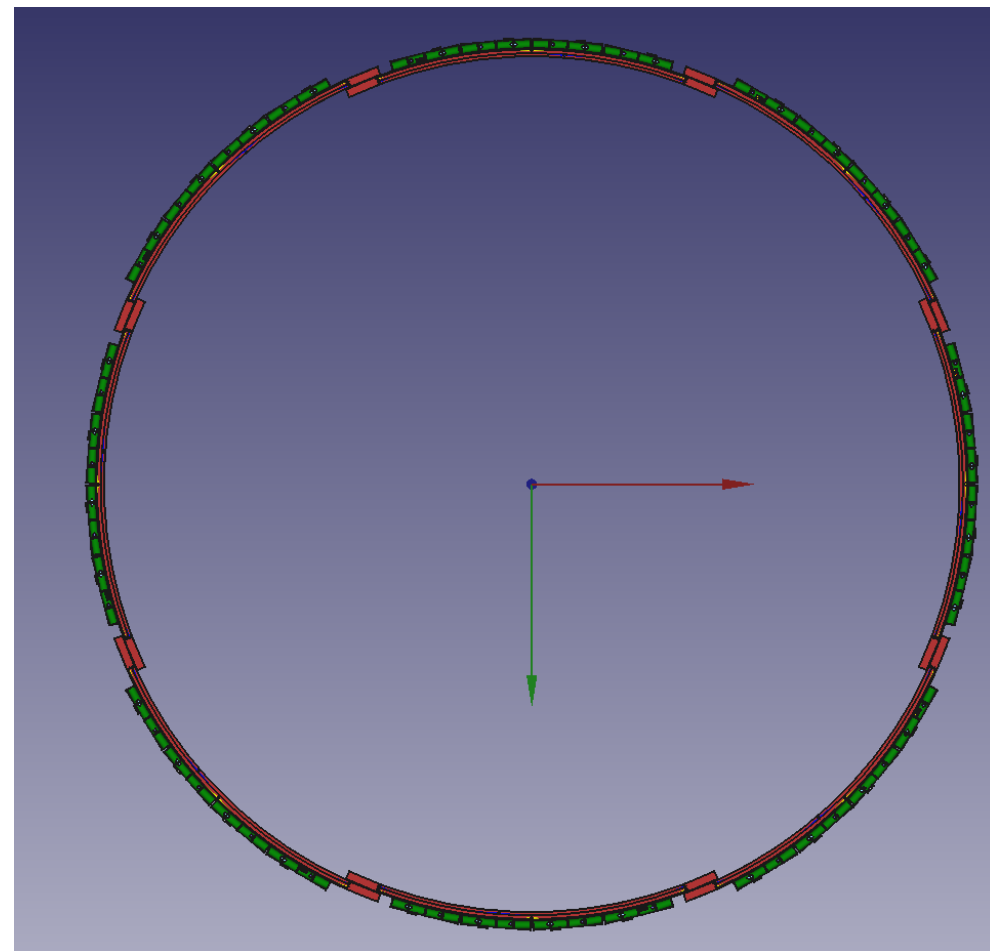
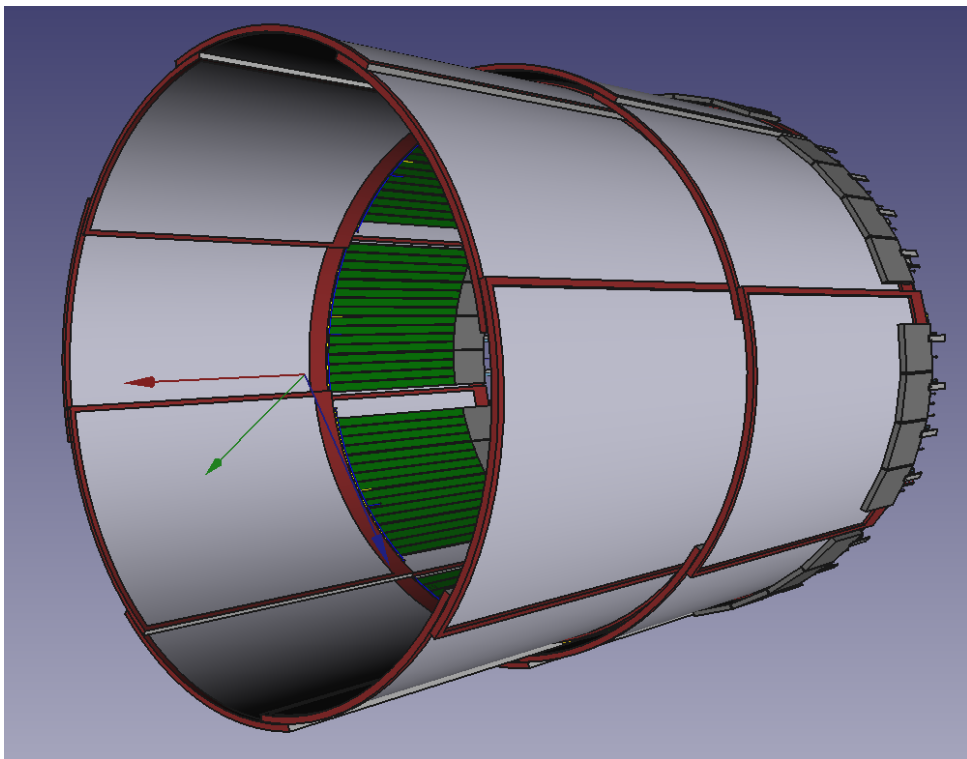
CyMBaL

