

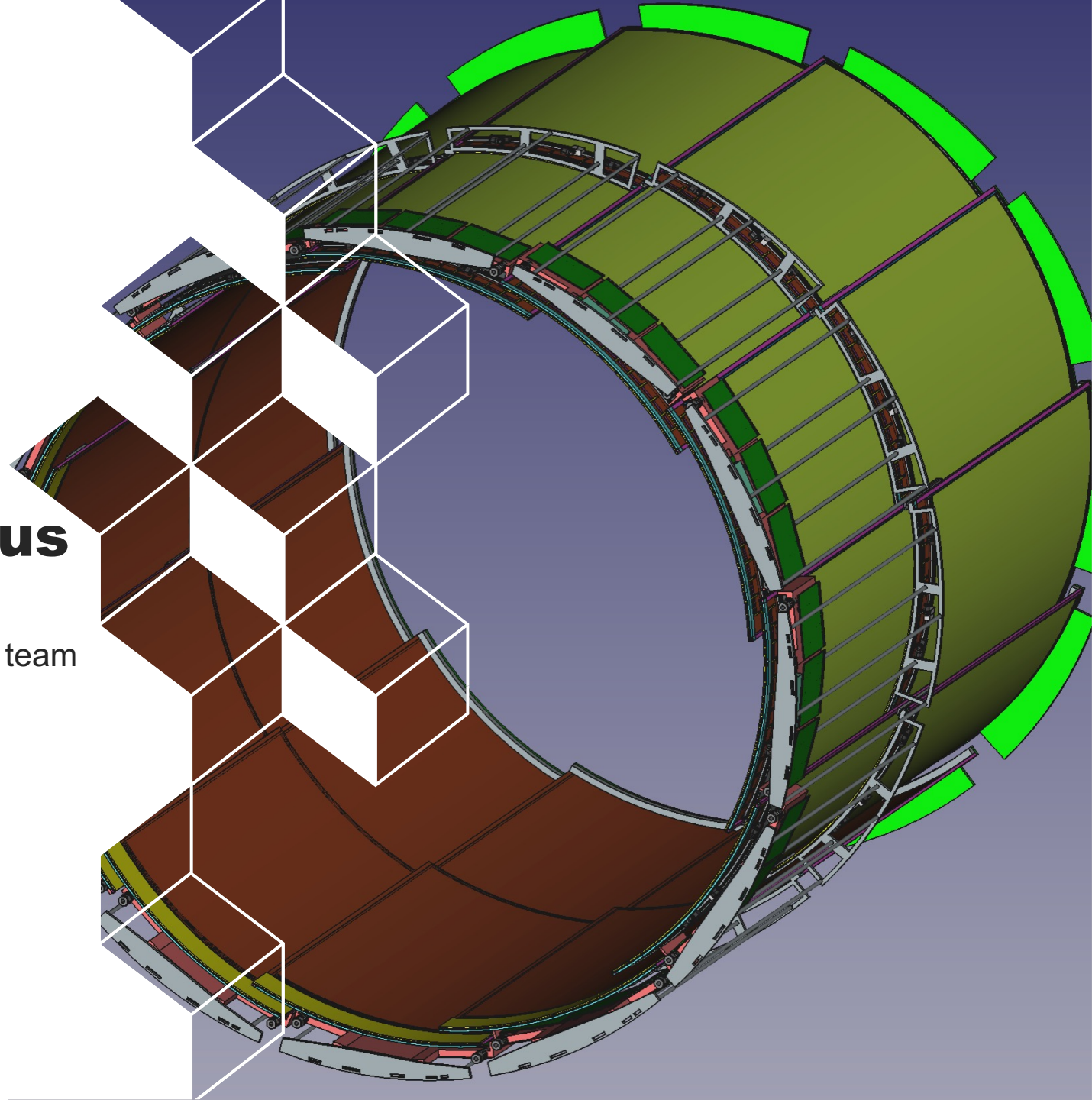


irfu



Inner MPGD CyMBaL Status

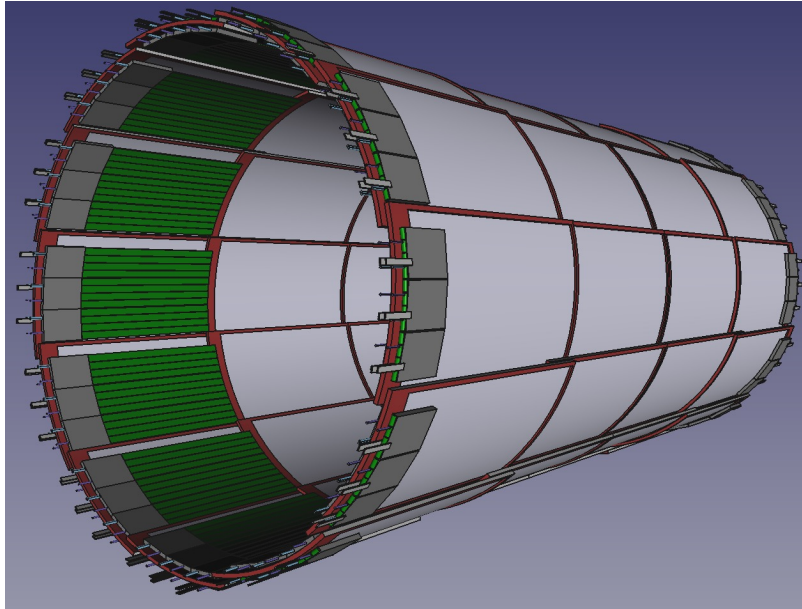
Alain Delbart, Seraphin Vetter, for the CEA/Saclay IRFU team



