

Connectors & patchpanels

From inners to outside

C.Clerc

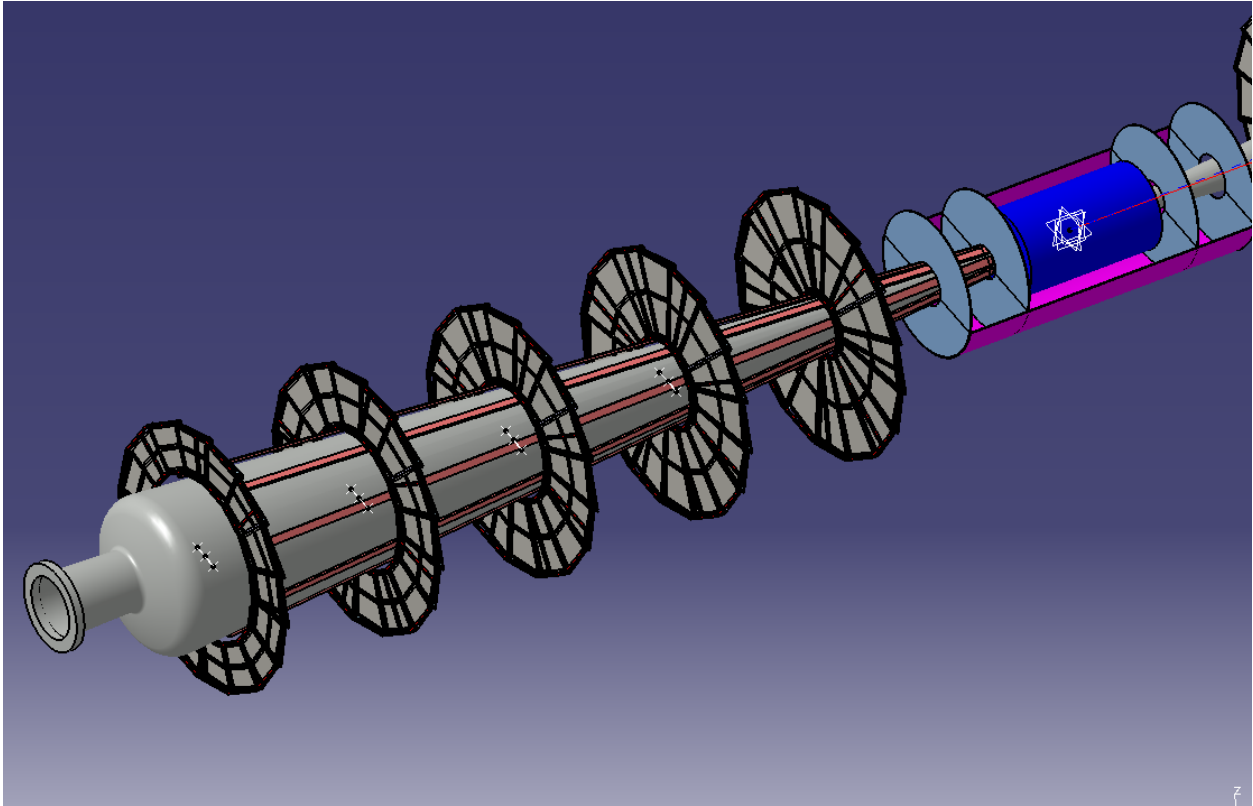
ILD Regional Integration Meeting

LAL, 12-13/04/2012

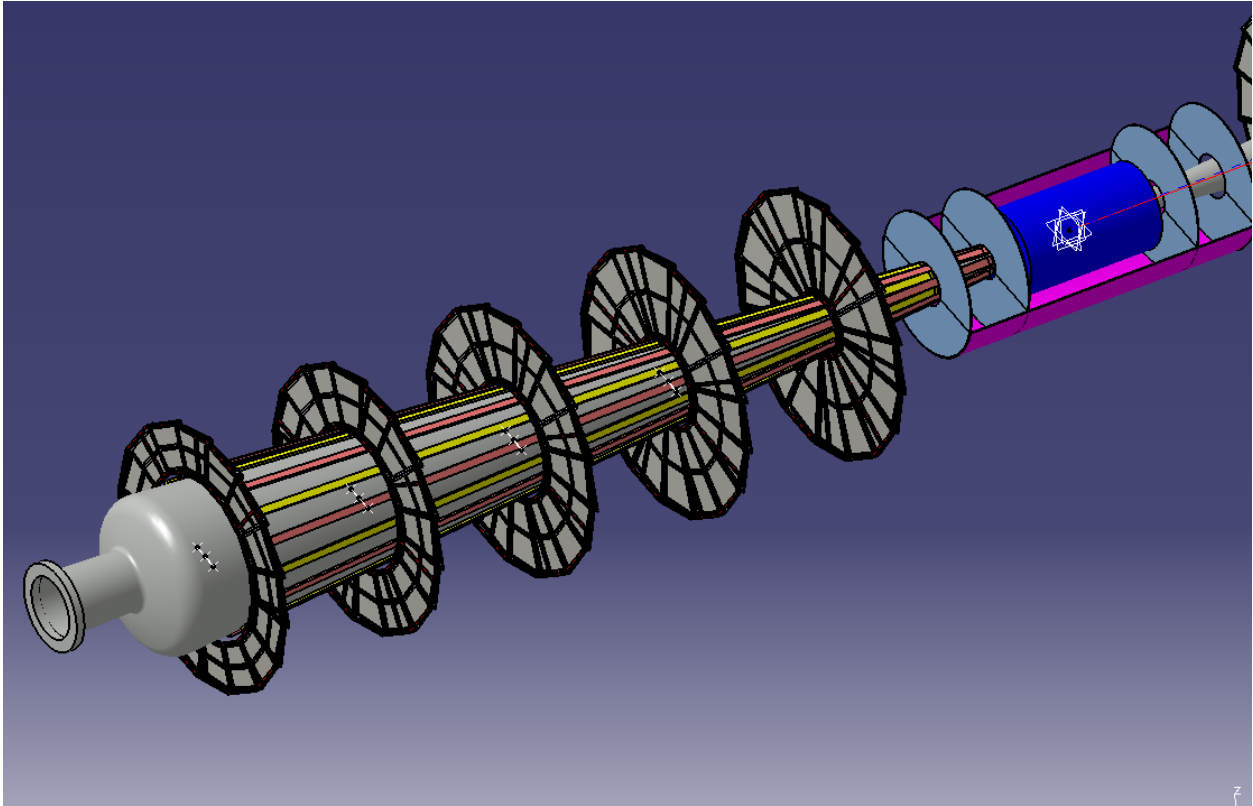
Inner detectors cables :

- Estimation of the volume of cables extrapolated from FTD datas :
 - 2* 12 Volts cables AWG 15 (chips alimentation) to the DC-DC electronic plate
 - 4 AWG 15 high voltage cable (sensors polarization)
 - 2 fibers of 300 um diameter (control of the chips and signal of the sensors)
 - I.e full inners : 448 HV+224 LV + 224 OF (VXD not included)
 - 2580 mm² of Al at the position of FTD 7 (single distribution, should be doubled for security reasons)

