



MAX-PLANCK-GESELLSCHAFT



# *Status of IBBelle*

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4<sup>th</sup> Belle II PXD/SVD Workshop  
DESY, 21<sup>st</sup> October 2013



# MARCO @ DESY

CERN



July 2013

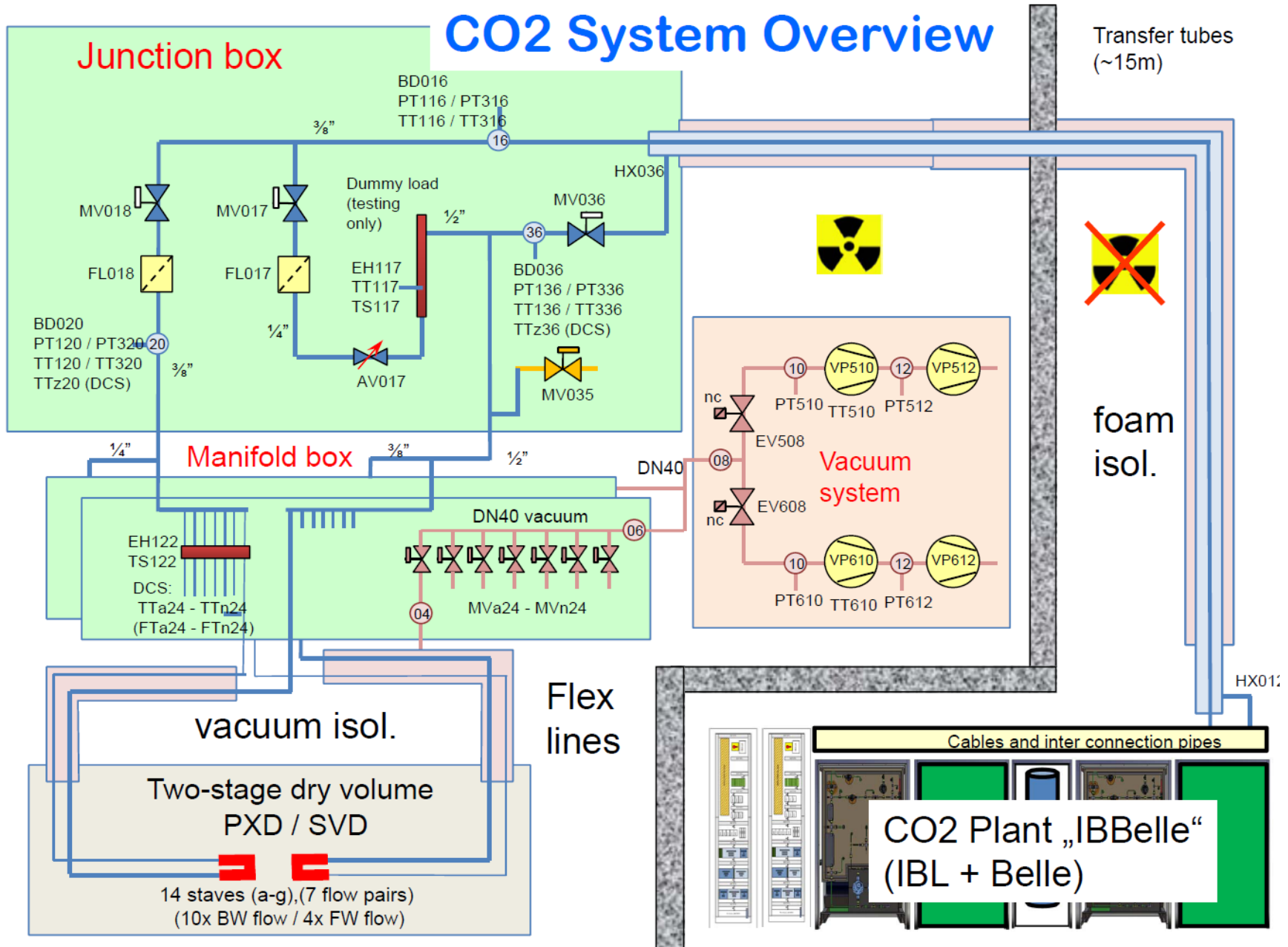
DESY



- MARCO commissioning at CERN completed
- MARCO is now at DESY. It will be used for the telescope test next January

