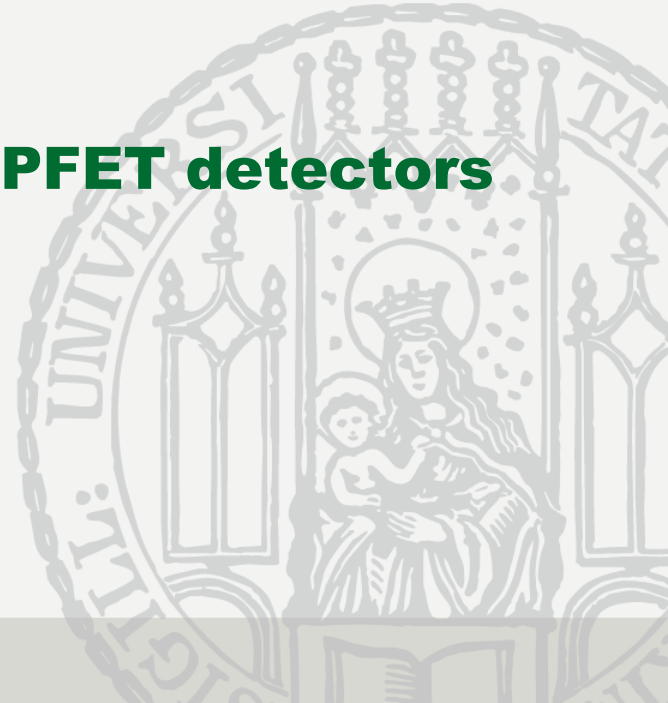
LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

LMU – Cluster Universe
Stefan Rummel, Andreas Seiler

PXD Services

7th International meeting on DEPFET detectors

6.02.11-9.02.11 Bonn



Outline

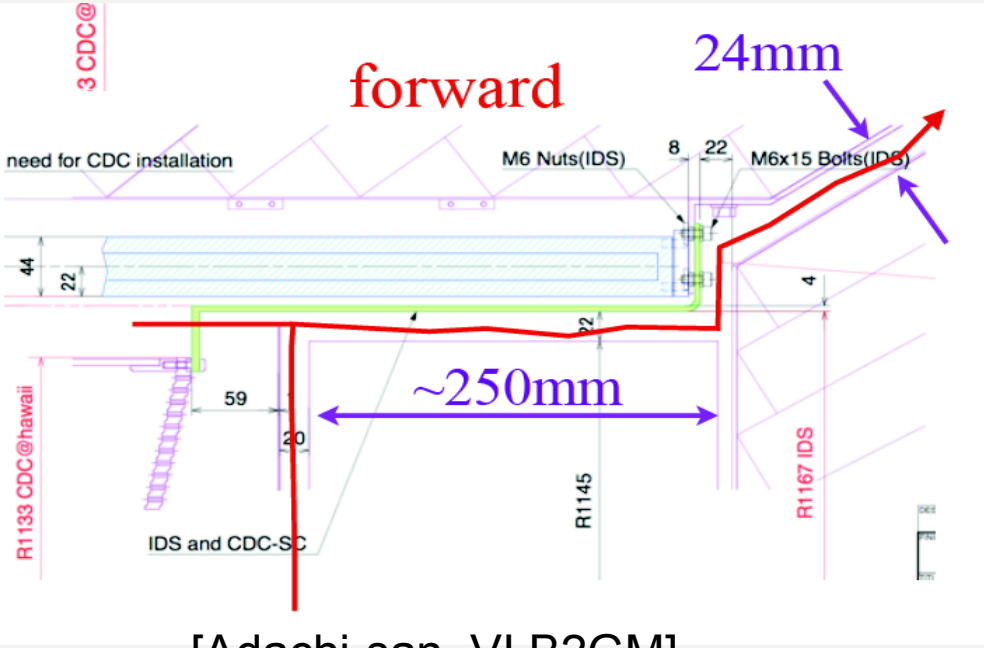
- Service space endcaps
- Update on power cables
- New SVD mounting concept – impact on PP location and service space
- PP & Flex design update

