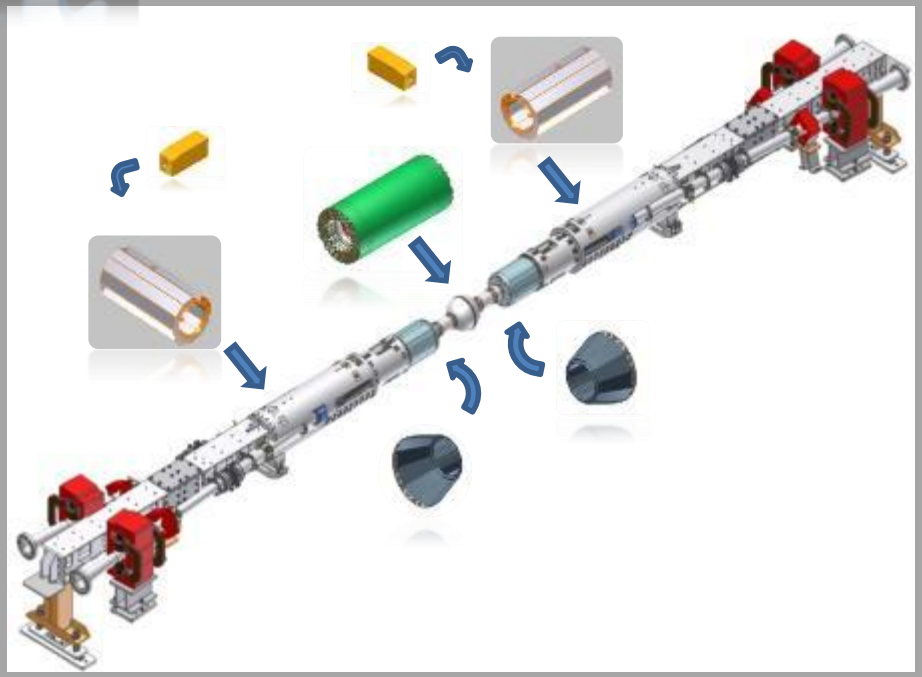
KLOE-2 INTEGRATION

E.Dané
on behalf of the KLOE-2 collaboration.

Laboratori Nazionali di Frascati

Frascati
20/11/2012
45° LNF Scientific Committee

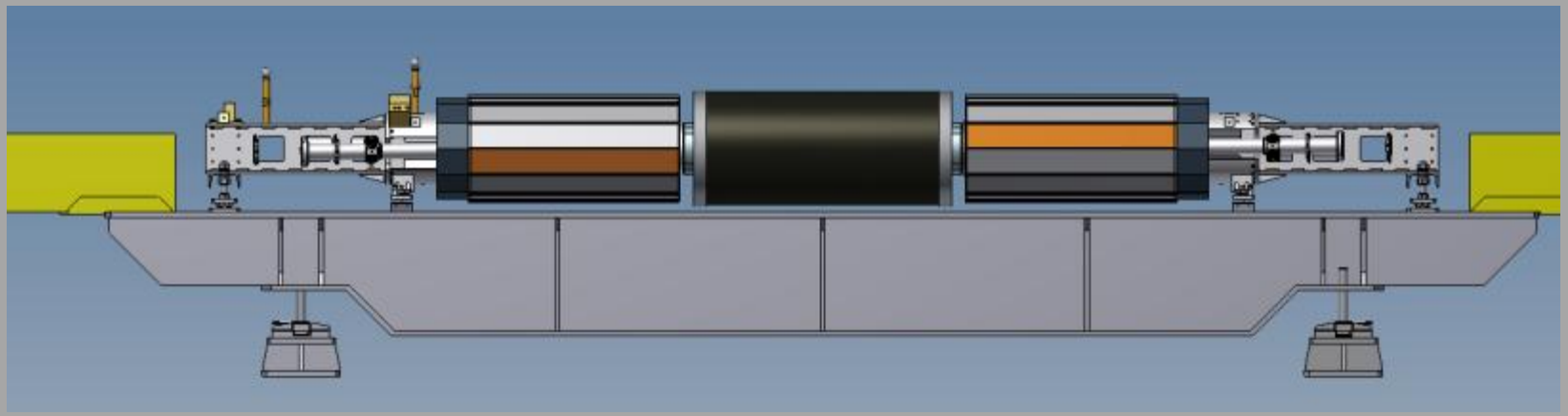
KLOE-2 Integration



3 MAIN TASKS:

1. Detectors installation on Beam Pipe Support (BPS);
2. Cabling & Piping of the detectors;
3. Insertion in KLOE;

Integration will start after the preparation activities of the DA on beam-pipe will be completed.



Accelerator Division

General Activities

- New Beam Pipe Support;
- New BP (sphere);
- Check rails and extraction tools;
- Design of the QF control;
- Shell Modifications;
- BP Cooling design and construction;

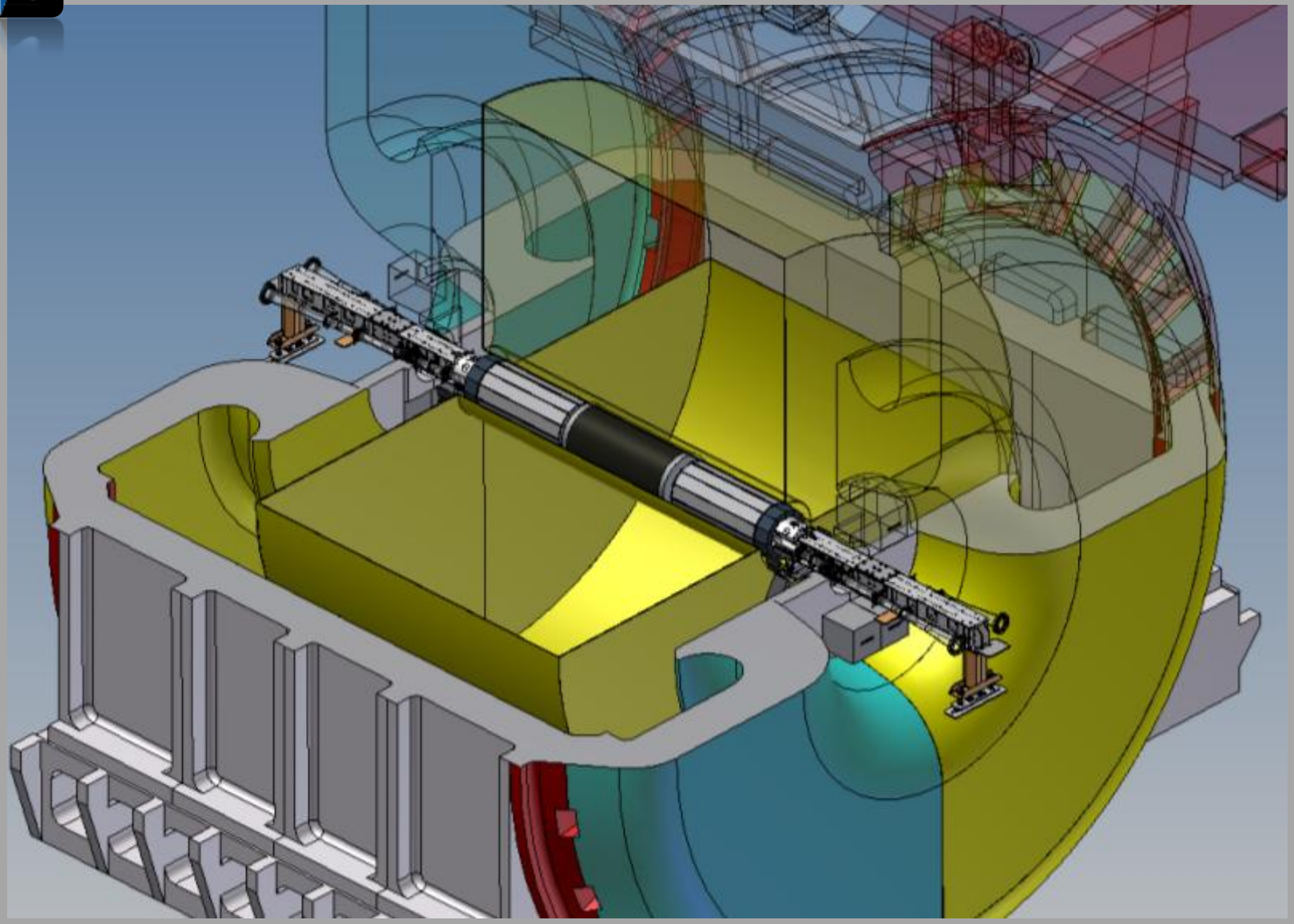
Preparation for BP extraction

- Restricted Area set up;
- Endcaps opening;
- Magnets disassembling;
- Rails preparation and alignement;
- BP extraction and parking in the clean area;

Beam Pipe activities

- BP sphere check disassembling;
- BPS e- disassembling;
- BPS e+ disassembling;
- BP soldering;
- Tungsten insertion;
- New BPS installation;

