Mechanical Status for the Barrel of Panda

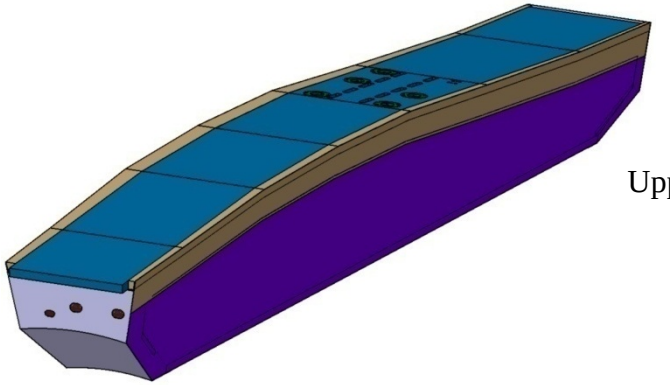
- Cooling System of One Slice
- Cooling System of the Barrel
- Status of the 480 Crystals' Prototype
- Conclusion

Cooling System of One Slice

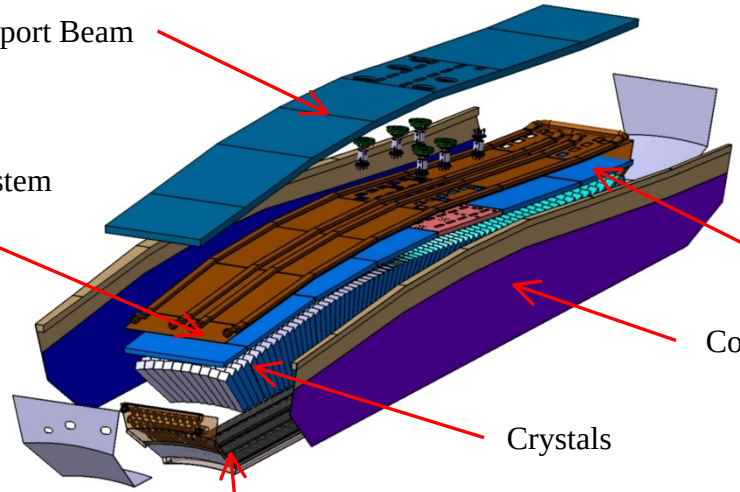
One Slice's Cooling System

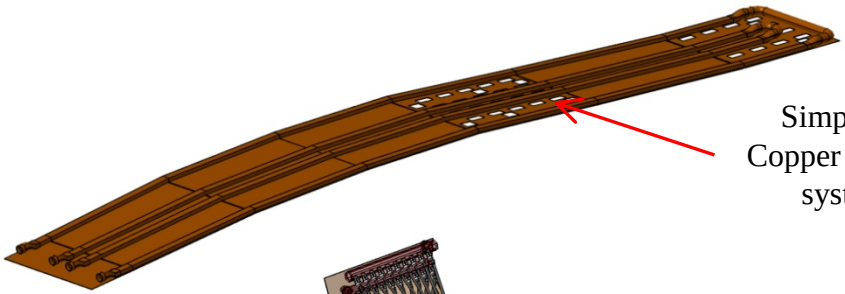
A slice = closed area cooled at -25°C

Completed View



Exploded View





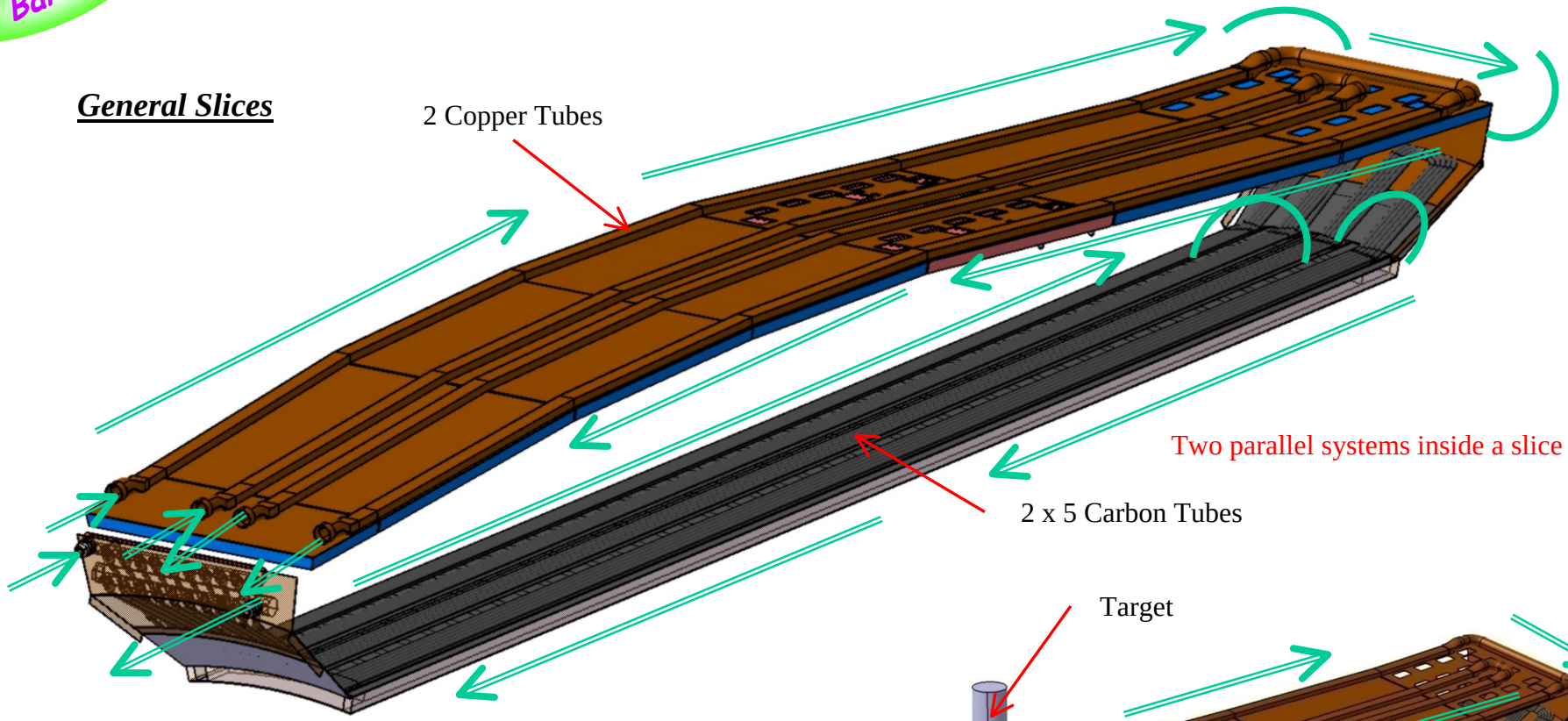
Simplifier Copper cooling system

Simplifier Carbon cooling system

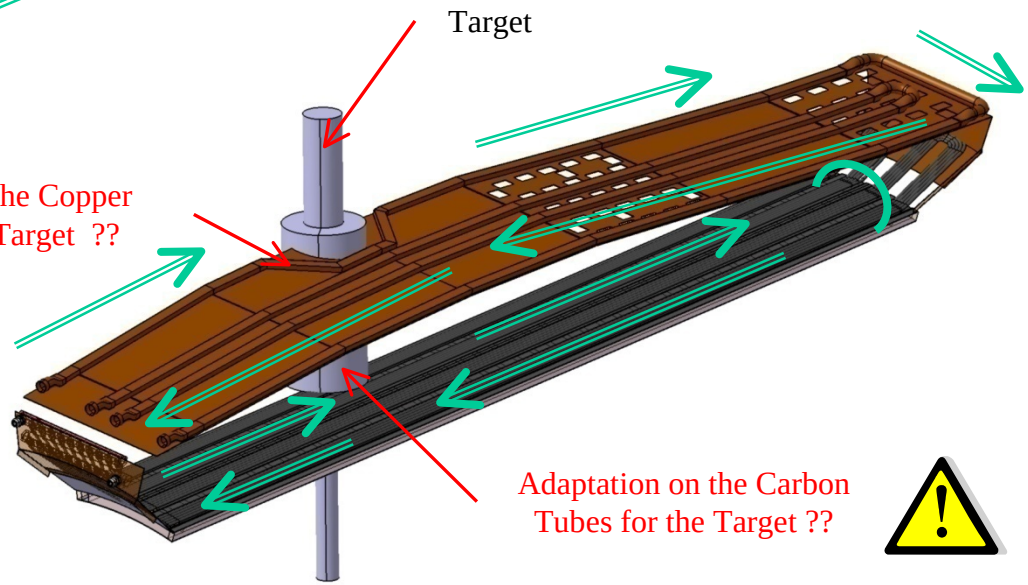
- First Study finished
- Final Design on stand by : waiting for the study of the FEE cables' running

One Slice's Cooling System

General Slices



Adaptation on the Copper Tubes for the Target ??



