IFR mechanics prototype and detector design

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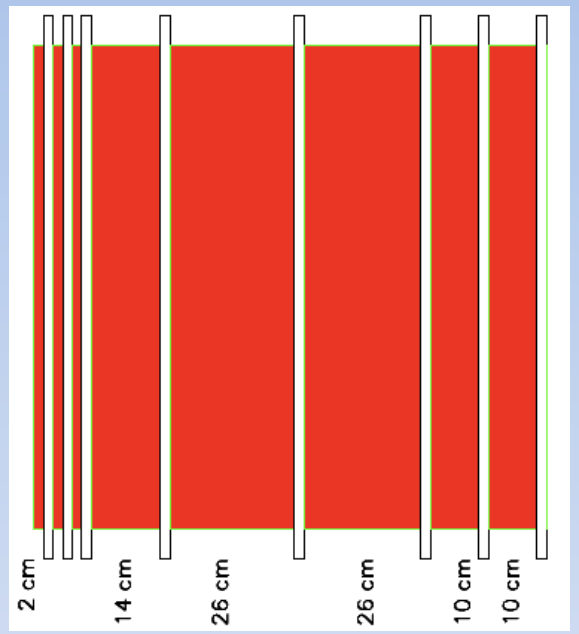
Outline

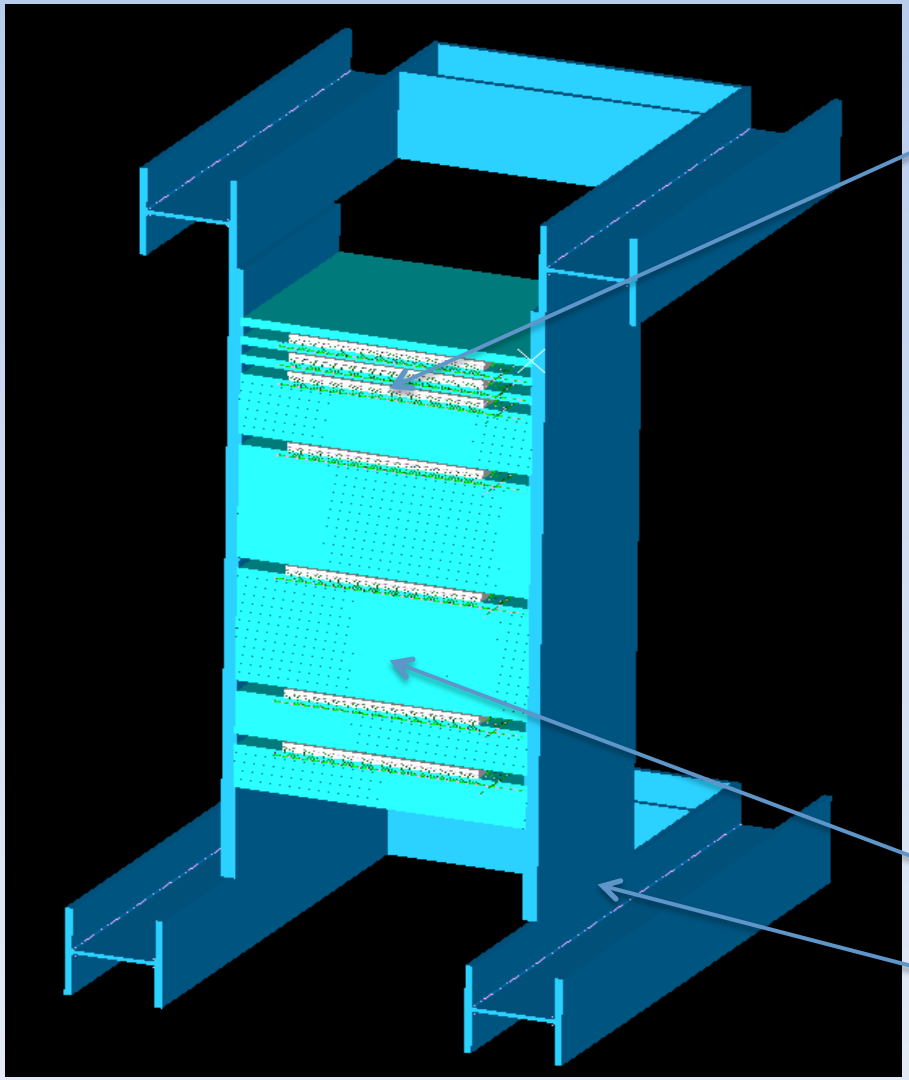
- Prototype design
  - requirements
  - first sketches
- Detector design
  - baseline and open issues
  - detector drawings

