



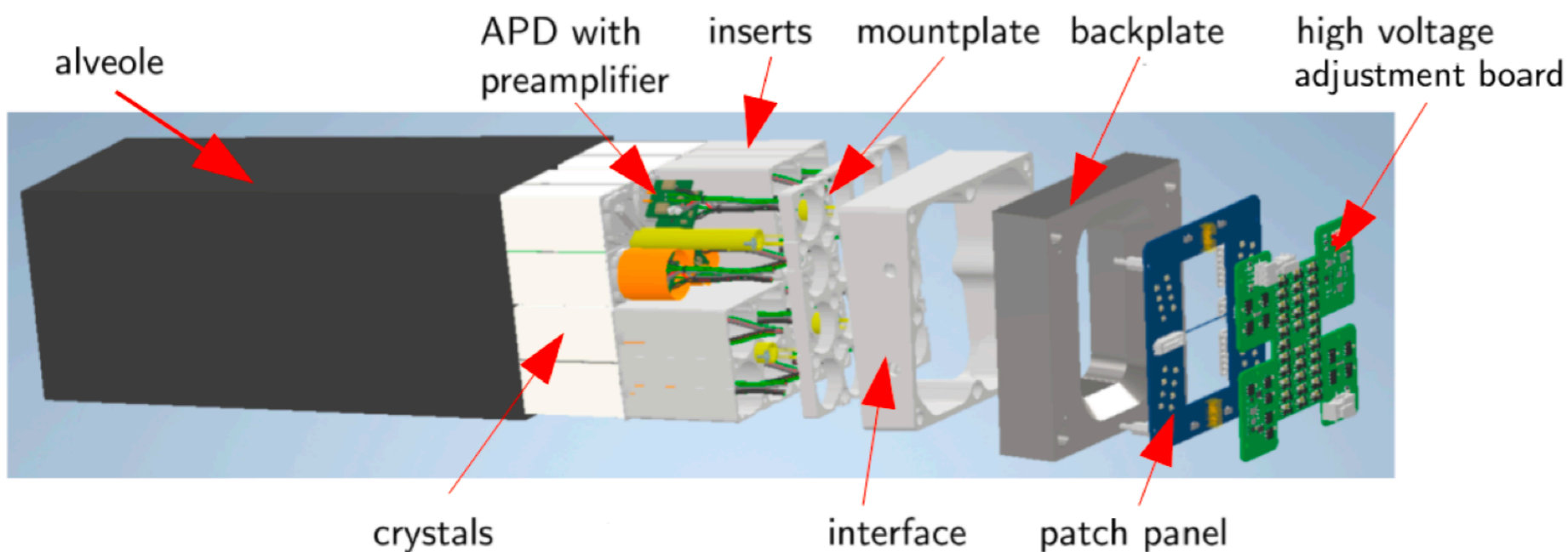
Update on EMC-FWEC Signal Cable Production

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Introduction

- The signals from the single detector modules of the forward endcap (FWEC) are digitized using sampling ADCs (SADC) which are placed outside the cold detector volume.
- The preamplifiers of the VPTTs or APDs are connected to the patch panel via short cables.
- From the patch panel, the signals are then routed to the outside via signal cables (Filotex VMTX). 16 crystals per submodule resulting in 32 ch for full APDs, 16 ch for full VPTT and half APD and 8ch for half VPTT.