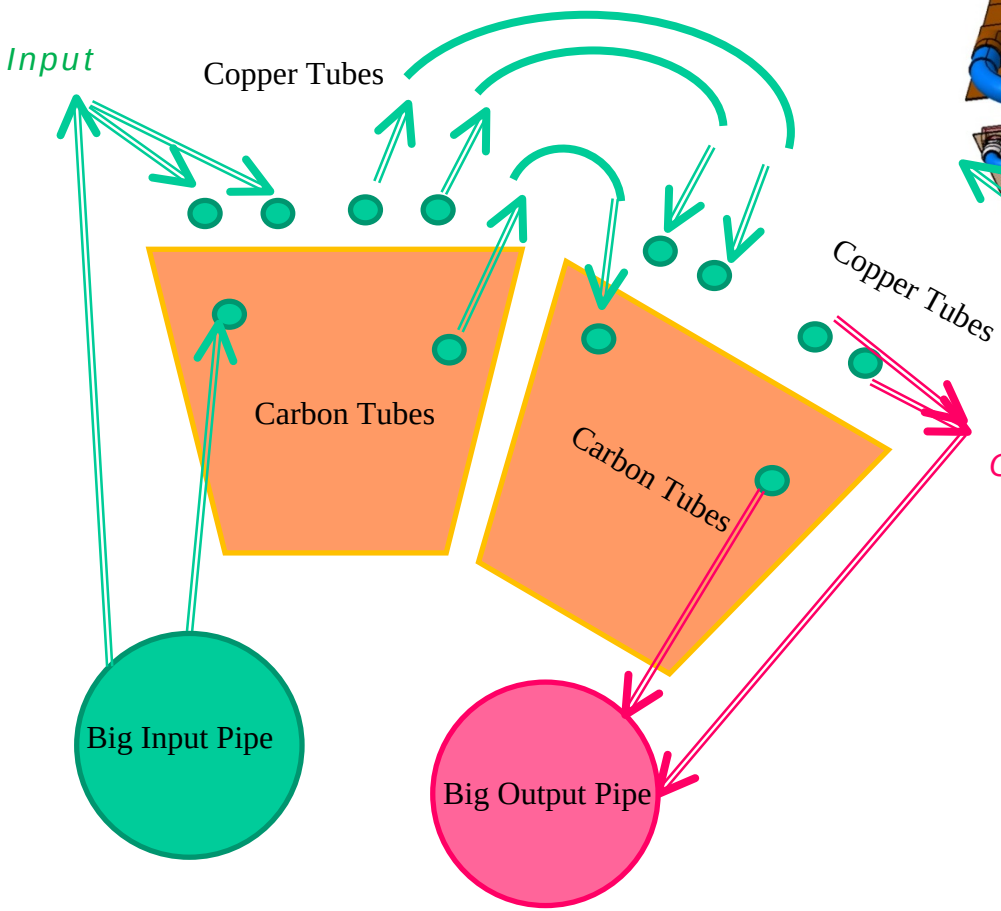
Vertical Slices

Cooling System of the Barrel

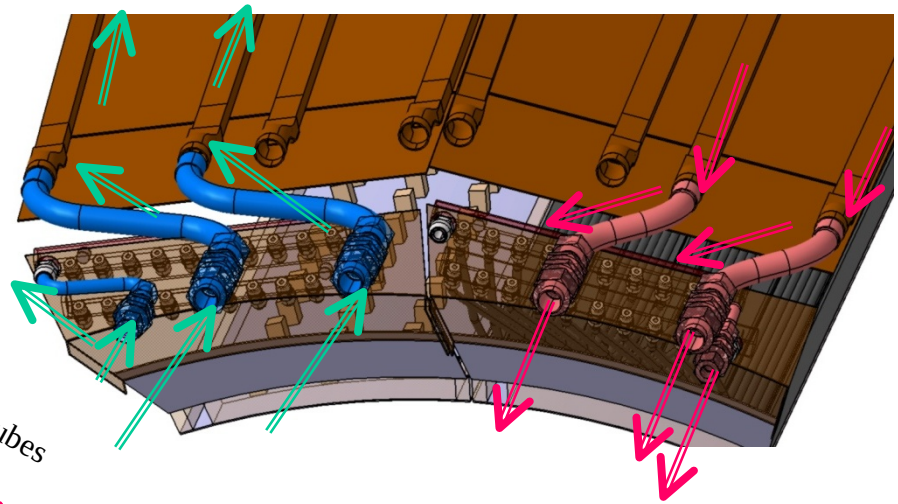
Barrel's Cooling System

Scheme of One slice

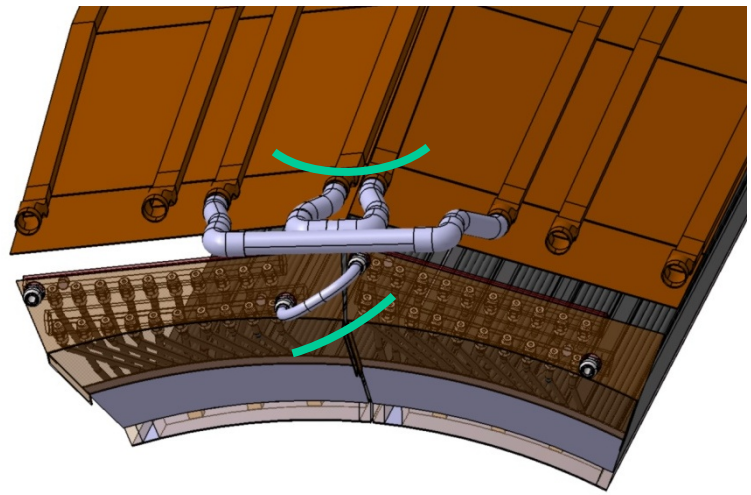
Scheme of the slice aside



2 Slices Input / Output



2 Slices connexion