- The length in z will be covered with 4 modules
- Two different radii, 50 and 52.5 cm
- No overlap in the middle: not needed as there will be support disks at the same location

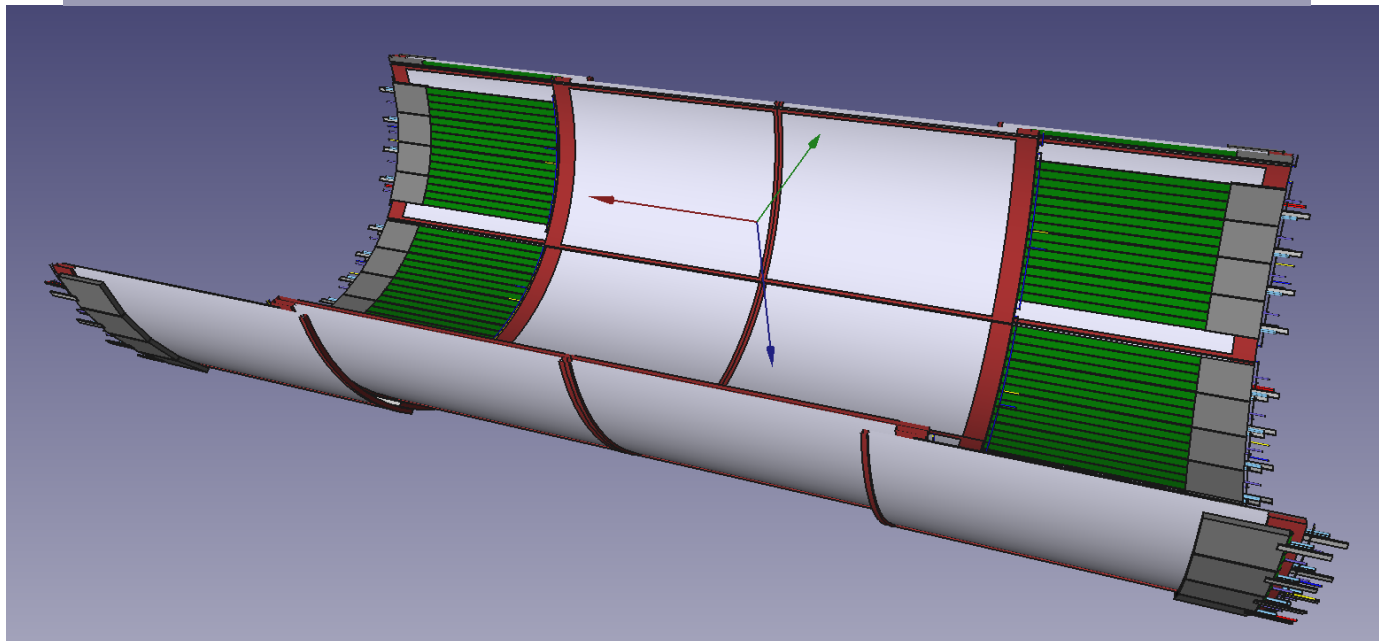
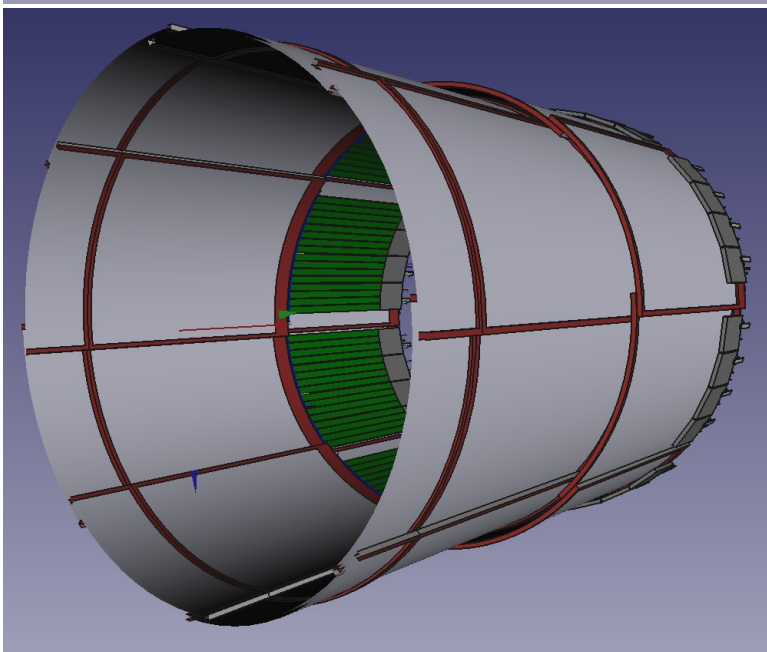
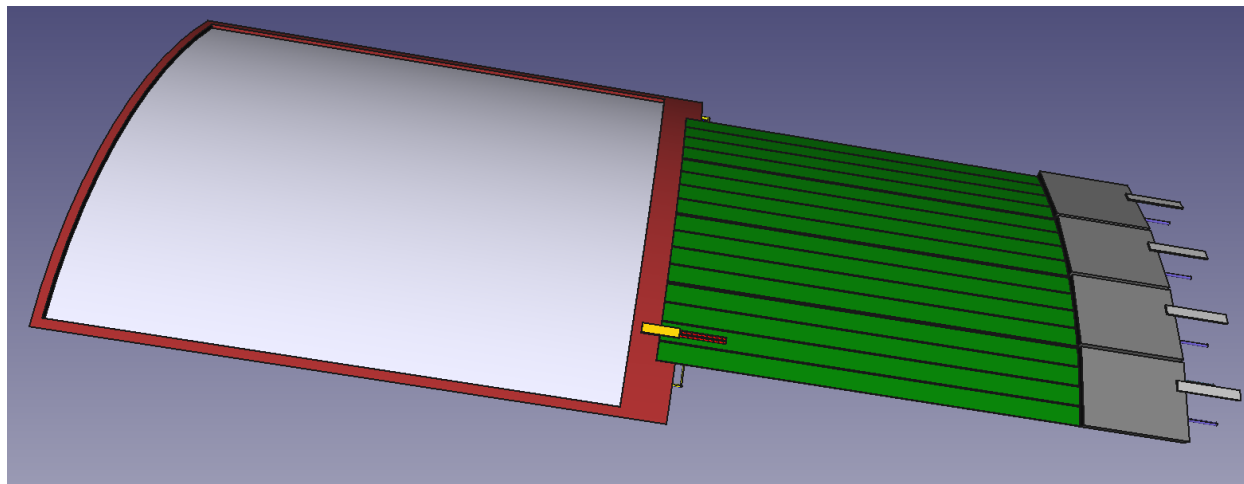
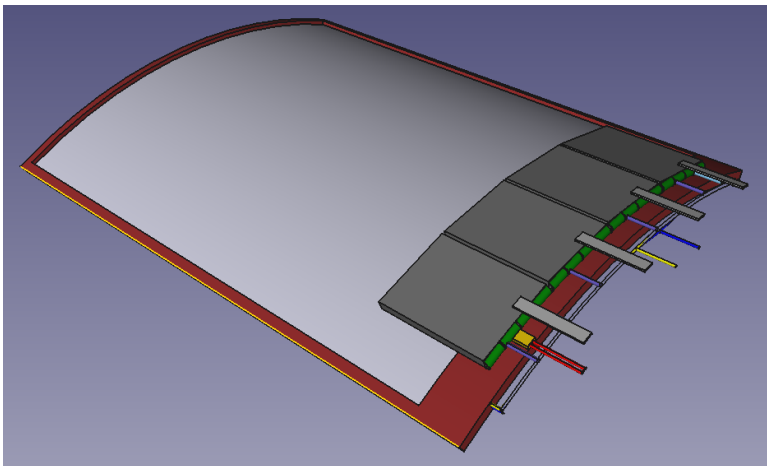


