

# calorimetry integration in ILD

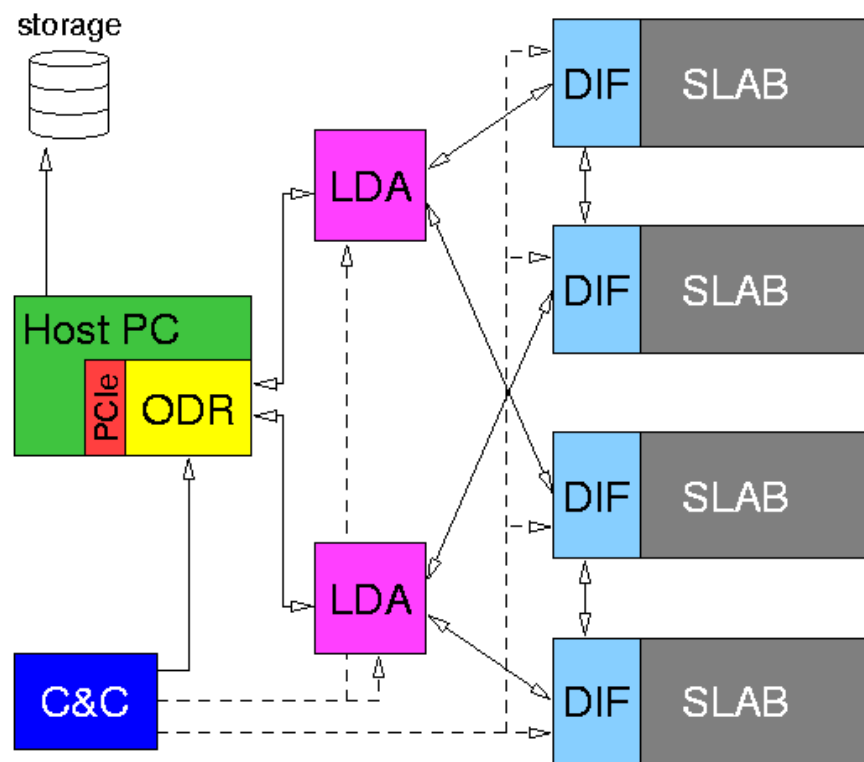
ECAL Cables : numbers and routing, a first thought

Rémi Cornat - LLR

Beware! Only one tower/module is drawn

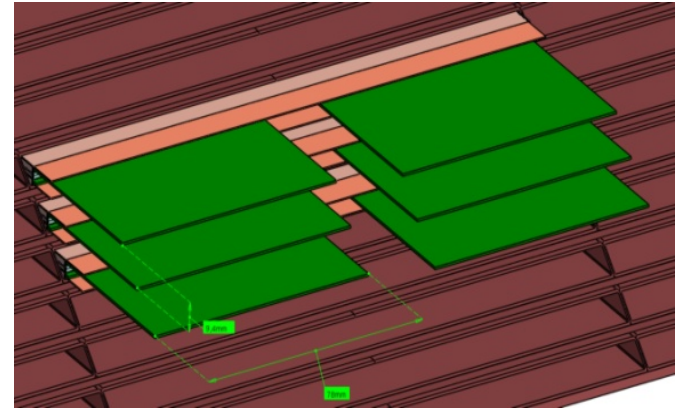
# Electronics architecture

- **Detector InterFace (DIF):** read out and control of a SLAB (1/layer, 30/tower, 750/STAVE)
- **Concentrator Card (CC):** intermediate and optional
- **Local Data Aggregator (LDA):** read-out of a tower + clock and control + power distribution (25/STAVE)
- **Off Detector Read-out (ODR) :** 1/STAVE