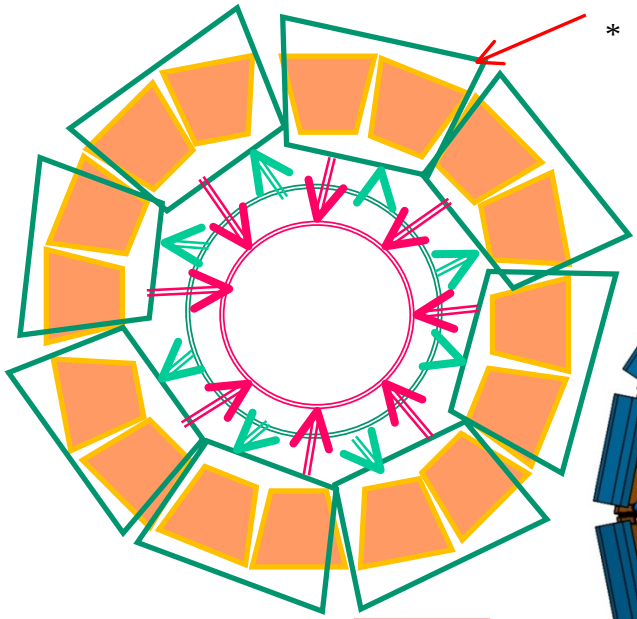


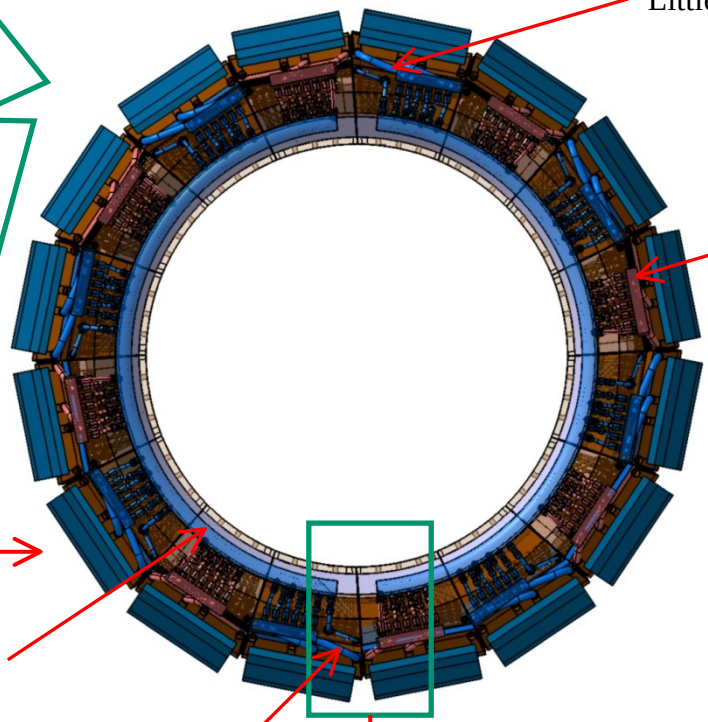
2 Slices in series !

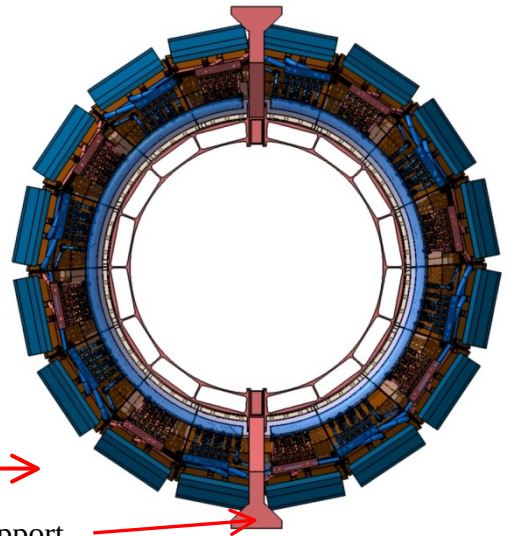
Barrel's liquid coolant distribution

Scheme of the Barrel

* 8 sub assemblies in parallel
* Each sub assembly is composed of 2 slices in series