CyMBaL

- 8 modules in phi
- Alternated layout at two slightly different radii



CyMBaL – more views

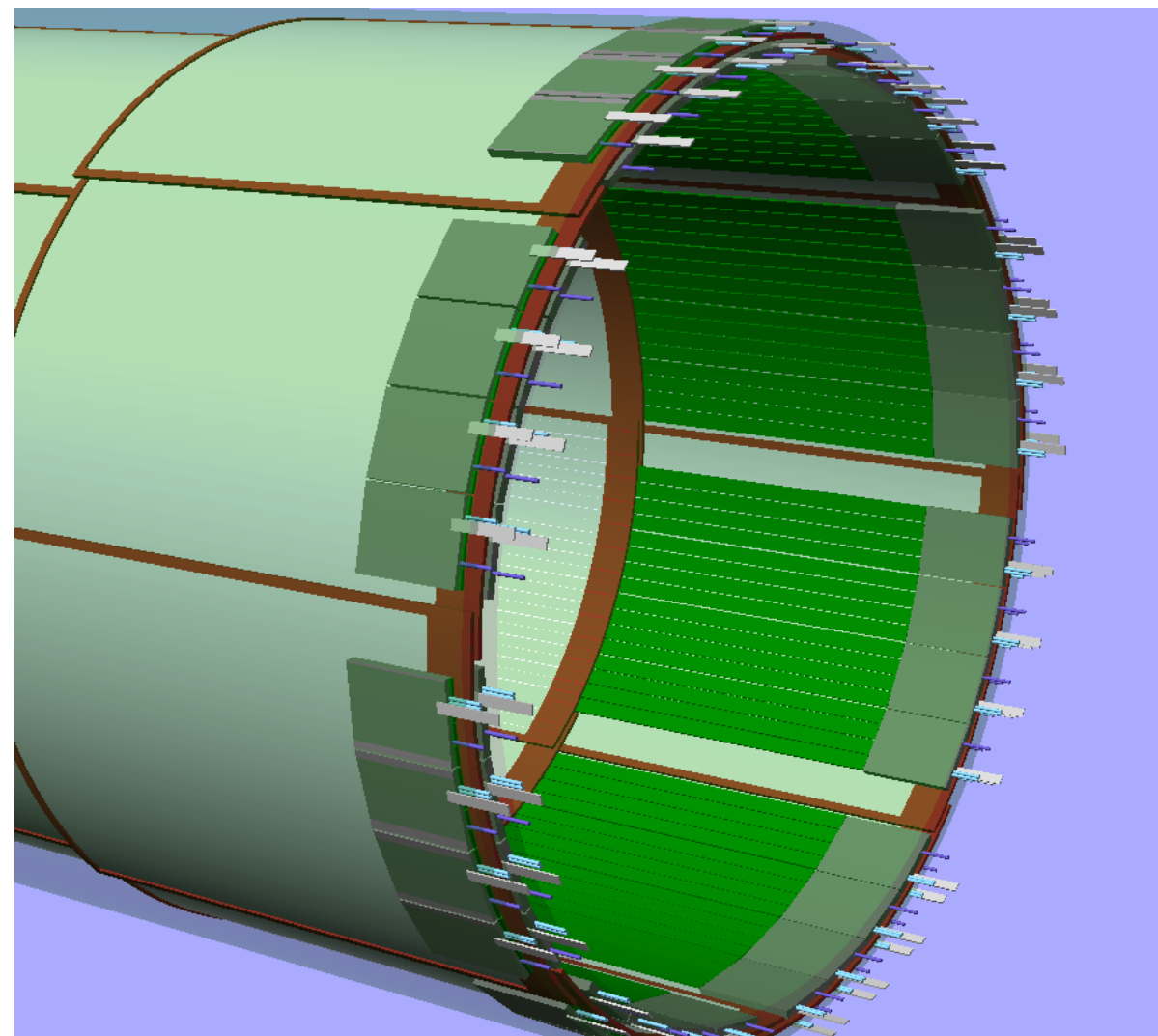