# CO2 Cooling

## CO2 System Overview



# IBBelle

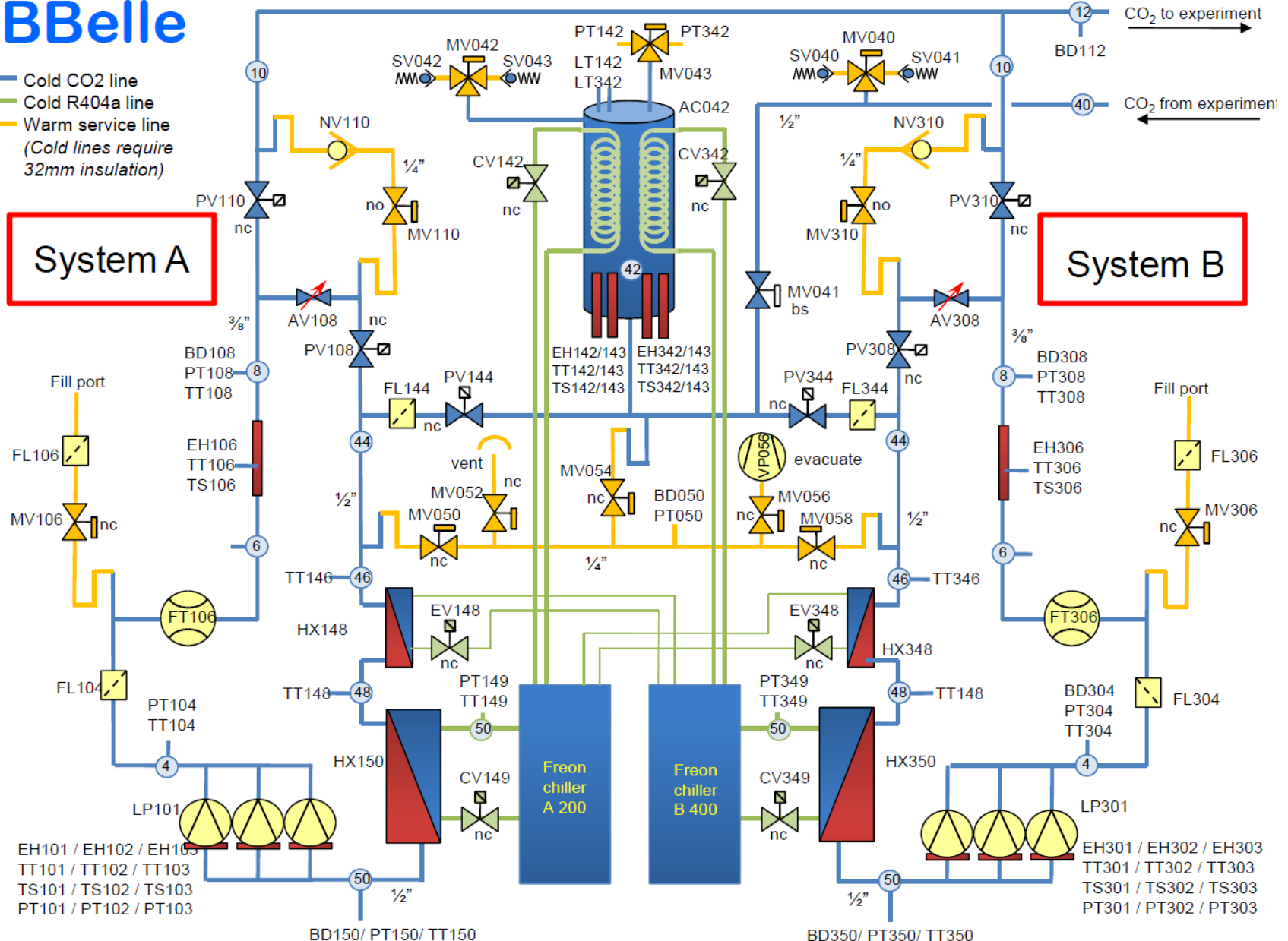
IBBelle is a common project of ATLAS IBL and Belle II VXD crews

## IBBelle

- Cold CO2 line
- Cold R404a line
- Warm service line  
(Cold lines require 32mm insulation)