KLOE-2 FINAL GOAL



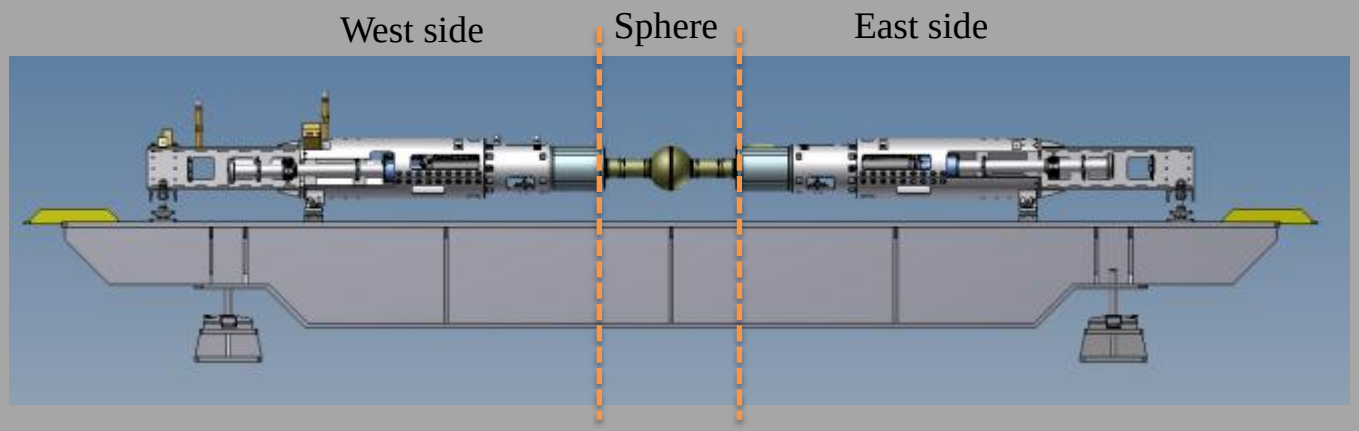
Integration Procedure: general tasks

INT. WEST SIDE (IT GAS IN)
IT Support_2 Installation
Soldering BP-QD0_2
COOLING_2 Piping
CCALT_2 Installation
CCALT_2 Cabling
Beam Position Monitor_2
IP Temp. Sensors_2
Isobutane sniffer tubes
IT INSERTION
IT Insertion Tool
IT Traslation Tool
IT Temp Sensor
IT Insertion in Shifted Pos.
INT. EAST SIDE (OUT GAS IN)
IT Support_1 Installation
Soldering BP-QD0_1
COOLING_1 Piping
CCALT_1 Installation
CCALT_1 Cabling
Beam Position Monitor_1
IP Temp. Sensors_1
Isobutane sniffer tubes
IT in Nom. Pos.
Alignment Ref. Installation 1,2

QCALT INSTALLATION
QCALT_1 Installation tool
QCALT_1 Installation
QCALT_2 Installatin Tool
QCALT_2 Installation
QCALT_1,2 cabling
QCALT_1,2 cabling test
IT CABLING AND TEST
PREPARATION FOR INSERTION
Beam Pipe alignment survey
Shell Installation
Beam Pipe Transport

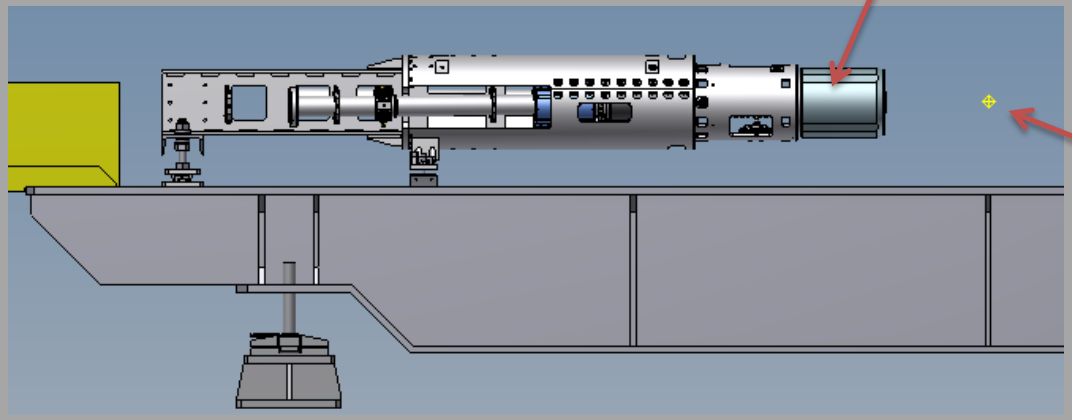
A very detailed schedule under study to find the critical points.

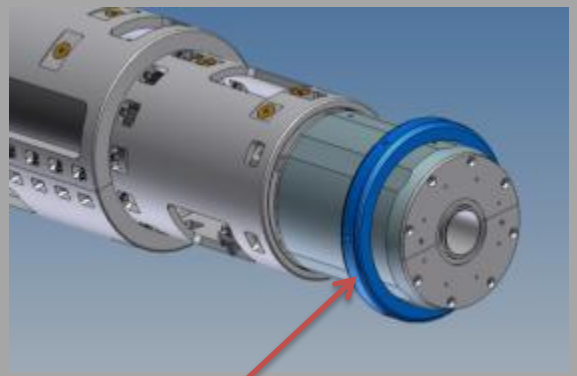
A Mockup is used to get trained on all of these activities;

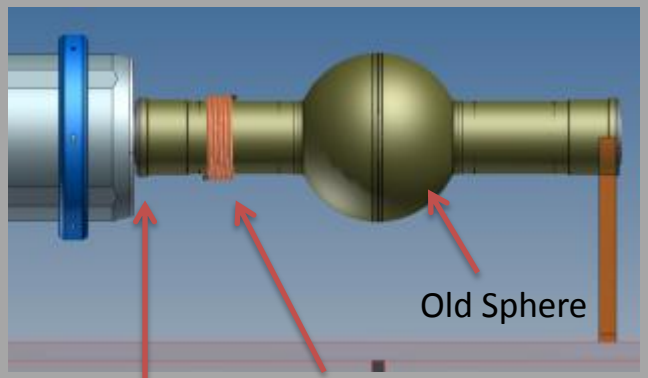


KLOE-2 WEST side Integration

INT. WEST SIDE (IT GAS IN)
IT Support_2 Installation
Soldering BP-QD0_2
COOLING_2 Piping
CCALT_2 Installation
CCALT_2 Cabling
Beam Position Monitor_2
IP Temp. Sensors_2
Isobutane sniffer tubes