Service space – IP - required

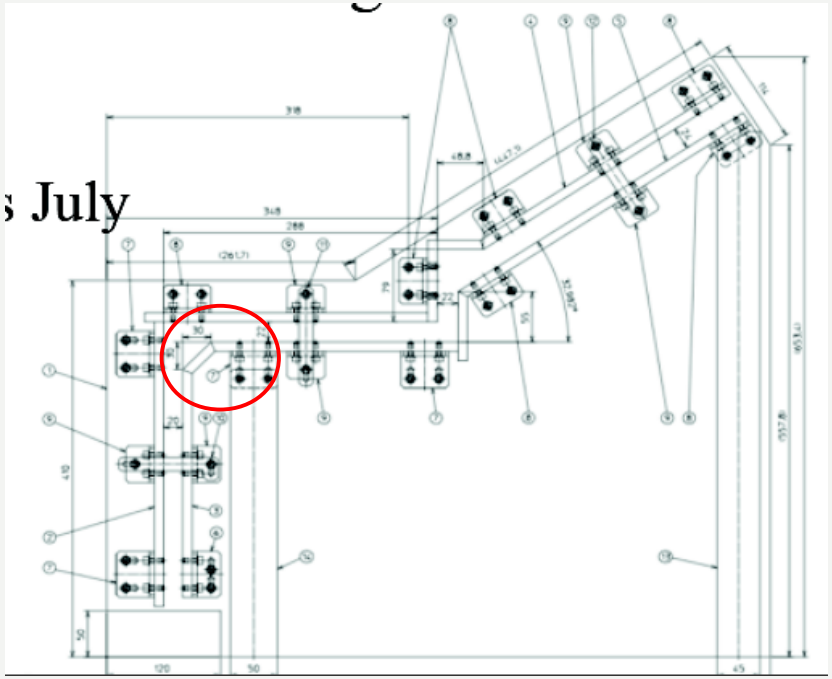
Per half side:

- Power
  - 50cm2
- Digital (CAT7 5.9mm diameter)
  - 4 cables each module
  - 21cm2
- Cooling (cold air 2 tubes, CO2 2 tubes)
  - Diameter 6mm ↔ 1.8mm and 2 per cooling block
  - + isolation
- Fibres for position monitor
  - ? few mm

Service space – End cap



[Adachi-san, VI B2GM]



- Critical region – forward between endcap and barrel
- Minimum channel width 20mm / 22mm
- 90 degree bend
- Relaxing the bend would ease cable development

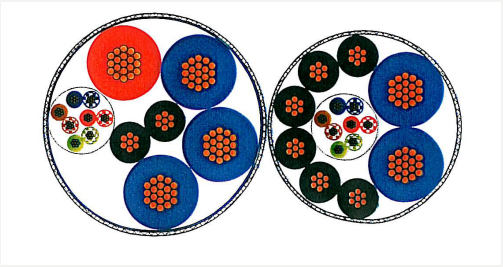
Power cables

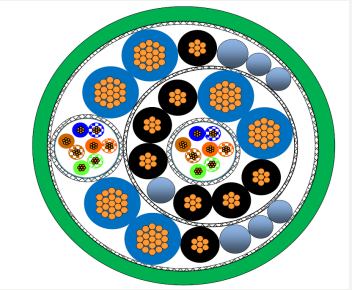
- Companies offered
  - ø 19.4 (22.5)mm
  - 2 cables – ø(11.2/13.3)mm

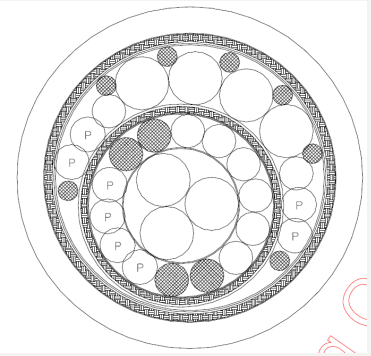
→ Single cable close to mechanical limit, bending radius = diameter