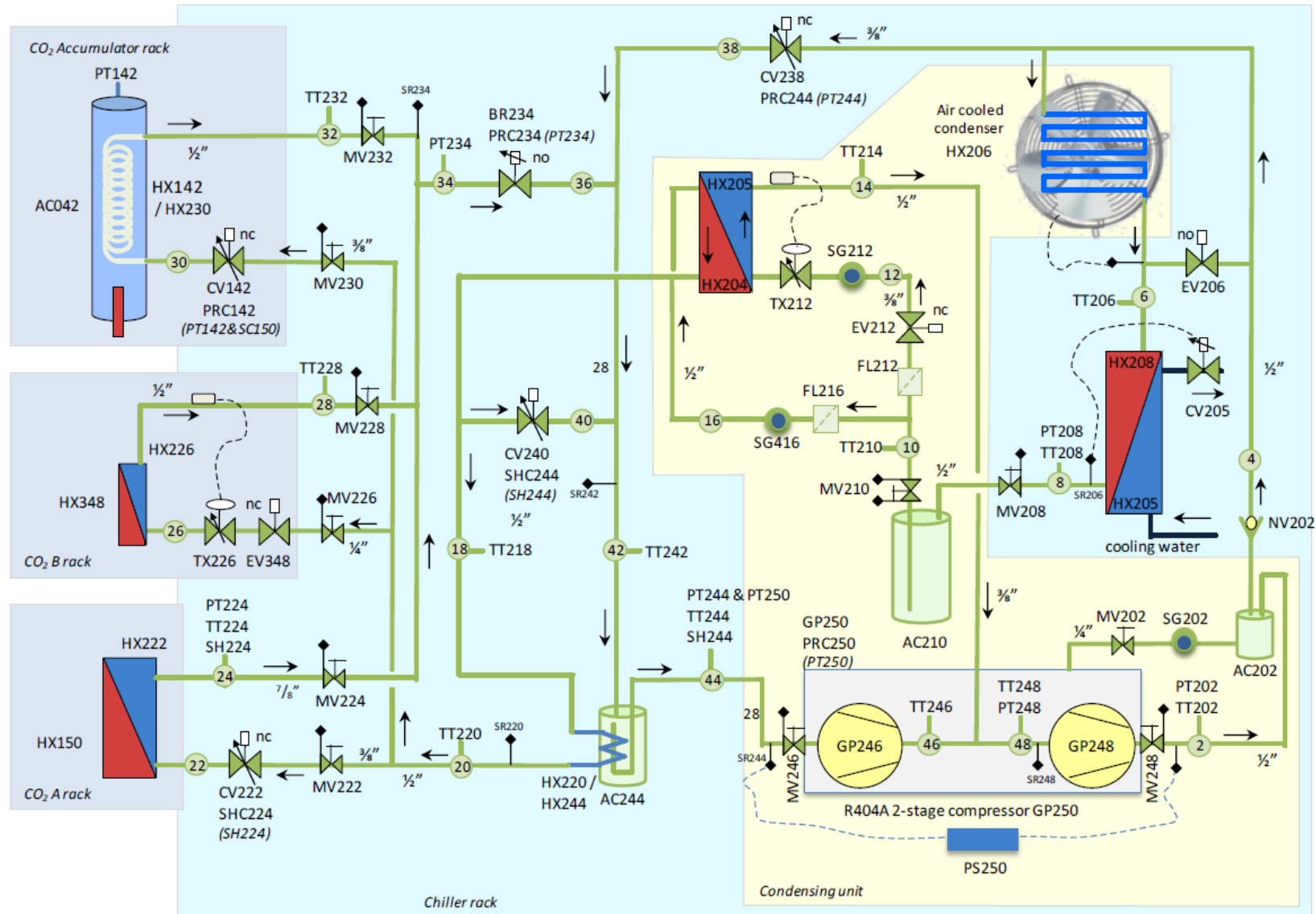
System A

System B



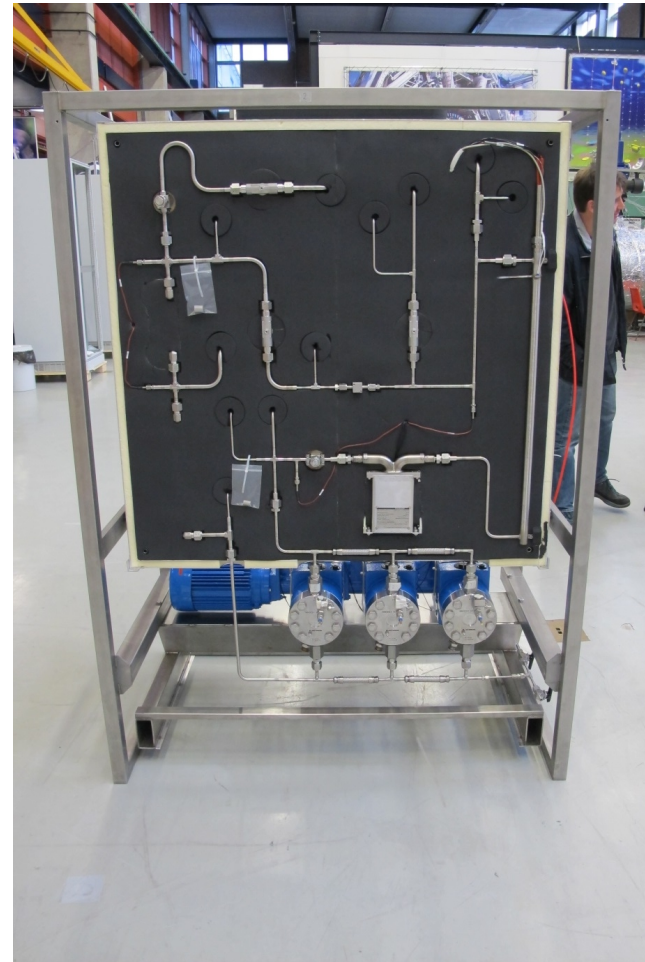
# Freon chiller unit

Chillers (two-stage) were ordered, to be delivered to CERN in December 2013

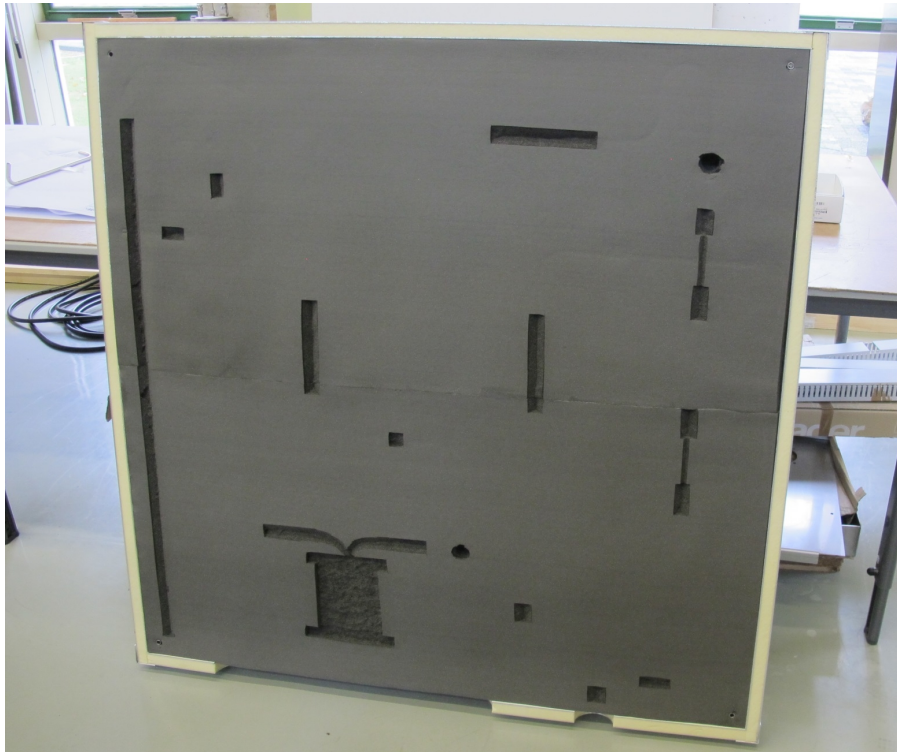