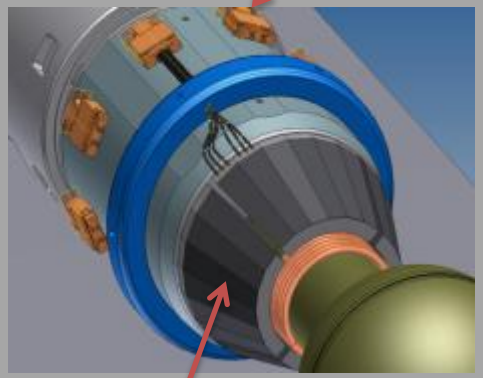



IT Support Installation



Sphere- QD0 welding

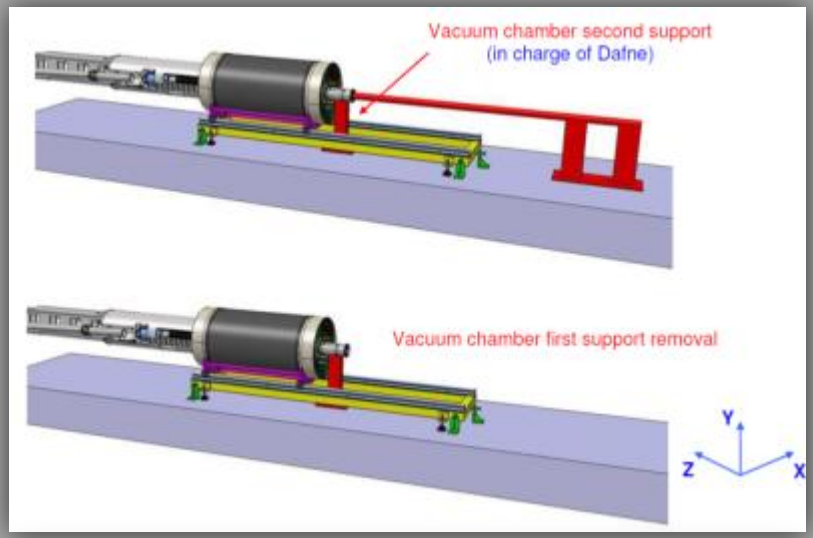
BP Cooling

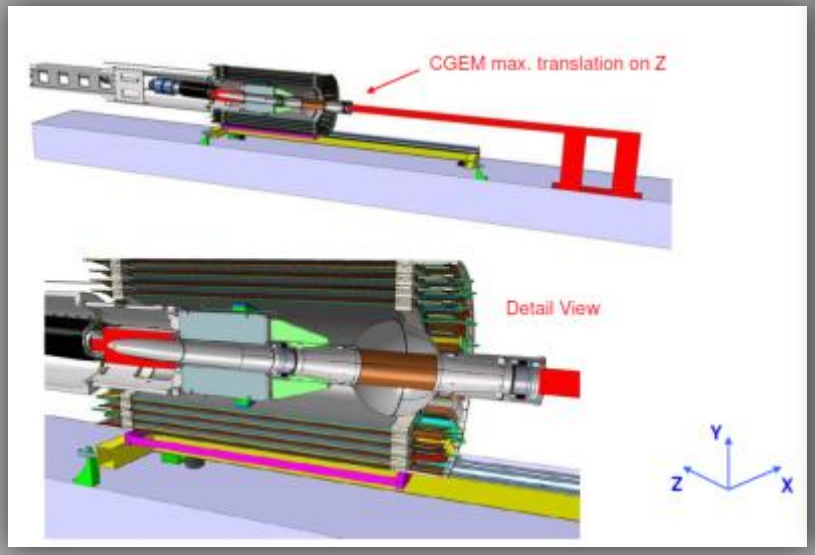

CCALT Modules

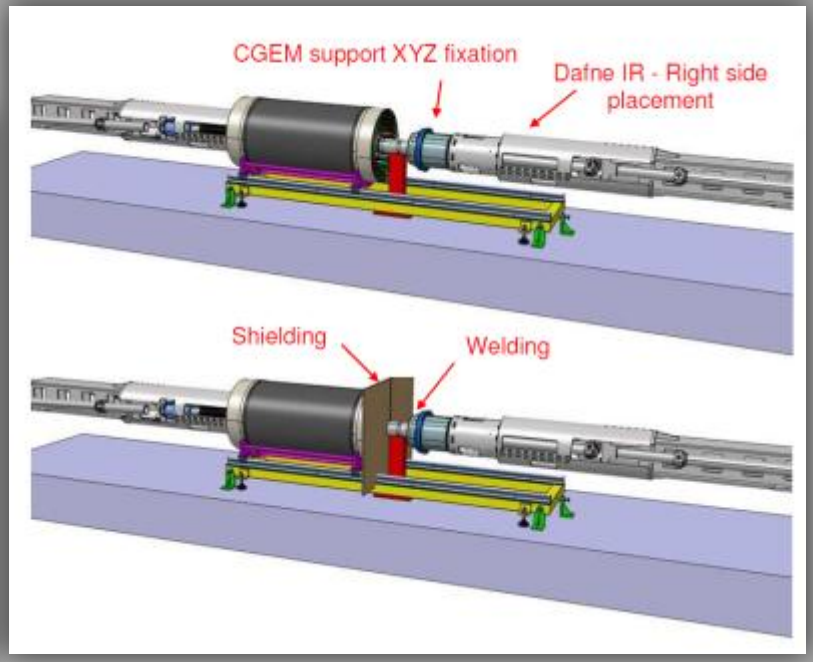
IT Installation

IT INSTALLATION
IT Insertion Tool
IT Traslation Tool
IT Temp Sensor
IT Insertion in Shifted Pos.

Insertion of IT involves the use of two structures:
- Translation Tool;
- Insertion Tool;.

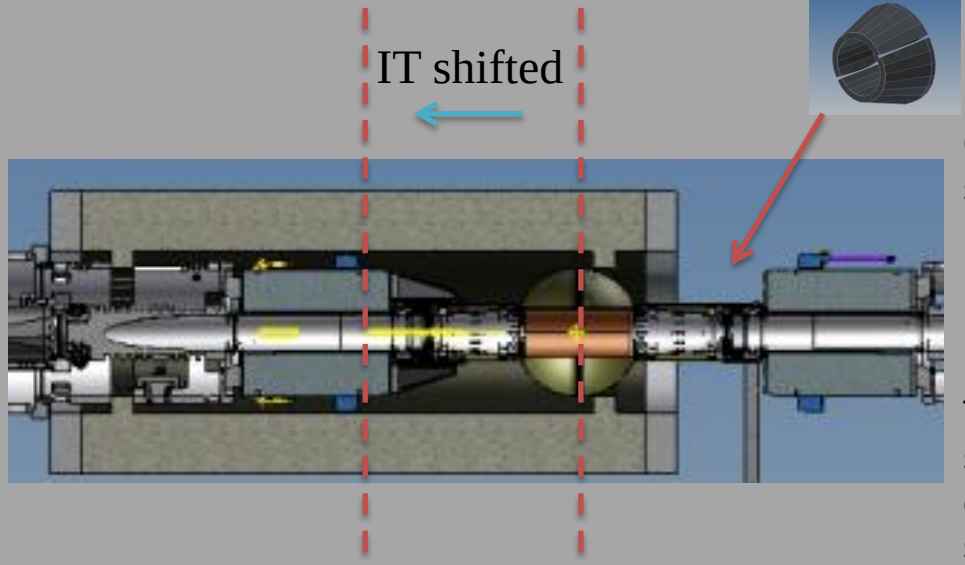






KLOE-2 EAST Side Integration

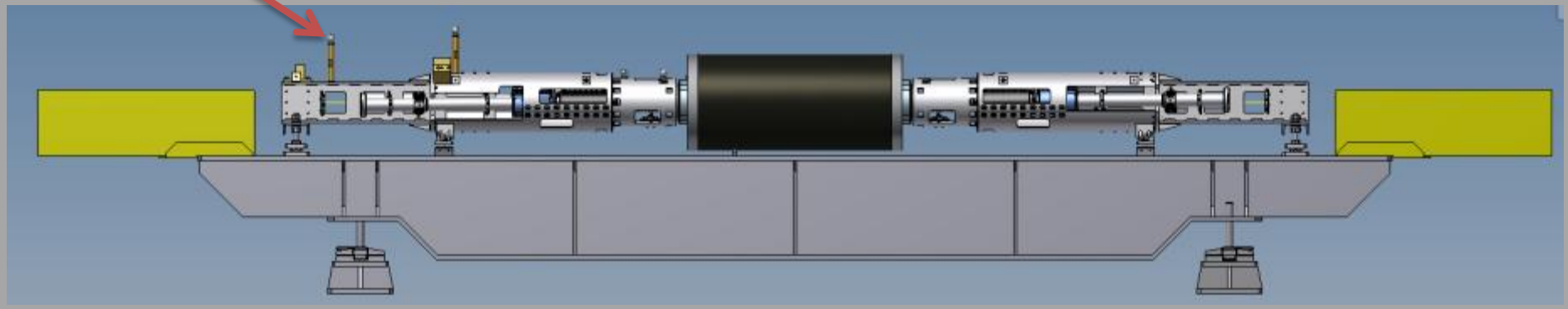
INT. EAST SIDE (OUT GAS IN)
IT Support_1 Installation
Soldering BP-QD0_1
COOLING_1 Piping
CCALT_1 Installation
CCALT_1 Cabling
Beam Position Monitor_1
IP Temp. Sensors_1
Isobutane sniffer tubes
IT in Nom. Pos.
Alignment Ref. Installation 1,2



Once the IT is in the shifted position it is possible to start the Integration of the East side.

The procedure is symmetrical to the one of the West side.

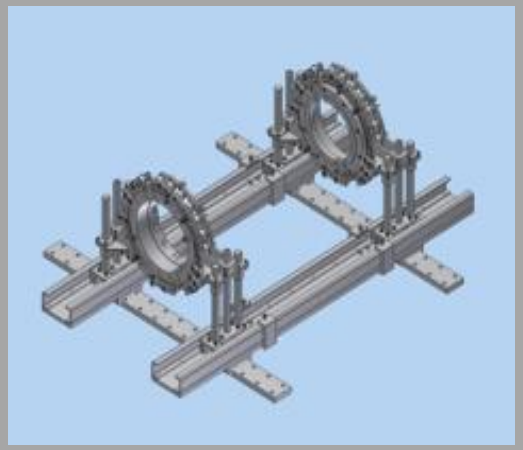
After the installation of the East side → IT is shifted back to the nominal position. Beam Pipe alignment Reference Tools are installed.