Little Input Pipes

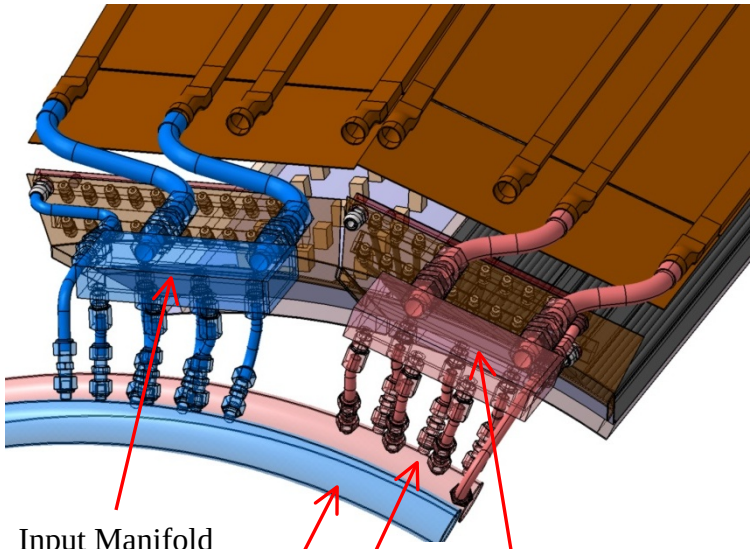
Little Output Pipes

Big Input / Output Pipes

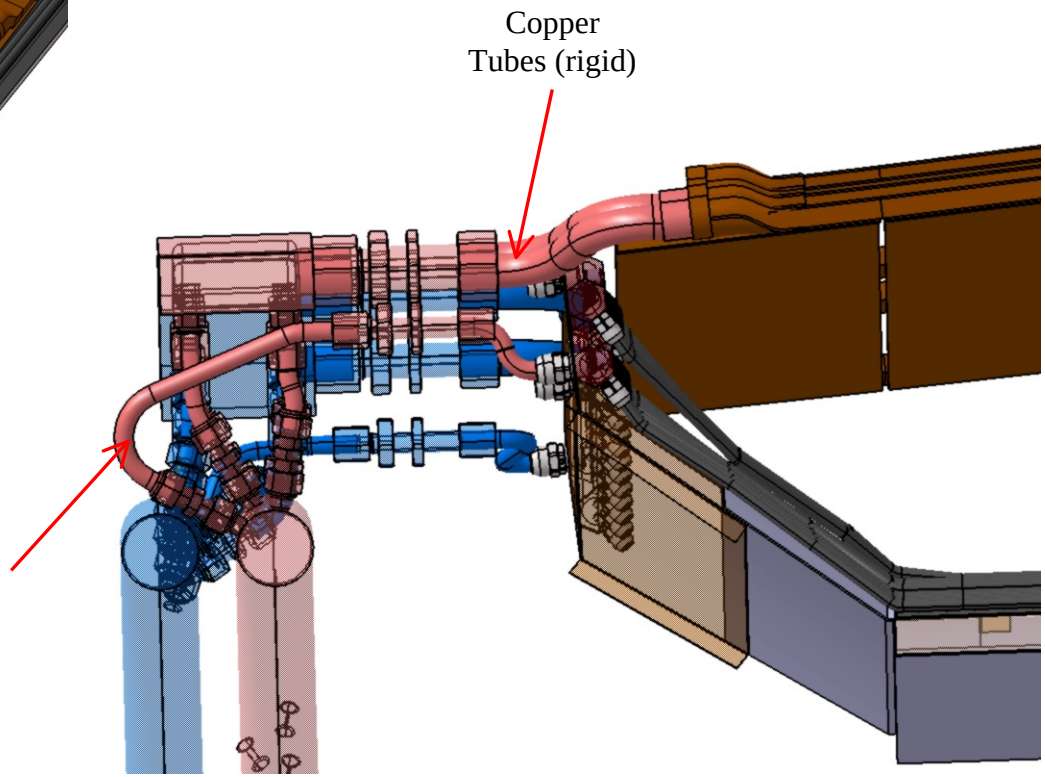
A cut in the cooling system

Dirc Support

Input / Output Manifolds

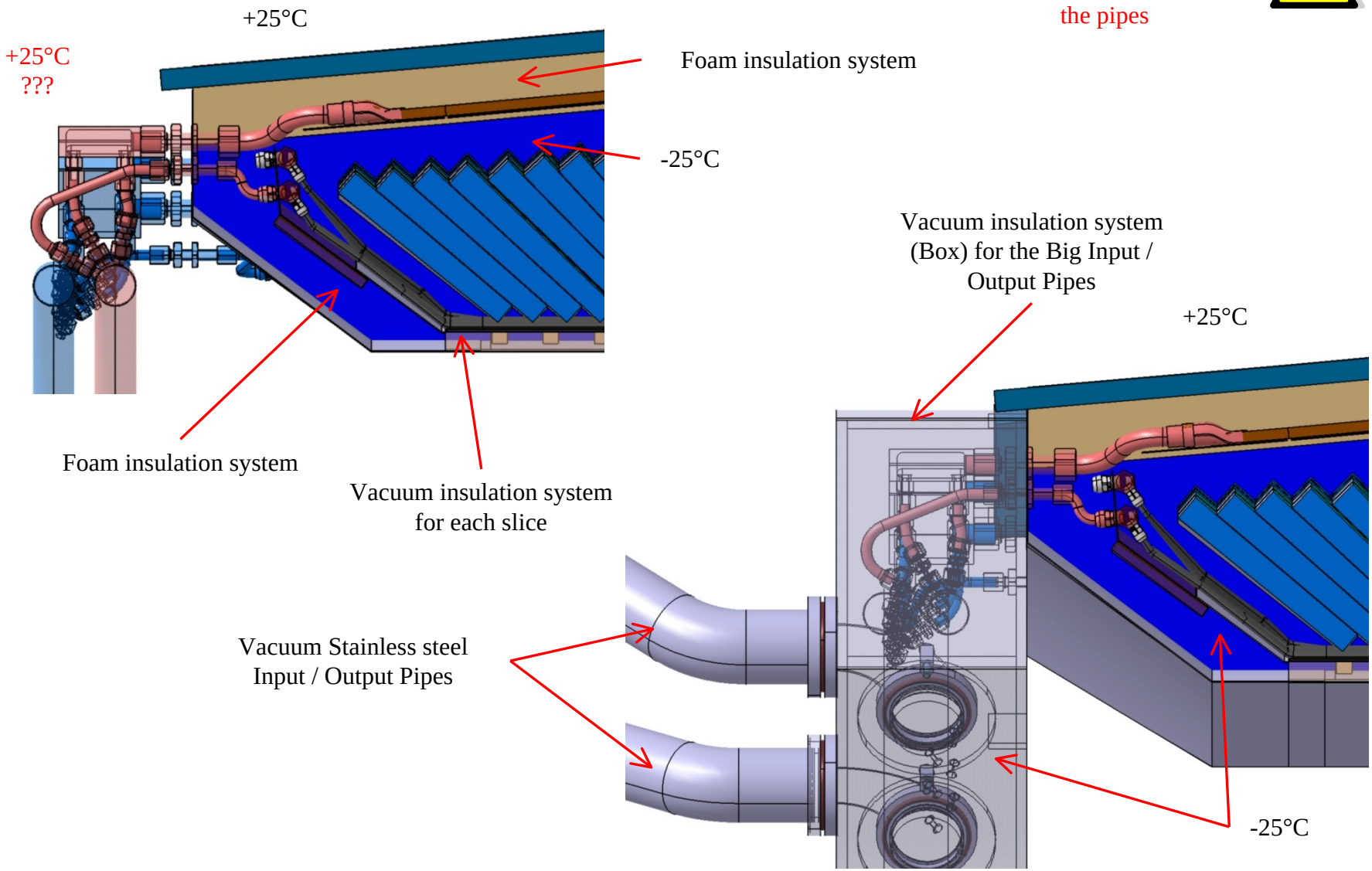


To do :
Calculation of the pressure drop at the exit of the slices



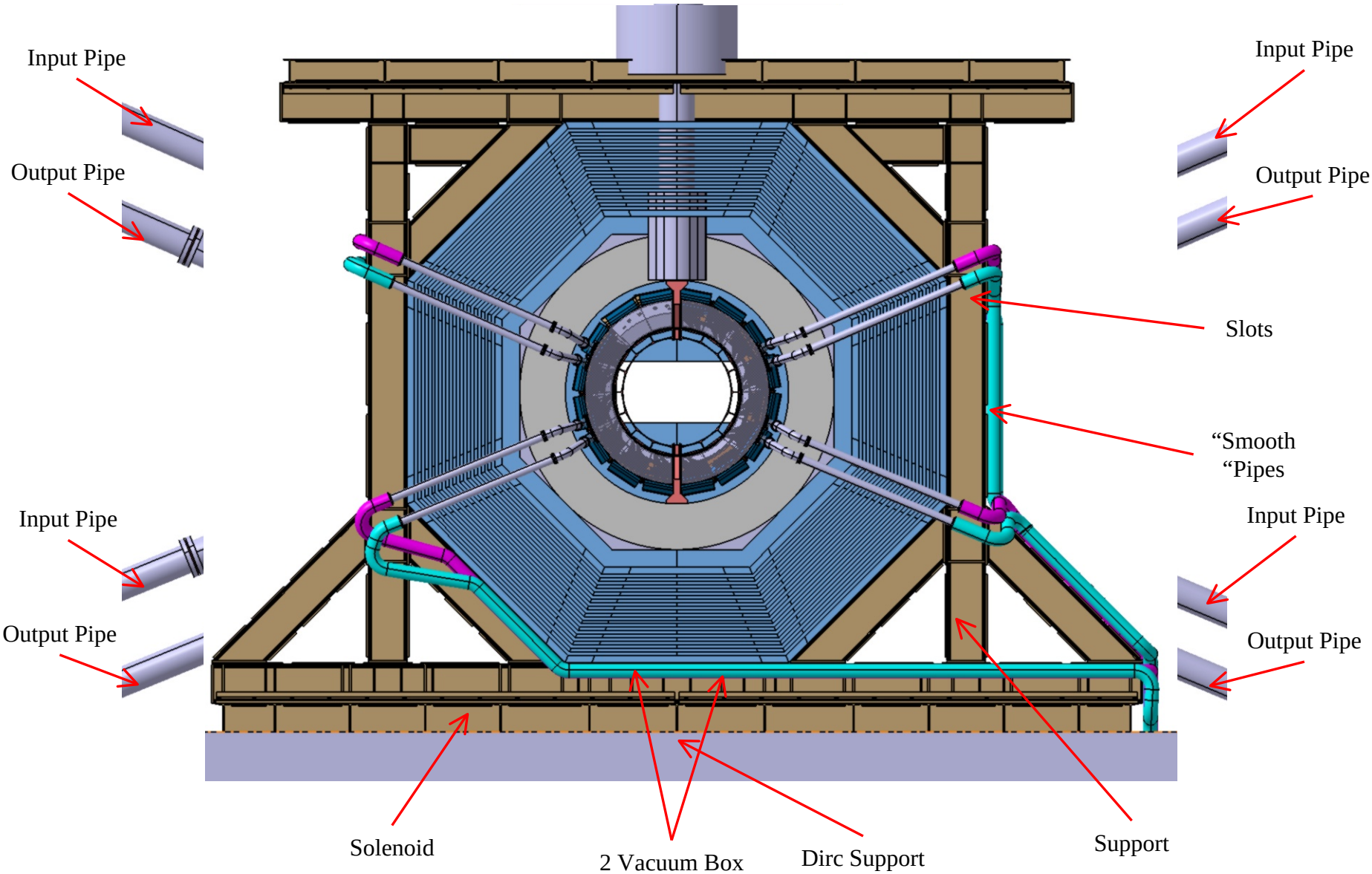
Insulation of the Input / Output Pipes

To do :
The fixation of the box and the pipes



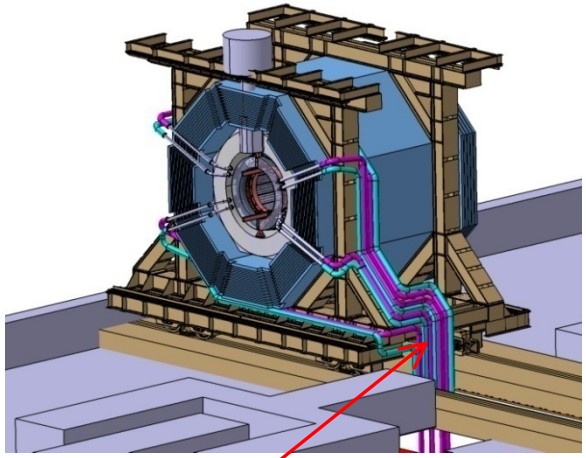
Barrel's Cooling System

