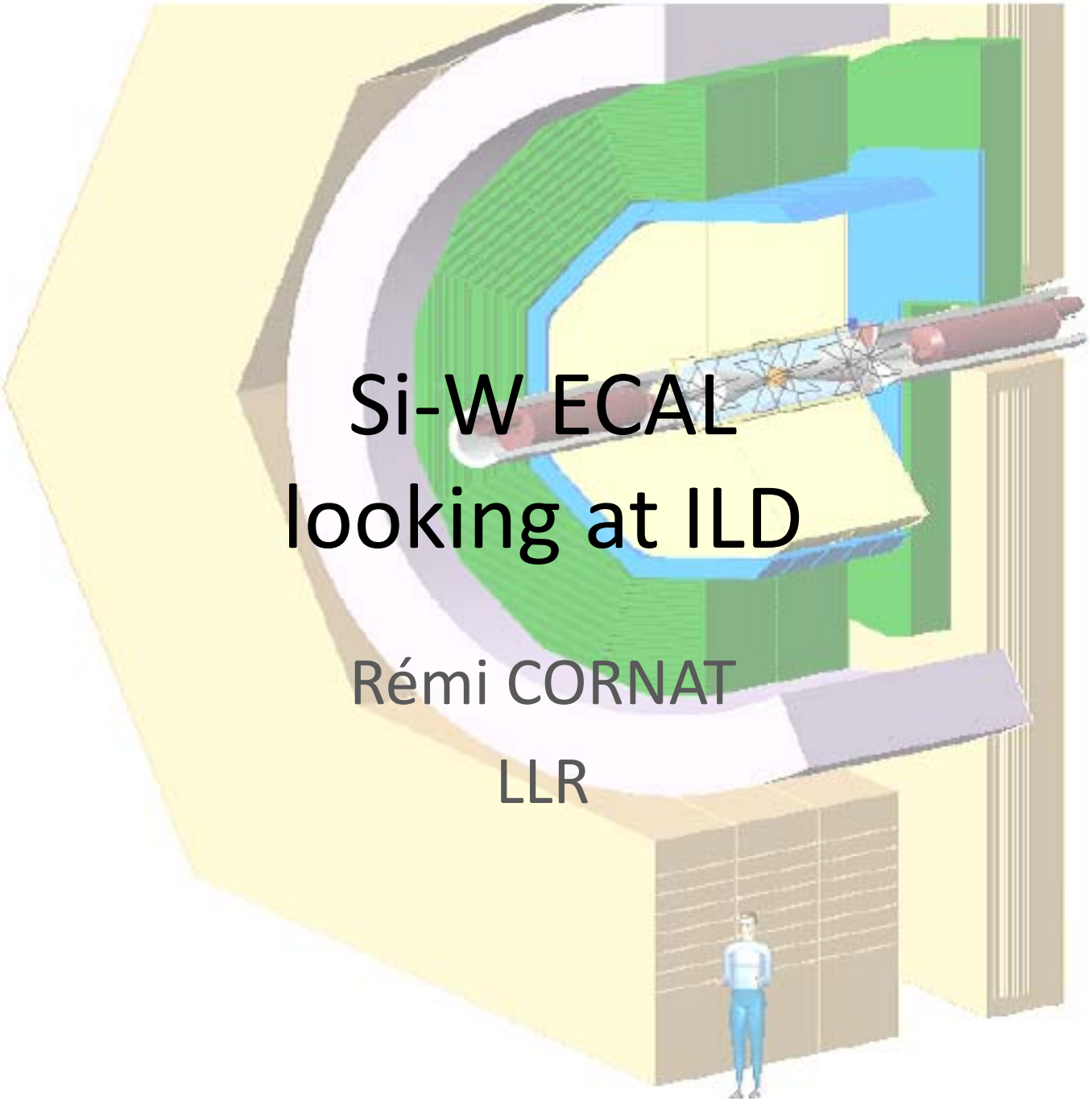
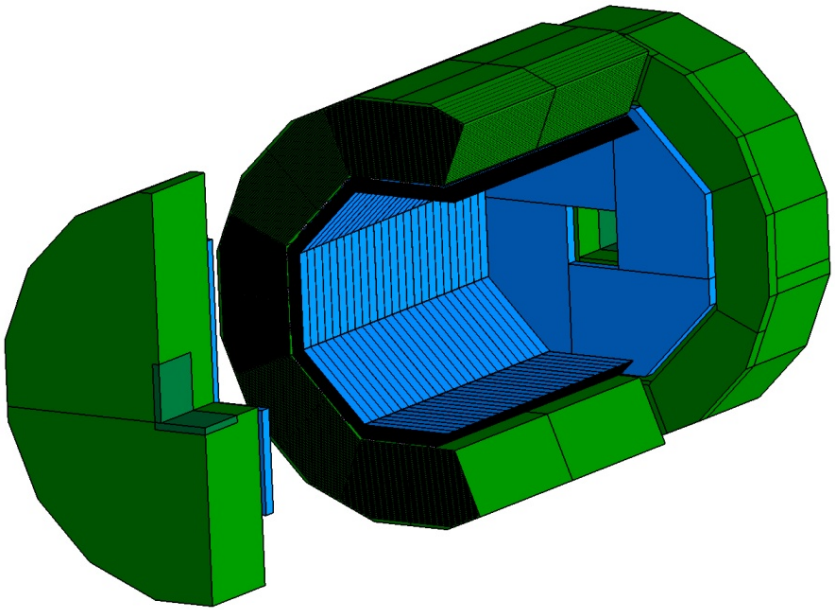