QCALT Installation

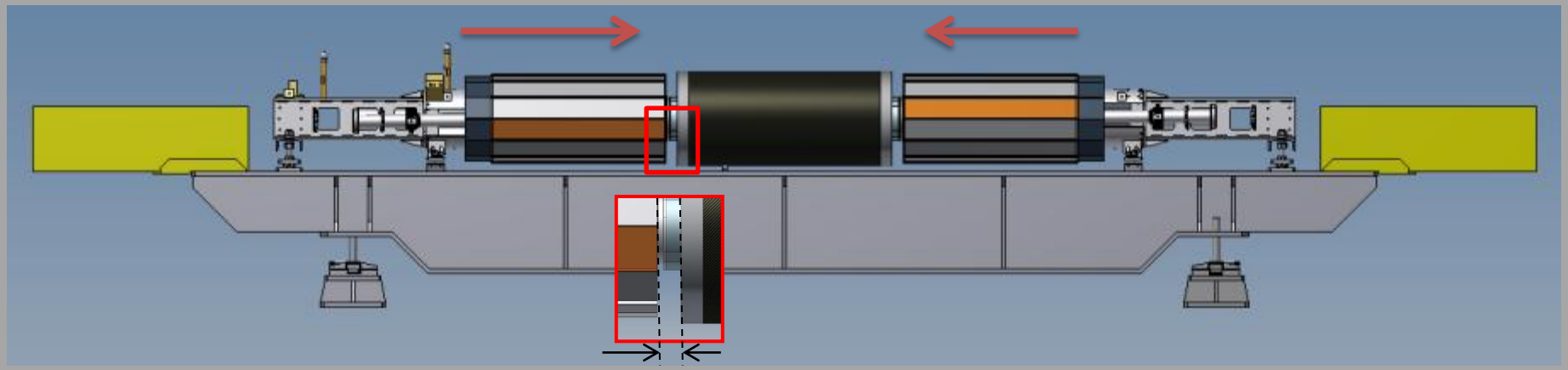
Each QCALT consists of two halves.
A special tool will be used to intagrate the QCALT on the beam pipe.

QCALT INSTALLATION
QCALT_1 Installation tool
QCALT_1 Installation
QCALT_2 Installatin Tool
QCALT_2 Installation
QCALT_1,2 cabling
QCALT_1,2 cabling test



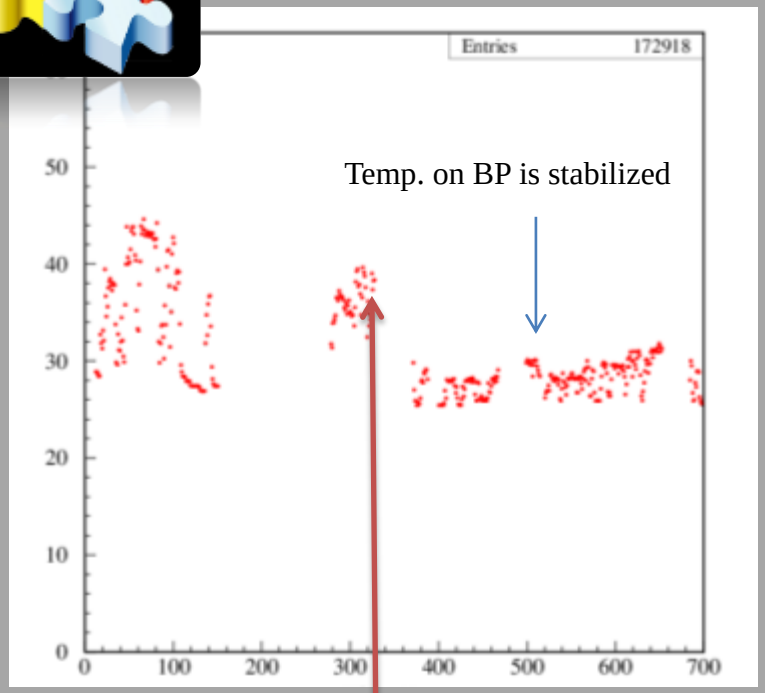
QCALT Installation Tool

QCALT half part

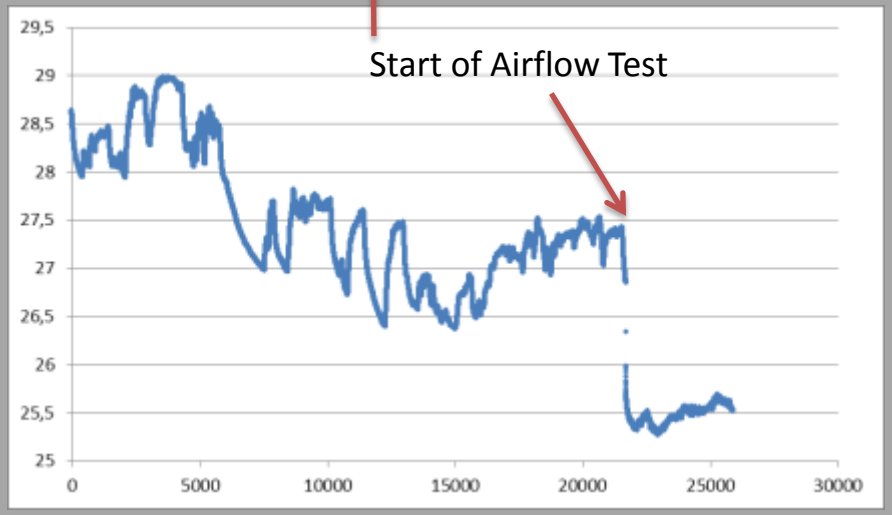


50 mm

IP Temperature

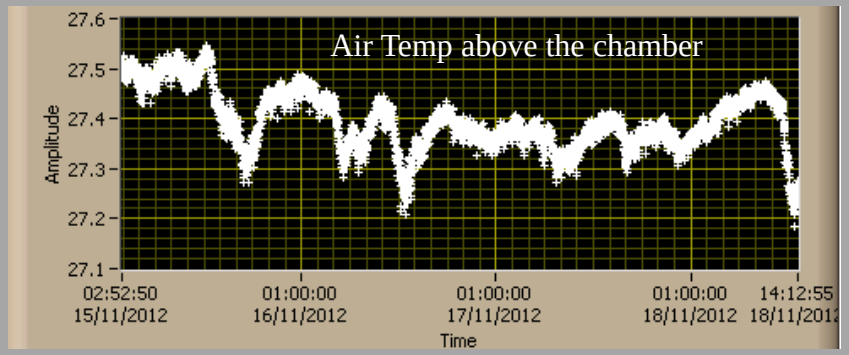


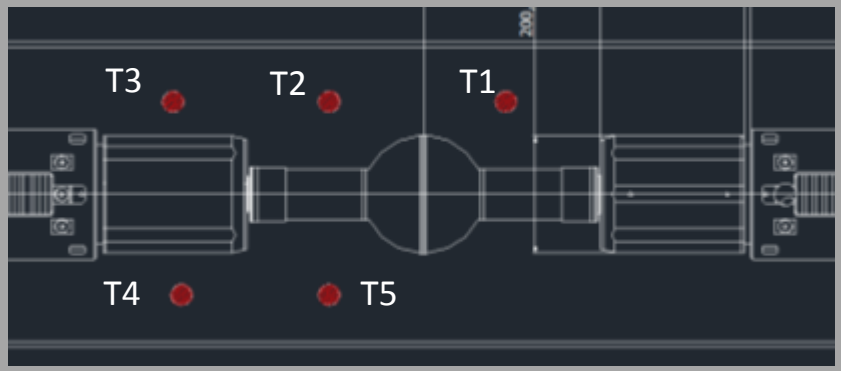
Plot of the QD0 temperature.



Plot of the air temperature close to the IP.

- Due to the fact that IT is sensitive to temperatures above 30 degrees, the area of the IP has been continuously monitored.
- We have placed 5 temp. sensors to measure the air in the inner region and other 4 temp. sensors in contact with the beam pipe.
- **Since October 16th air at room temperature is flowing in the IP region.**
- A decrease of the air temperature of about 2 degrees is observed, while the temp. on BP got stabilized to reasonable values

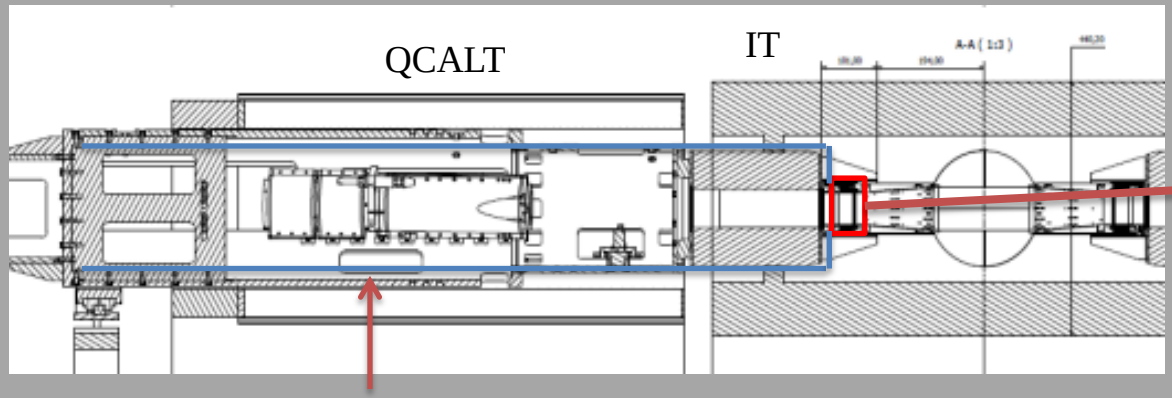


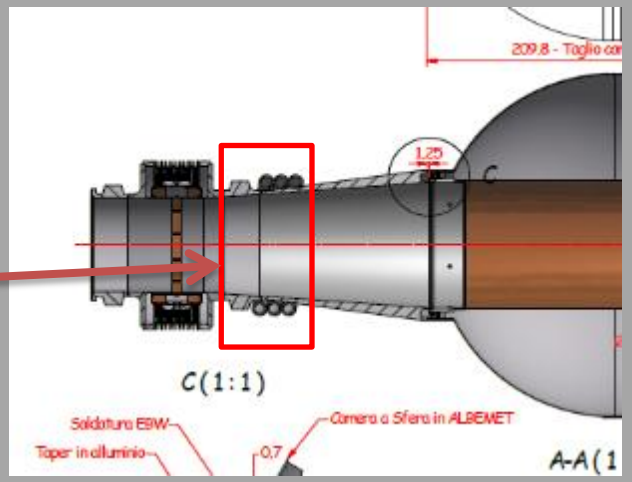


IP Cooling: two parallel systems.