Barrel's Surroundings



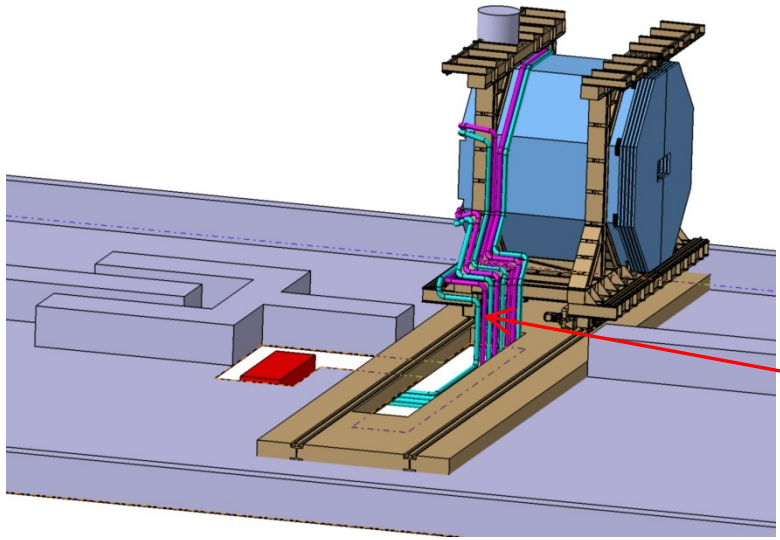
Barrel's Cooling System

Barrel's Surroundings



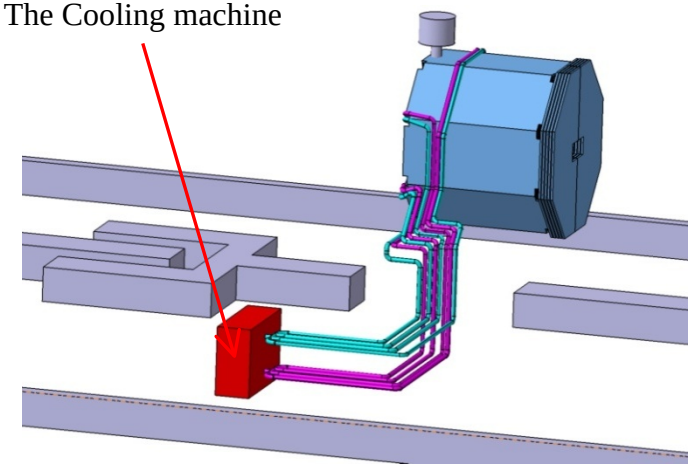
Cable runs for the Cooling Pipes

- Need to find the best position for the Cooling Machine
- Cooling system disconnected during Barrel displacement ??

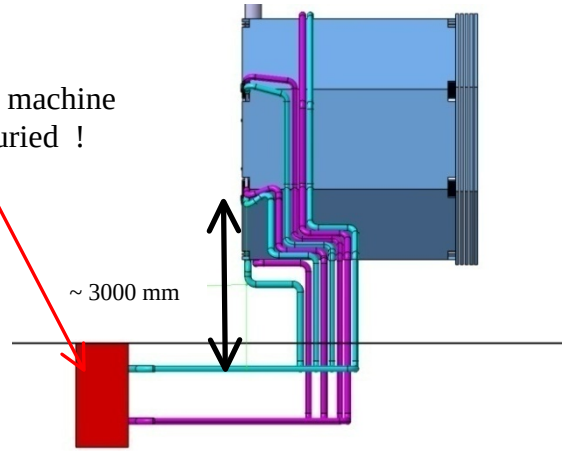


Cable runs for the Cooling Pipes

The Cooling machine



The Cooling machine must be buried !

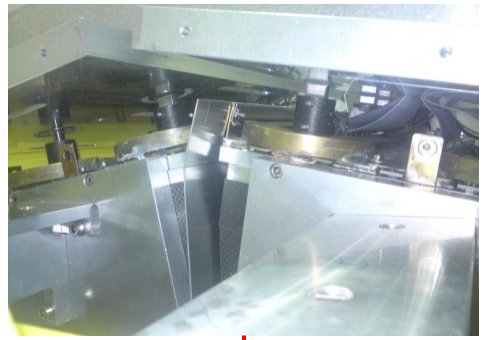


Status of 480 Crystals' Prototype

