

# CO<sub>2</sub> Cooling of PXD Endflange: First results from Karlsruhe

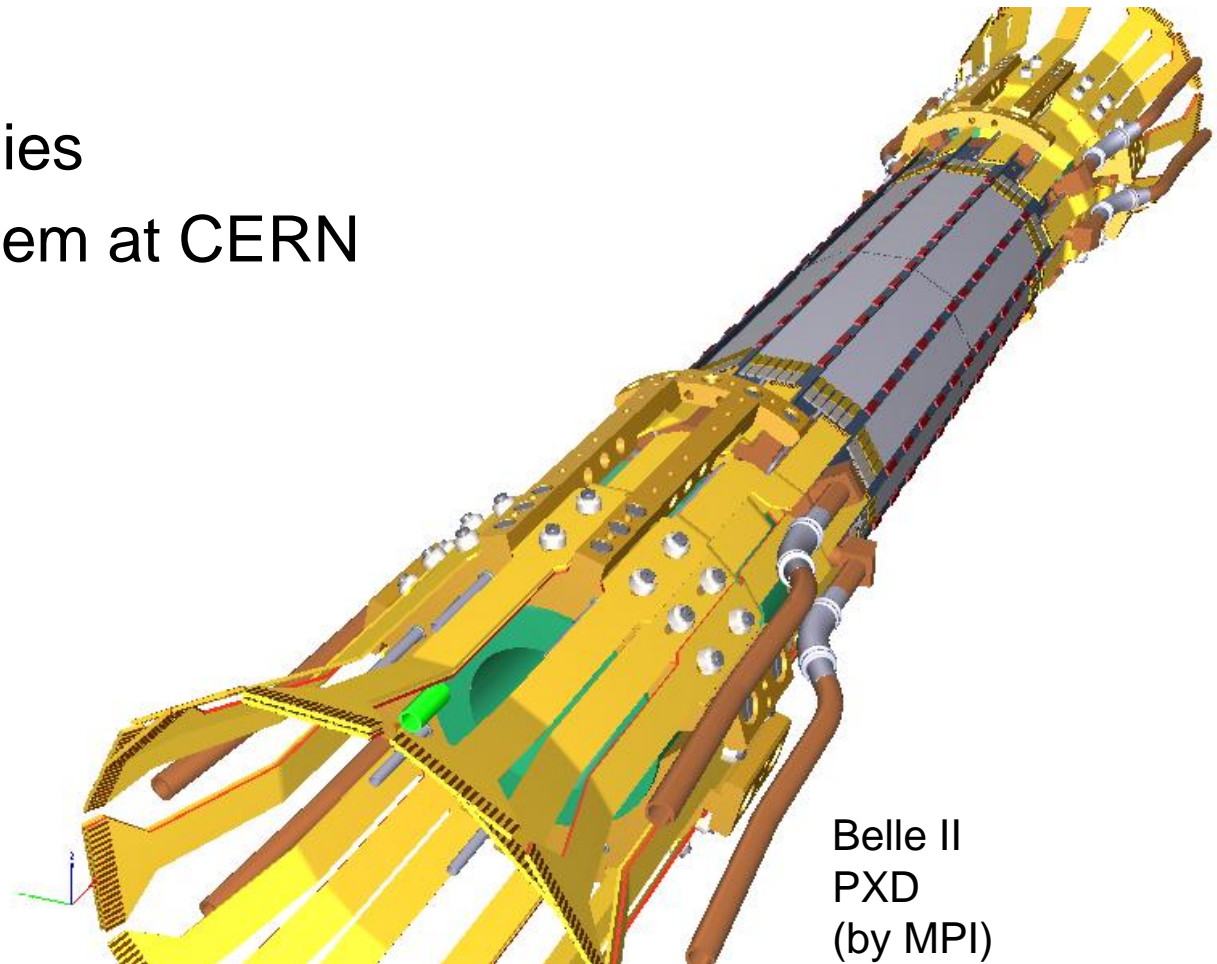
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Belle II PXD EVO, 30.11.2010