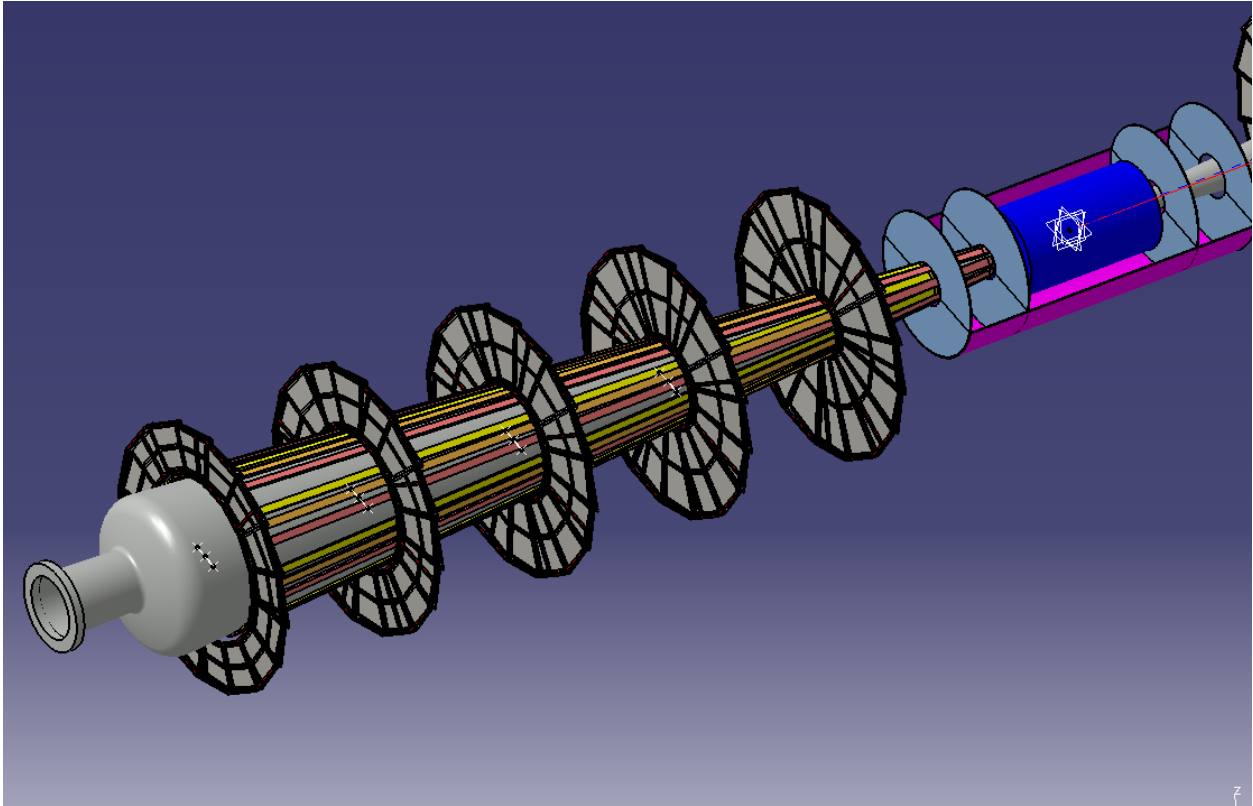
FTD1



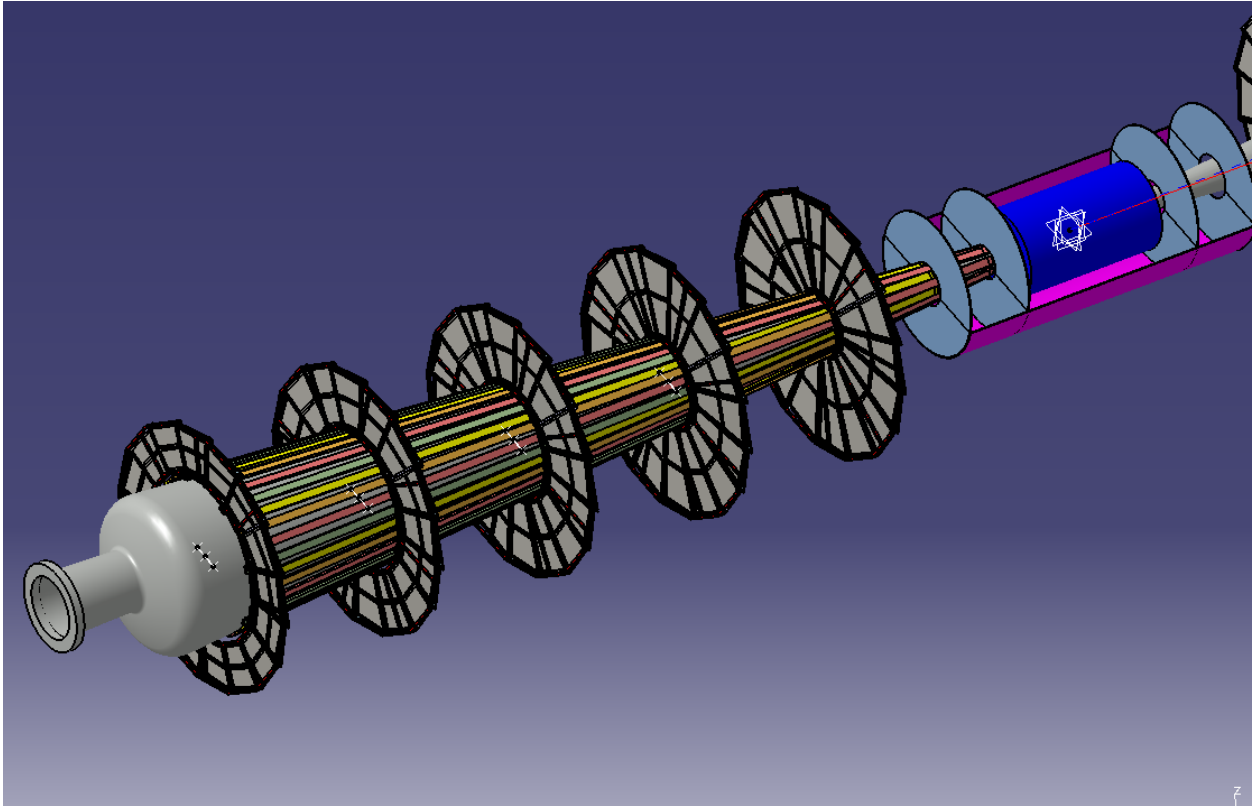
FTD2



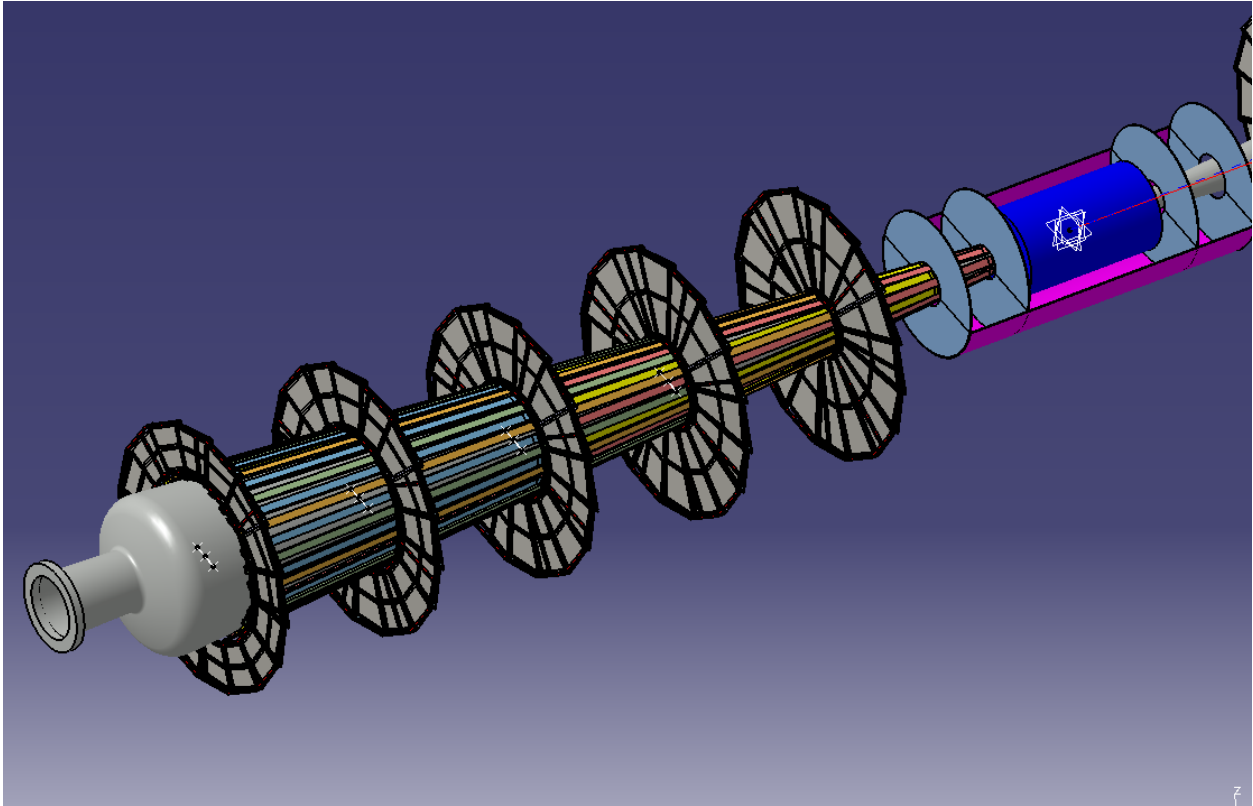
FTD3



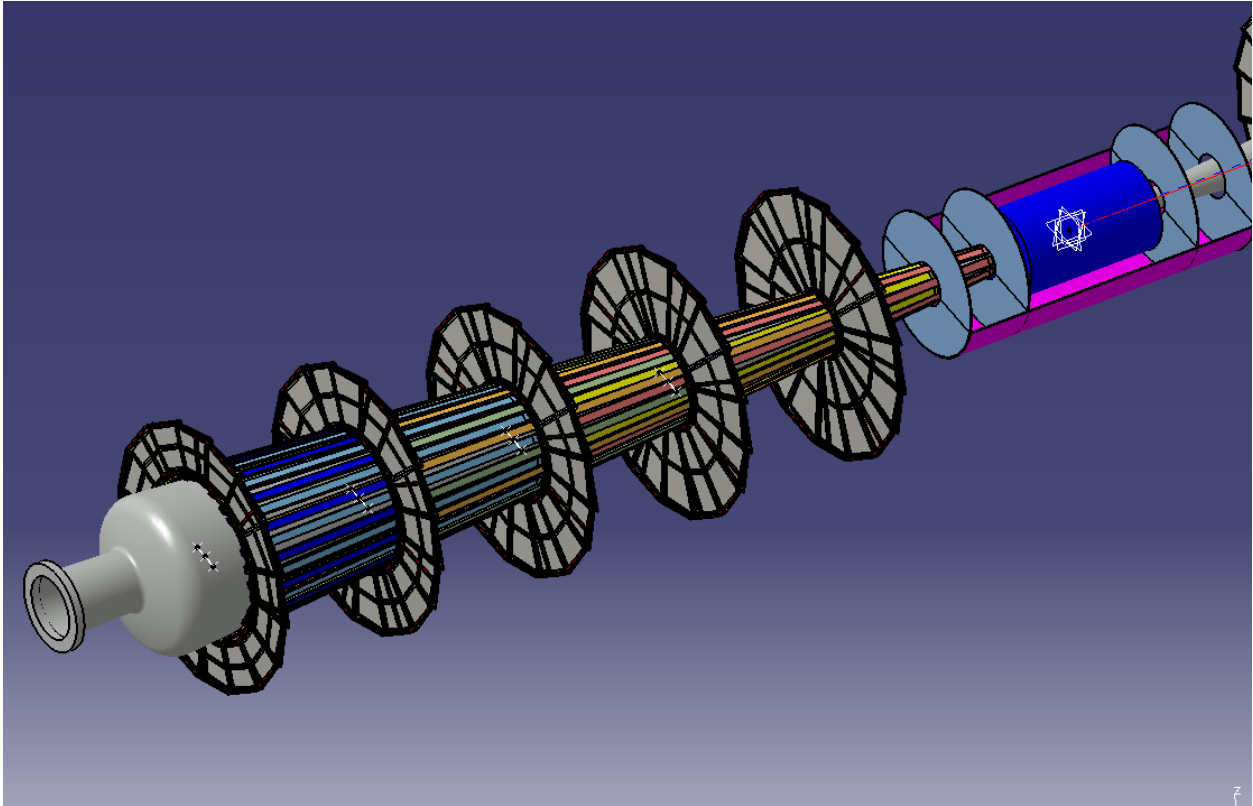
FTD4



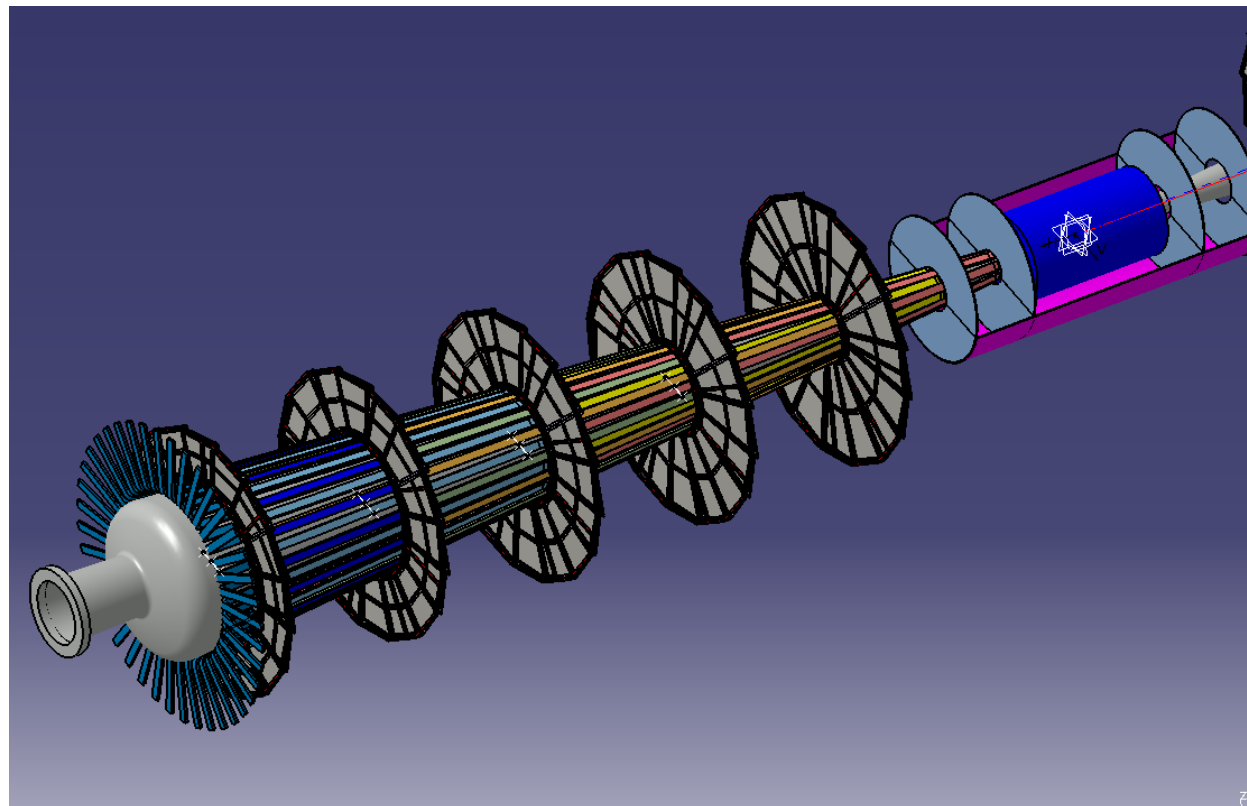