# Control and read-out cables (SC/RO)

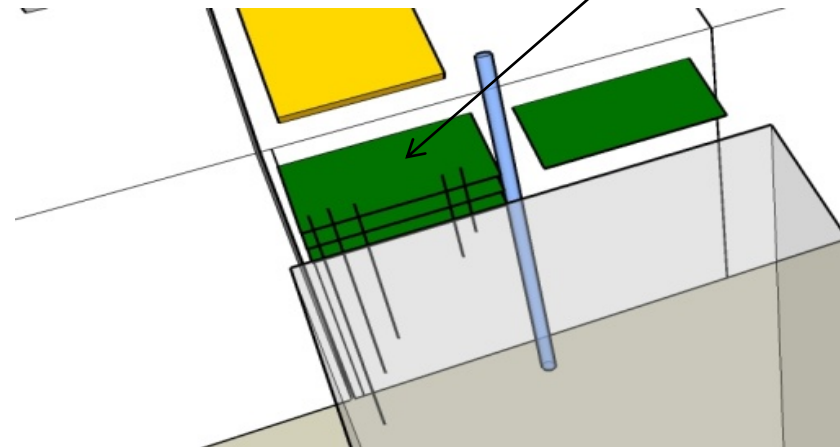
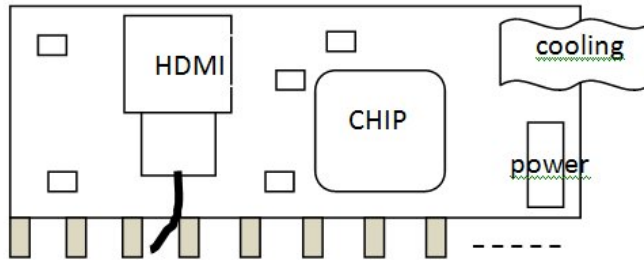
- DIF-LDA
  - 30 cables per tower = 18 cm
  - About 4mm of diameter
  - HDMI connectors (today)
    - 19 pins
    - CLK, DIN, DOUT (+ POWER ?)
    - Read-out rate : 5 Mbits/s
    - Fast Control and commands encoded in the link (assumption)
- LDA-ODR
  - Clock and control : 1 cable (CAT5), 5/module, 25/STAVE
  - Read-out : optical : 2 fibres or 2x CAT5, 50/STAVE
  - Power if distributed by LDA ?





# SC/RO : DIF side

- Space for DIF is only 7x3x0.6 cm<sup>3</sup>



- No place to put cables on right or left sides
- Cable guides at the front of DIF to make a ribbon

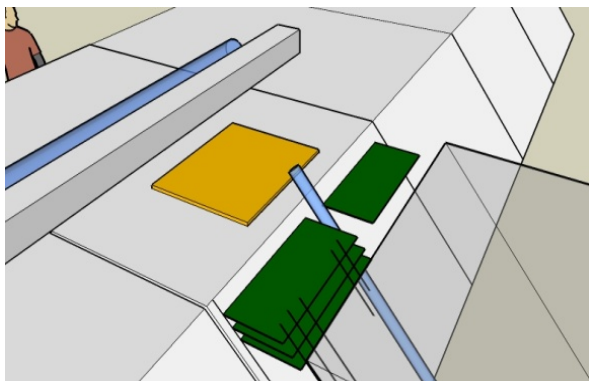


LDA has to host 30 connectors : ~ 45 cm unstacked

LDA could be located either inner or outer side of the STAVE

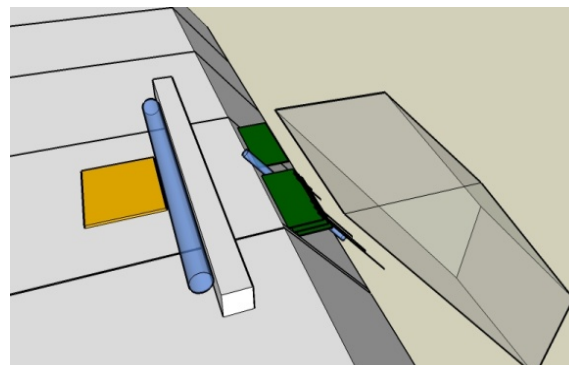
Option : 2 LDA per tower (LDA-DIF cabling easier but double LDA-ODR cables)

OUTER



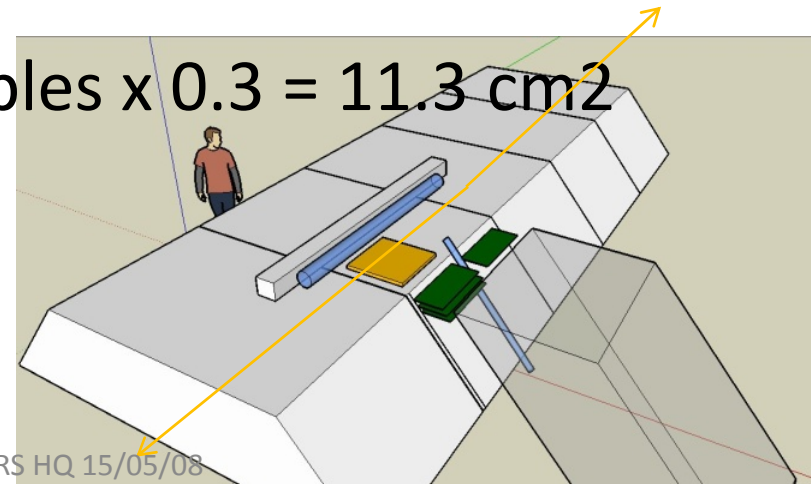
Some place for connectors and plugs around LDA but small room for LDA

INNER



Maximize place for LDA but cable have to go through the rail : hole of about 4x2 cm<sup>2</sup>  
LDA close to cooling pipe, common tray for cables, grounding,...