CyMBaL – Keeping zones

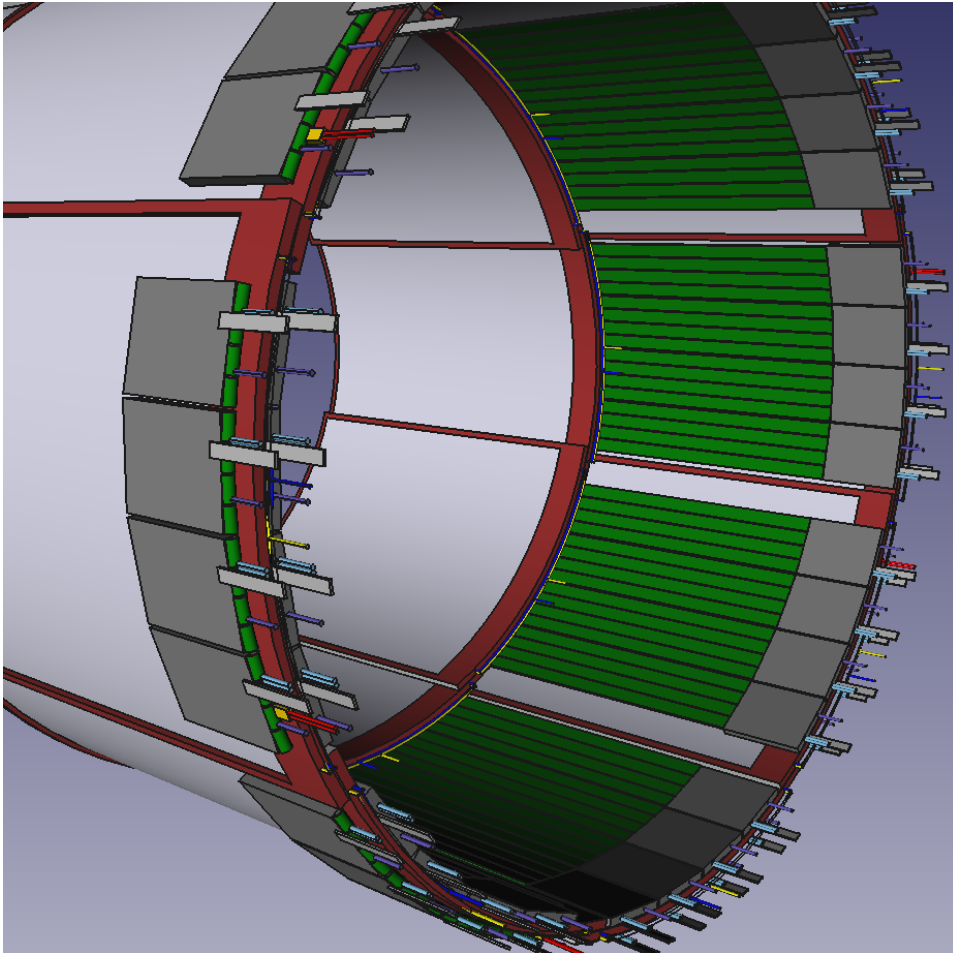
$Z = [-1050, 1350] \text{ mm}$

$r = [500, 550] \text{ mm}$ (green shade in the picture)