FTD5



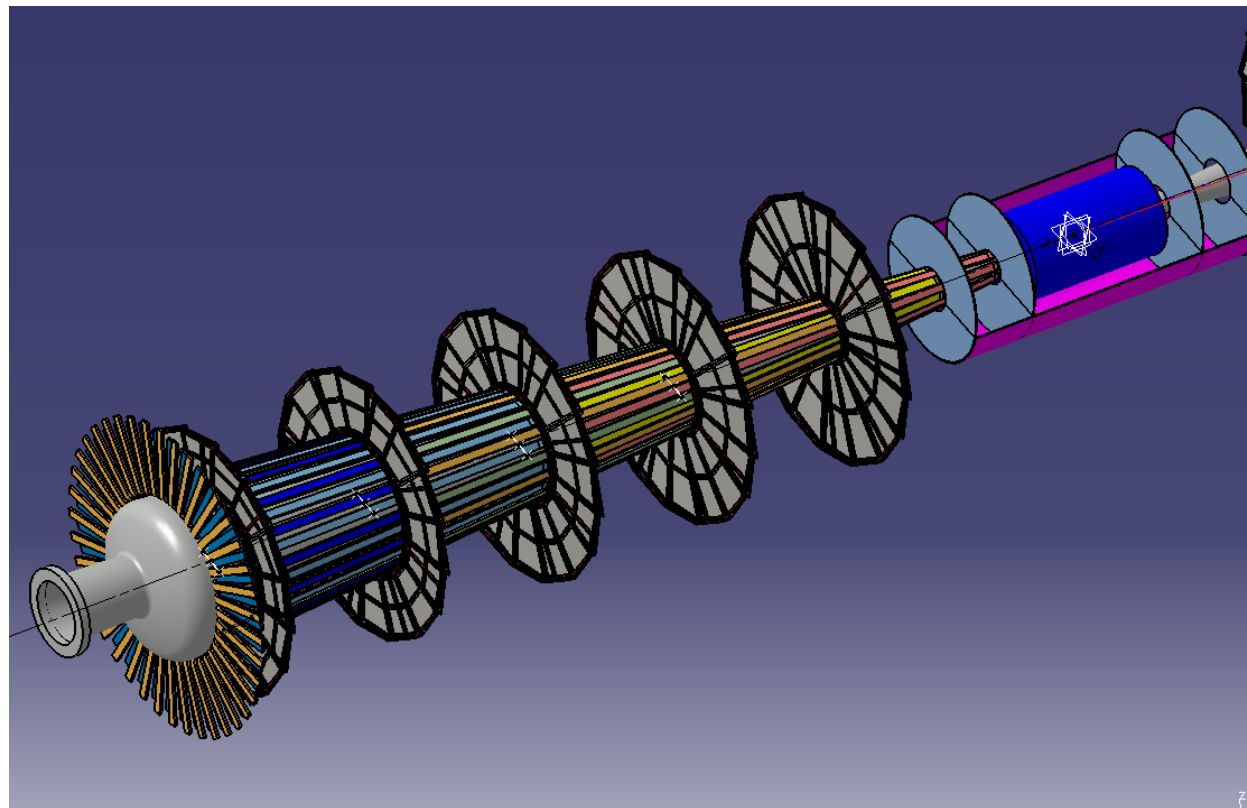
FTD6



First
exiting ring
of cables

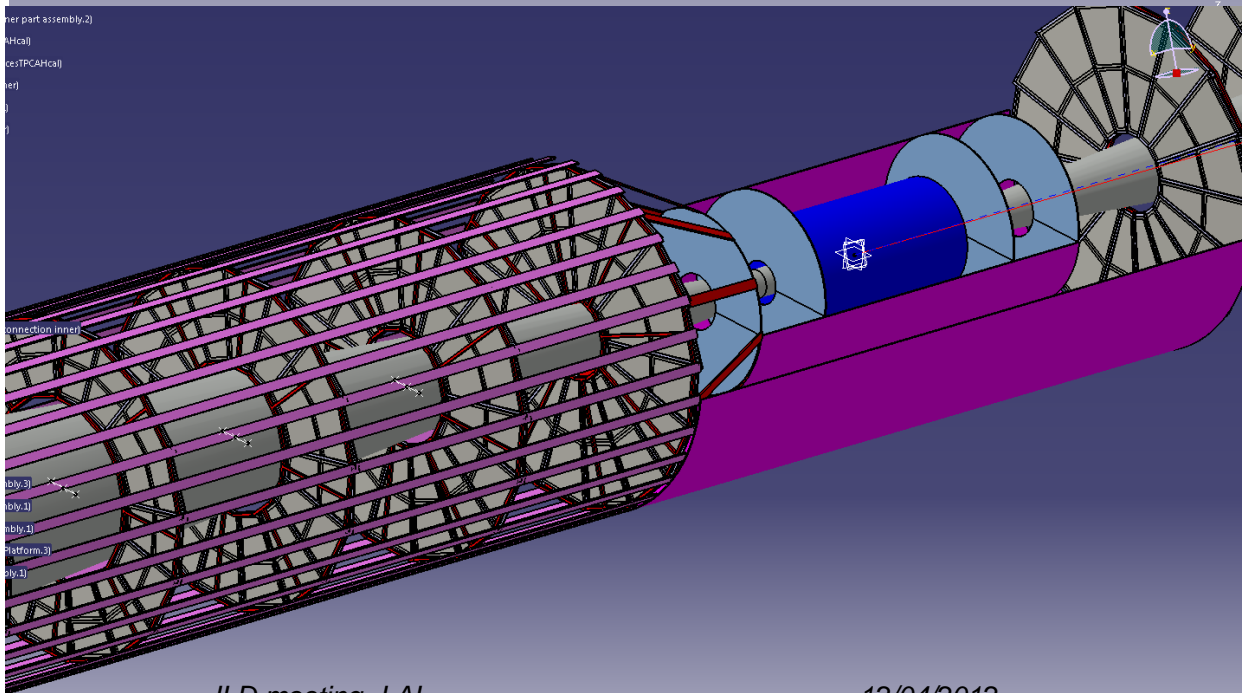
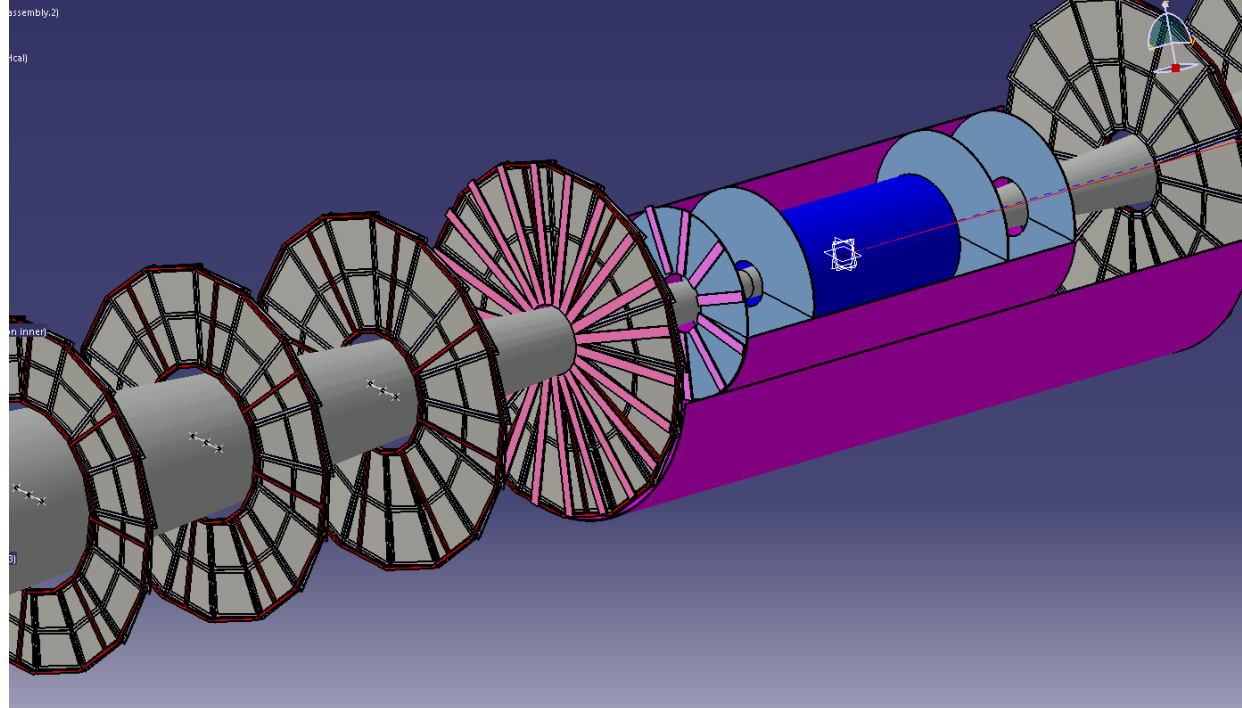


second
exiting ring
of cables



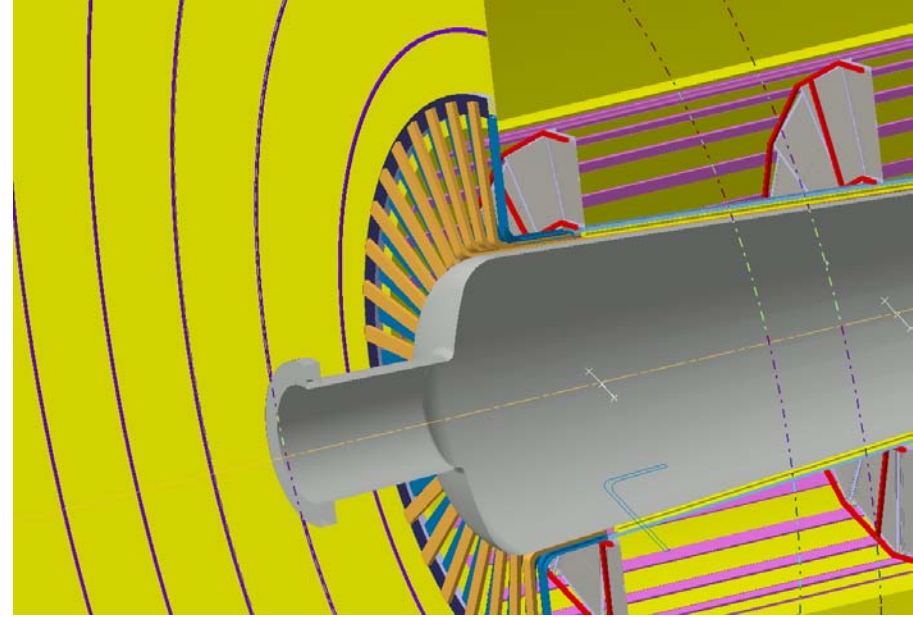
SIT, two solutions

1. Along the beampipe : they have to run on backside of FTD2 and 3 , then :
 - huge amount of material around BP
 - Material in front of the other FTD
2. Run along the inner radius of TPC