IP WATER COOLING

A liquid cooling system is under study by the DA (G. Sensolini).



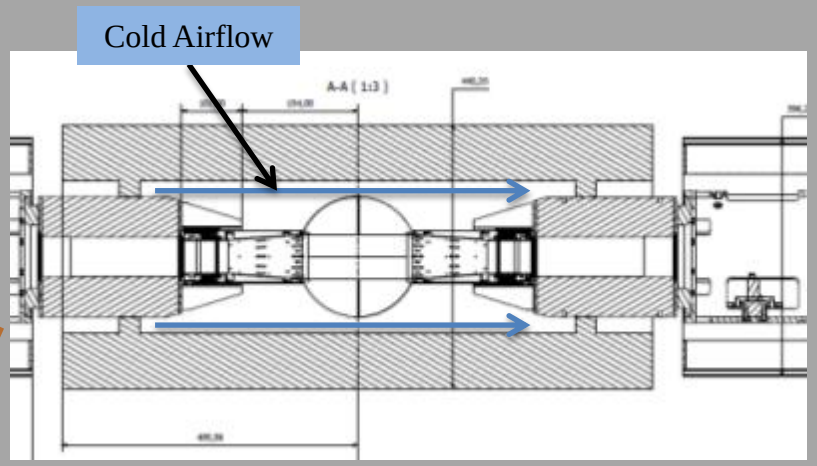


All the cooling pipes (air and liquid) pass through the Beam pipe Support.

IP AIR COOLING

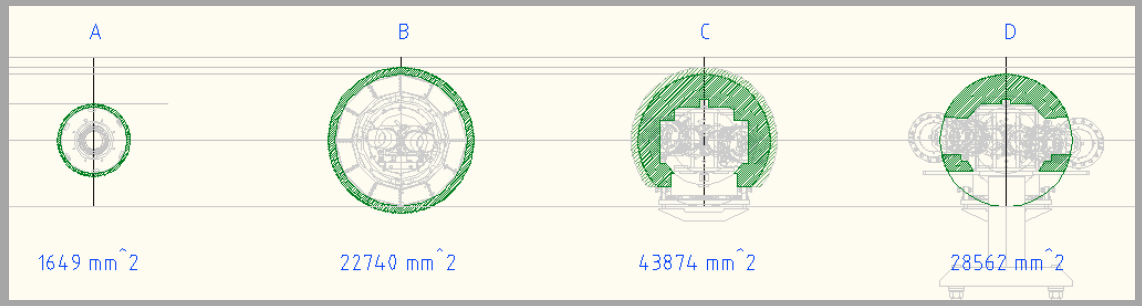
Air cooling test was made in July using the IP Mockup:
Power applied: 40W;
Air flow: 300 l/min;
ΔT decreasing from 30°C to 25.5 C°;

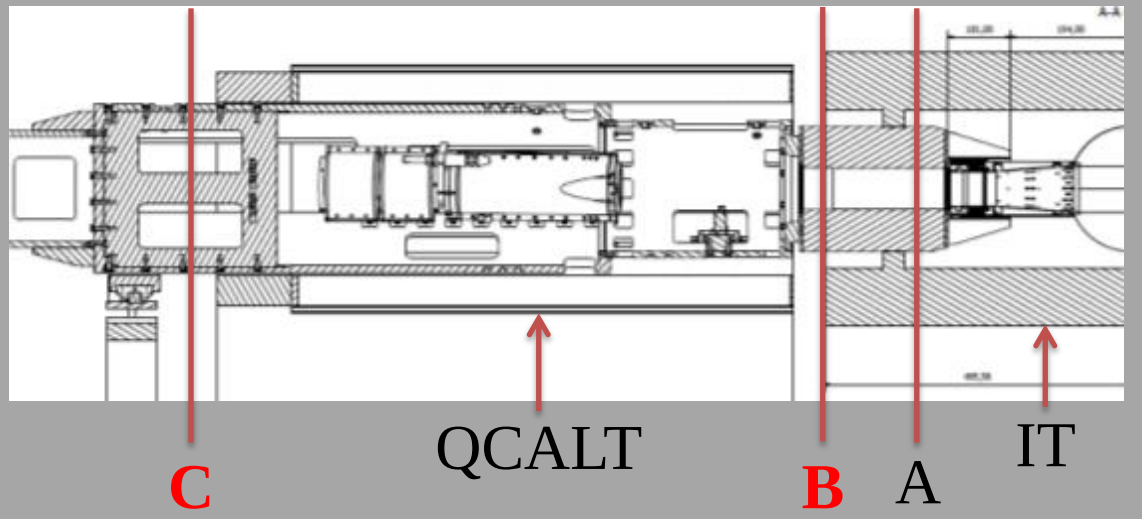
Airflow in order to cool down the inner part of IT;



Cabling&Piping

CAVI PER LATO	Num.	Diam. [mm]	Num. IT HV Eq
CCALT			
CCALT_SGN	72	2,4	**19**
IT			
IT_HV	69	9,0	69
IT_SGN	90	8,0	80
IT_GAS	36	5,0	20
TOT IT	195		169
*QCALT**			
QCALT_SGN	48	5,9	**32**
LET			
LET_SGN	40	1,2	**5**
SERVICES			
TEMP. SENSOR	5	1,2	**1**
AIR COOLING	20	6,0	**13**
LIQ. COOLING	2	5,0	**1**
BEAM POSITION MON.	4		
TOT	*386*		**409**



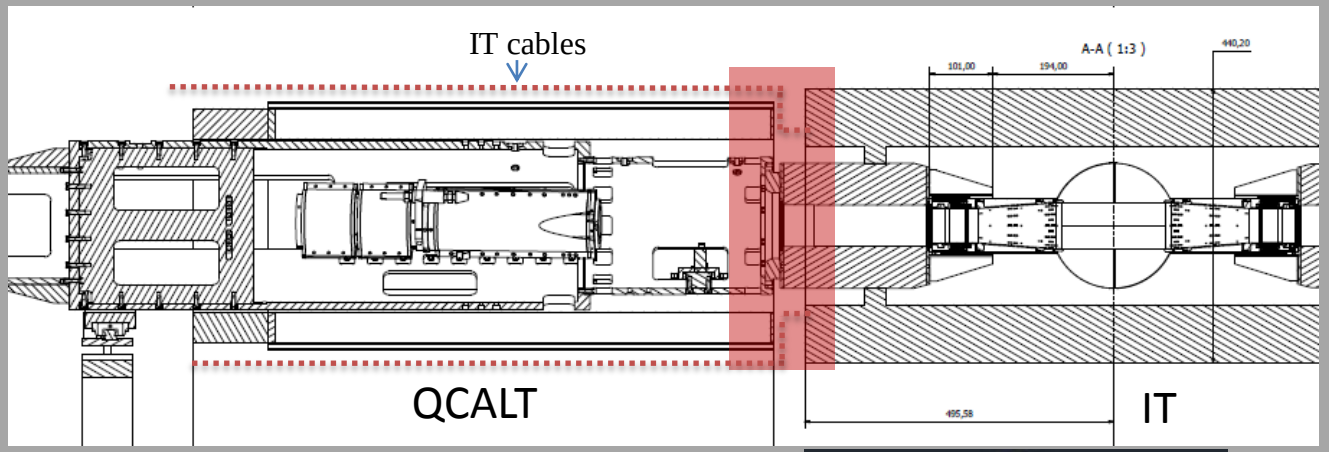


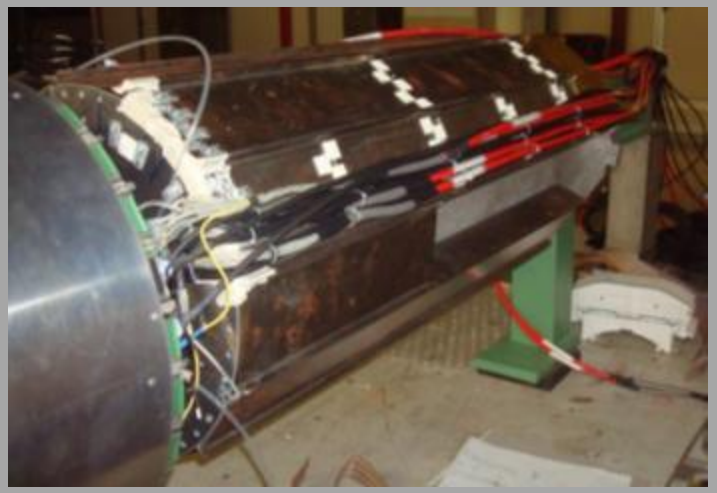
Preliminary study was made to evaluate the space available for cabling and piping.
2 critical zones: B and C.