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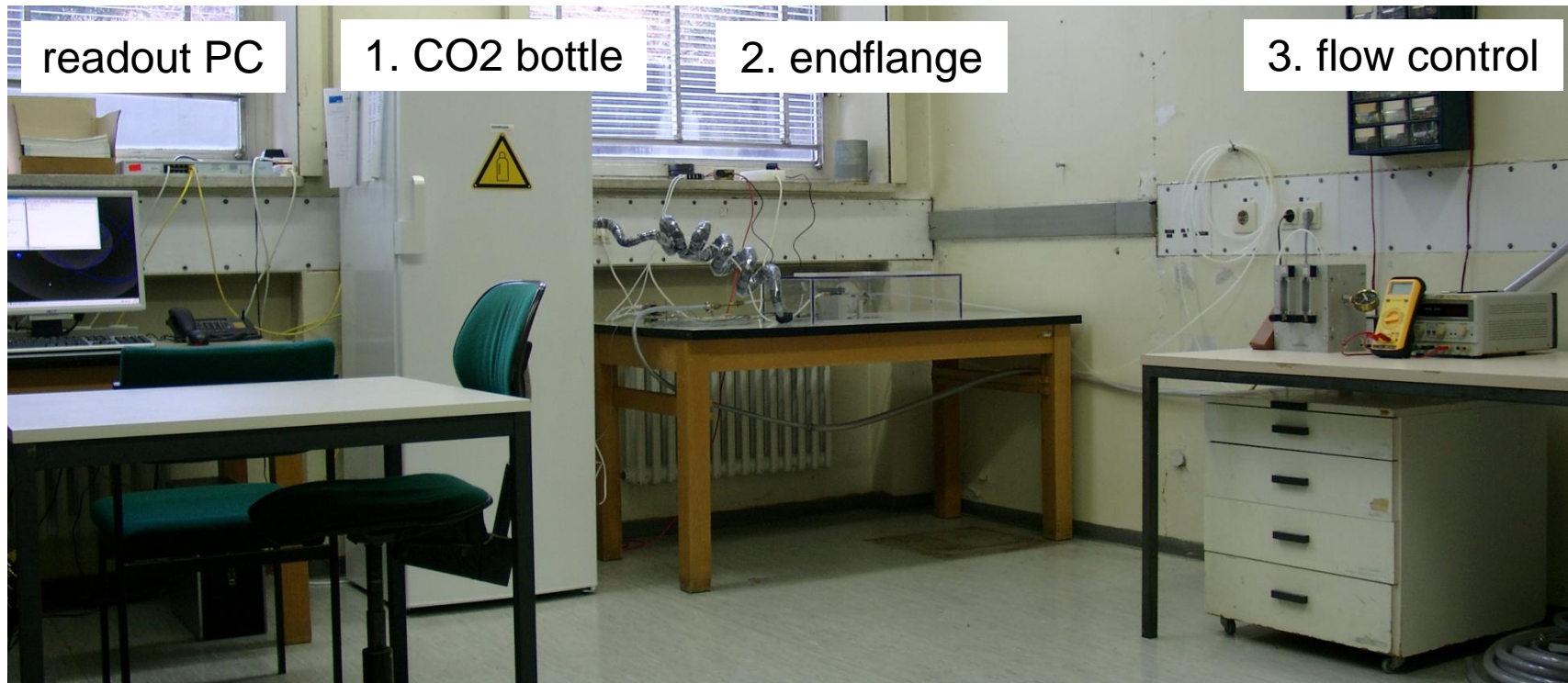
# Overview

1. Open CO<sub>2</sub> system in Karlsruhe
2. First results
3. Heat load dummies
4. Closed CO<sub>2</sub> system at CERN
5. Timeline
6. Summary



# 1. Open CO<sub>2</sub> system in Karlsruhe

- Built for CMS Tracker Upgrade
- Now used for Belle II PXD cooling tests
- Manual operation → limited runtime