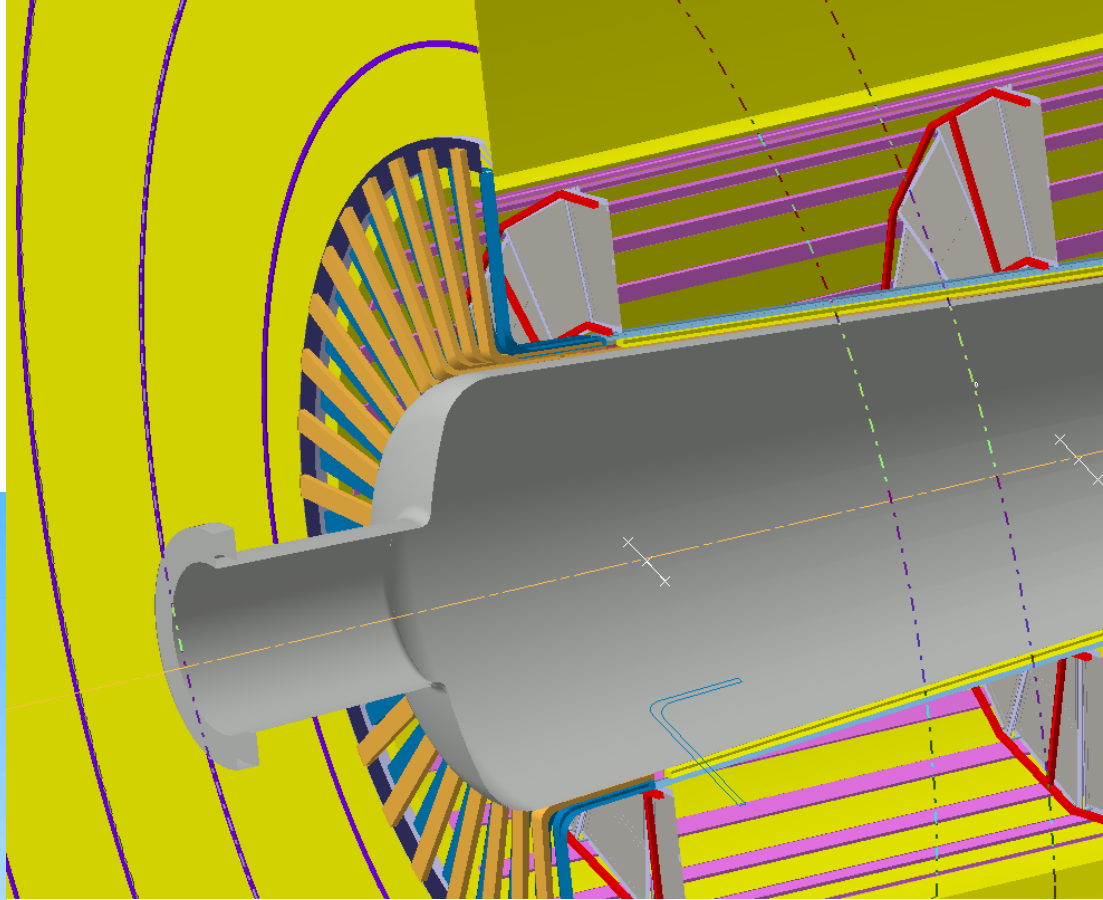
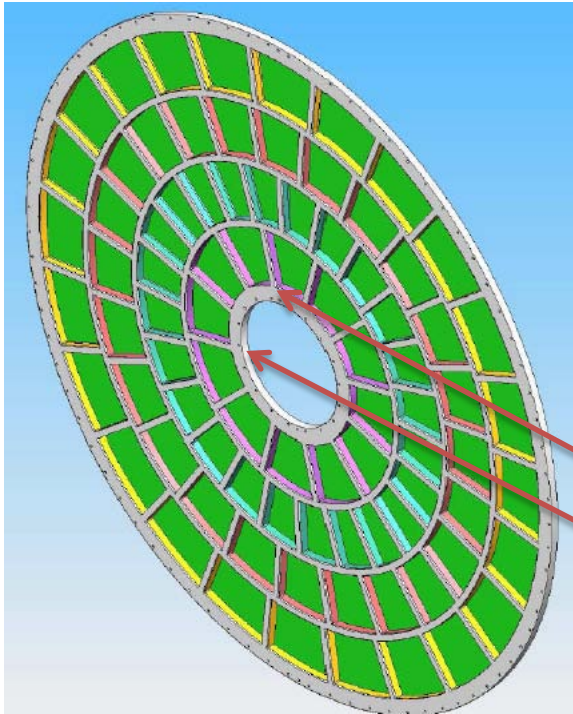
1St patchpanel :

(section of 3 time the
occupancy of the cables)



What for :

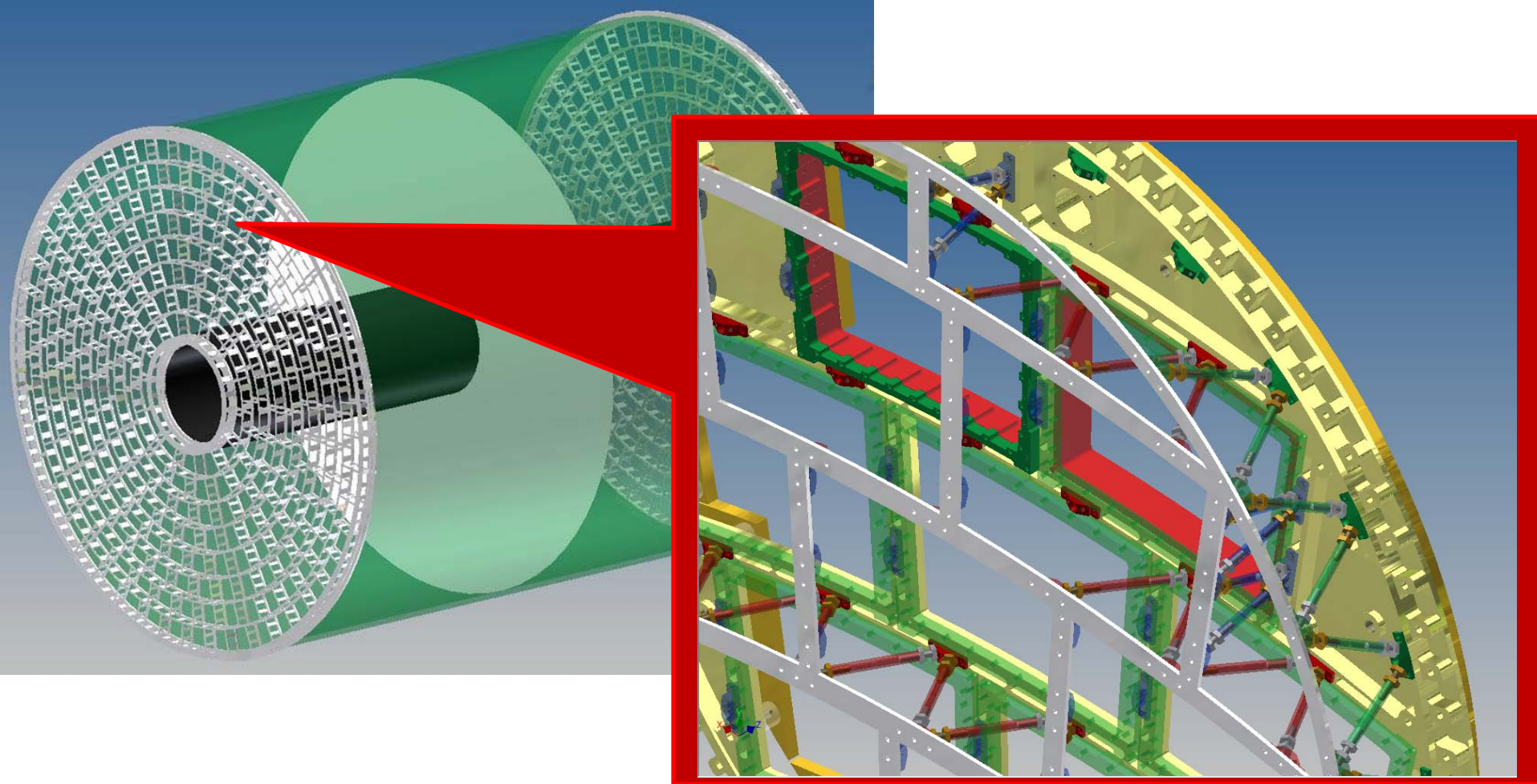
- 1) connectors for assembly/maintenance operations : importance of their positions
- 2) Optical conversion of signal ?
- 3) DC/DC convertor ?? (depend if already under 12 V as proposed by FTD (only 33 % of the cables are for LV (12 V), the rest : HV for Si sensor polarization)
- 4) Multiplexing of the power distribution in order to reduce the amount of cables along the TPC endplate (less interference with TPC modules cabling, cooling) : but in front of the Ecal endcap : is it better to distribute and average the 2600 mm² of Al on all the surface or to have +/6 12 ways out (215 mm²) (see design of TPC endplates : 12 modules in inner radius)