# IBBelle cooler unit

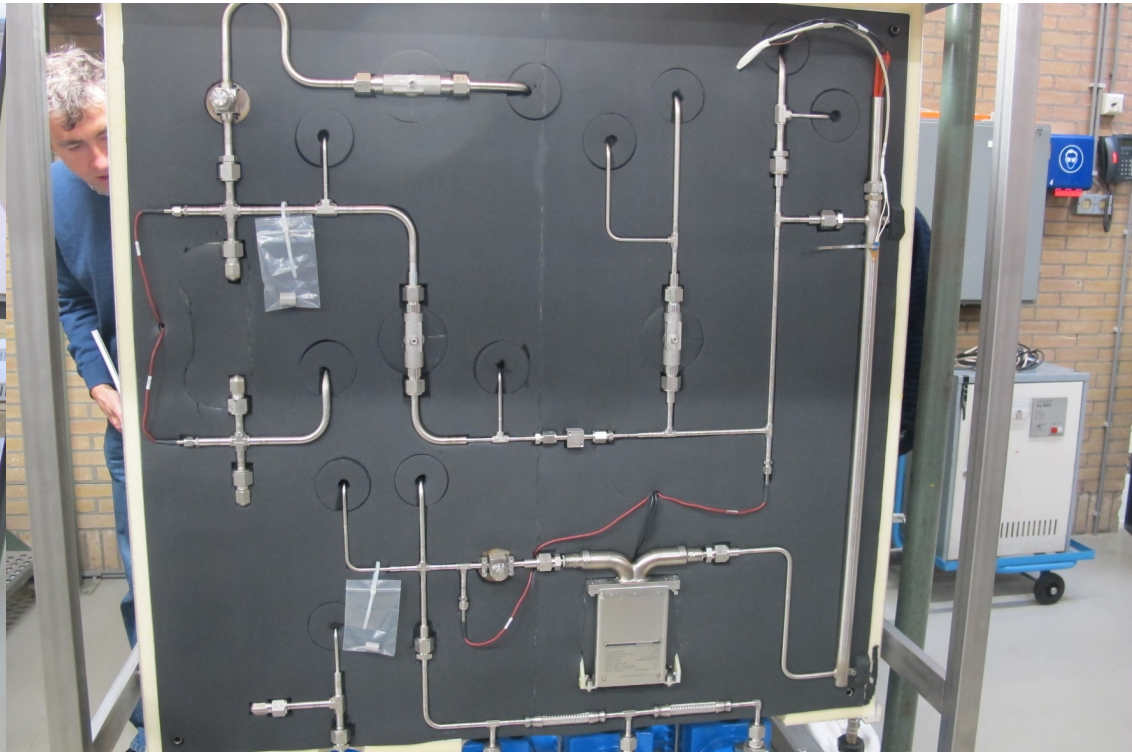
- NIKEF has already built and delivered the first IBBelle cooler Unit to CERN
- The second one is about to be delivered (pictures taken at NIKHEF)