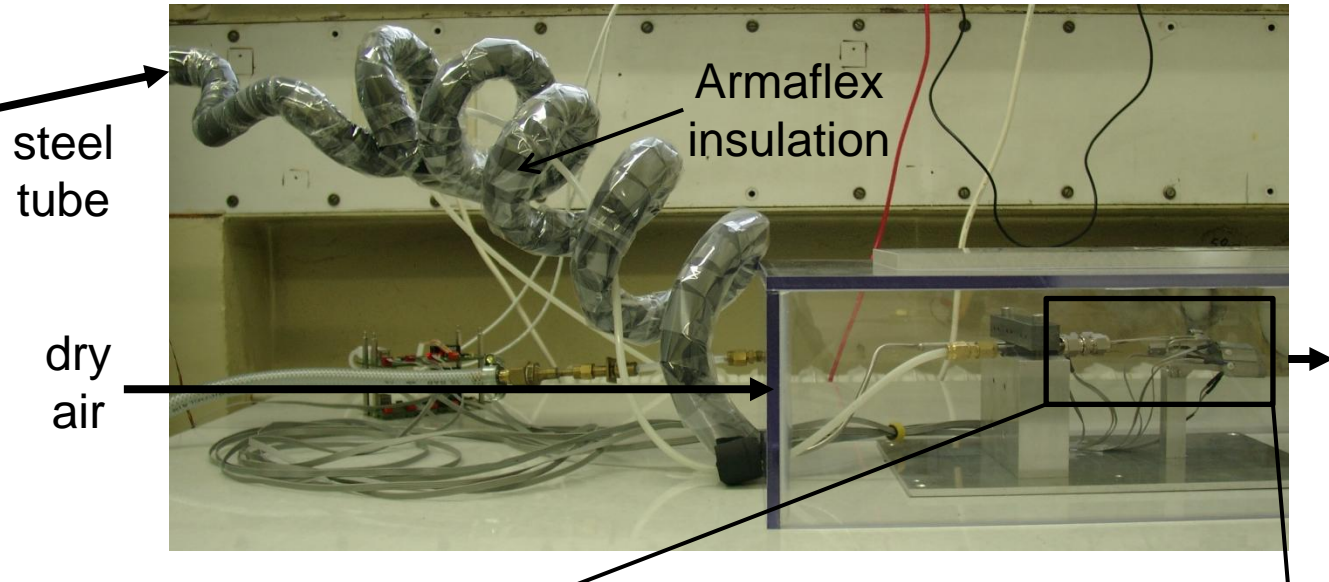


# 1. Open CO<sub>2</sub> system in Karlsruhe

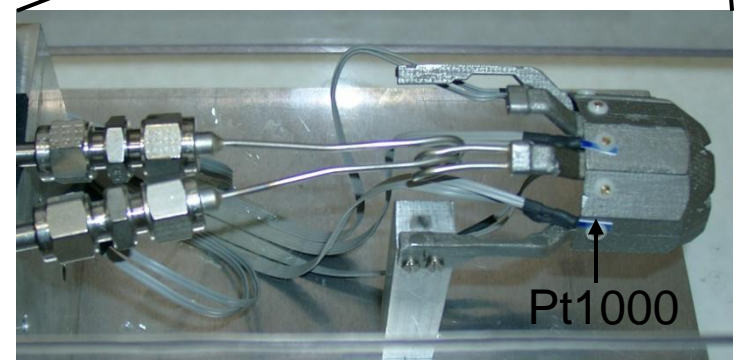
## ■ components of the system:



1. CO<sub>2</sub> bottle with pressure regulator pre-cooled to -32°C (saves CO<sub>2</sub>)



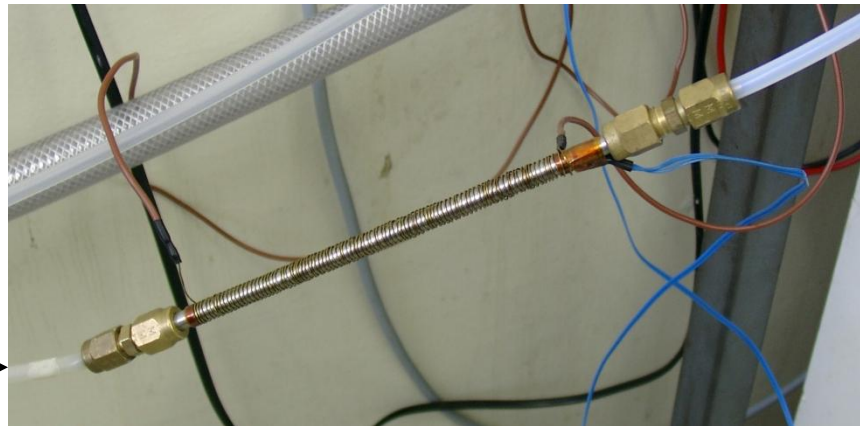
2. endflange prototype in air-flushed box to prevent condensation, Pt1000 for temperature readout