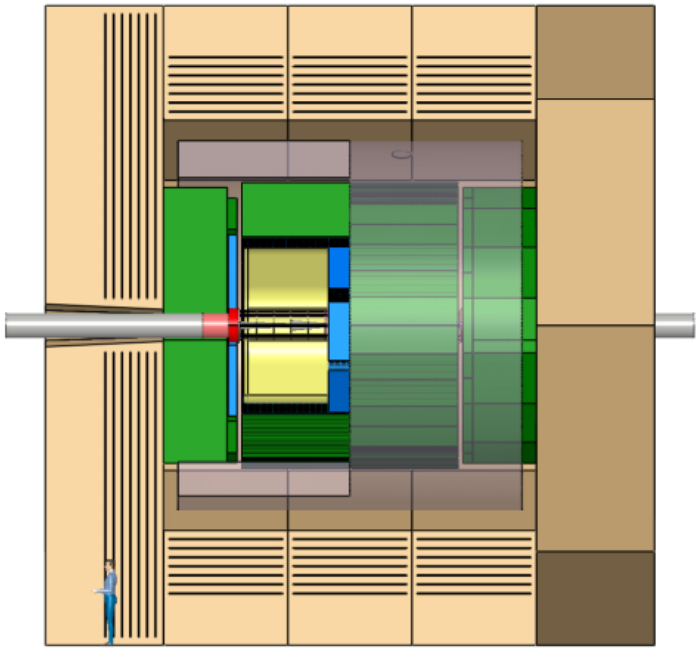
Si-W ECAL looking at ILD

Rémi CORNAT

LLR

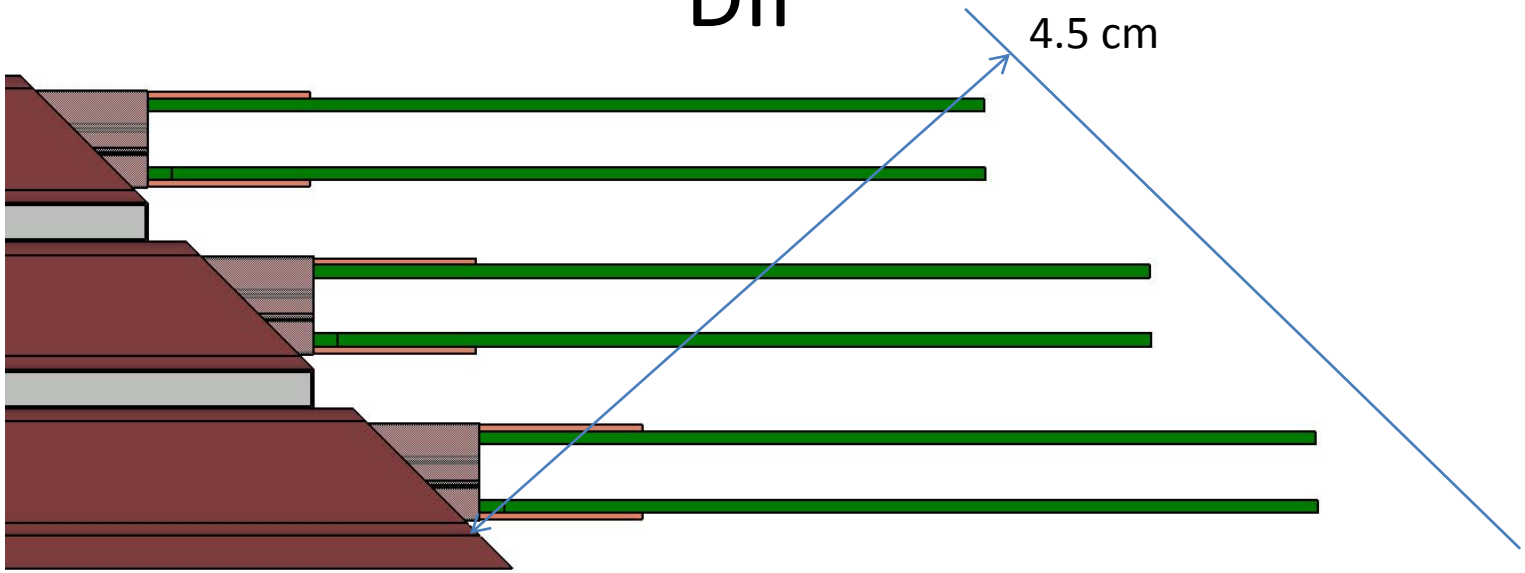
Mechanical dimensions





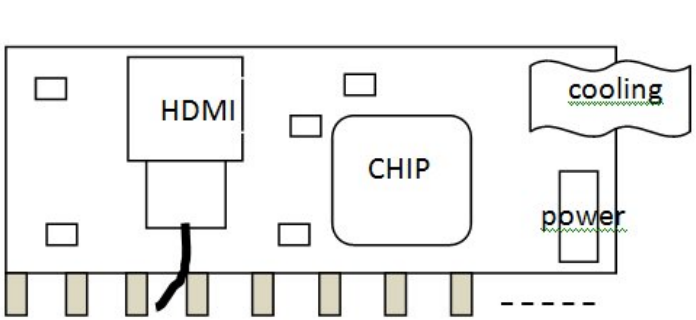
See Mathieu's talk

DIF



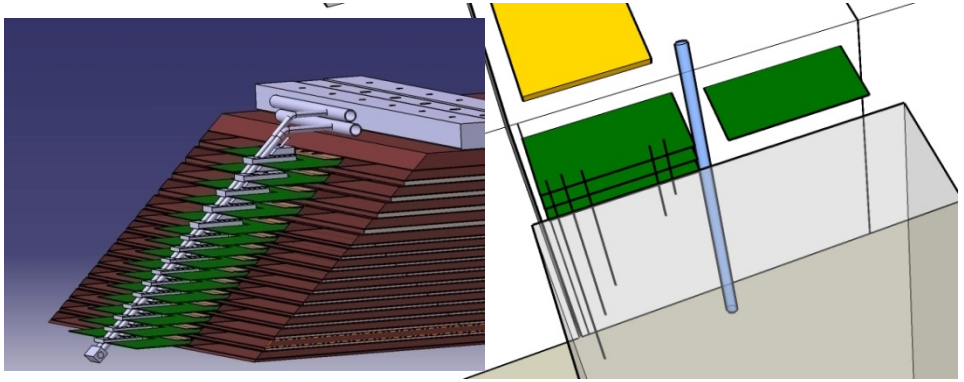
- 45° => 6 cm, - cables, - assembly margin
- About 3.5 remaining
- DIF will include what is put on the adapter board (EUDET)
  - Higher density of components
  - Less components : optimizations

ILD



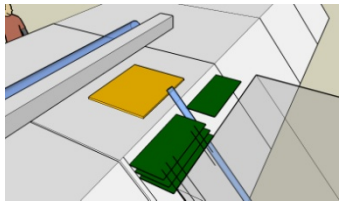
DIF is part of last ASU of the SLAB
Allowed space : 6-7 x 3 x 0.6-0.8 cm3 !
Small amount of components allowed