EIC/EPIC 3I meeting, 10 november 2025

CyMBaL tiles integration

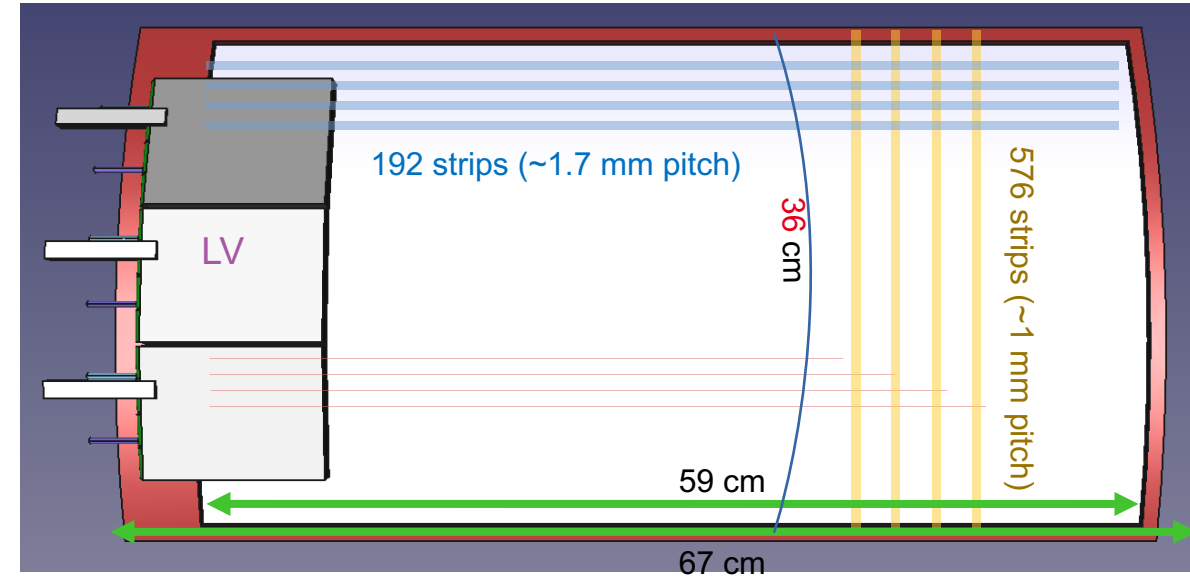
CyMBaL: Current design



Services
via patch panel(s)