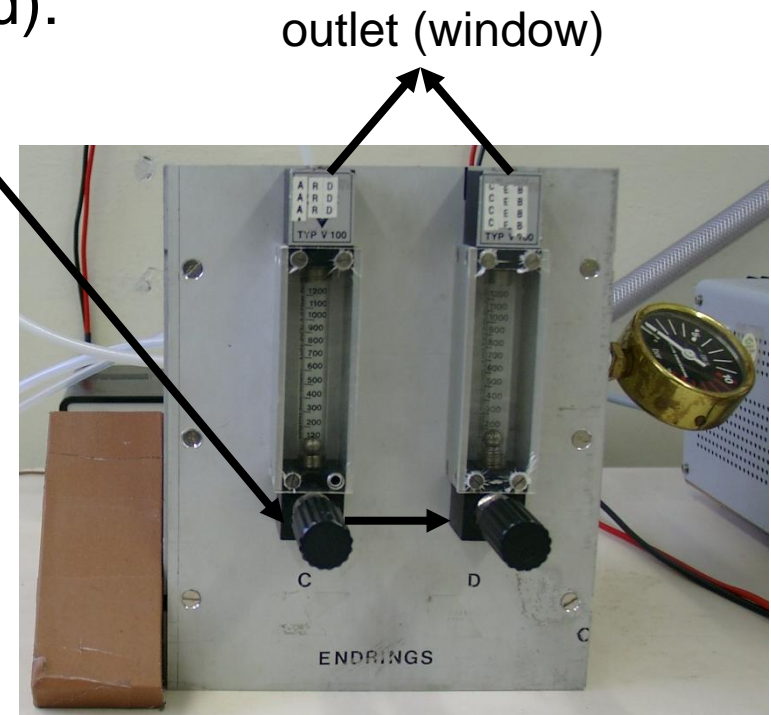


# 1. Open CO<sub>2</sub> system in Karlsruhe

## ■ components of the system (cont'd):



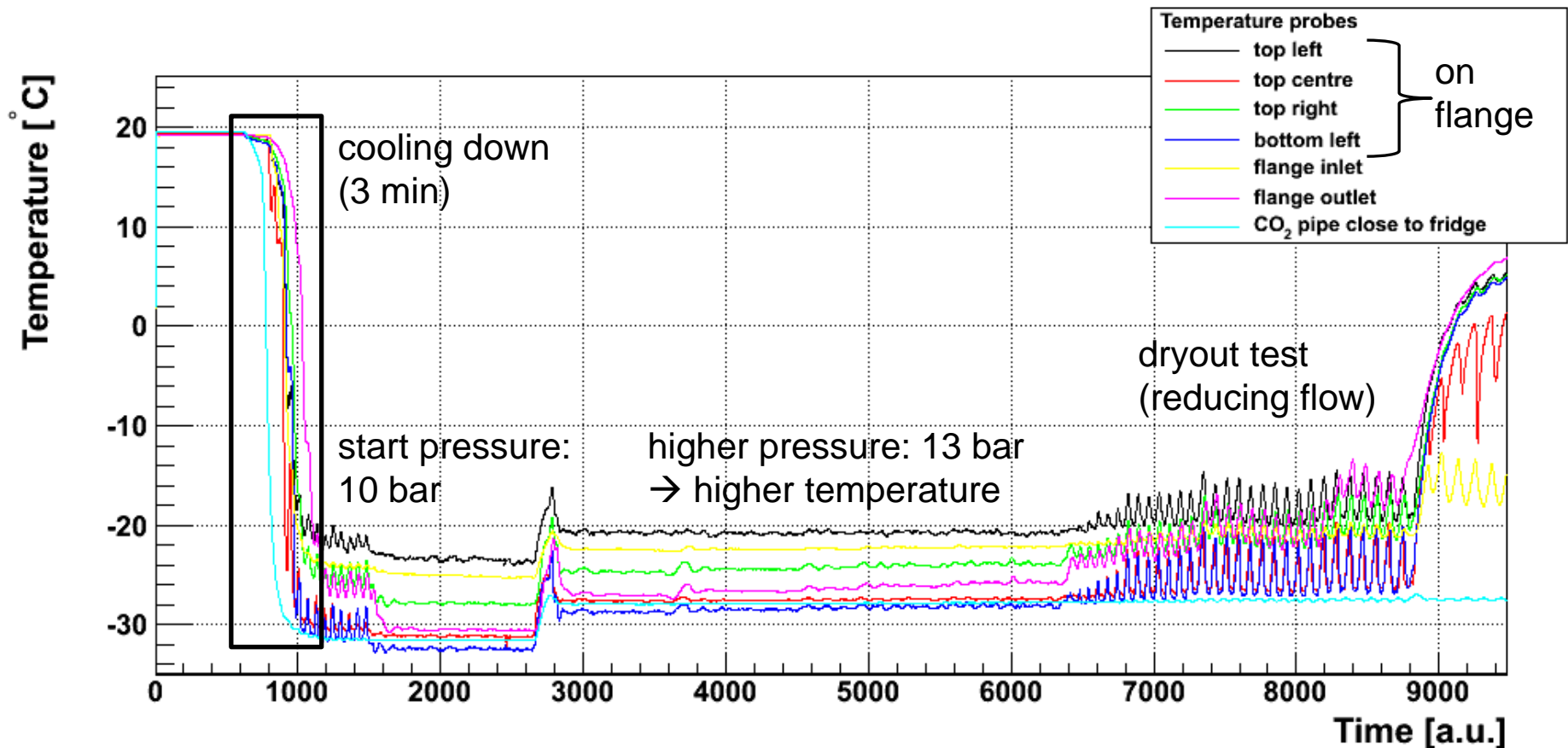
3. electric heater (temp. controlled) to prevent liquid CO<sub>2</sub> from reaching the gas flow meters