→ Dual-cable – recommended bending radius 5 fold diameter

- We will go into a second iteration looking into more flexible rectangular cross section, flexible isolator, thinner wires

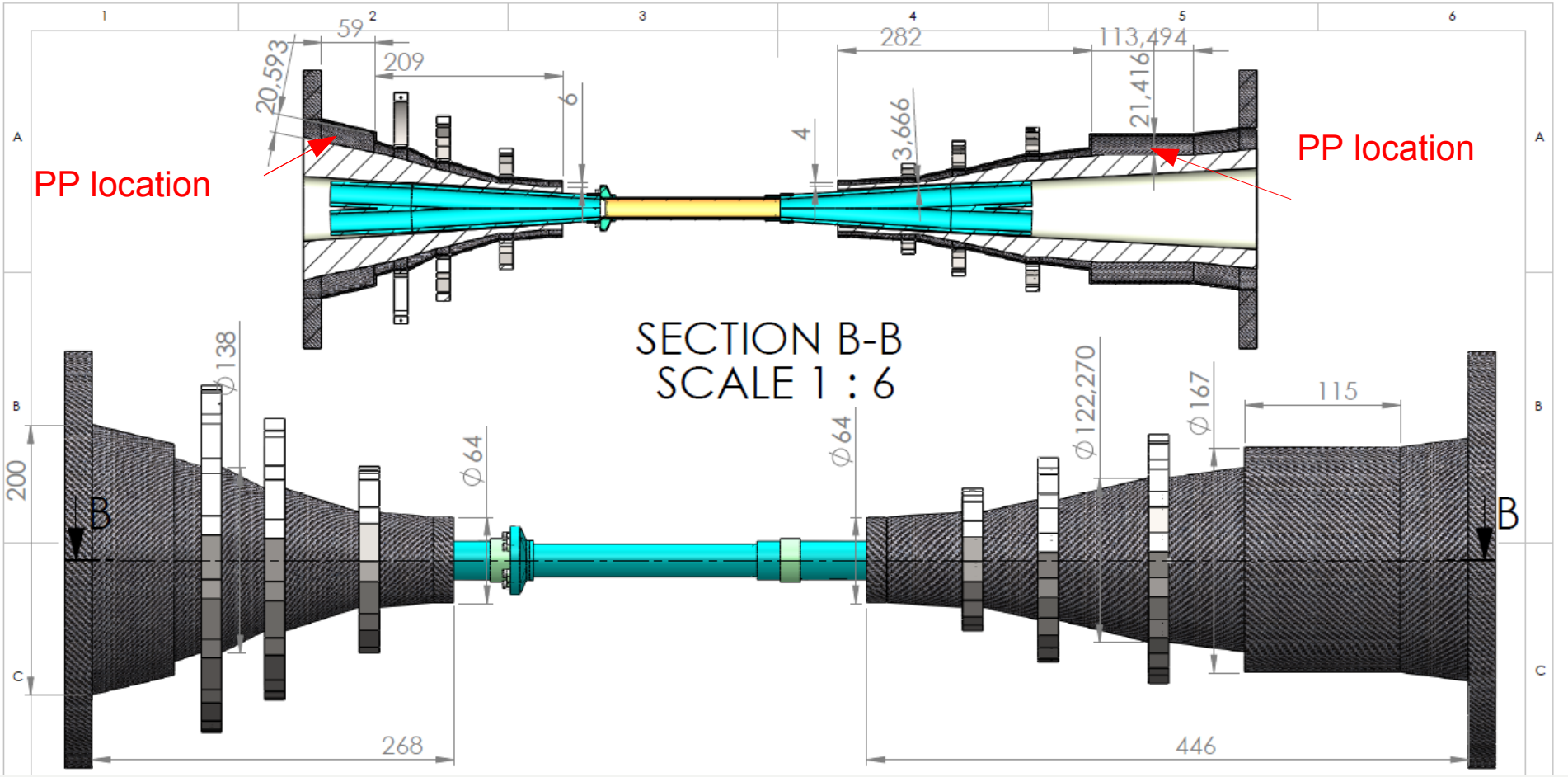






Inner detector

New SVD mounting concept



[Immanuel Gfall, Vienna]