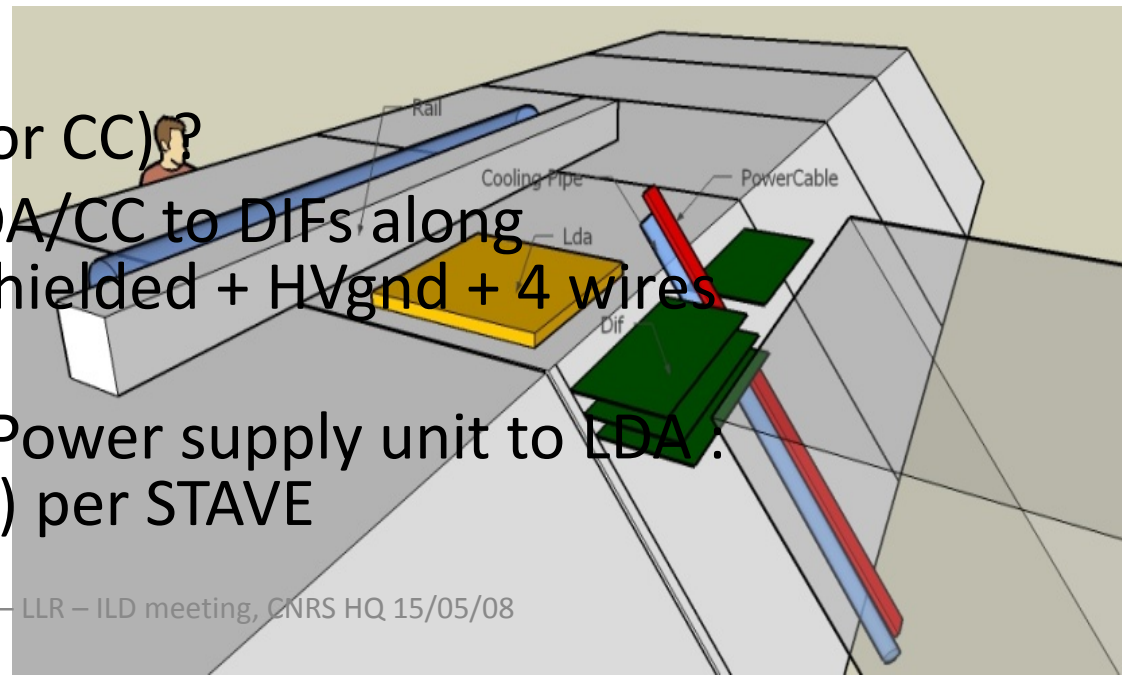
- 1 CAT5 (clock and fast control) + 2 fibres per LDA (read out)
- If use of intermediate CC : 3 CAT5 (CC replace LDA, LDA could be placed off detector : conversion to optical)
- 0.3 cm<sup>2</sup>/cable
  - 2.5 modules x 5 LDA x 3 cables x 0.3 = 11.3 cm<sup>2</sup> bundle
  - at both ends of the STAVE



- HV : 100-200 V to bias detectors
- LV : single 3.3 V routed in LDA-DIF connectors
  - Could be on dedicated cables (option)

- HV power

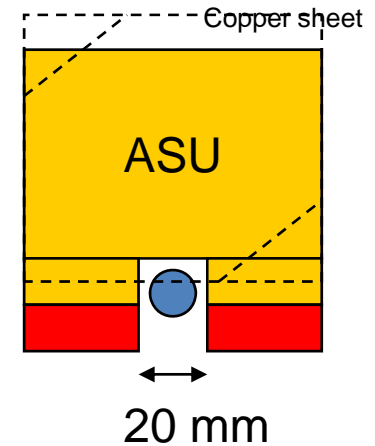
- Managed by LDA (or CC)?
- Power bus from LDA/CC to DIFs along cooling pipe : HV shielded + HVgnd + 4 wires probe/control
- From off detector Power supply unit to LDA. 13 HV cables (coax) per STAVE





# Cooling

- Cold water distribution pipes (see D. Grondin's talk)
- Most of interDIF space taken by pipes
  - How to connect pipes to copper sheet of the slabs
  - Place for HV/LV cable + ground cable
    - $0.5 \times 1.2 \text{ cm}^2$  +  $0.4 \times 2 \text{ cm}^2$
  - LDA should be cooled : location near pipe



Ground network ? mandatory





# End Caps



- Higher data flow
  - Longer slabs
  - Occupancy
- Probably a slightly different architecture for electronics would be needed
  - Power consumption optimization
  - More cables (factor 4 / DIF for SC/RO)...