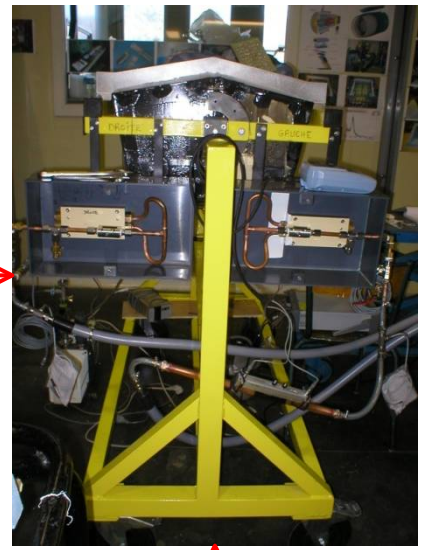
480 Crystals' Prototype

Steel dummy crystals,
cooling and support feet

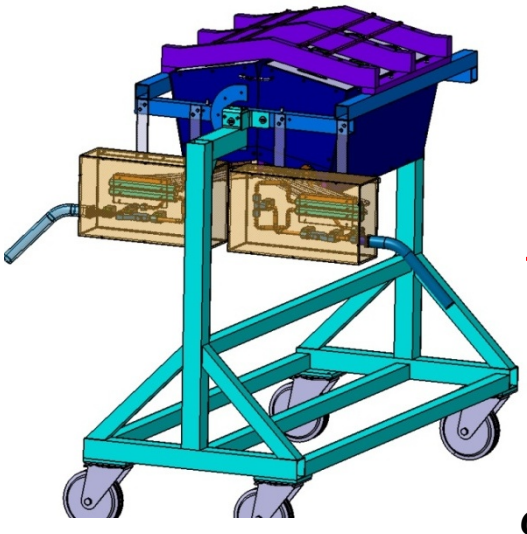
Input and Output Pipes



Cooling tests to be done



Support Feet



The two modules equipped and fixed
on the yellow support

Completed View of 480 Crystals Prototype with its support

Conclusion :

- Job on stand-by :
  - The design of the Back Plates and the Support Beam (depends on the design of the Inserts)
  - The design of Upper Cooling System (depends on the passage of the FEE cables)