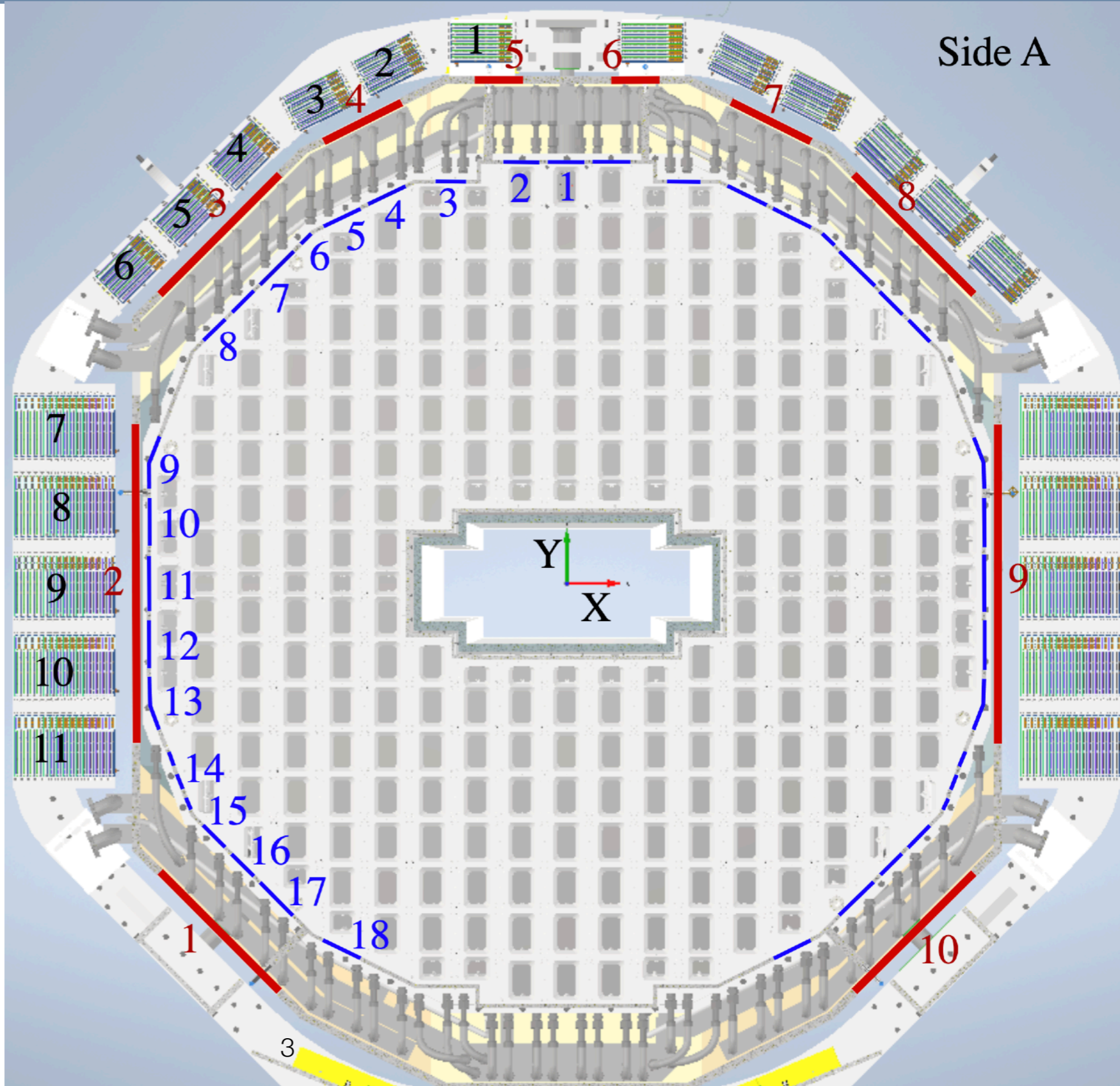


Signal cables



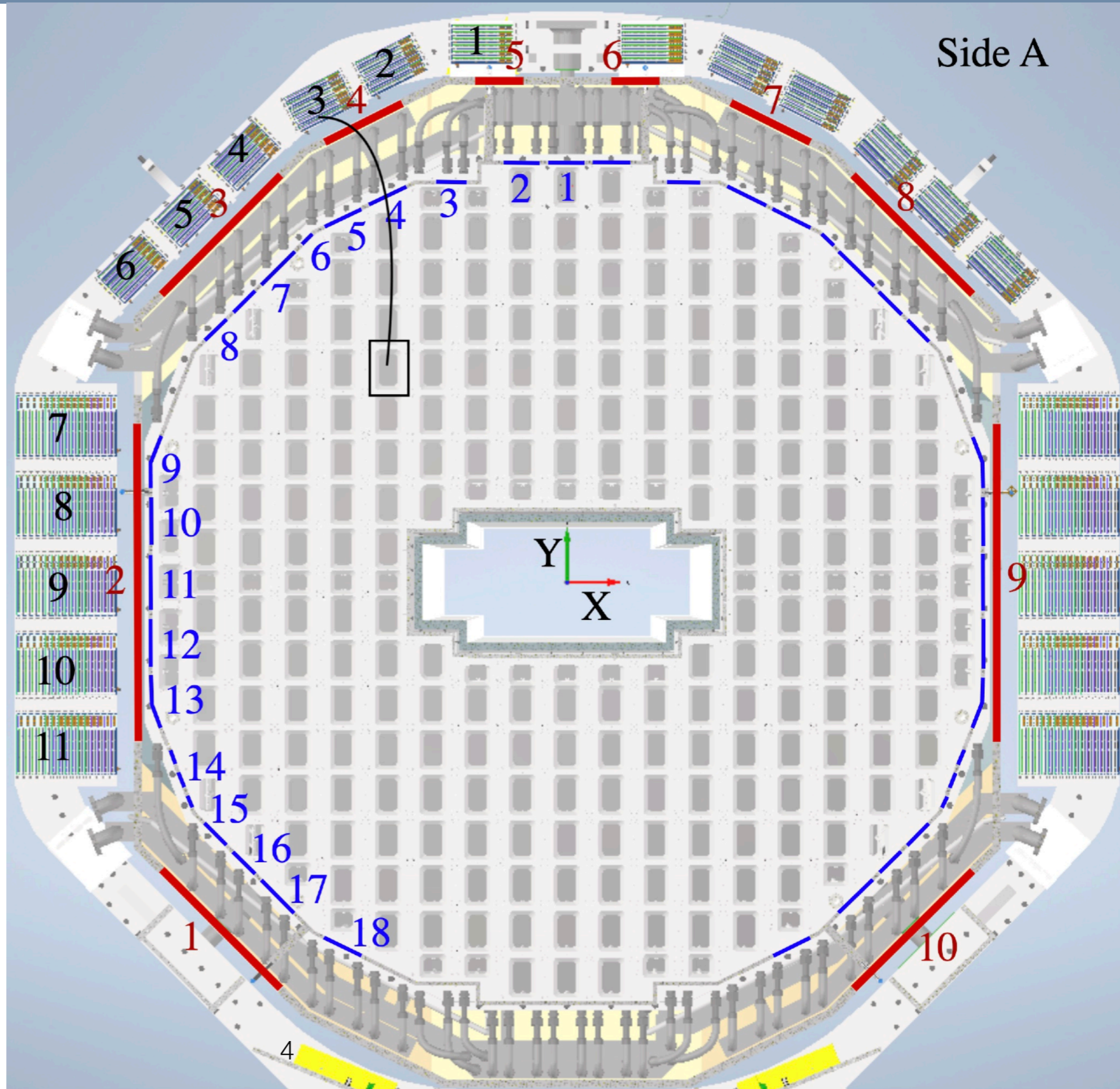
Signal cable routing

- The main idea is to route the cables out of the **feedthrough** through the **insulation slit** and then to the respective SADC crate.
- 6 x 6-ch SADC crates on top and 5 x 15-ch SADC crates on either side of the FEC.