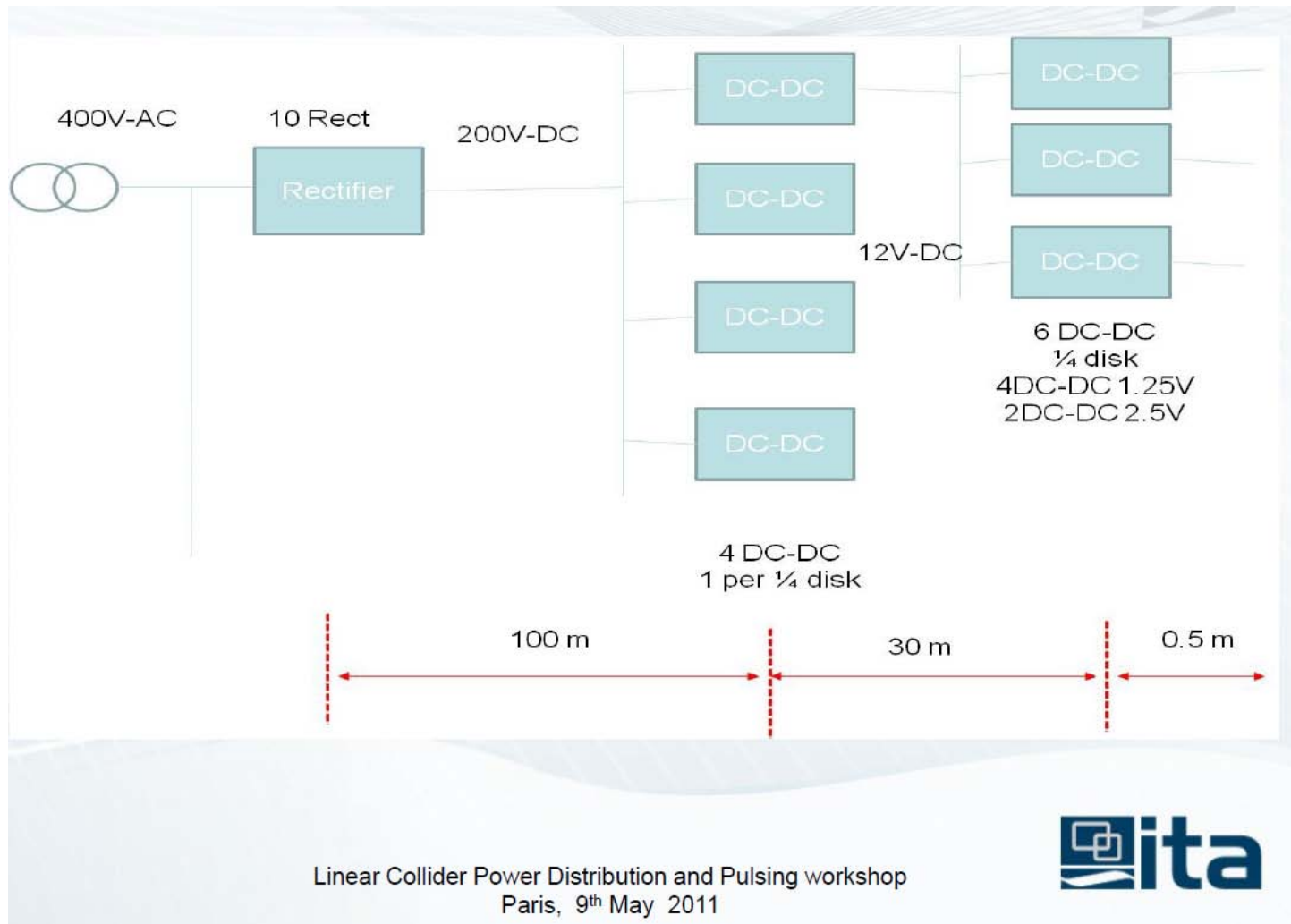
Ø Out 780

Ø In 678 of the structural ring

Ring of 5 cm enough for patchpanel
but for convertors ??



If possible,
Need to have some details on the mechanical structure of the endplates, the cooling and services, fixing system...etc.. in order to avoid interferences.