Prototype requirements

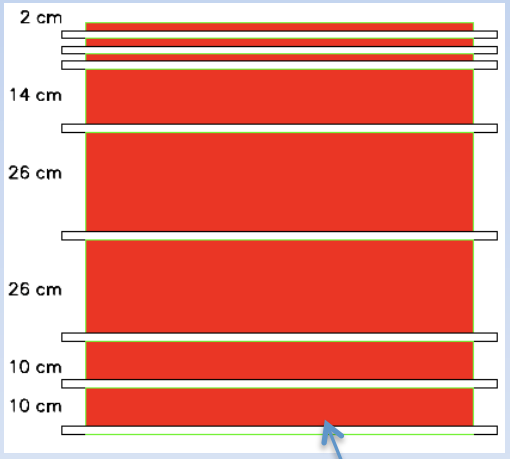


- The prototype must have the same longitudinal segmentation of the real detector: i.e. the same amount of interaction length.
- We started with the TDR layout.
- We may want to test different configuration (add more iron): possibility to extend with more module/layer.
- The active area of each layer will be 40x40cm2.
- The prototype needs to be orientated in 2 directions: vertical (for cosmics test) and horizontal (for beam test)
- It needs to be also moved transversally as respect to the beam line.

Prototype sketches (I)



SCINTILLATORS/FIBERS

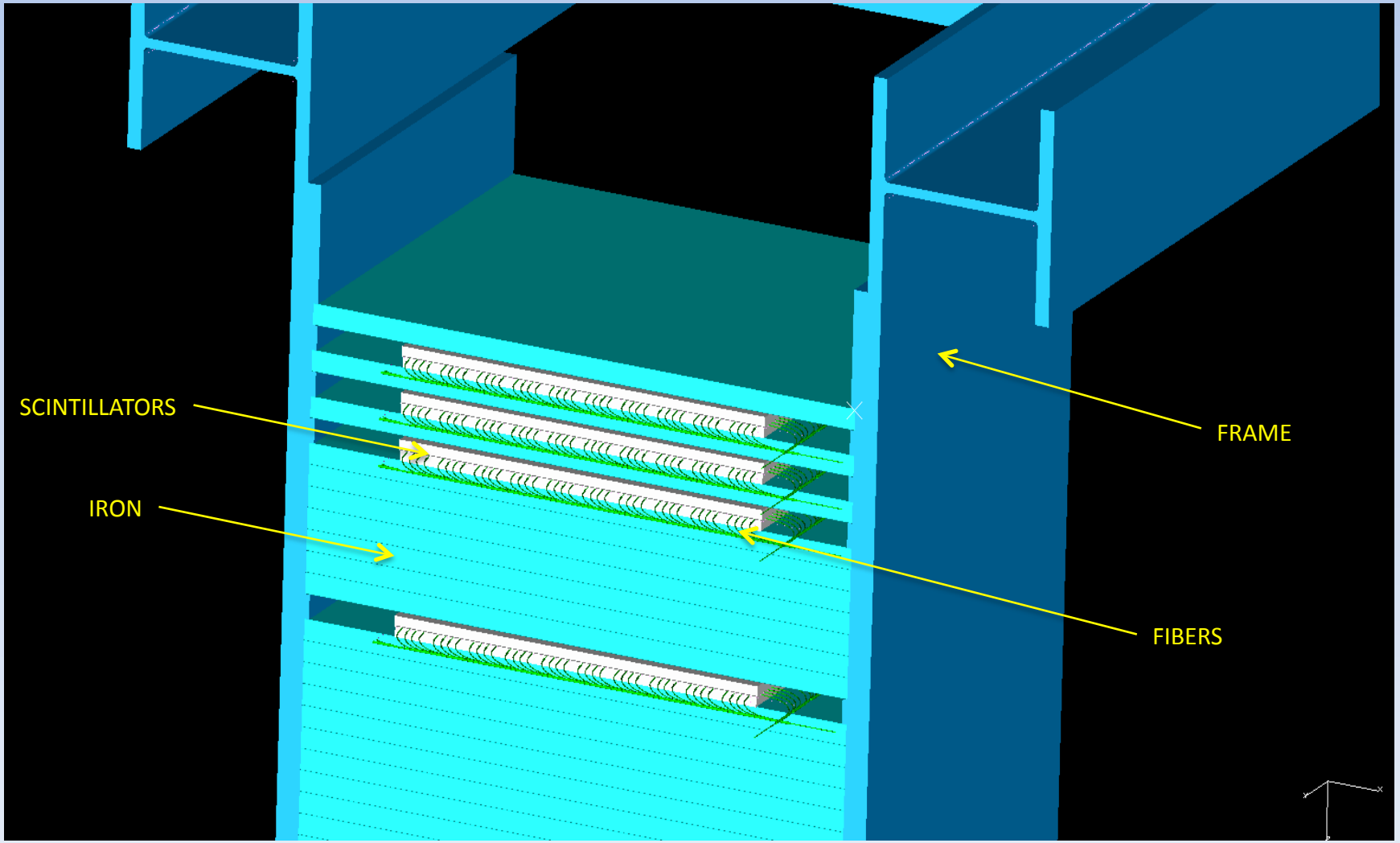


IRON

FRAME

TDR LAYOUT

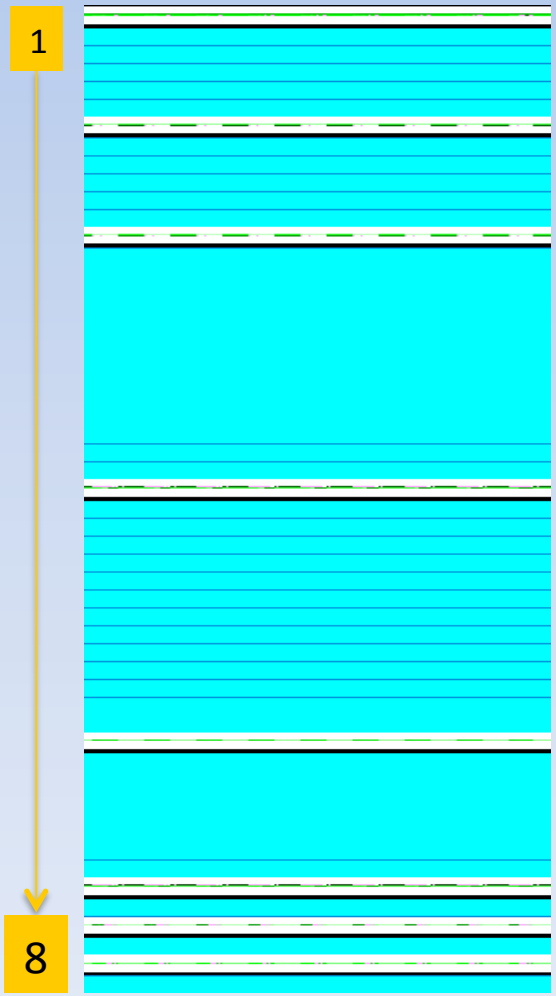
Prototype sketches (II)



Detector design: the iron

- Much will depend on the possibility to reuse the BaBar flux return
- If we recycle the BaBar iron
  - A layer of scintillators can weight ~400kg (~10 times the weight of the old detector) : need to understand the iron bending and redo structural calculations.
  - Some mechanical constraint and open issues: number of interaction length, possibility to add iron at the end…
- If not
  - design a brand new structure (everything to do)
  - less constraint

Detector design
scintillators weight & sagitta of the iron



LAYER N.	IRON WEIGHT (Kg)	SCINTILLATOR WEIGHT (Kg)	TOTAL WEIGHT (Kg)	Total W / Iron W
1	8880	400	9280	**1,05**
2	8470	380	8850	**1,04**
3	19600	355	19955	**1,02**
4	17200	310	17510	**1,02**
5	8500	280	8780	**1,03**
6	1185	265	1450	**1,22**
7	1155	255	1410	**1,22**
8	1130	250	1380	**1,22**