- Assumptions for the radial keeping zone:
 - Thickness of a tile structure ~1cm
 - Thickness of FEB ~1cm
- But this is still a crude (and safe) estimate:
 - We need better estimates for the FEB (see later)
 - Results from the mechanical mock up (later in the year)

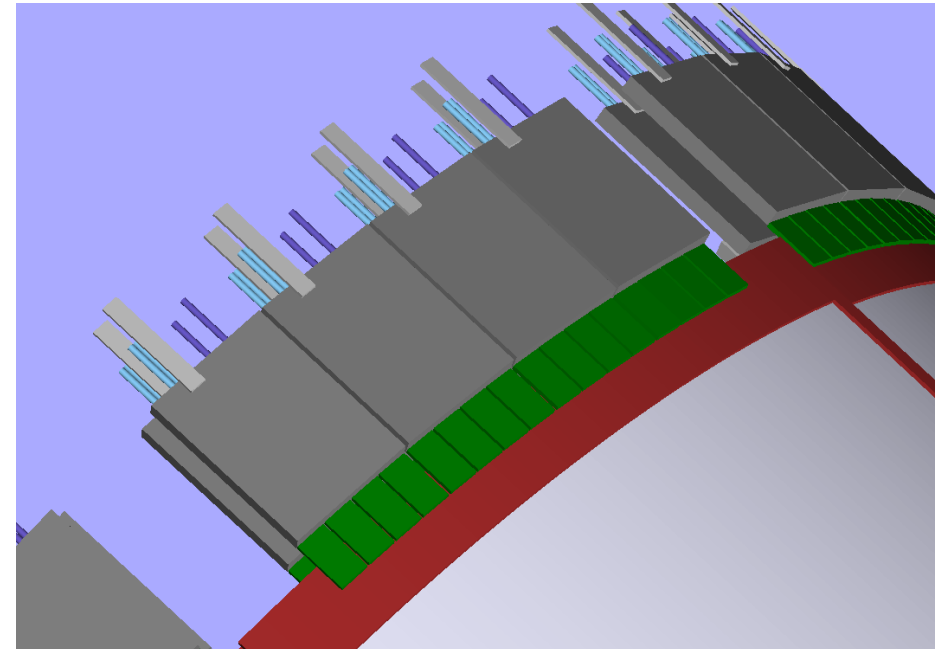


Questions – CyMBaL – FEB locations



- FEB on the extremities of the system to avoid too much material in the active region
- The inner modules will need longer flex cables (~50cm) to bring the signals to the FEB
- QUESTION: If the 5cm radial keeping zone is not available, we could save some radial space by moving the FEBs close to the modules

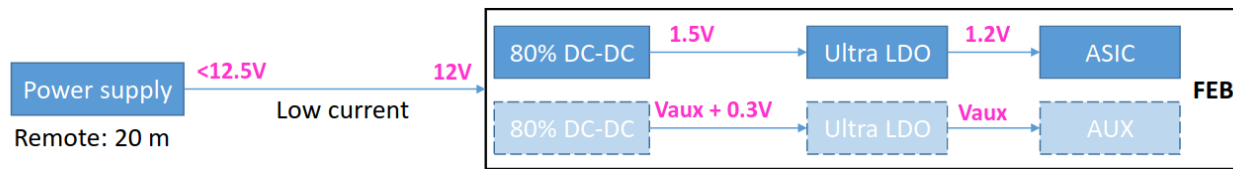
Is there enough space in z?