- Job to be finished :
  - Insulation of the slices and services
  - The Vertical slice type 2
  - Tests of the 480 Crystals' prototype
- Job to do :
  - Fixations of the services
  - Calculation of the pressure drop of the Cooling System
  - Study of the Cooling machine for the Barrel and the Endcaps

Status of the barrel EMC studies at Orsay

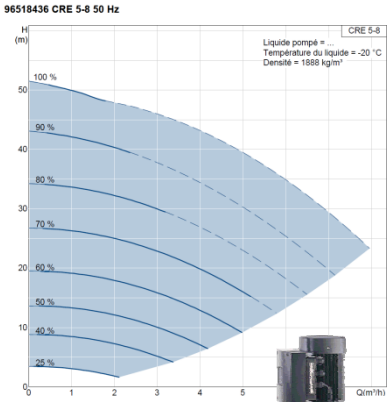
Vacuum leakless cooling system

Crystals dimensions control

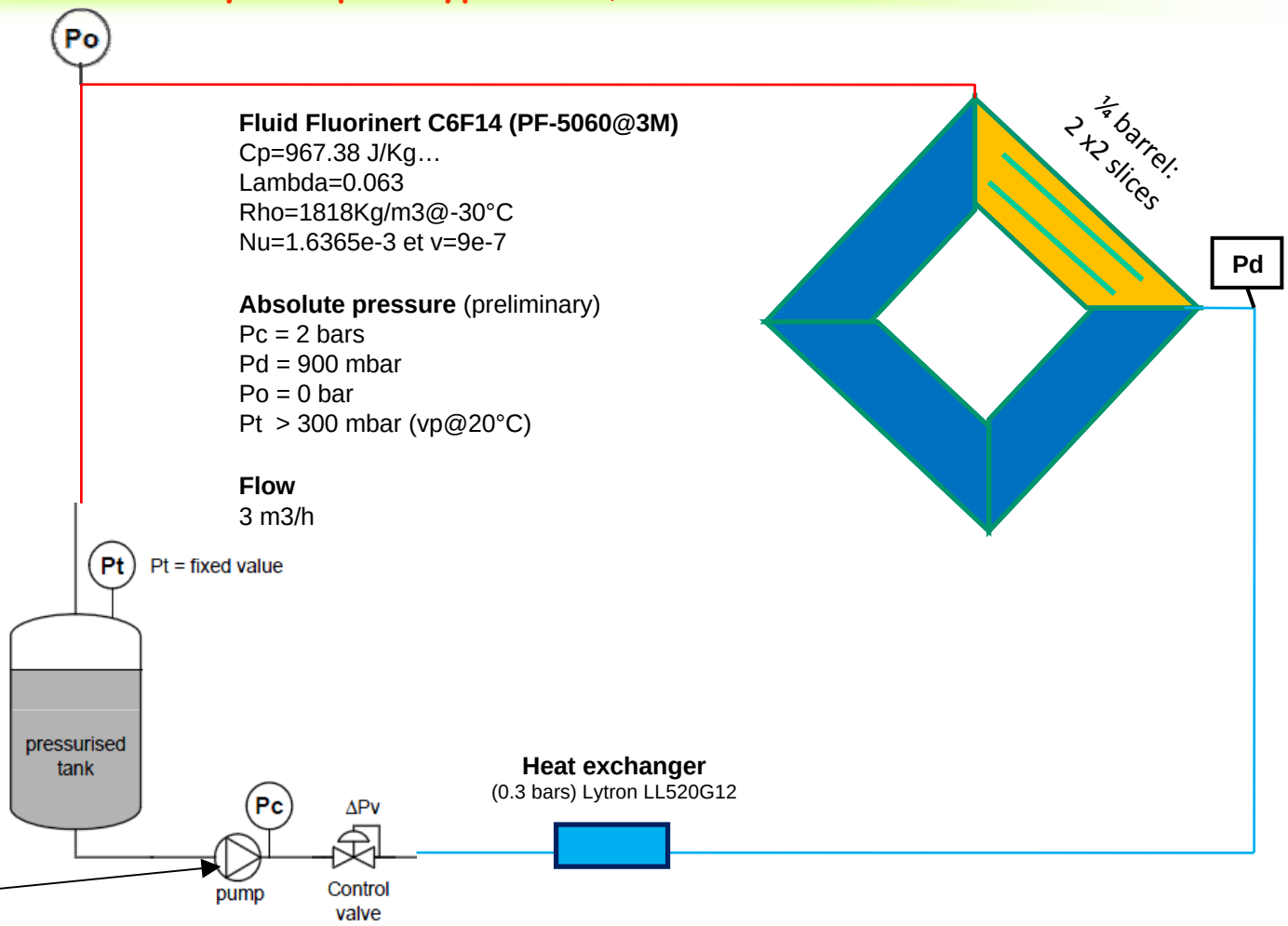
Optical fiber in front of crystal …

Proto 60 @ 90°

Vacuum leakless system prototype with ¼ barrel (based on CERN dvpt)



Pump
Grundfos
CRNE5-8
1.5kW



Fluid Fluorinert C6F14 (PF-5060@3M)
Cp=967.38 J/Kg…
Lambda=0.063
Rho=1818Kg/m3@-30°C
Nu=1.6365e-3 et v=9e-7

Absolute pressure (preliminary)
Pc = 2 bars
Pd = 900 mbar
Po = 0 bar
Pt > 300 mbar (vp@20°C)

Flow
3 m3/h

Discussion with P.Bonneau (Cern) and Greg Hallewell (CPPM) for a better understanding of the vacuum leakless system and the choice of the fluid and compatibility with materials

Elements ordered and in 2010 this system will be built for testing

PbWO4 crystal production

Dimension analysis report

Barrel EM Calorimeter

Barrel EMC Note P. Rosier[1] **November, 2009**

The PbWO4 crystal lots B1, B6 and B7 for the EMC barrel have been delivered and measured on the ACCOS machine. Measurement datas are given by Dormeney [2]. It has been analysed and compared with the mechanical tolerances. The result is summarized in board 1.

A total of **1994 crystals** on the 11360 composing the EMC barrel have been produced. It is composed of the pairs Left and Right of the types 1 and 9. Few percent of additional crystals have been delivered (between 1.6% and 4.7%).

The crystal dimensions, regards to their tolerances, have been checked. Initially, the tolerance is 0/-100µm but the acceptance threshold of this analysis has been set to 5/-105µm. It considers the possible precision mistake of the ACCOS machine, and aims to reject fewer crystals without disturbing the mechanical mounting. Finally, between 41 crystals for the type 1 Left and 6 crystals for the type 9 Left are completely **out of tolerances (up to 200 µm) which represents 5 % in mean** of the number of crystals.