- ❖ 3 OF (to DAM)
 - ❖ 5 HV cables (TbC)
 - ❖ 3 LV cables (1 tile)
 - ❖ Gas I/O (2 tiles)
 - ❖ FEB cooling I/O
- 2 tiles – 6 FEBs+DC/DC
few l/mn of 18°C water

Design of a tile (Cylindrical)



48 tiles: 12 in ϕ $\times$ 4 in z (integration in GST in “fish scale”)

- ❖ $R_{\min} = 55.5$ cm; $R_{\max} = 61.5$ cm (new baseline October 6)
- ❖ Overlaps in ϕ and in z for hermeticity (~2-4 cm)
- ❖ 768 readout channels/module
- ❖ 36K readout channels in 3 FEBs/tile

Module dimensions

Z = 67 cm / R*phi = 36 cm

Active zone dimensions

Z = 59 cm / R*phi = 34 cm

Weigh estimates

~1 kg / tile + ~0,6 kg / FEB

Expected performances

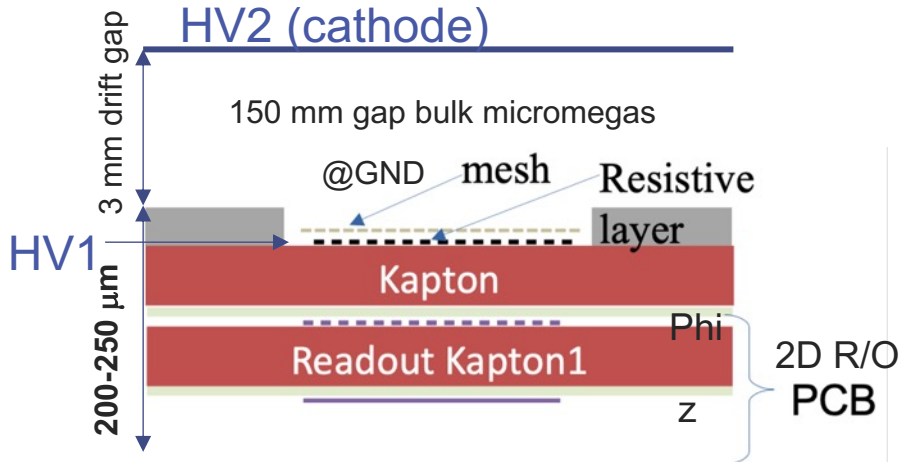
- ❖ Spatial resolution: < 300 (500) μ m in Z (r*phi)
- ❖ Time resolution ~20ns
- ❖ Efficiency $\geq$ 98%
- ❖ Material budget ~0.5% X0

18-20°C water cooling for FEBs (8.5 W with 25% margin) for a 1224 W total power (excl. DC/DC cards, 5 W / FEB ?)

→ up to ~2 KW with DC/DC

CERN/SPS on-going testbeam (w45-47)

Goal : spatial & timing resolution Vs resistive paste layer configuration (paste, pattern, resistivity)



9 “RD5” chambers (~15x15 cm²) with new 2D x-y R/O

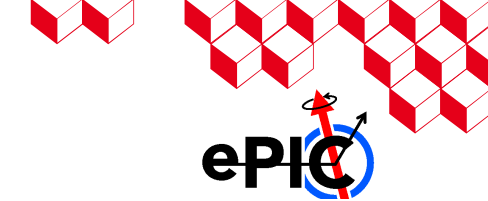
Ar 95% - Isobutane 2% - CO₂ 5% (baseline)

CLAS12/DREAM electronics (2x128 ch. / RD5)