Critical Zone B: IT - QCALT

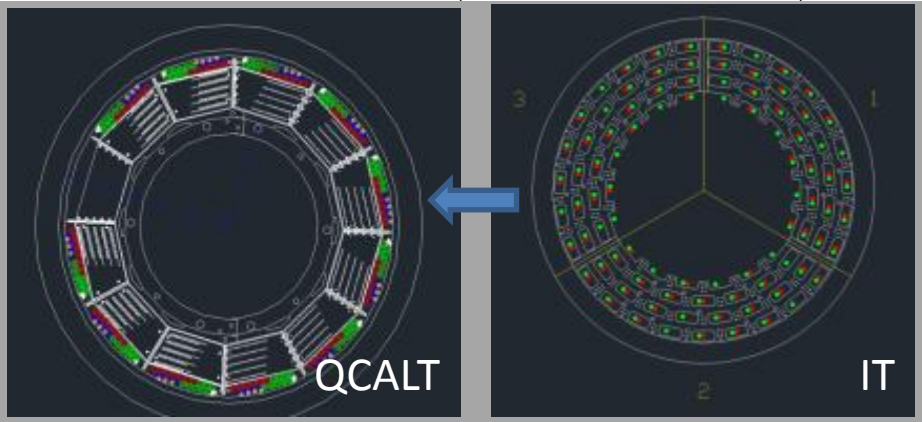
First attempt on cabling to learn how to arrange the IT cables on QCALT.

Only 50mm distance available to connect the IT cables and arrange it on QCALT.





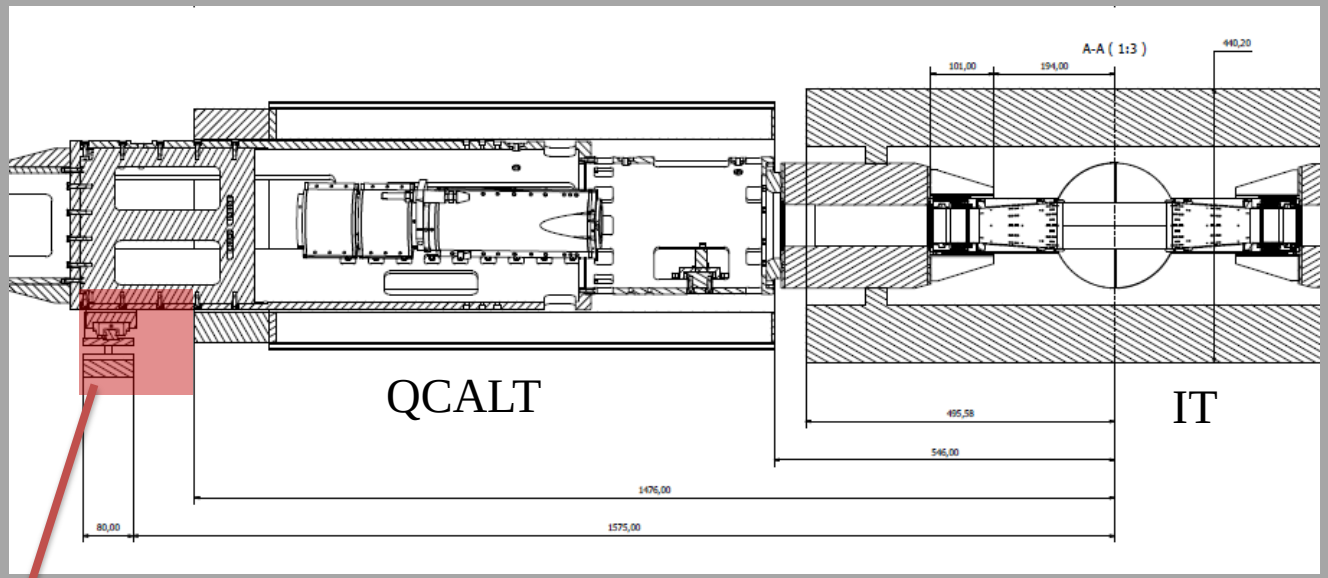
Aluminum holders glued on QCALT surface modules.



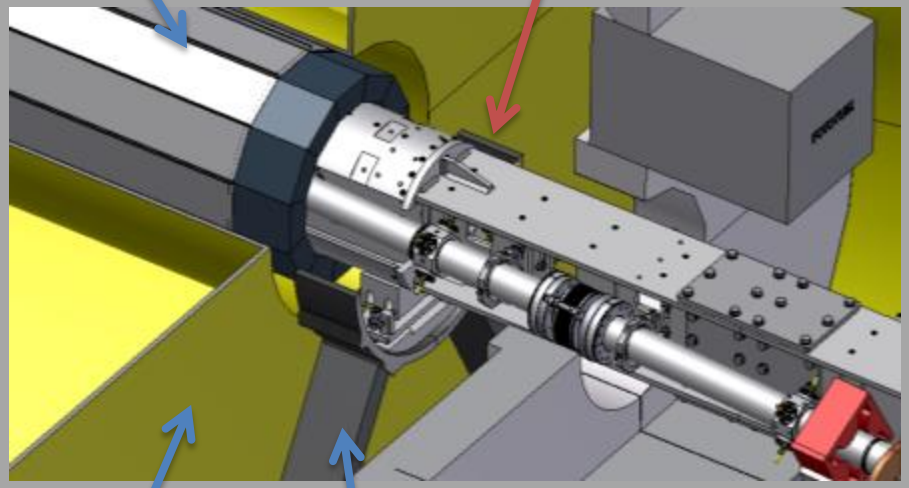
We are studing a cable map to arrange the IT cables on the QCALT.

Critical Zone C: QCALT vs BP CF support

- This is a critical section due to the presence of the positioning system of the beam pipe.
- This issue is still under discussion with DA.