# Piping in planar construction

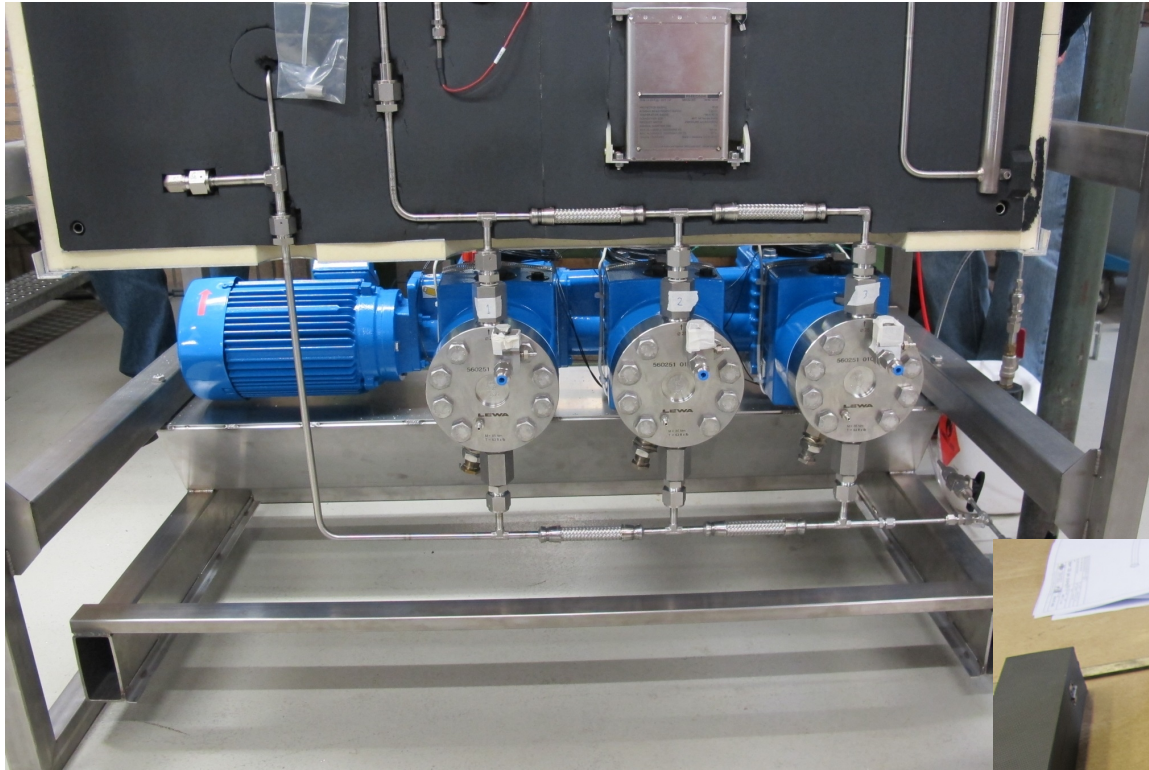


Foam cover



Pipes with foam insulation

# IBBelle CO2 unit: pumps



3 LEWA Membrane Pumps,  
in 120° phase



Foam Isolation for the LEWA Pumps



# Accumulator unit and certification



CE certification

Accumulator unit in preparation

# Slow control

Electronic cabinets: Schneider PLC, being programmed by CERN crew

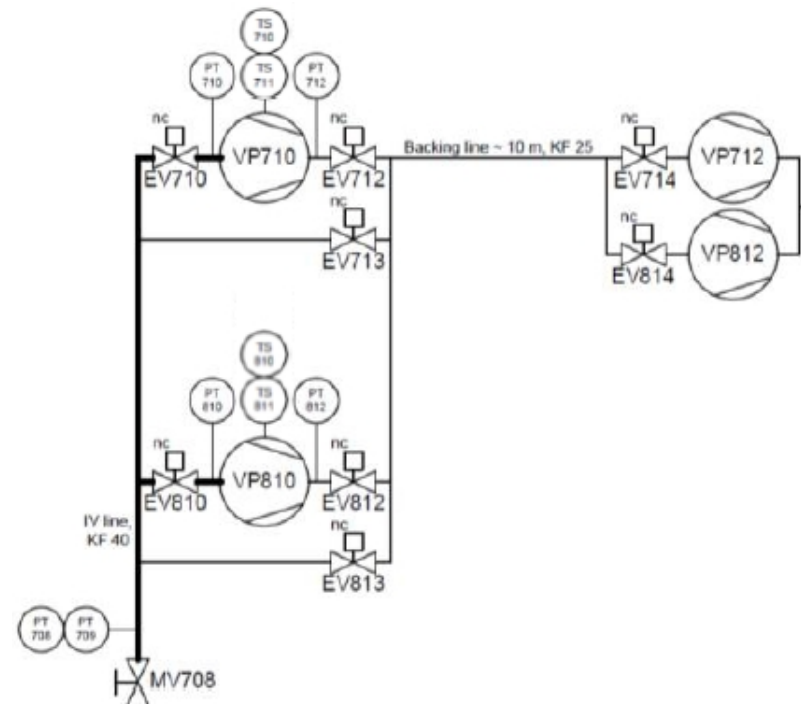
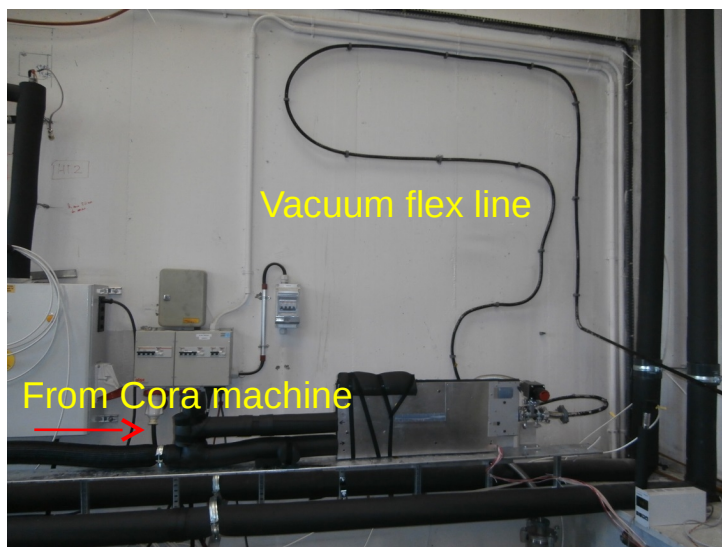
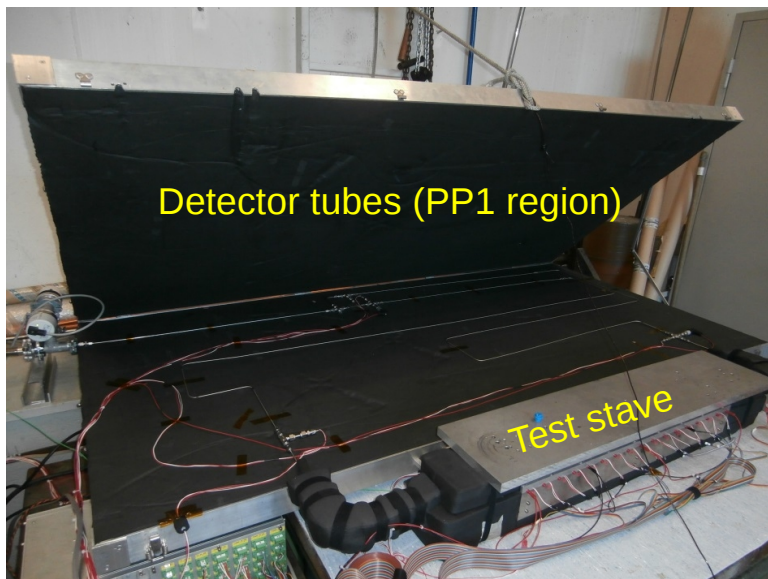
- CERN uses UNICOS + PVSS
- EPICS will be used for the Belle version