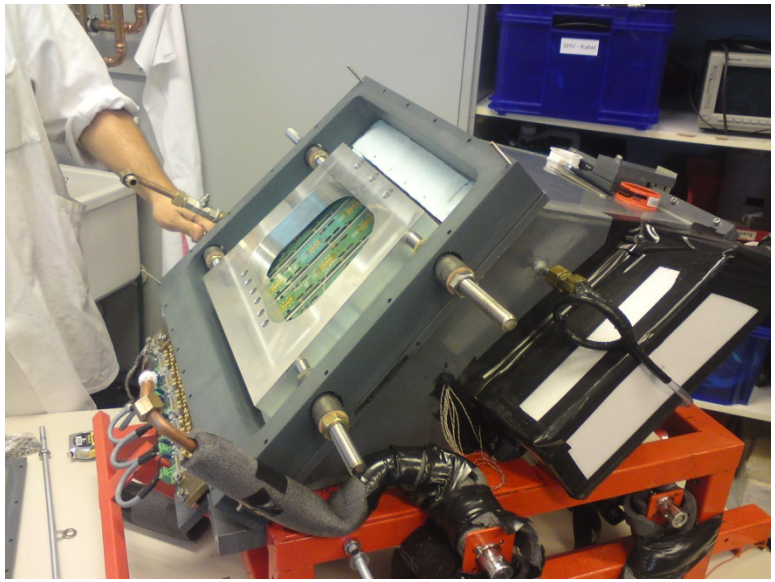
The additional crystals produced equilibrate these numbers and finally there are between 93.4 % (type 9R) and 99.8% (type 1R) of good crystals. **The main default is the under length (less than 200 mm)**. Fortunately it will not affect the mounting possibility inside the alveolus.

All details of this analysis are available in the EXCEL file "Mechanical study Lot_B1_B6_B7.xls".

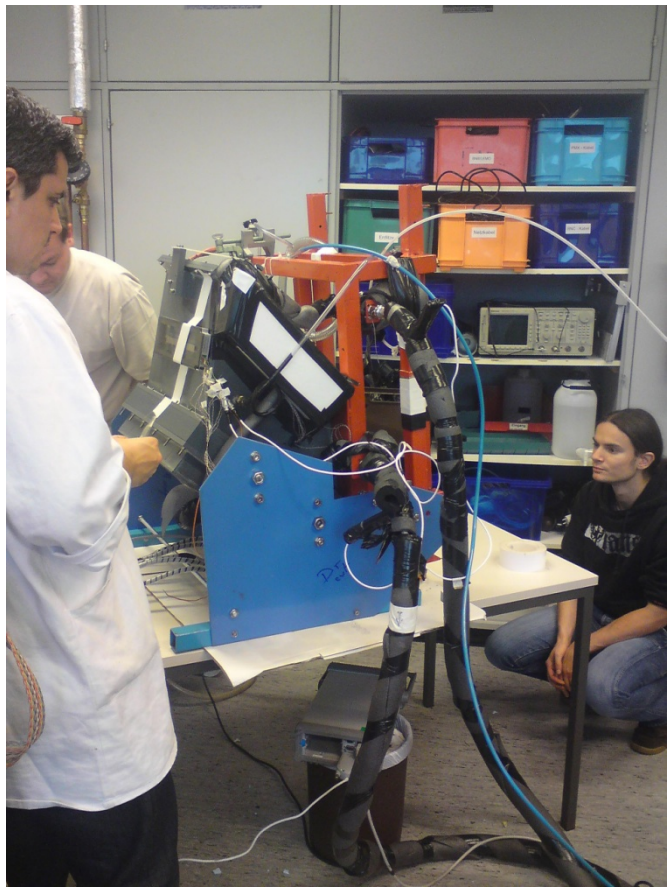
Board 1: Production summary for the barrel (05/11/2009)				
	Number 1L	Number 1R	Number 9R	Number 9L
Lot B1	363	21		
Lot B6	167	113	330	
Lot B7	159	536		325
Theory	640	640	320	320
Produced	669	670	330	325
%	104,5	104,7	103,1	101,6
Total barrel	11360			
Total produced	1994			
Out of tolerance (>5µm;<-105µm)	41	31	31	6
% of good crystals	98,1	99,6	93,4	98,7

To conclude, the production is satisfactory.

Proto 60 modification => 90°



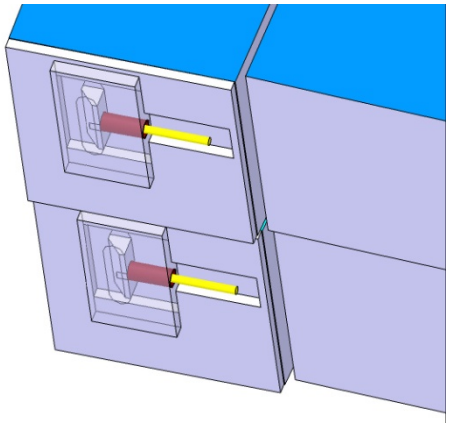
Add of a aluminum block to hold the crystal weight. Screwed directly on the back if the inserts



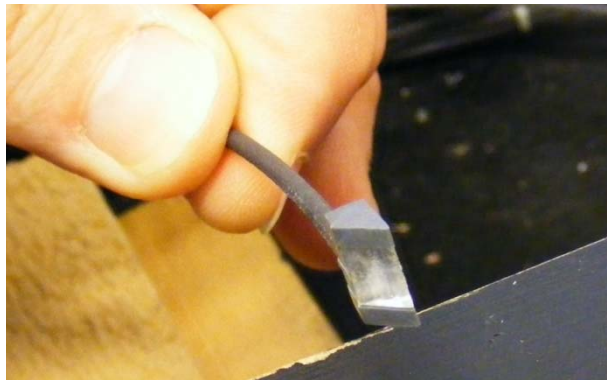
Rotation at 90° completed

Optical fiber tests

The calibration can be done with optical fiber placed in front of the crystals



A prism can hold the fiber and reflect at 90° using a VM2000 foil



Test with a blue led
=> loss 10% (reference: direct light fiber @0° in PMT)

Without prism but fiber at 90° taped on the PMT surface => gain 10%

The use of a fiber in front of the crystals must be studied and also its fixing.
But this basic test shows promising result => need more studies (with Bochum bench test)