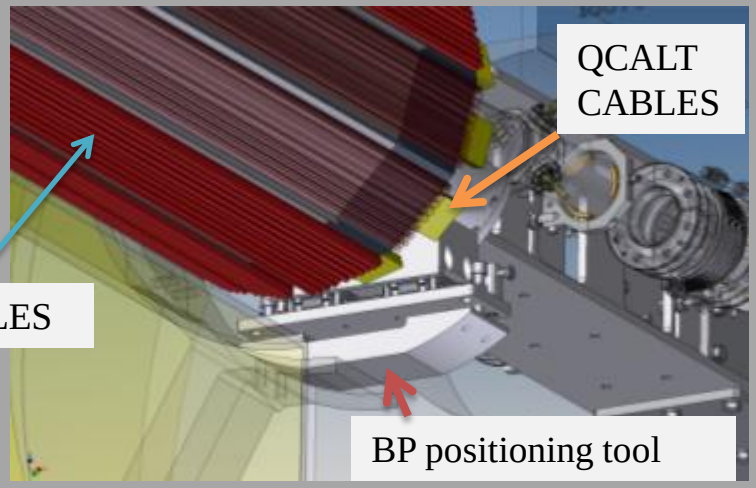


QCALT



Kloe DC

Carbon Fiber BP support

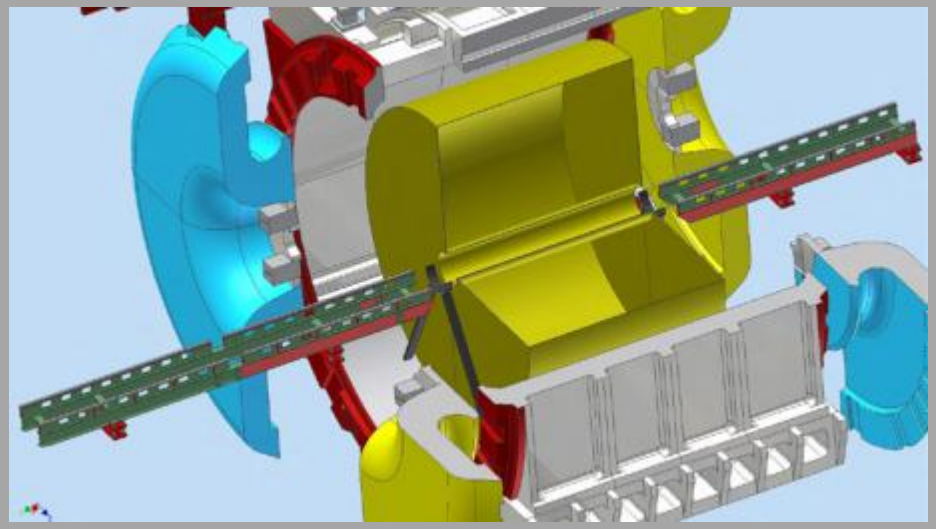


IT CABLES

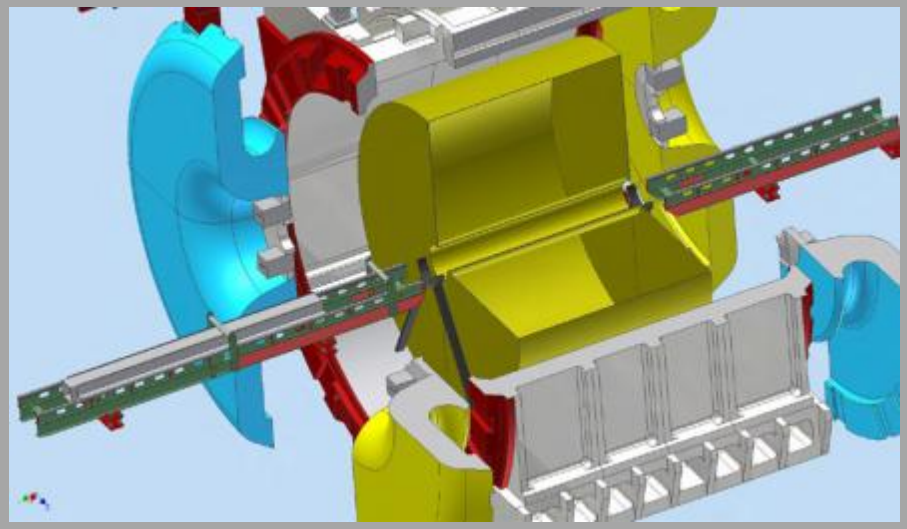
QCALT CABLES

BP positioning tool

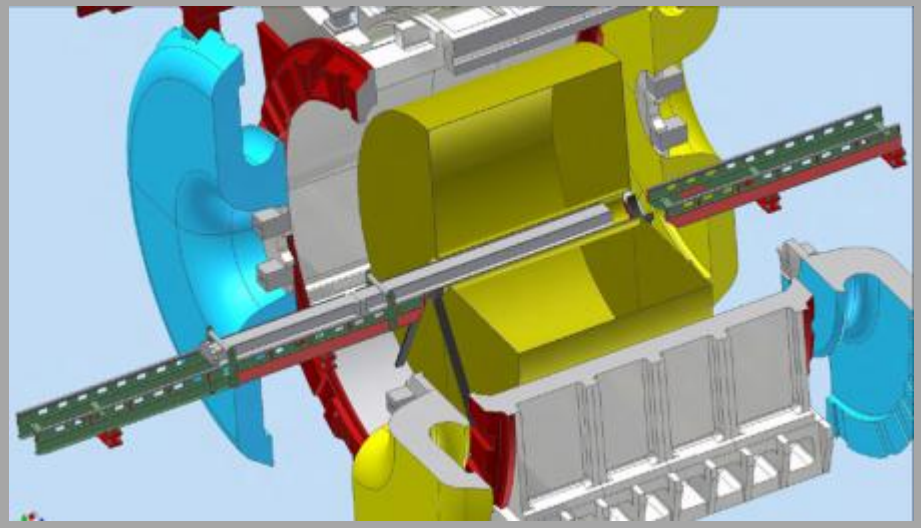
Beam-Pipe Insertion (I)



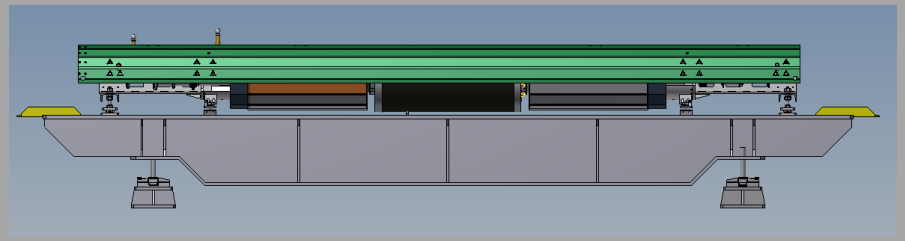
Step 1. Installation of the rails;



Step 2. Insertion of the 1st part of the beam guide;



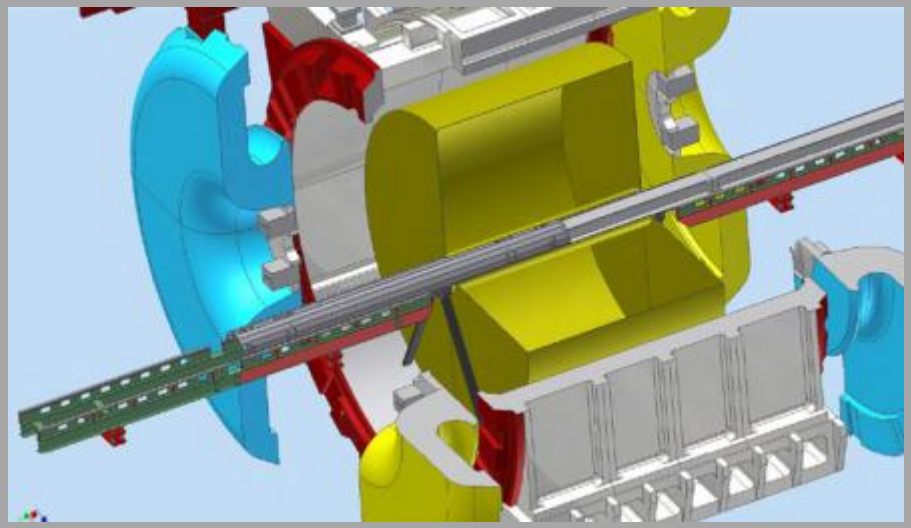
Step 3. Insertion of the beam guide in the Kloe DC;



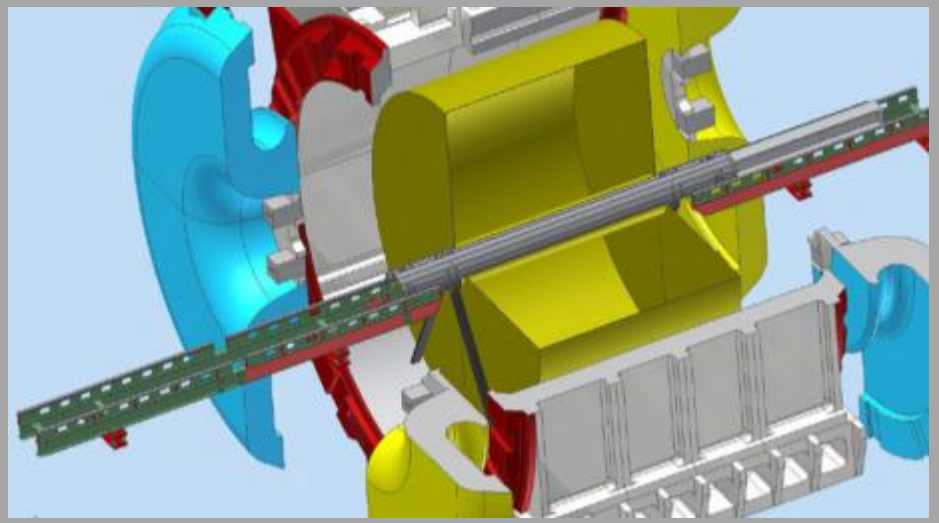
Step 4. Shell installation;

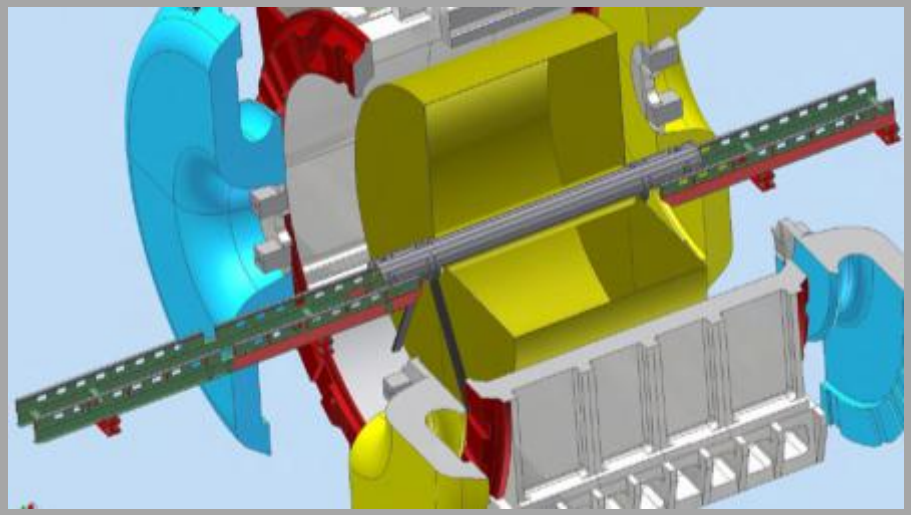
Beam-Pipe Insertion (I)

Step 5. Connecting the shell and insertion of the BP;