3. gas flow meters (combined) and pressure gauge for controlling operating values

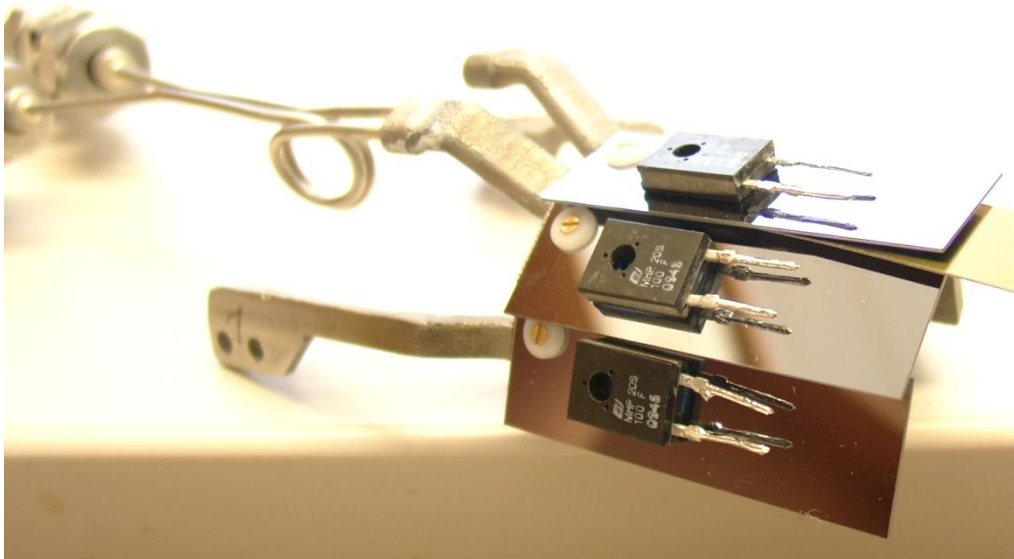
## 2. First results

- preliminary: no heat load attached to endflange!
- system is working as expected (max. pressure: 15 bar)