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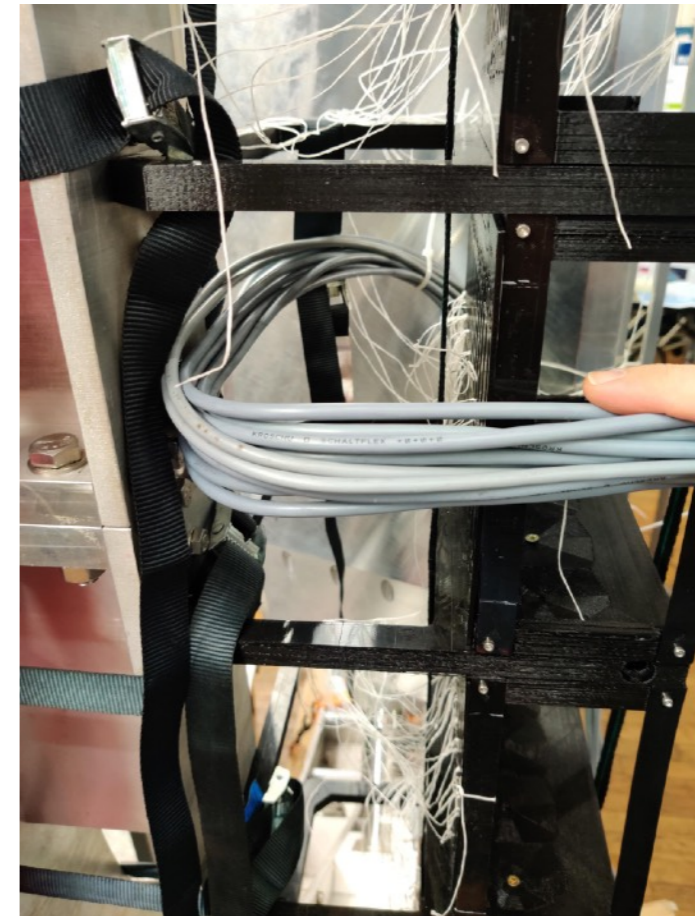
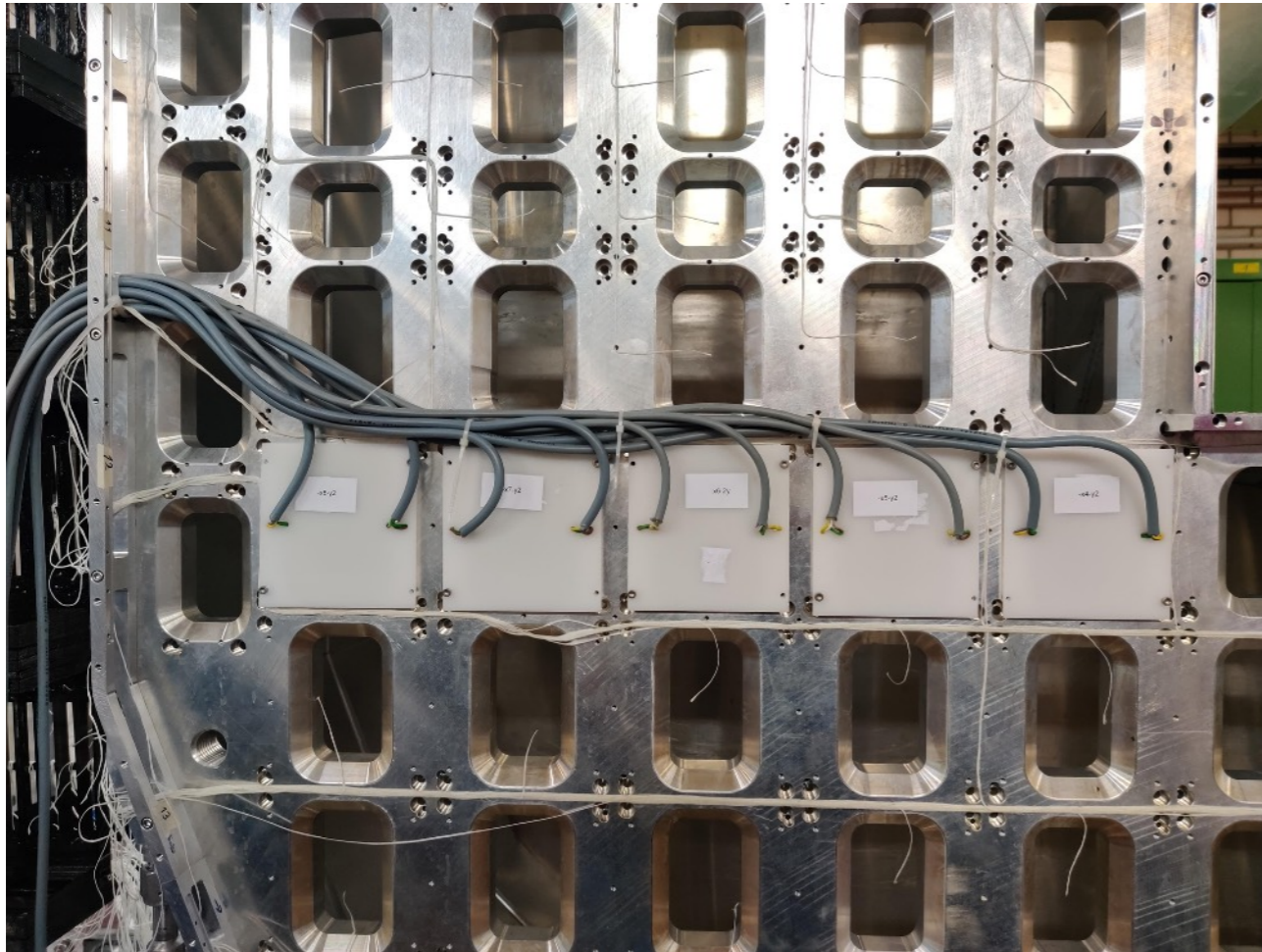


Routing Scheme

- A preliminary routing scheme has been developed by Dr. Claudius Schnier (Uni Bochum).
- After detailed testing and further investigation of the cross-sectional area of all cables (HV, LV, signal cables, light fibres etc) passing through the feedthroughs and insulation slits, it was found that for certain feedthroughs cables might not fit.
- Adjustments in the routing of signal cables were done while keeping the routing of other cables the same.
- Measurements were taken on-site on the mounting plate to determine the exact cable lengths, as there is little space for cable buffers.

Cable length measurements at Bochum

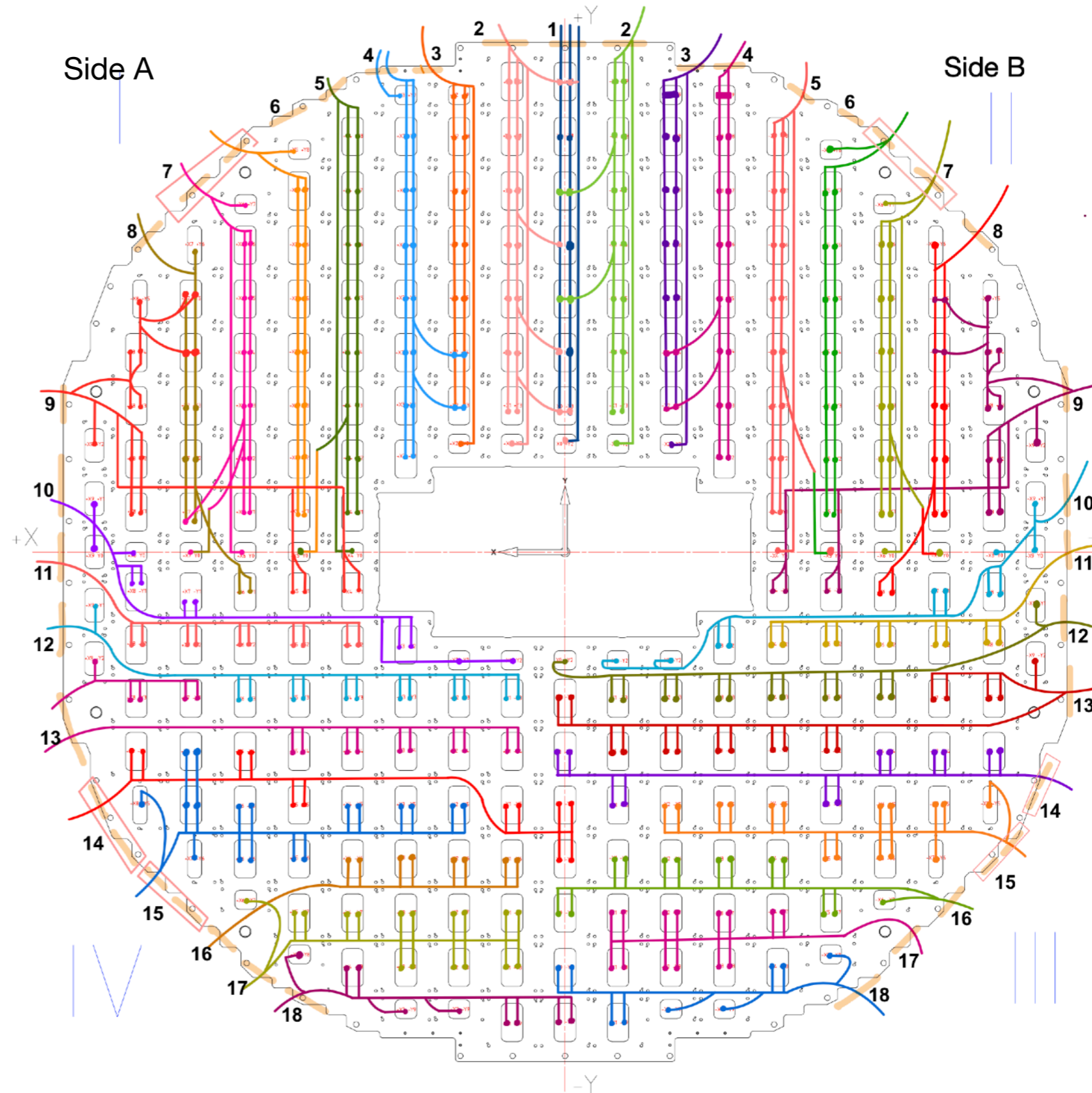
Cable length measurements with patch panel prototypes