Operation and control:

- **Operation mode**
  - Normal operation state
  - Automatic start procedure
- **Stand-by mode**
  - It occurs when the other unit is in operation mode
  - Full liquid circulation
- **Bake-out mode**
  - Only if beam-pipe back-out is present
  - CO2 overflow (units A+B)
- **Maintenance mode**
  - The system is completely stopped.
  - Components can be switched on only manually by experts.
- **Operation**
  - The cooling system can only be started and stopped by trained people being part of the engineering team or the services team.
  - Limited control actions allowed from DCS: change of accumulator temperature set-point and demand a swap to the standby system in case of warnings.

# Transfer lines

- Transfer lines have been successfully tested at CERN
- IB Belle to Junction Box: isolated by permanent-vacuum
- Flexlines from Manifold Box to detector: vacuum by pumping



- The vacuum system is fully redundant and has 2 pump levels for low and high pressure.
- The vacuum manifold is integrated in the CO2 cooling manifold

# Cost overview

## IBBelle

accumulator	27030.0
chillers	51312.0
flow meters	28615.0
frames	15618.0
heaters	3271.0
insulation	4323.0
pumps	53054.0
sensors	24264.0
<u>Swagelok</u>	40265.0
valves	30588.0
<u>miscalaneous</u>	17044.8
	=====
Total	295384.8
electronics (from Nigel)	120000.0

## Minimum set of electronic for starting EPICS development

CPU unit	4208.11
CPU memory card	1276.08
PLC Power Supply	491.31
PLC Communication card	1000
PLC rail	330.83
Industrial Ethernet switch	844.42
	=====
	8150.75