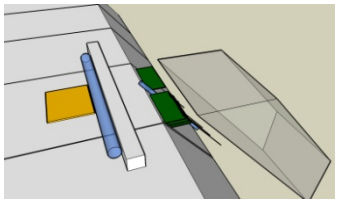
Quite no place for cabling : DAQ + HV + GND
LDA has to receive 30 cables (45 cm linear)
Service space is mostly taken by cooling

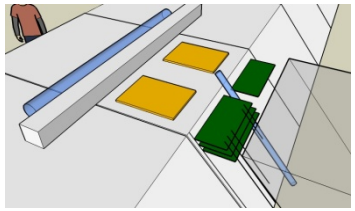


Space for HV and GND ?

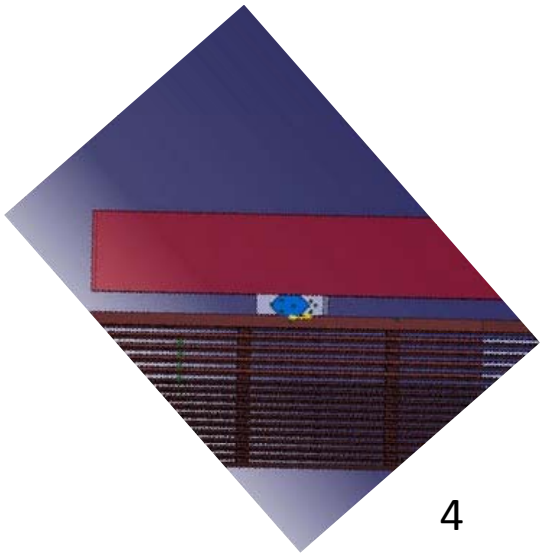
Space for LDA : 15x15 cm2 + connectors and cable curvature, holes (small!) for cables below rails







Outter, inner, divided



Initial view : Cables per tower

- 1 HDMI cable /DIF
  - Maybe DIF-DIF cable (no room, see later)
  - Diameter from 7 to 10 mm
  - Flat HDMI 4mm x 18 mm exist
  - Short (less than 1 m)

} Concentrated on LDA,
LDA-ODR = Gb Eth

- Common HV
- Common LV
- => 3 cables / tower
  There are 5 towers per module, 5 modules per stave, 8 staves for the barrel.
  => 5*5*8 = 200 cables of each sort for the barrel

  For a very first approximation, let's assume that the control/data cable is 0.5 cm2, LP cable is 1.5 cm^2, and HV cable is 0.5 cm2 (TBC!!)
  => 2.5 cm2 * 200 = 0.05 m2

  Appling a security factor of 2 (lost spaces, curvature, trays, misalignment,etc...) :
  => 1250 cm2 spread around the barrel

- If both side of each stave is used : 80 cm2 at both ends of a stave

DIF-LDA Cables

- 1 HDMI cable

4mm x 18 mm. Improved flexibility 10.2 GB/sec (V1.3b standard) up to 12m.

- 1 HV (bus topology)
- 1 LV (bus topology)

LV Power supplies : optimization or not…

- 3 kW FE-full det., 30*5*5*8*1.2 DIF, 3V (2.5 V techno)
  - 150 mA/DIF , 4.5 A/tower
- 10m, 1 cm^2 : R=2 mOhm, Pj=40 mW/tower
  - 10 W / detector Local distribution: 1m : 4 mW/tower = 1 W/det.
- 150 mA/DIF : use of a wire of the data cable
  - No more LV cable from LDA to DIF, individual connection
  - AWG24 : 1m=800 mOhm = 20 mW (120 mV loss), 150 W (det.)
  - Need 10 mF cap on DIF (“battery”)
  - Single LV+ cable to serve a STAVE or a MODULE (DC-DC conv.)
    - STAVE 36V, 10 staves, 4 cm2 : 8A/stave, 30 mW + DC-DC loss (x3)
    - MODULE 12 V, 5 towers, 2 cm2 : 5A/module, 25 mW + DC-DC loss (x3)