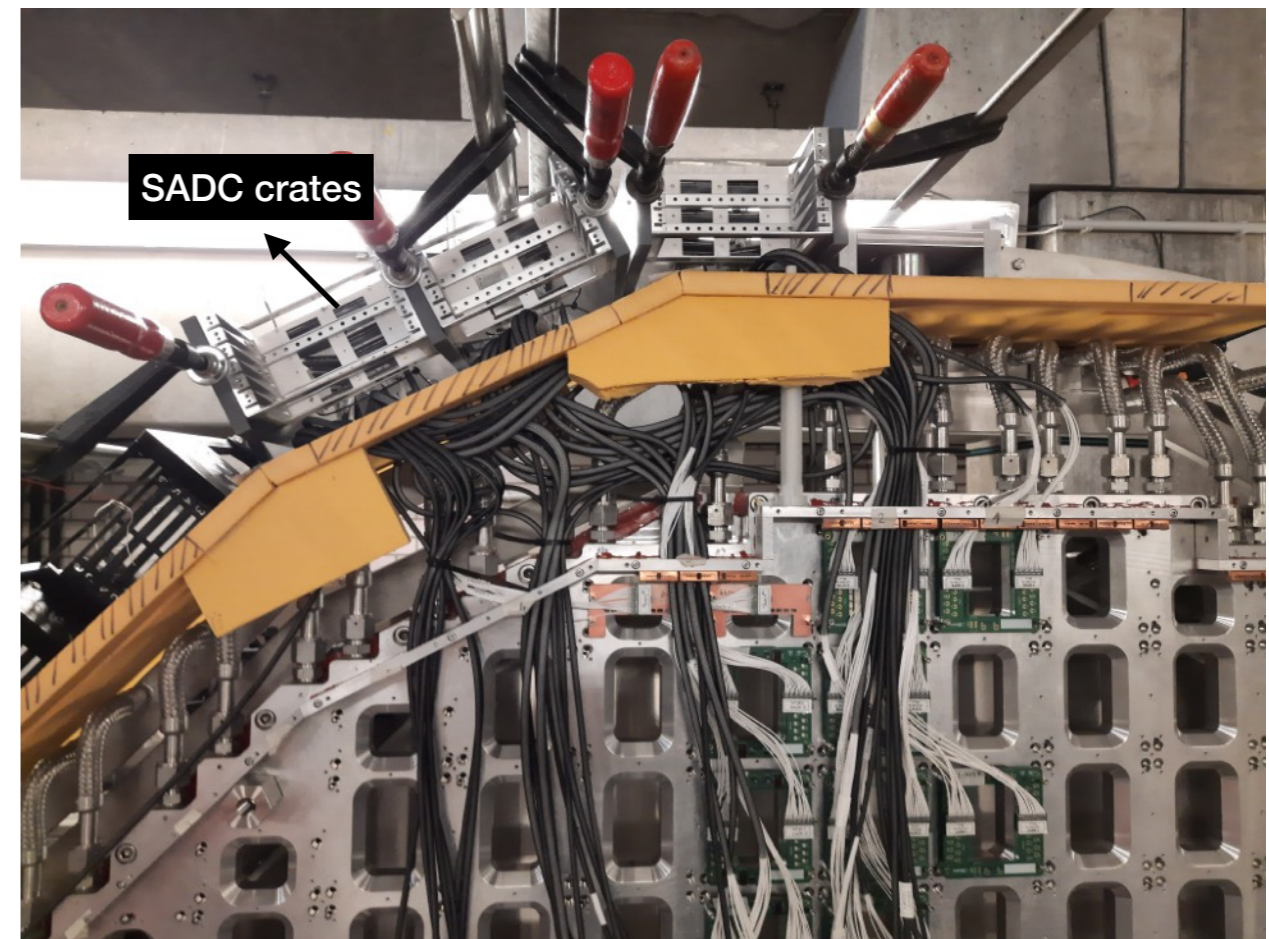
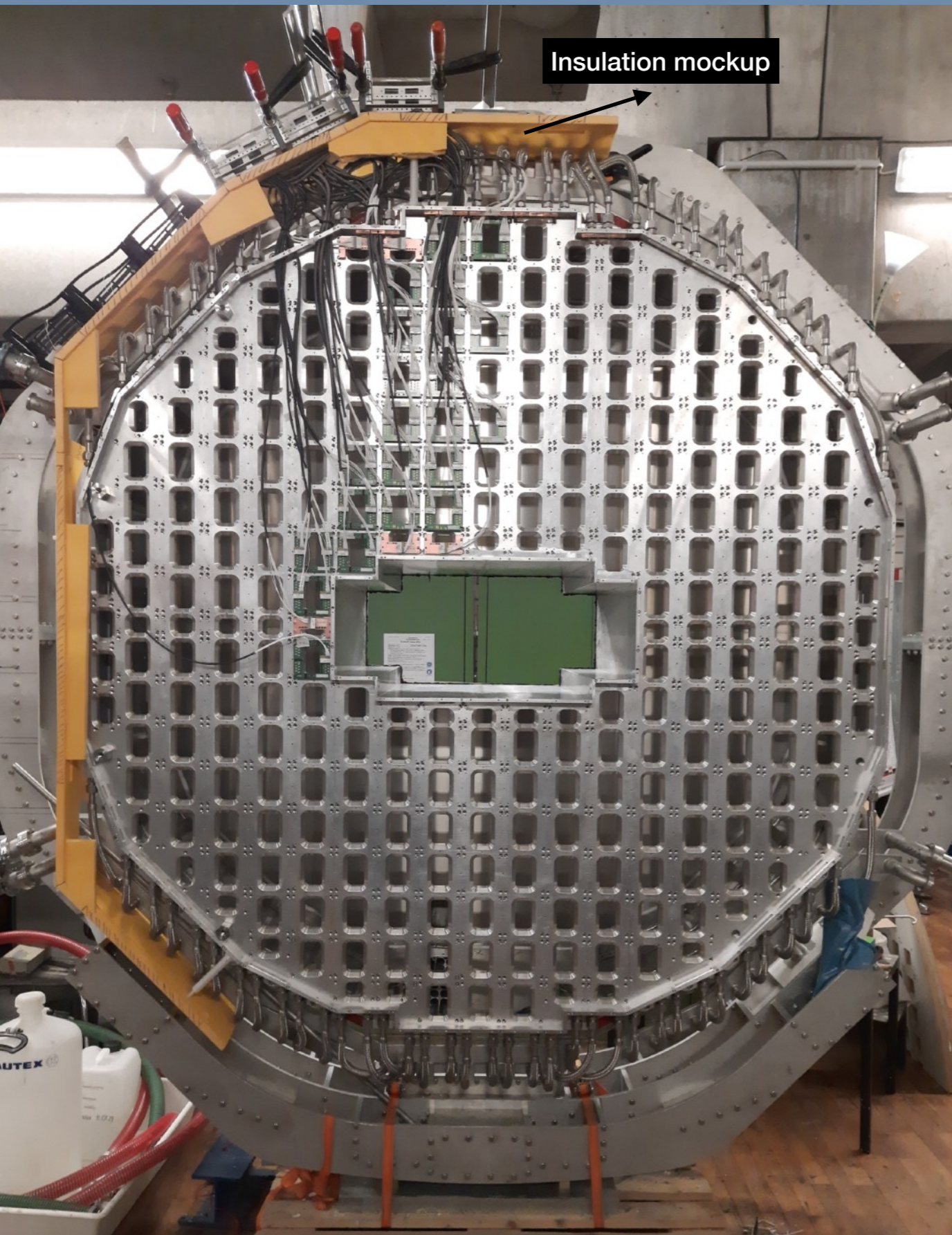
- Measurements with patch-panel prototypes with the cables of flexibility corresponding to the 16-channel actual signal cable bundle.
- Additional loop at the rear side to account for power supply and cooling pipes.