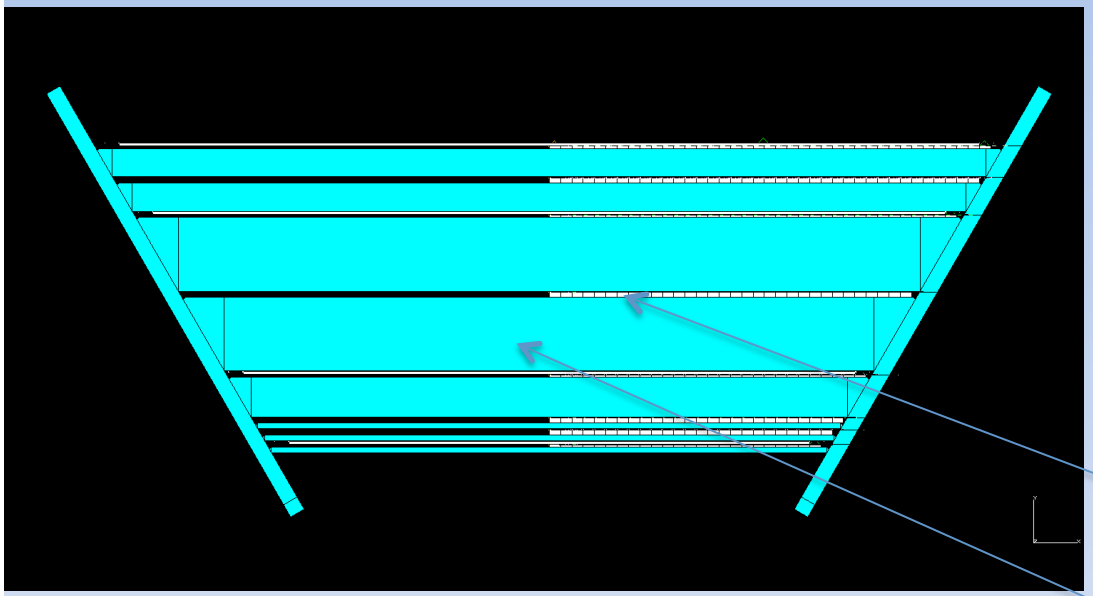
Detector design: the scintillators

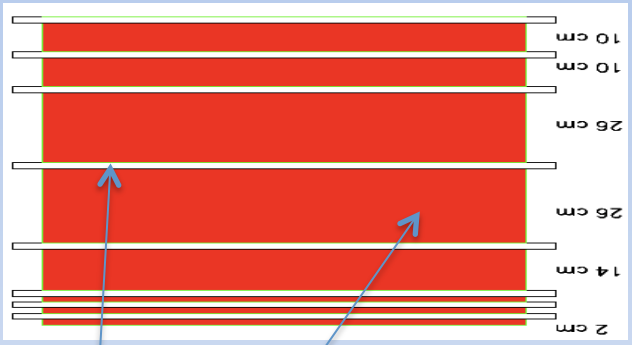
- Some critical decision need to be taken:
  - Single or double view reading?
  - Where to put the photon detector? Inside or outside the gaps?
- Check/negotiate spaces and conduits with other detector and infrastructure

Detector design: general needs

- How to manage scintillators and fibers : modularity , routing of the fibers , toolings for the installation
- Detector assembly : scintillators and fibers on board the sextant before or after the installation?
- If iron not reused (building a new sextant) : prebending the iron plates avoiding the sagitta do to the weight?
- The detector geometry will be optimized based on the simulation and beam test: the following are some very preliminary drawings

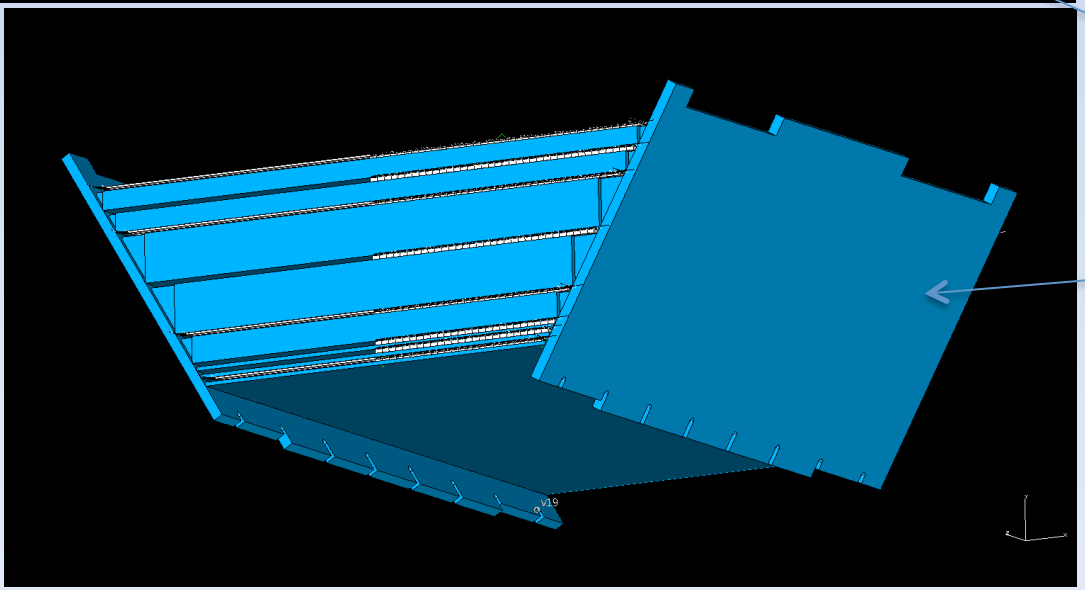
Detector drawings (I)