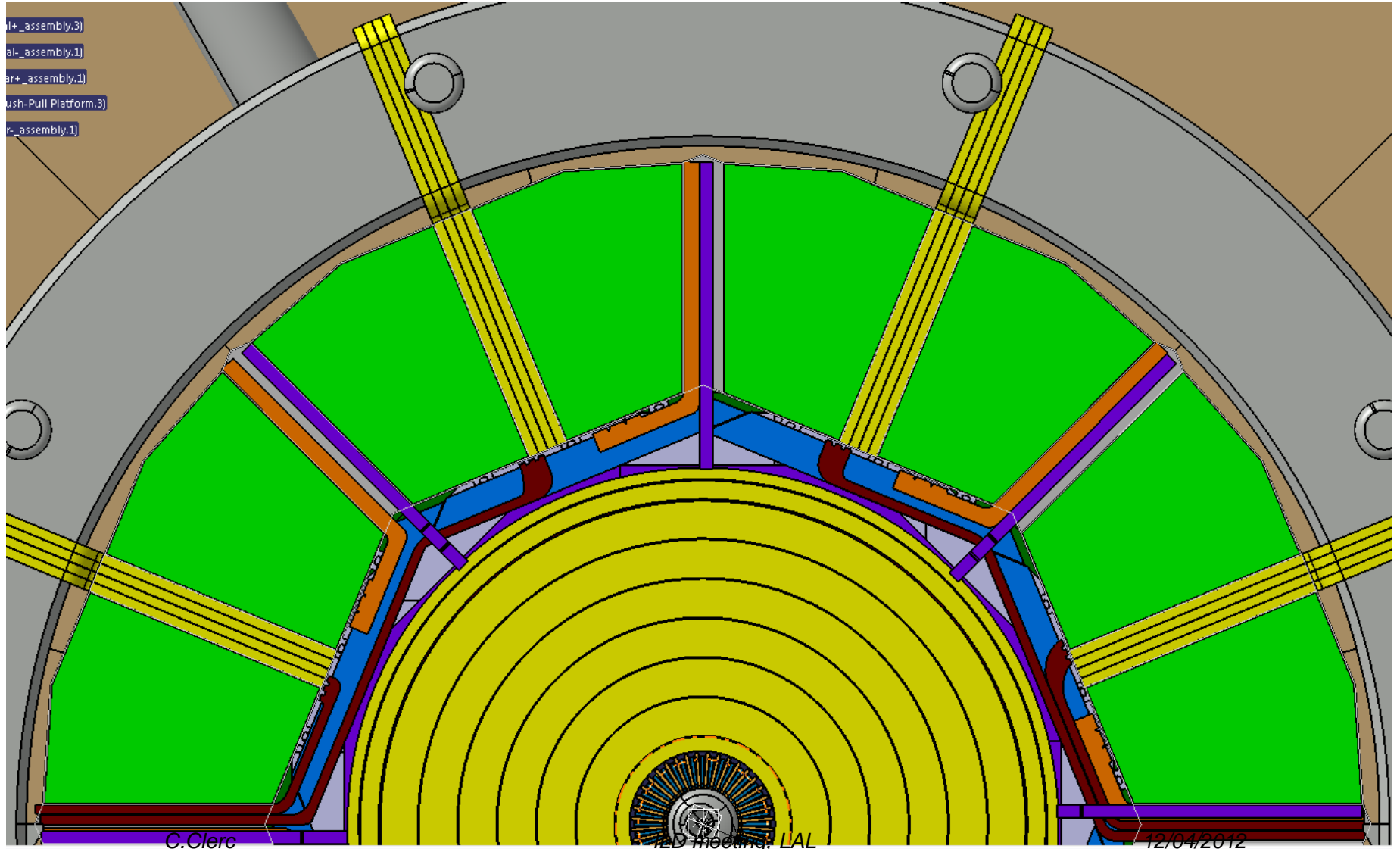


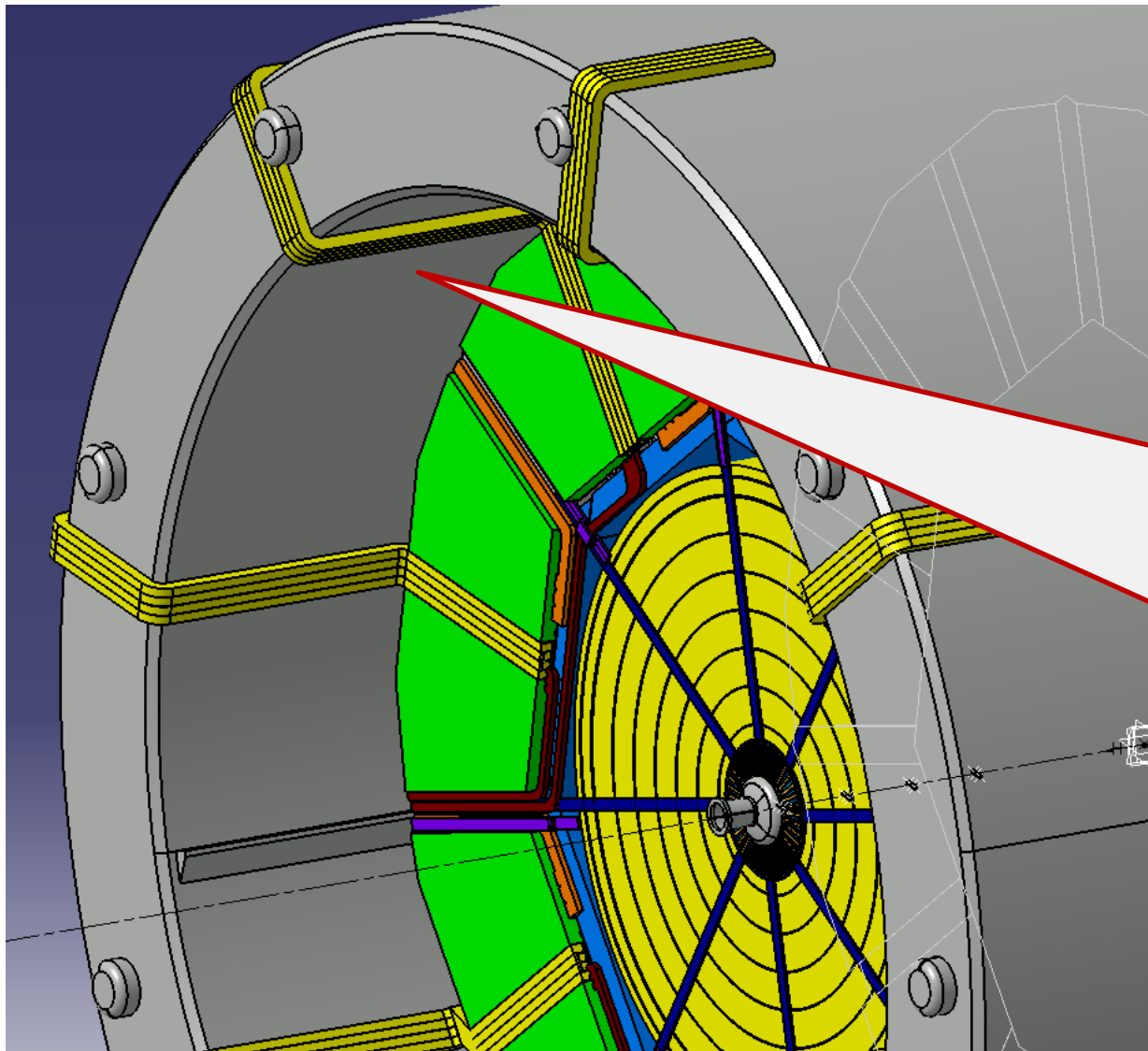
$$\Delta V = \rho(l/s) \times l, \rho(al) = 2.7 \cdot 10^{-8}$$

ΔV per meter = 0.5% under 12 V i.e = about 2% at Rout TPC:

Need to have another stage of conversion from 12 v to ??? V

From inner to outer : where to foresee patchpanels ?

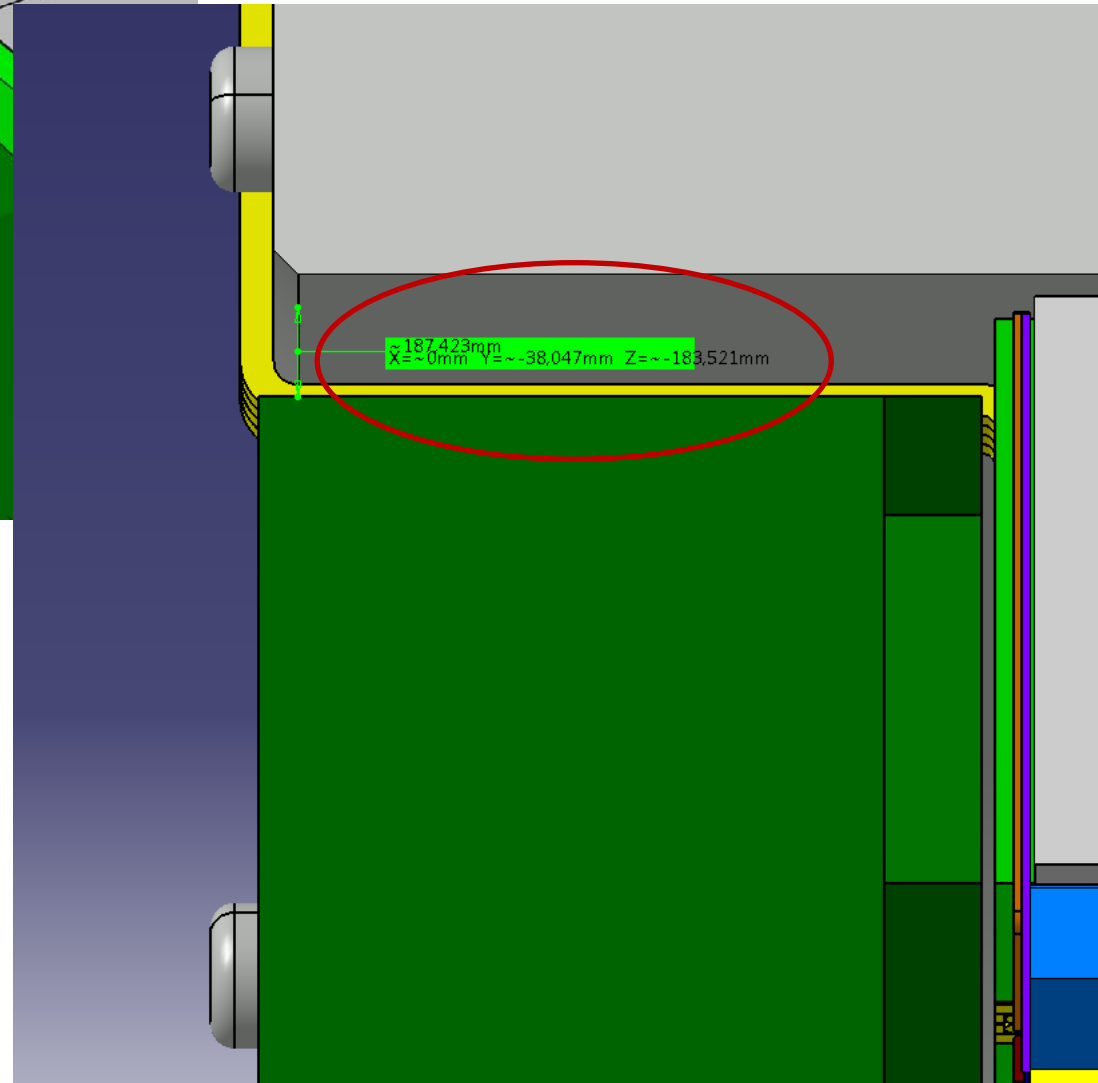
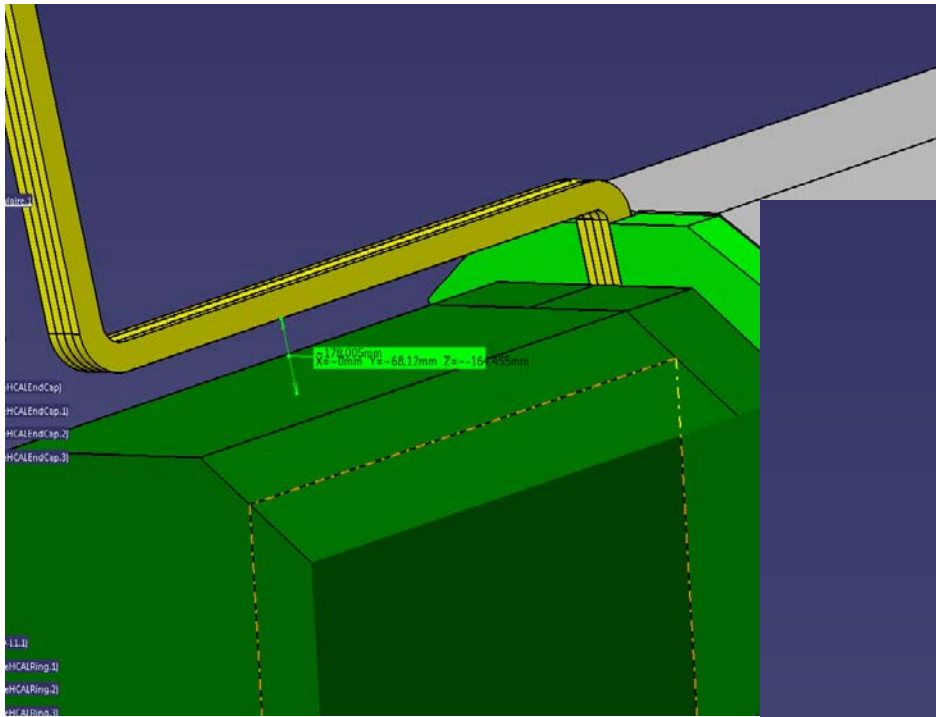




Proposition :
Use the inner radius
of the coil .