Updated Routing Scheme

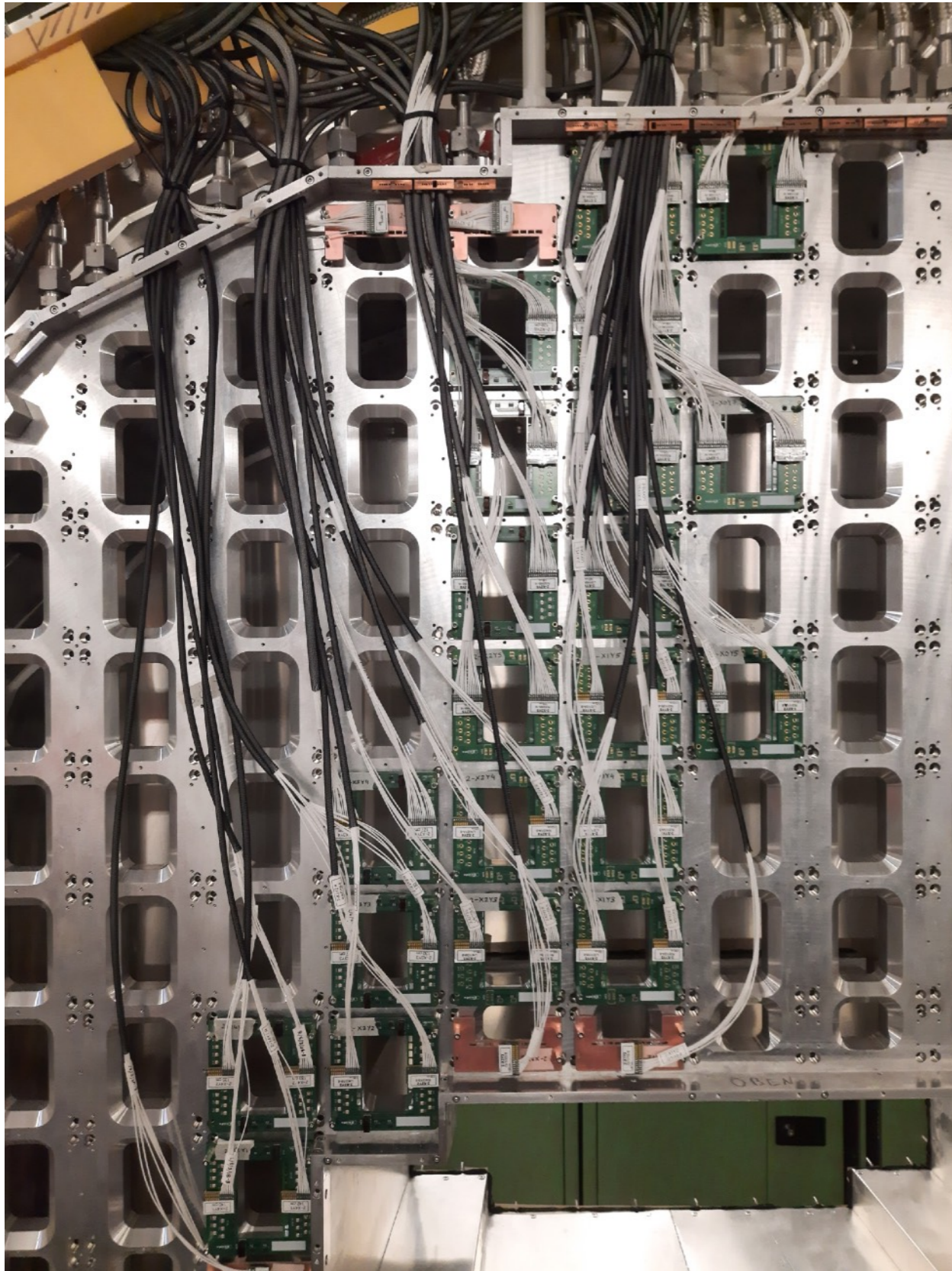
- Latest routing scheme
- Takes into account the connector positions for the half submodules
- Tried to make it as similar to our prototype routing as possible.