160 W

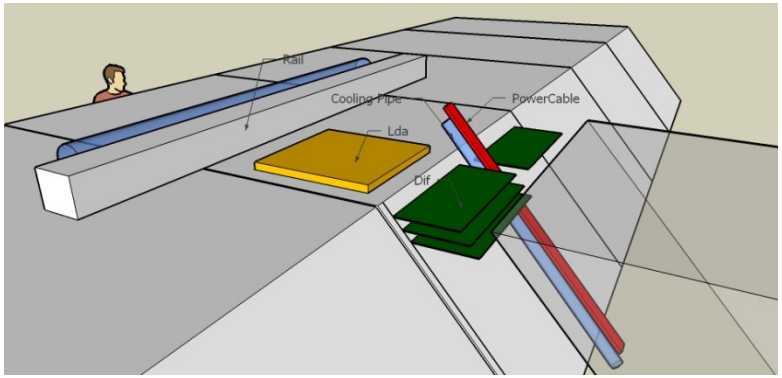
Global distribution : 10 m : 1- 5 W

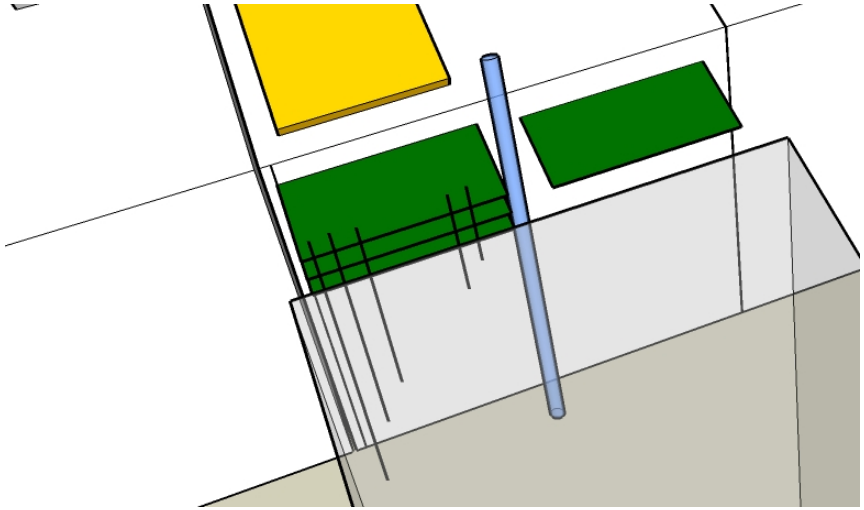
⇒Local LV cables + global LV cables and DC-DC on LDA

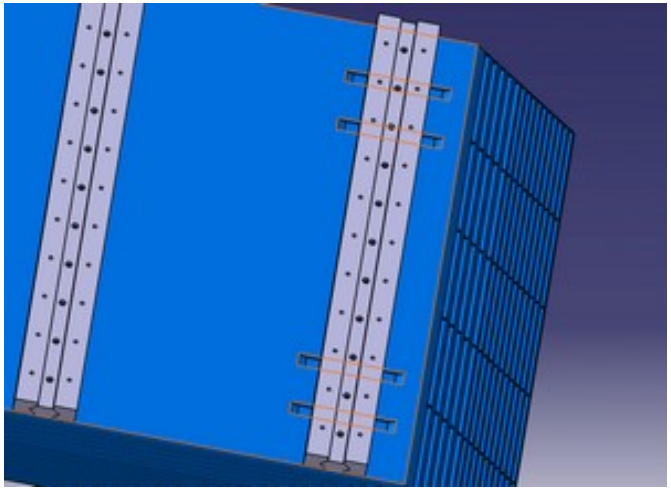
⇒ 6 W, 100 cm2 (focator 3 gained)

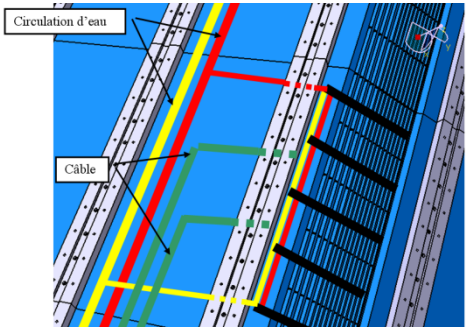
Put security factors!