For Hcal
Ecal
TPC

Inner ?



Inputs :

Rin coil = 3440 mm

Circ= 21 m

Ecal**Per 2/3 stave**

LDA		1 per column	5 per module			
			cable Ø	mm ²	Nbre	S total cm ²
LV to DC/DC 48>3,3 V	48V/2A	2*1,5mm ² of Cu	8	50,24	15	7,536
HT depletion Wafers 250 V/50µA par layer	250V/1,5mA		8	50,24	15	7,536
Signal/CC	flat multiwire cable 2,54 mm	0,05cm ² *10wires		50,67	15	7,6
Ground line		1 per module ?		210	3	6,3
			Total			28,972

Where is the optical conversion of signal ?

AHcal**For one half octant**

pe+A34r layer	(48 par 1/2 module)		cable Ø	mm ²	Nbre	S total cm ²
1Power	50v 0,3 µA per channel 276 ch/layer	2*5pins SAMTEC IPL1	10*2,54 mm	50,67	48	24,3216
1 HDMI			8	50,24	48	24,1152
Ground line		1 per Half octant		210	1	2,1
			Total			50,5368

TPC**per way-out** 80 modules per endplate to be shared into 8 way-out

			cable Ø	mm ²	Nbre	S total cm ²
central Cathode	70 KV		15	176,625	1	1,76625
µmégas/Gem's power supply	0,4-1KV multibrins 14	14*0,14 mm ²		1,96	10	0,196
1 double optical fibre					10	0
1 low voltage 32 A	Assuming Conversion 48V/2A ???	2*1,5mm ² of Cu	8	50,24	10	5,024
Ground line				210	1	2,1
						9,08625

Shown at LCWS10

Ecal**Per 2/3 stave**

		1 per column	5 per module				
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			Total			28,972	

Where is the optical conversion of signal ?

33 cables per
3/5 staves
per even ways
out

AHcal**For one half octant**

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98 cables
per uneven
ways out

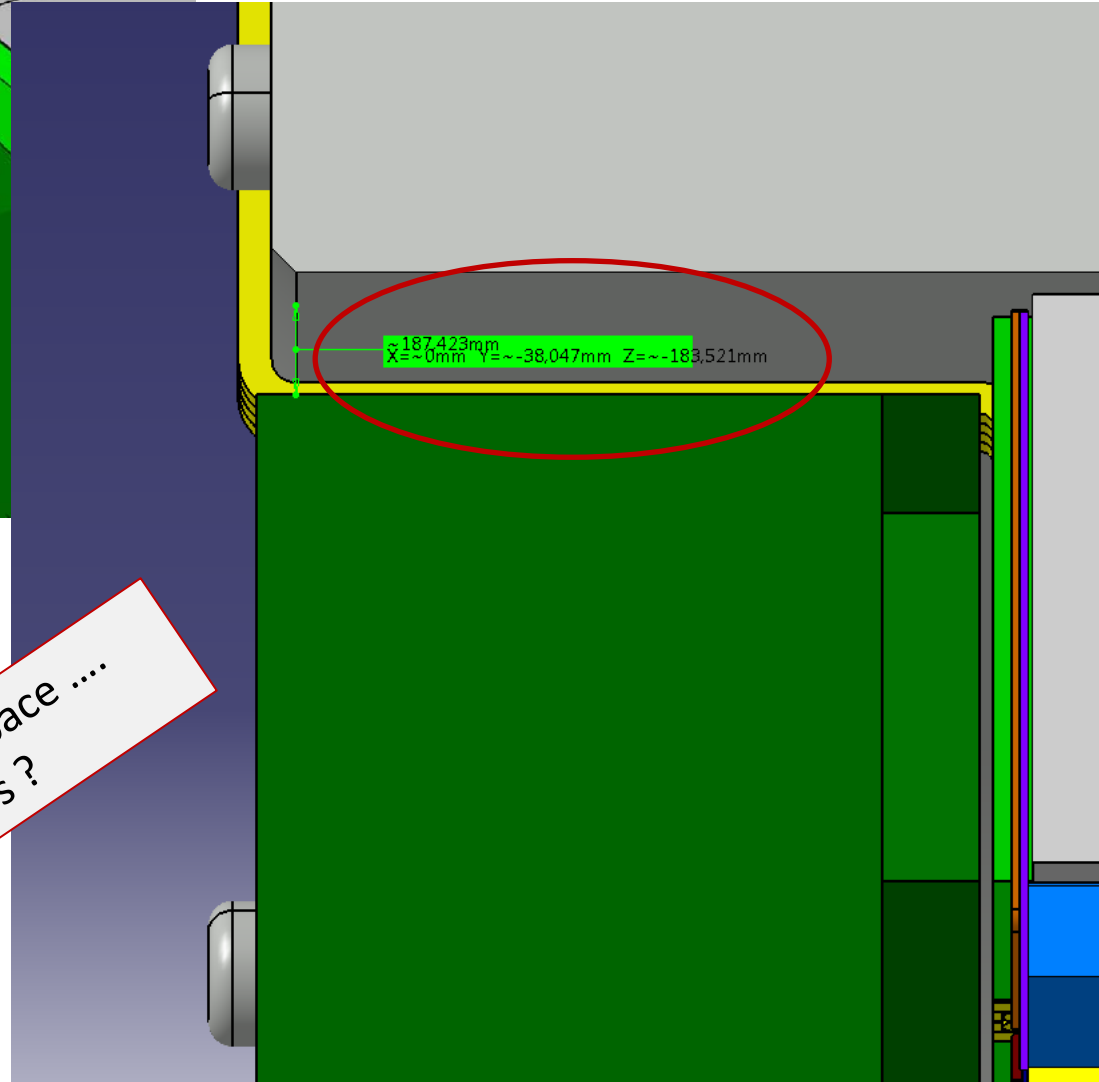
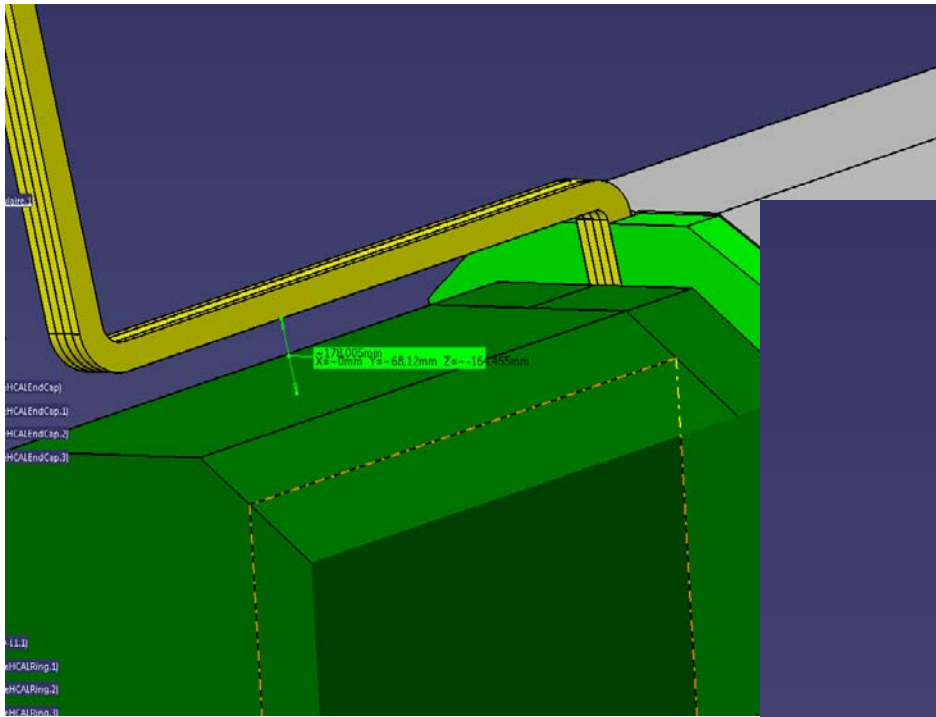
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Ground line				210	1	2,1
						9,08625

32 cables
per uneven
ways out

+ for inner detectors : 85 per even way out (into flat cables of 6 wires)

Uneven ways 1 to 15 = 98 cables / Even ways 2 to 16 = 150 cables



Inputs :

Rin coil = 3440 mm

Circ= 21 m

Not so much space
Endcaps ?

Conclusions/ questions :

- Use of bars of power distribution
- Power distribution common to some subdetectors
- Definition and position of DC/DC convertor, storage capacitors ??
- Begin to dimension the patchpanels

Backup slides