Cable routing tests with actual cable



Cable routing tests with actual cable

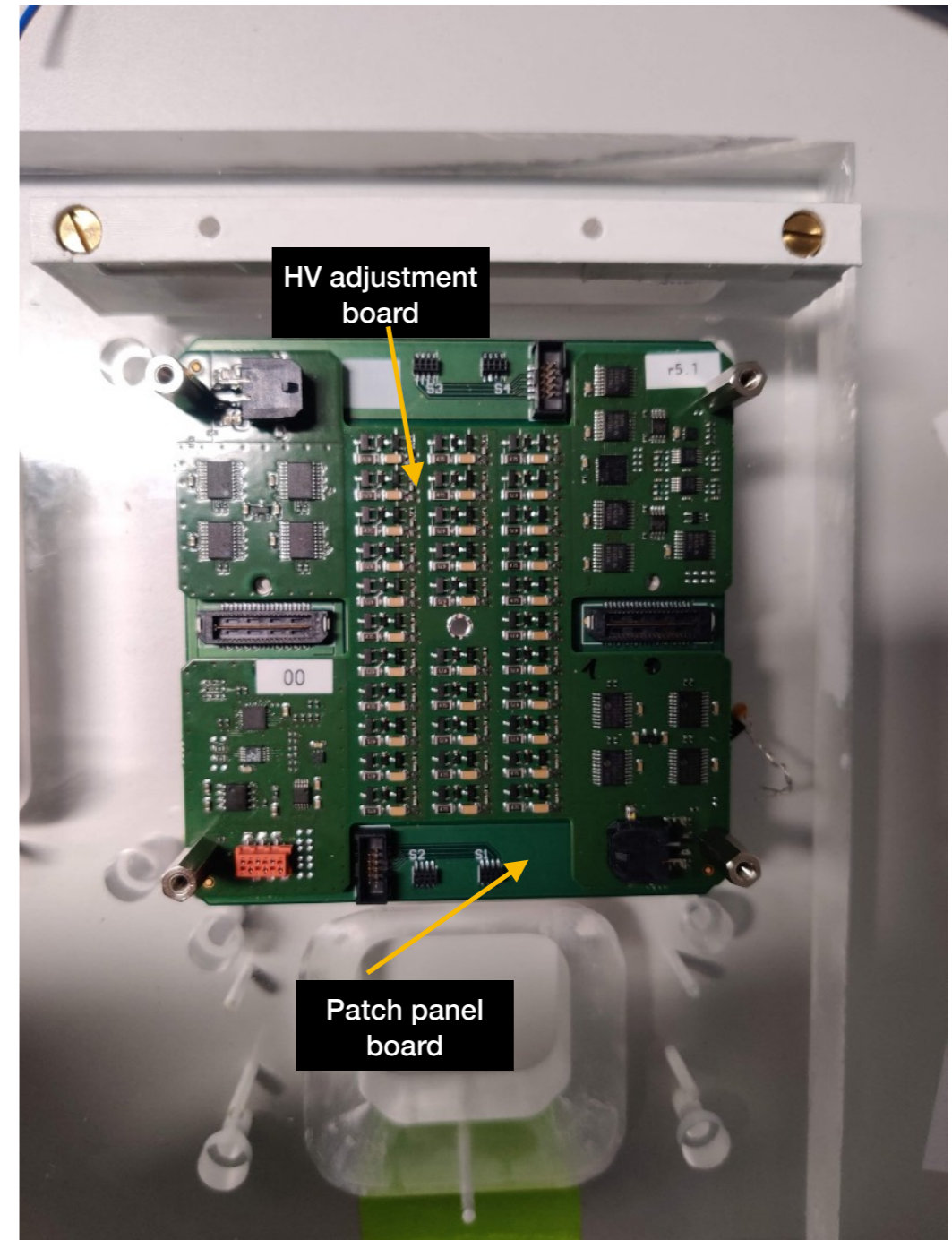


- The signal cables are bundled in sleeves (Techflex Flexo Overexpanded).
 - Makes handling of the cables easier.
 - The sleeves will be cut near the feedthrough and insulation slit so that it doesn't account for the additional cross-sectional area.
- The actual cables for SADC crates 1, 2, and 3 fit well as expected. The additional buffers came in handy.
- We will move forward with the production of cables for the same crates on the other side.