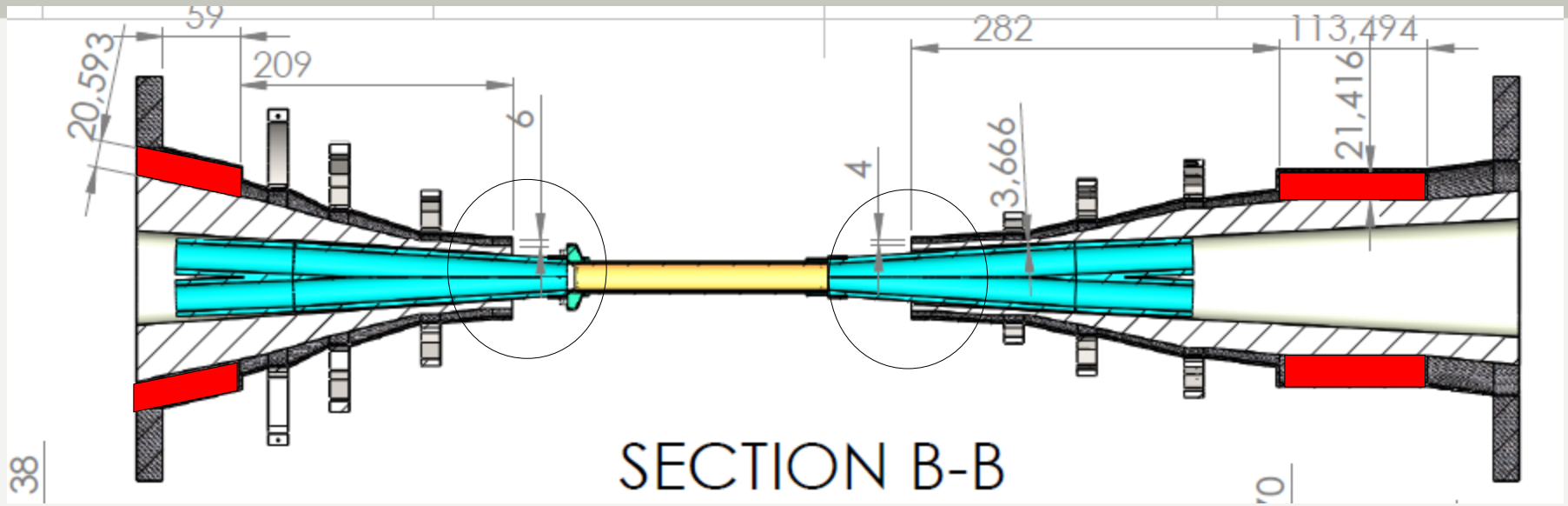
New SVD mounting concept

- Decouples the mounting structure from machine development (QCS shield dimensions)

- ✓ Well defined space for patch panel

- ✓Close to detector ~30cm to 35cm

Service space - IP



- Space for PP:
  - 110mm x 20mm @ R= 73 mm ~ 96cm2
  - 70mm x 21mm @ R= 90mm ~113cm2

- PP to detector
  - 6mm / 4mm @ R = 32mm → U ~ 200mm

Service space – IP - required

Per half side:

- Power (conservative assumption, old cable)
  - 50cm2
- Digital (CAT7 5.9mm diameter)
  - 4 cables each module
  - 21cm2
- Cooling (CO2 2 primary 6mm tubes, 4 capillary, 2 Air tubes)
  - Diameter 6mm / 1.8mm @ cooling block inlet
- Fibres for position monitor
  - ? few mm

Service routing

- Possible routes:
  1) **Between QCS and SVD mounting**
  2) Between QCS and beam pipe

Electrical services will evidently use (1), Fibres (1).