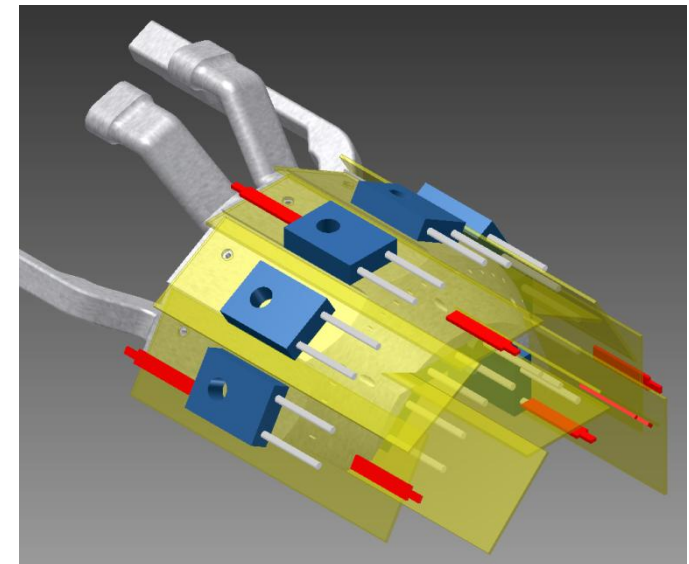


### 3. Heat load dummies

- small silicon pieces made by HLL (length: 46 mm)
- one resistor per piece (max. power: 20 W)
- screwed to flange
- Pt1000 for temperature monitoring



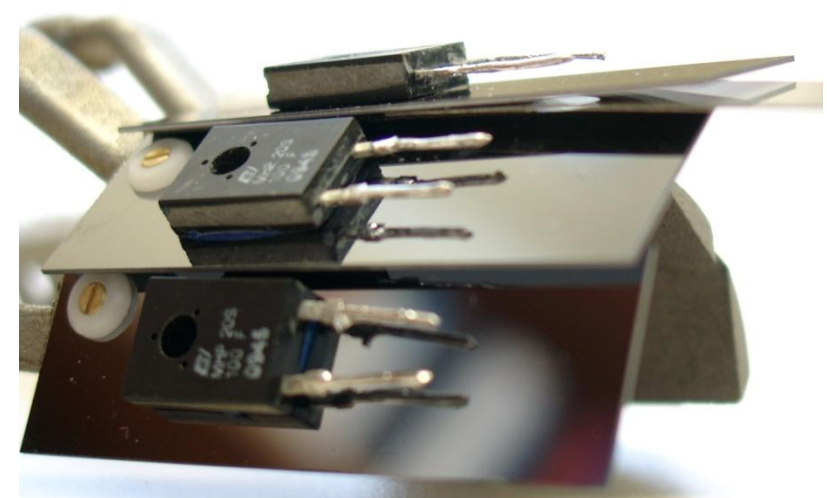
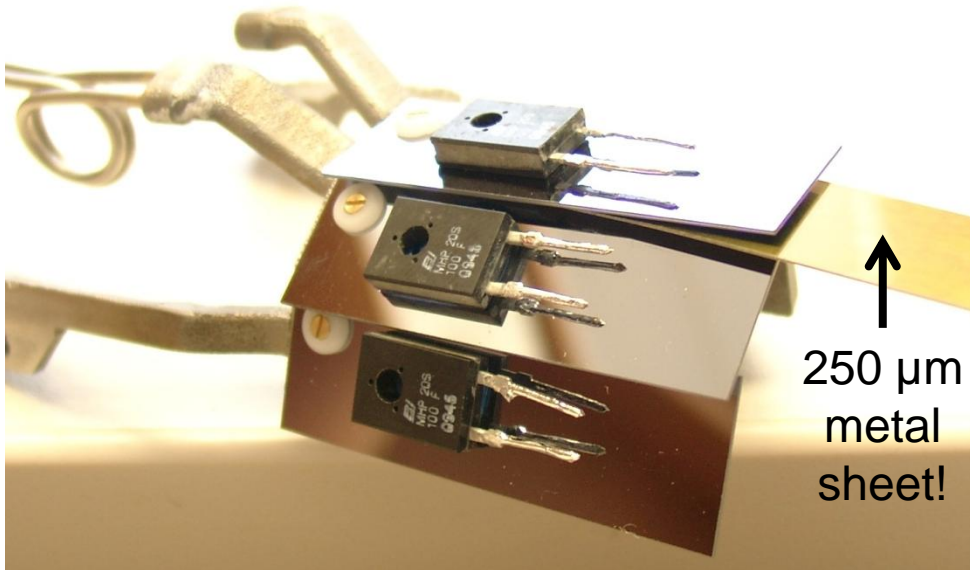
first dummies on flange to check positioning



drawing of the fully equipped flange (Pt1000 shown in red)