Cable path

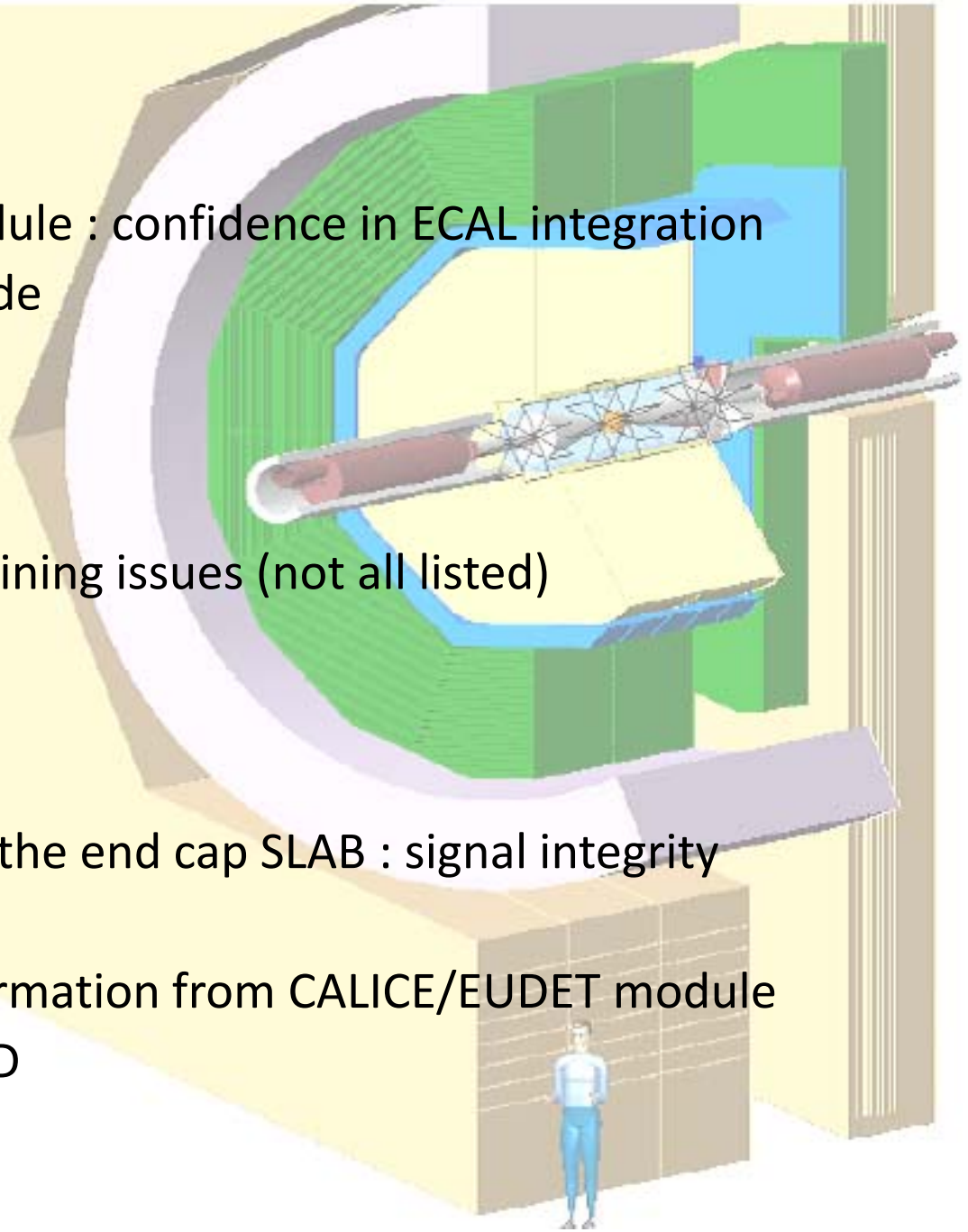








How to go outside :
See Mathieu's talk



CALICE/EUDET module : confidence in ECAL integration

- Electronics inside
- SLAB assembly
- Sensors

For ILD, some remaining issues (not all listed)

- Cabling
- Power
- Room for DIF
- Extra length of the end cap SLAB : signal integrity

Try to derivate information from CALICE/EUDET module

- do as if it was ILD

Backup

Assembly/Disassembly

- Cable path allowing the assembly of the detector in the right order
  - Remove the 2 end caps
  - Slide the TPC
  - Slide the modules

Before / after ?