Cooling with 6mm tubes diameter excludes (1) in the current geometry → use either (2) or change carbon shell and/or QCS shield

→ Further discussion needed

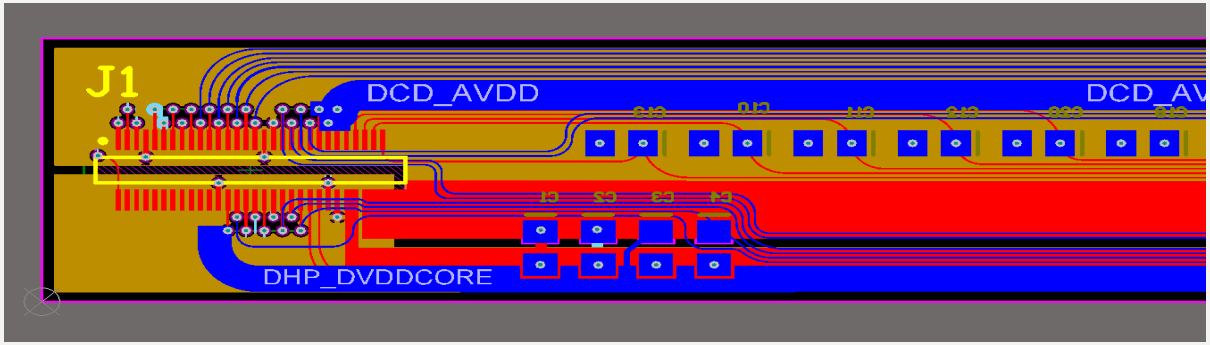
PP design update
- Andreas Seiler

- Assuming Vienna design proposal
- PP arranged on QCS
- Two connectors power and digital

- Position of pads for cable not decided
  - Either on front of QCS (as proposed in VLC)
  - In PP volume
    → can be decided after new cable layout is there

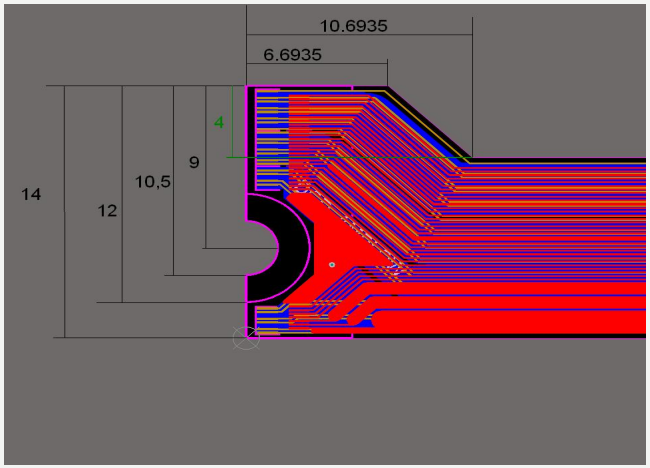
- Two Board to Board connectors with 5mm mating hight for power and data lines → hight <8mm.

- Decoupling capacitors in 0805 for each power line



Flex design update
- Andreas Seiler

- KEK offerd us a Flex prototyping run @ Taijo
- Design incorporating TML and power lines and reference without power
- Length 30/40/50cm
- Looked into designs with screw and washer
- Testing will be done in Bonn



Summary

- New geometry:
  - Well defined space for PP
  - Short flex relaxes signal integrity issues
    → PP including capacitors can be fitted below cone

- Cabling / Fibers
  - Digital cables and Fibers will fit into PP volume
  - Routing power cable below carbon cone is critical
  - Additional “power flex” to face of QCS can solve this issue
    → decision after new cable layout is there

- PP design related to availiable space → PP space assignment → PP design → feedback to mechanics

- Routing of cooling needs further discussion