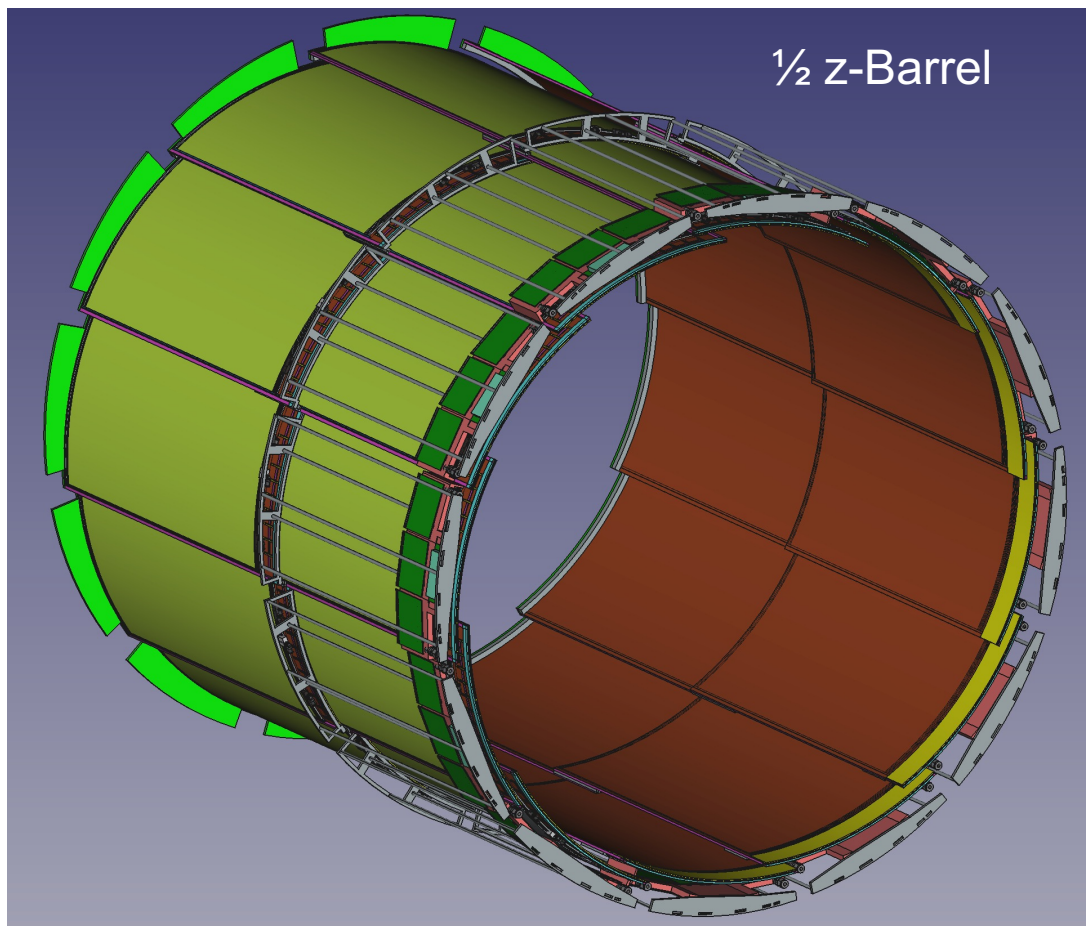
- Strip pitch / width : Phi : 1 mm / 300 μm & z : / 1.2 mm / 1.08 mm
- Resistive layer :
 - 3 patterns (plain, strips, grid)
 - 3 different inks (ESL, SARAL, VFP), 1-5 Mohm/sq.
- New micromegas bulk integration process with new photoimageable dynamask (2x75 μm layers)

Note: Phi-z strips pattern following old EPIC 32 CyMBaL tiles configuration !