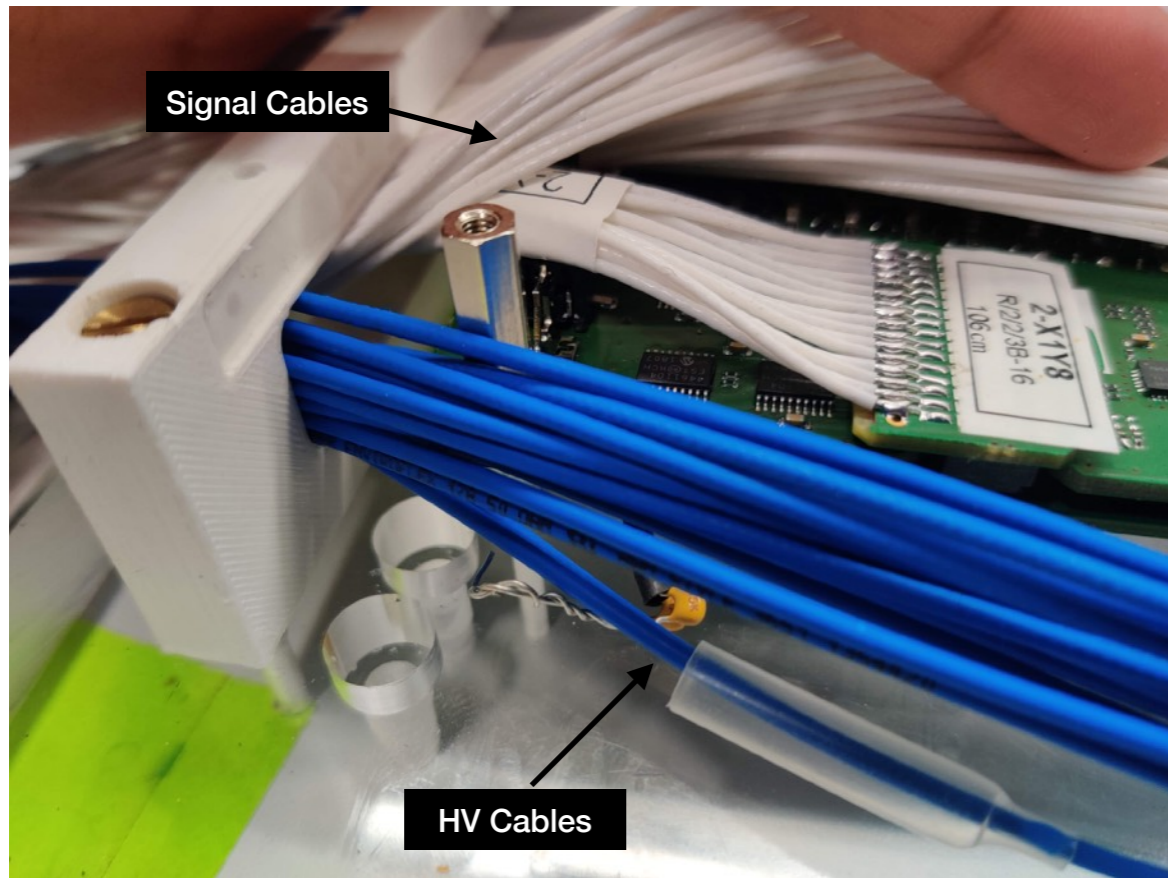


Cables through one feedthrough

- During on-site measurement it was suspected that patch-panel board + hv board might block some part of the feedthrough.
- For testing purpose, I chose the feedthrough 2.
 - Light fibres: 64 (480)
 - HV cables: 30
 - Signal cables: 232
 - LV cables: 3
 - Ribbon cables (readout temp. Sensor): 8
- In this case, available cross sectional area theoretically = 28.47 mm²

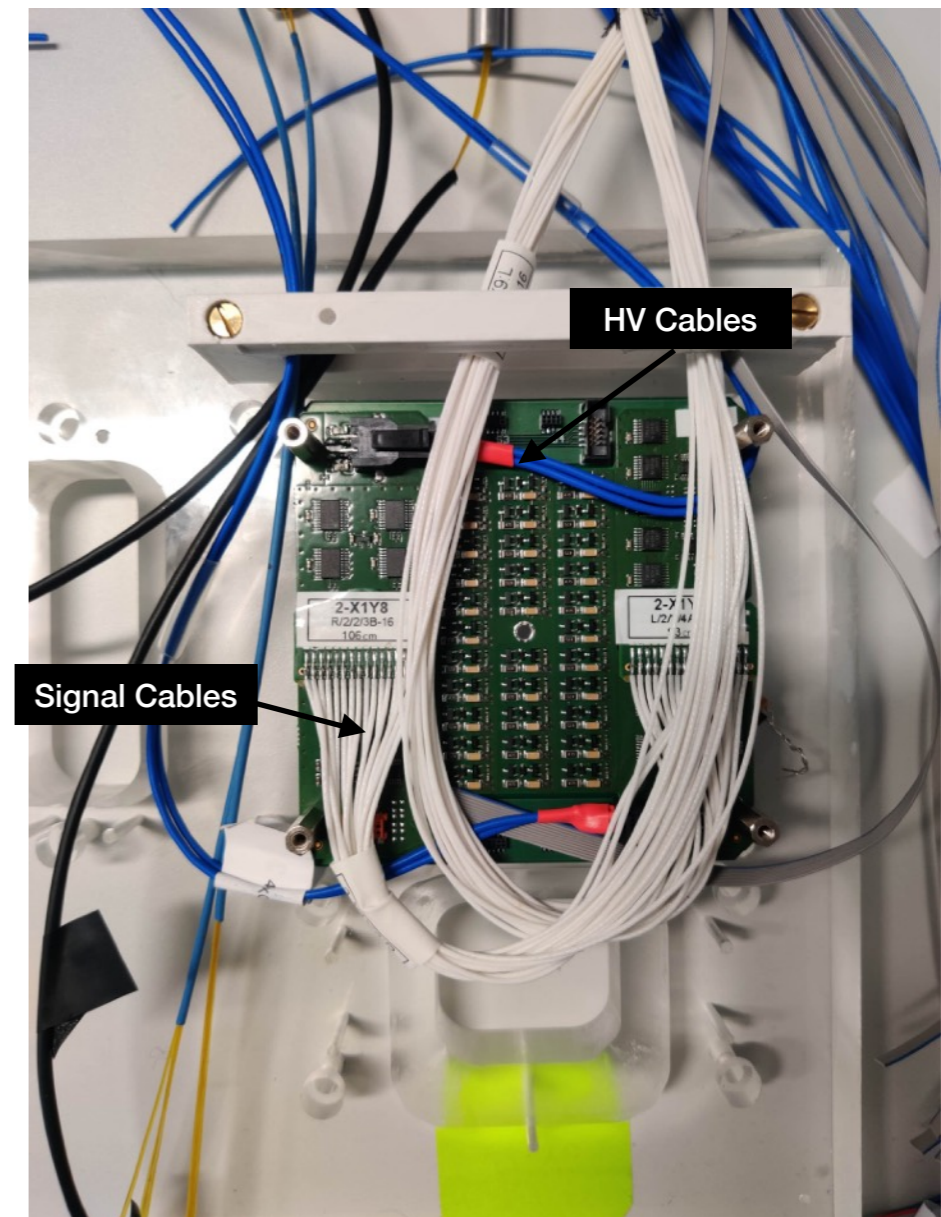
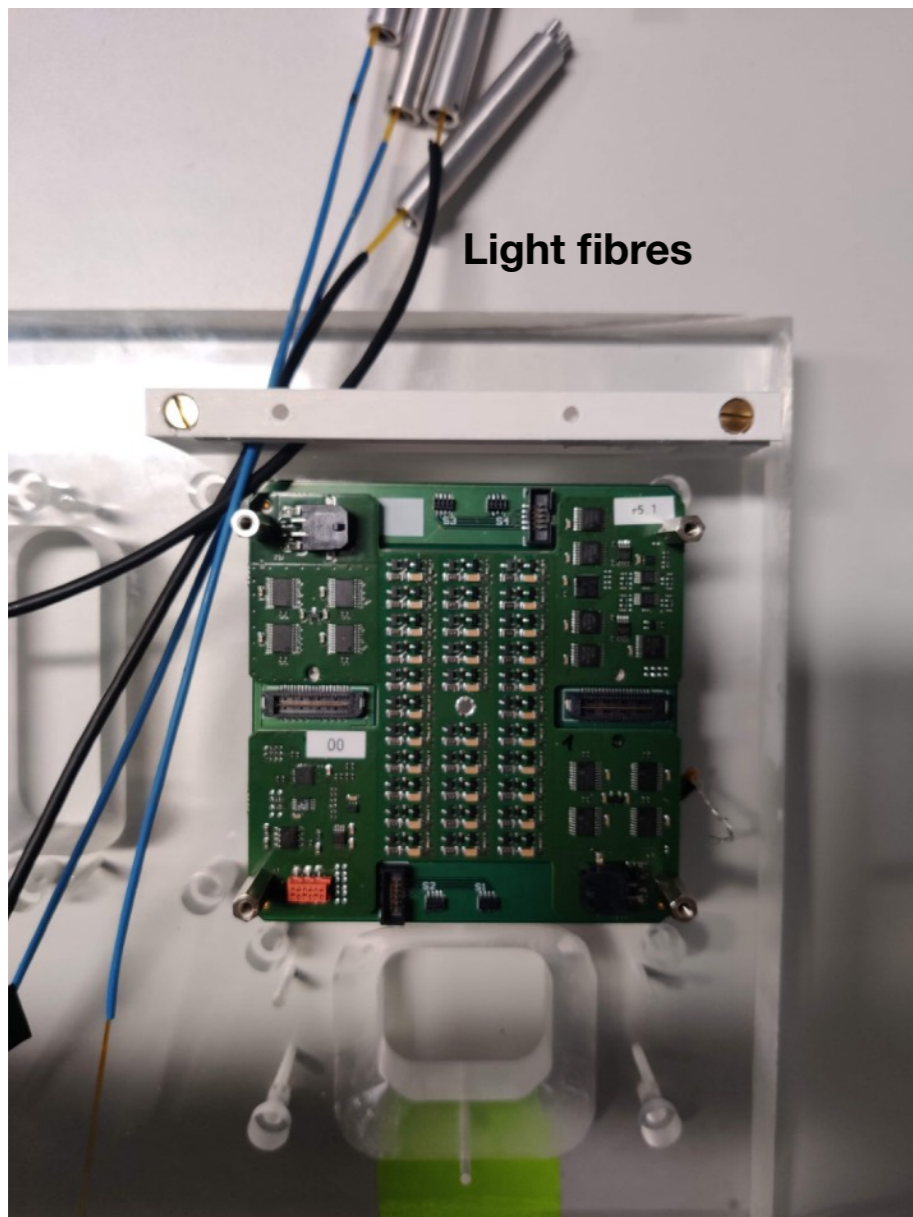