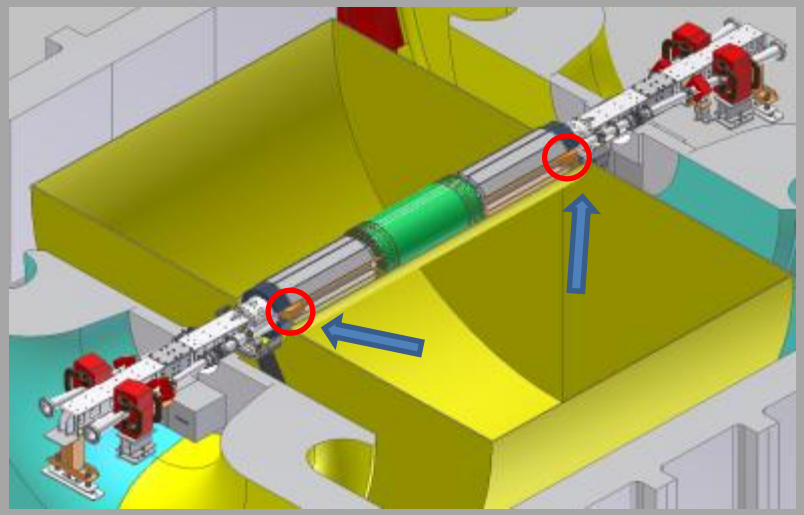


Step 6. Traslation of the BP in nominal position;



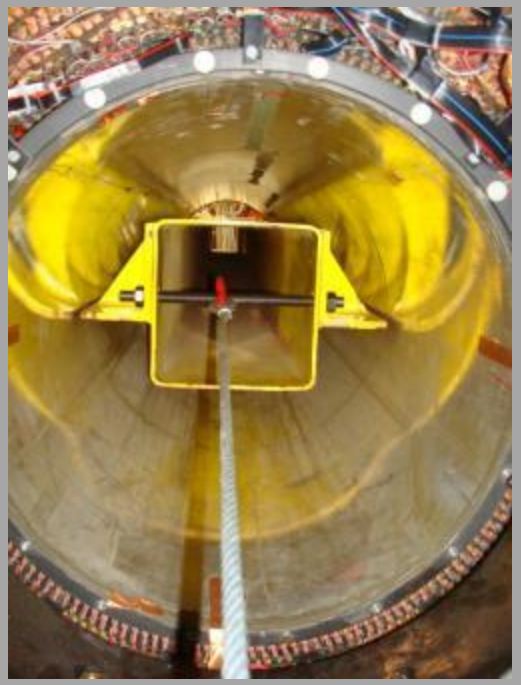


Step 7. Removal of the beam guide;



8. Removal of the the shell ← More critical point
9. Installation of LET detector;

Insertion of the 1st part of beam guide;



PREVIOUS INSTALLATION

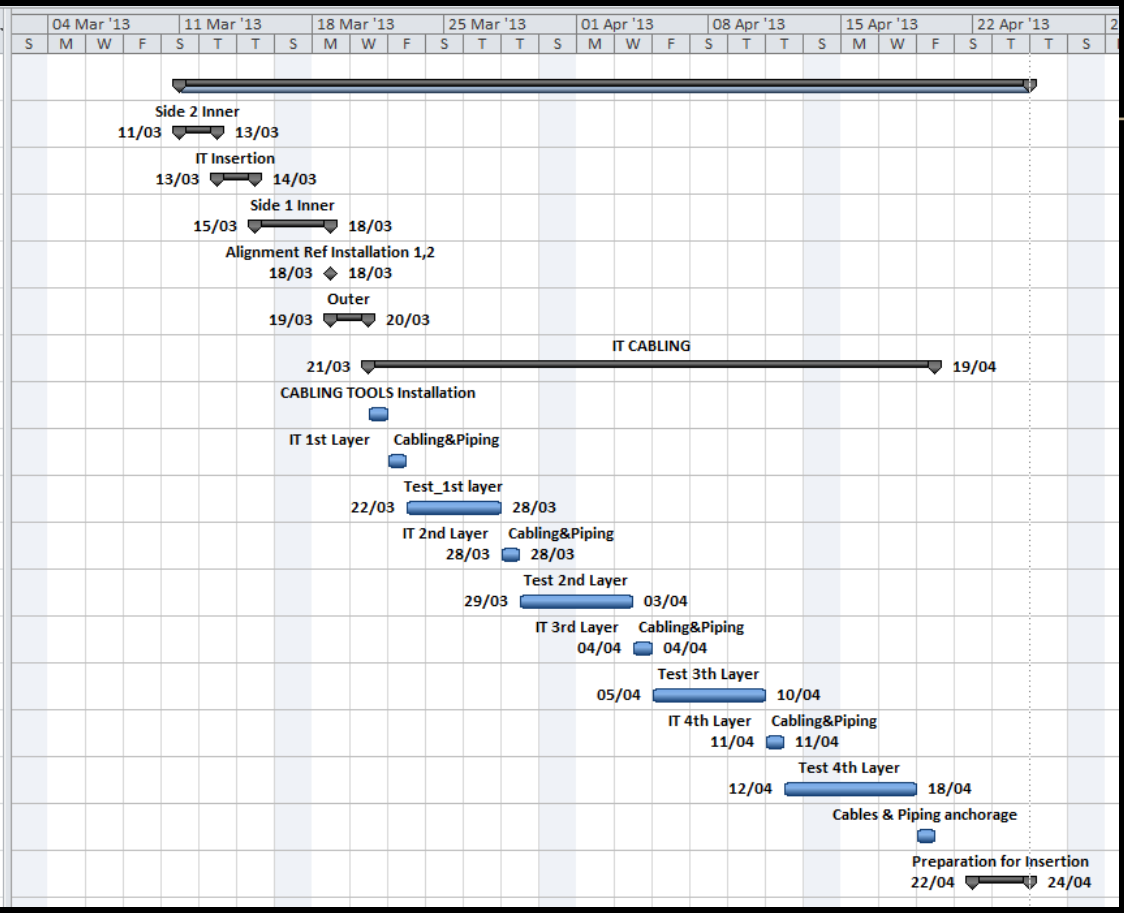
Insertion of the beam guide in the Kloe DC;

Shell installation and transport BP on rails;

Traslation of the BP to the nominal position;

KLOE-2 INTEGRATION GANTT

	Tas Mo	Task Name	Duration	Start	Finish
1		**Integration**	**33 days**	**Mon 11/03/13**	**Wed 24/04/13**
2		**Side 2 Inner**	**2 days**	**Mon 11/03/13**	**Wed 13/03/13**
12		**IT Insertion**	**2 days**	**Wed 13/03/13**	**Thu 14/03/13**
17		**Side 1 Inner**	**2 days**	**Fri 15/03/13**	**Mon 18/03/13**
27		Alignment Ref Installation 1,2	0 days	Mon 18/03/13	Mon 18/03/13
28		**Outer**	**2 days**	**Tue 19/03/13**	**Wed 20/03/13**
34		**IT CABLING**	**22 days**	**Thu 21/03/13**	**Fri 19/04/13**
35		CABLING TOOLS Installation	1 day	Thu 21/03/13	Thu 21/03/13
36		IT 1st Layer Cabling&Piping	1 day	Fri 22/03/13	Fri 22/03/13
37		Test_1st layer	4 days	Fri 22/03/13	Thu 28/03/13
38		IT 2nd Layer Cabling&Piping	1 day	Thu 28/03/13	Thu 28/03/13
39		Test 2nd Layer	4 days	Fri 29/03/13	Wed 03/04/13
40		IT 3rd Layer Cabling&Piping	1 day	Thu 04/04/13	Thu 04/04/13
41		Test 3th Layer	4 days	Fri 05/04/13	Wed 10/04/13
42		IT 4th Layer Cabling&Piping	1 day	Thu 11/04/13	Thu 11/04/13
43		Test 4th Layer	5 days	Fri 12/04/13	Thu 18/04/13
44		Cables & Piping anchorage	1 day	Fri 19/04/13	Fri 19/04/13
45		**Preparation for Insertion**	**3 days**	**Mon 22/04/13**	**Wed 24/04/13**



In total 33 working days (1,5 months) necessary for integration activity.
22 days devoted to the cabling and test of the IT detector.

ACTIVITIES IN PROGRESS FOR INTEGRATION TASK

1. Detectors Installation on Beam Pipe
   - Assembly of IT Insertion Tool
   - Assembly of QCALT Insertion Tool

2. Cabling & Piping of the detectors
   - Air Cooling Piping
   - Liquid Cooling Piping
   - Complete Cable Strategy Study on critical zones
   - Completion of Mockup on critical zones
   - CCALT Connectors holders
   - Cable Box

3. Beam Pipe insertion in Kloe
   - Check of insertion system
   - Sensor for the shell removal (under discussion with DA)

Conclusions

- Plans for Kloe integration almost ready;
- Mockup for cabling and cooling systems done;
- Critical points related to the interference with Dafne under study:
  - Cabling in the beam pipe support region;
  - Insertion inside Kloe;

A lot of work in front of us for the next months in cooperation with AD experts!