### 3. Heat load dummies

- problems during check:  
surface of flange not only rough, but also **not flat!**
- opening too large to fill with heat transfer compound



- solution: polish surfaces by hand  
→ good results so far

screw

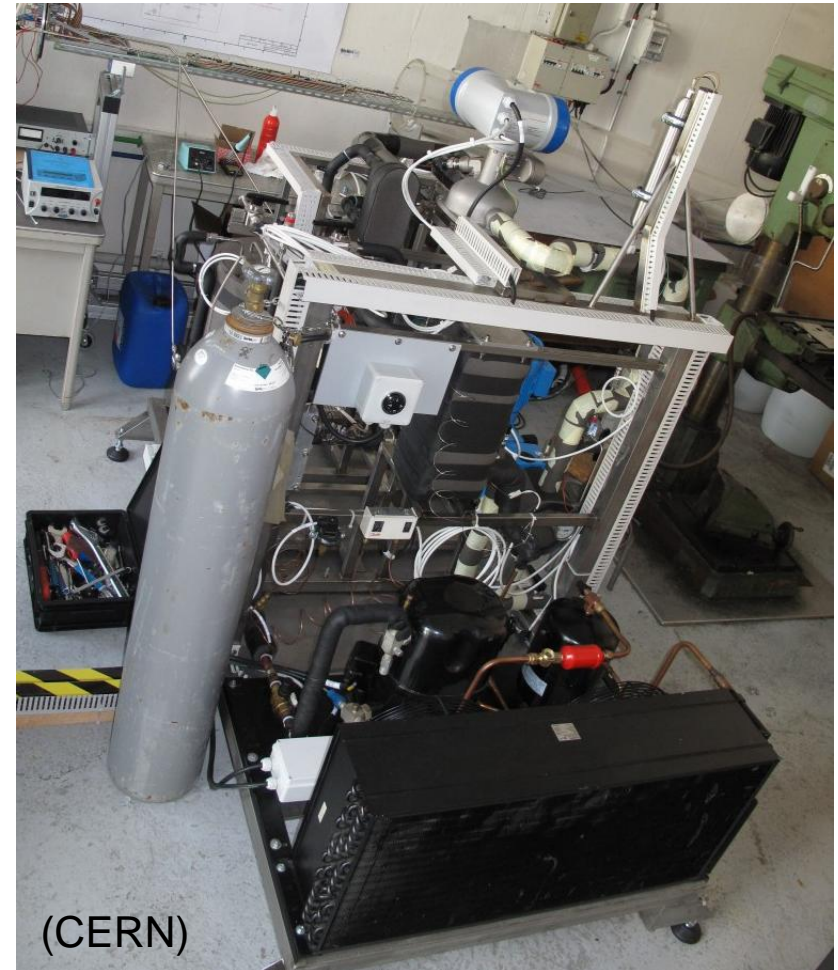
silicon dummy

flange surface



## 4. Closed CO<sub>2</sub> system at CERN

- Closed CO<sub>2</sub> system built by the group of Hans Postema, also for CMS Upgrade testing
- Finished in July 2010
- Available to IEKP Karlsruhe for tests
  
- Similar system supposed to be used for cooling of Belle II PXD and SVD



## 5. Timeline

- Open CO<sub>2</sub> system:
  - polish surfaces of flange
  - new measurements with heat load
  - final results available in January
  
- CO<sub>2</sub> cooling meeting in Karlsruhe:
  - define next steps and work-sharing
  
- Closed CO<sub>2</sub> system:
  - visit CERN in February 2011
  - try to cool flange for a longer time
  - become familiar with closed system and its components

## 6. Summary

- CO<sub>2</sub> cooling tests of endflange prototypes have started
- First test results without load are promising
- Some problems with flange surfaces
- New measurements in the next weeks
  
- CO<sub>2</sub> cooling meeting (around next DEPFET meeting)
  
- Visit CERN in February to use closed system
- Similar system is foreseen to be used by Belle II PXD and SVD subdetectors

**Thank you...**