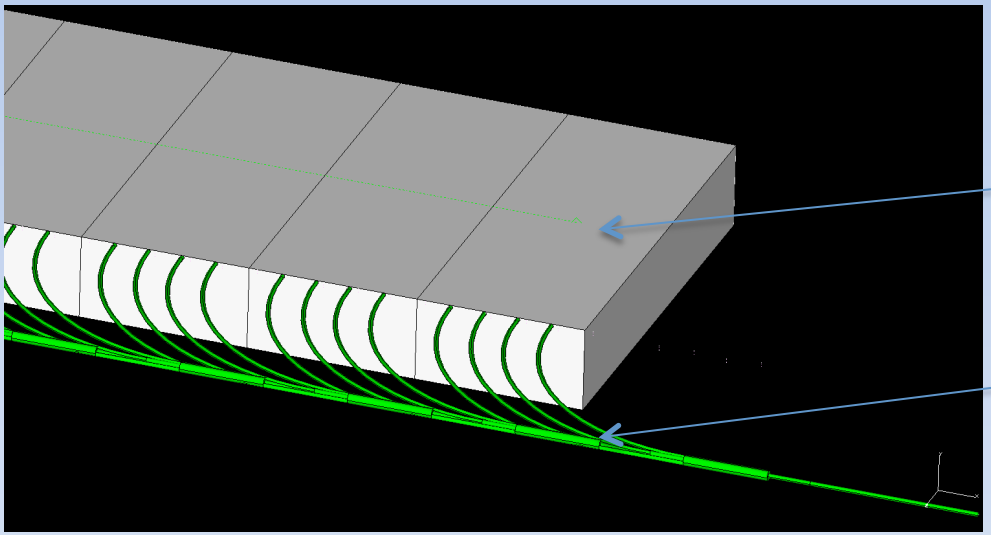
SCINTILLATORS

IRON



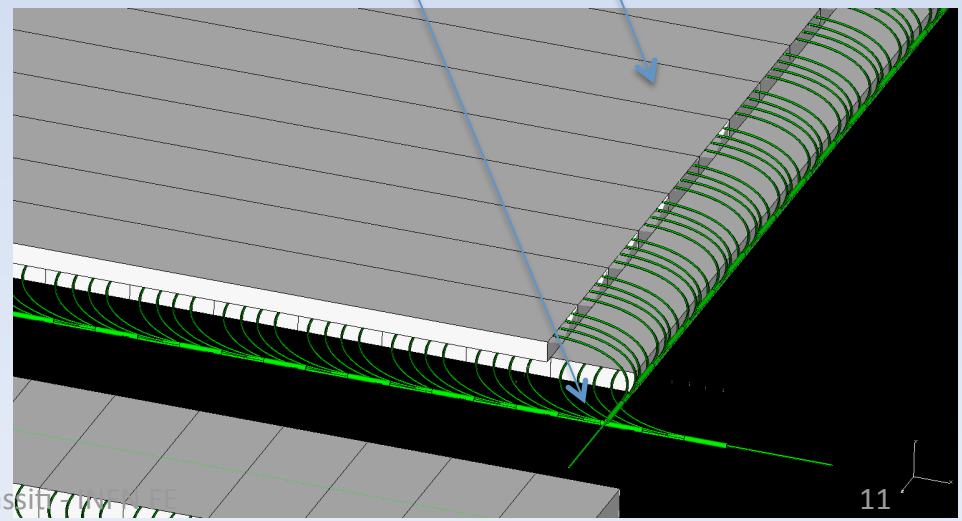
FRAME

Detector drawings (II)