## Other components

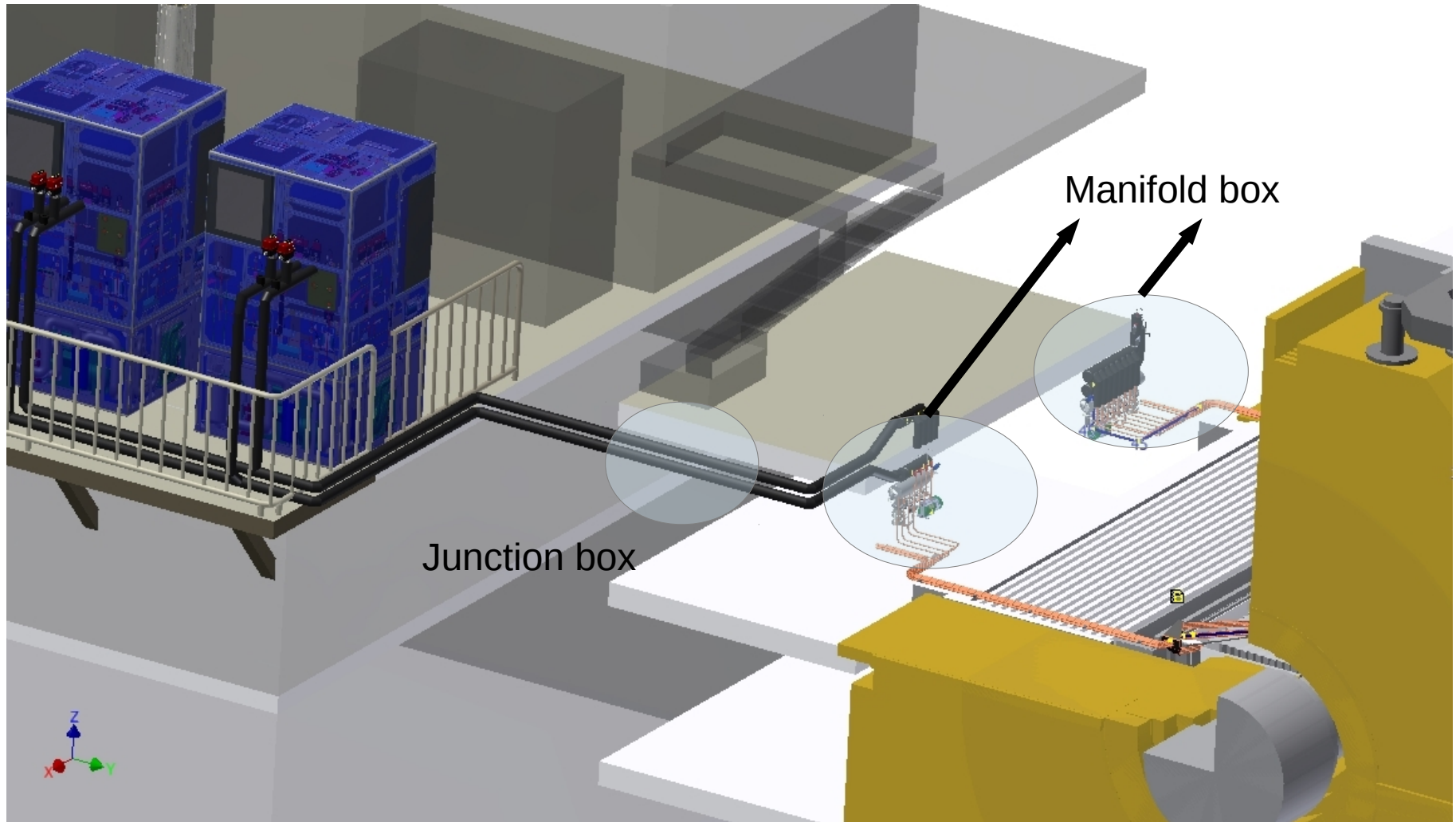
junction box
manifold
transfer line
Flex-lines (24 x 15m)
vacuum pumps (flex)

# Status and outlook

- Design of IBelle is completed, 3D model up-to-date, updated production drawings to be delivered (to MPI) by end of the week.
- NIKEF has already built and delivered the first IBelle cooler Unit to CERN
  - The second one is about to be delivered.
- Accumulator Unit is being prepared.
- Chillers (two-stage) are ordered, to be delivered to CERN in December 2013.
- Junction Box and Manifold design completed (at MPI), under construction, to be delivered to CERN by the end of the year.
- Transfer lines have been successfully tested at CERN.
  - IBelle to Junction Box: isolated by permanent-vacuum (new)
  - Flexlines from Manifold Box to detector: vacuum by pumping
- Electronic cabinets: Schneider PLC, being programmed by CERN crew
  
- Assembly and commissioning in Jan . 2014 – March 2014
- Training for Operation crew in April 2014 (KEK cryo-group should get involved at this point).
- Ordering parts for VXD cooling system still this year
- Start construction of VXD cooling system at MPI: spring 2014
- construction time about 3 months, commissioning in the fall of 2014