CyMBaL – Powering and data schemes

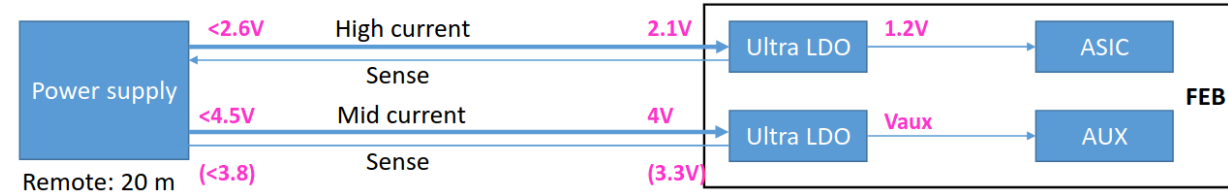
From Irakli's presentation at the DAQ meeting: <https://indico.bnl.gov/event/22316/>

DCDC on (or close by) FEBs



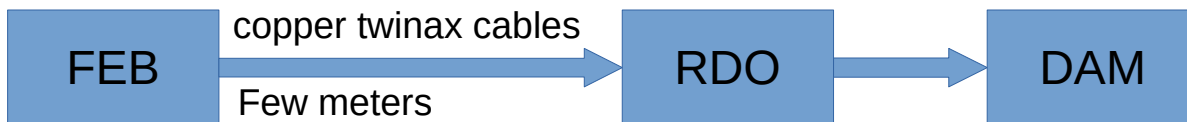
PRO: Small cross section cables
 CON: DCDC might be bulky

LDO based powering scheme



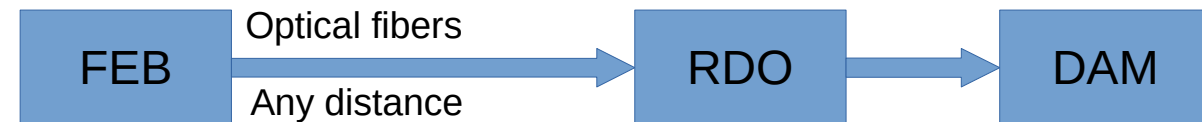
PRO: No DCDC on FEBs
 CON: Large cross section cables for high current delivery

FEB-RDO: on copper twinax cables



PRO: no intelligence on FEBs
 CON: RDO MPGD specific, radiation hard, space?

FEB-RDO: on optical fibers



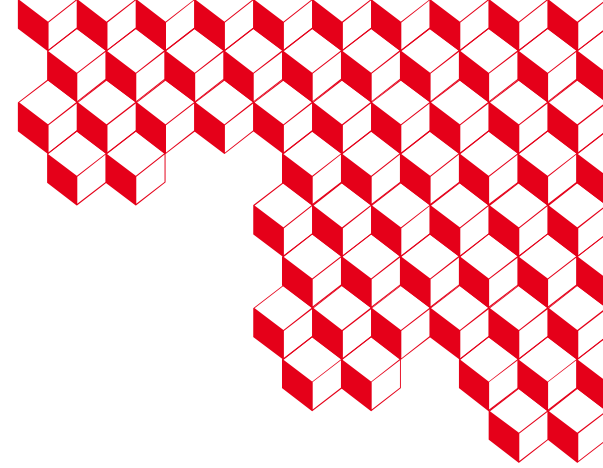
PRO: small cross section for service and no problem of space for RDO
 CON: intelligence on FEB, consumption, radiation hardness

CyMBaL – Open questions

- Services and cooling
 - Heat dissipation depends also on the choice of the LV scheme: DCDC per FEB? Or DCDC somewhere close by?
 - Cooling: we look forward at a common effort
- Space:
 - We need to have confirmation about the keeping zones
 - Side note: the menagerie is probably not up to date, Matt started a discussion about it
 - The module design will be improved to be more realistic in the coming months
 - FEB form factor will be driven by the thickest component. If DCDC on board, the choice of the DCDC is crucial.
 - Discussion ongoing within the DAQ meeting (see presentations by [G. Visser](#) and [T. Camarda](#))
 - RDO: if electrical connection FEB-RDO, is there a place where the RDO can sit?
- Support structure:
 - How the CyMBaL modules will be supported?






irfu



Merci

Basic module: a tile; readout routing



-  Z; (r
phi)
-  C;
(z)
-  return trail for C
strips