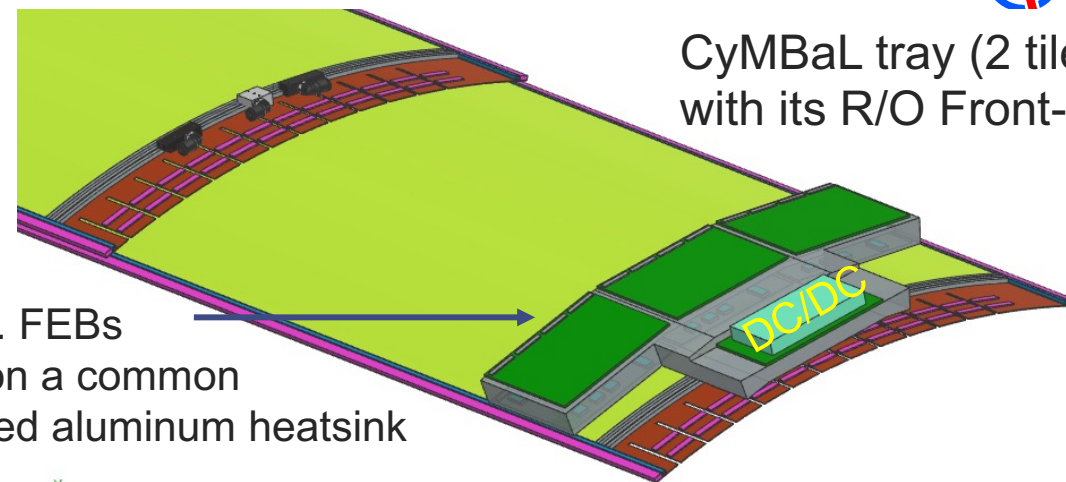
Progress on design study of CyMBaL integration



First ideas on CyMBaL tray assembly
and interface with GST & TOF

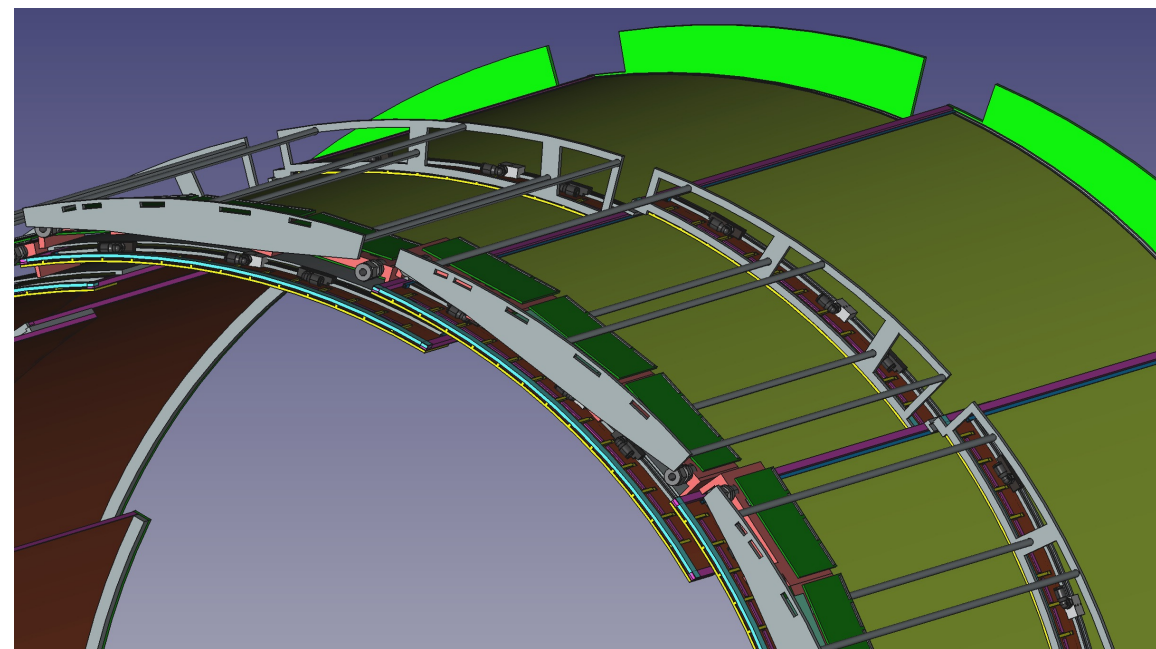


$\frac{1}{2}$ z-Barrel



CyMBaL tray (2 tiles)
with its R/O Front-End

6 x 256 ch. FEBs
+ DC/DC on a common
water cooled aluminum heatsink



Progress on design study of CyMBaL integration

Strictly fit in the 555 / 615 mm radius envelop but no assembly tolerances yet included