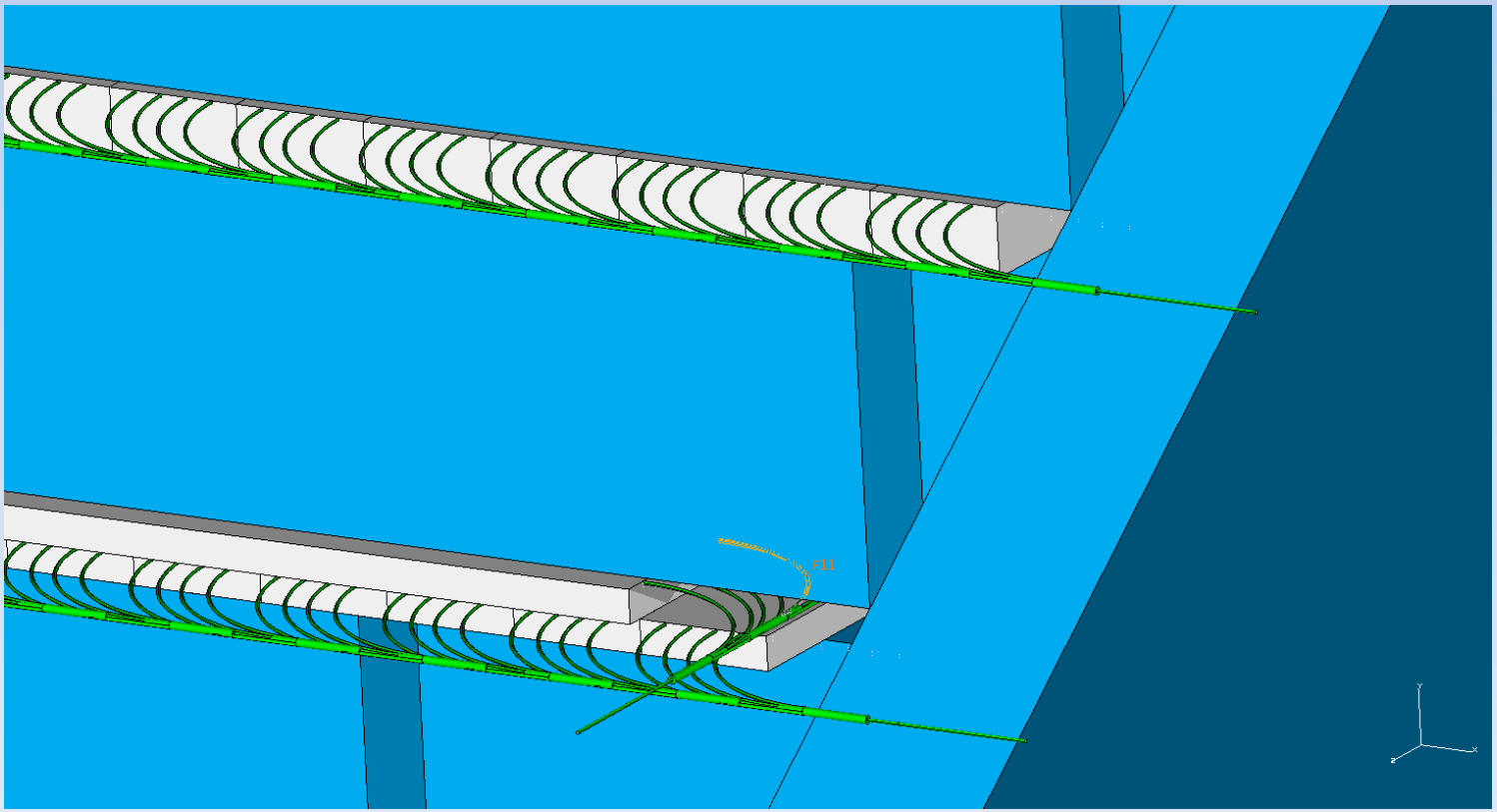


SCINTILLATOR

FIBERS



Detector drawings (III)



Conlusions

- A super-B prototype is under study and construction
- The goal : find out the solution giving th best performances of the super-B detector