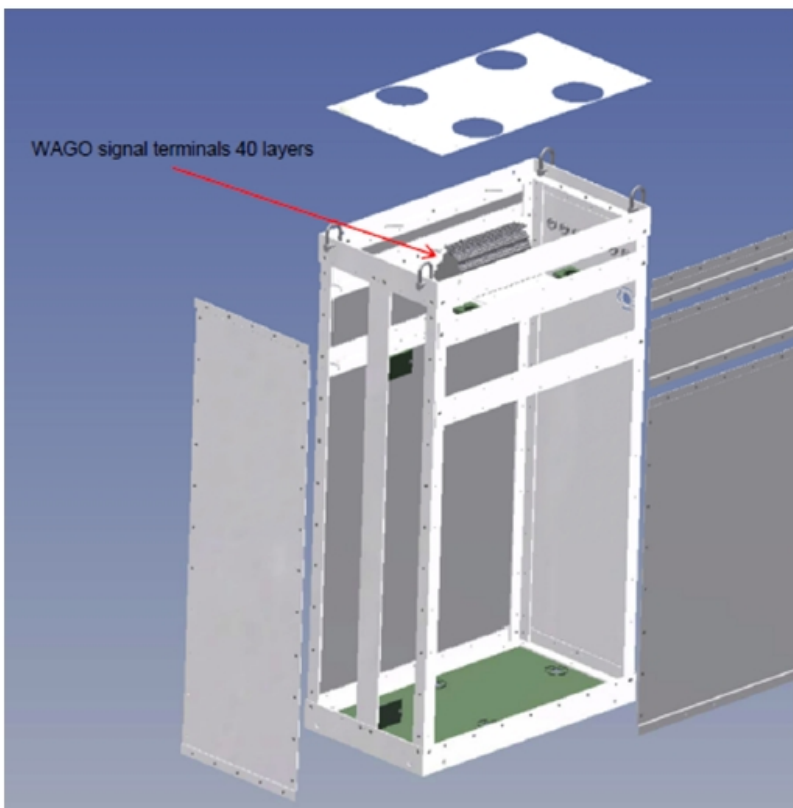
Backup slides

# Location



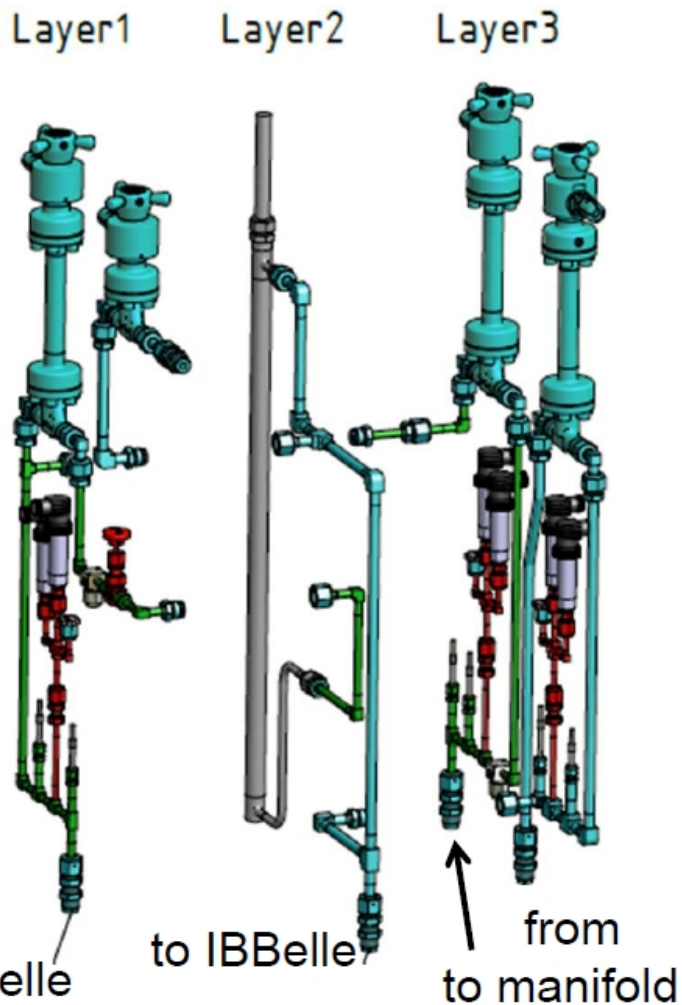
Karlheinz Ackermann

# Junction box

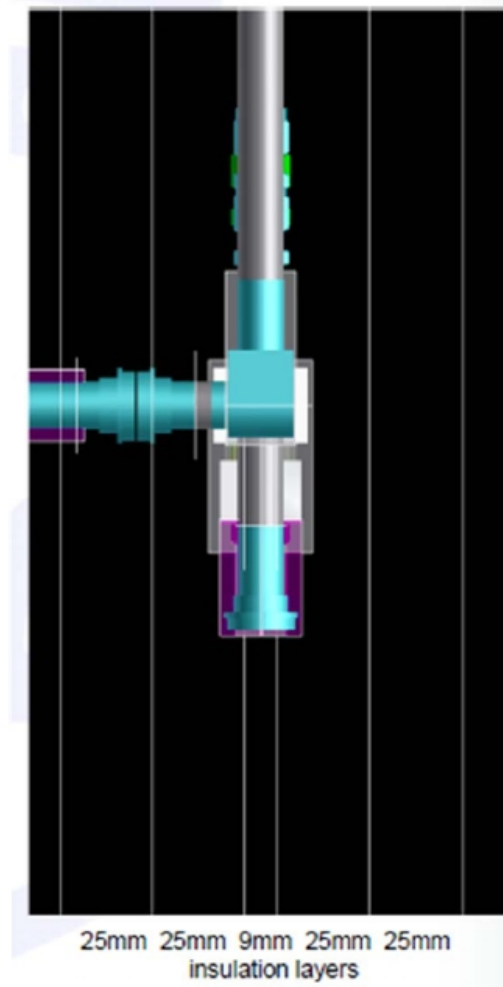


housing

dimensions of junct. box:  
1060 x 625 x 345 mm



„2-D“ arrangement  
In 3 layers



foam insulation  
between layers

design by MPI

Luigi Li Gioi



# Manifold box