Cables through one feedthrough



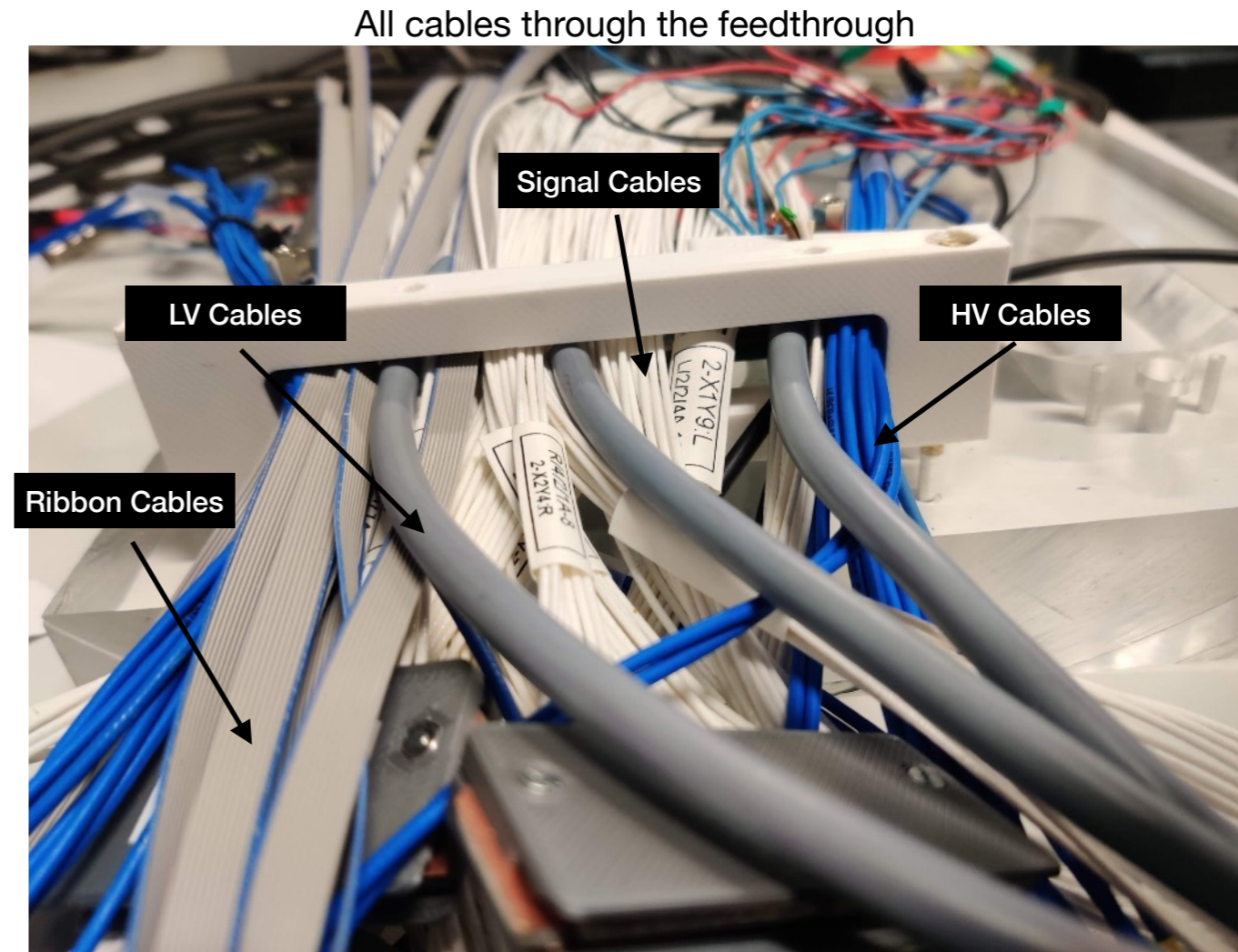
Added strain in the signal cables as the cables go over the HV connector.

Cables through one feedthrough



- It is better to connect all the cables for the top board.
- Sleeves of the signal cables should not cover the top high voltage board.

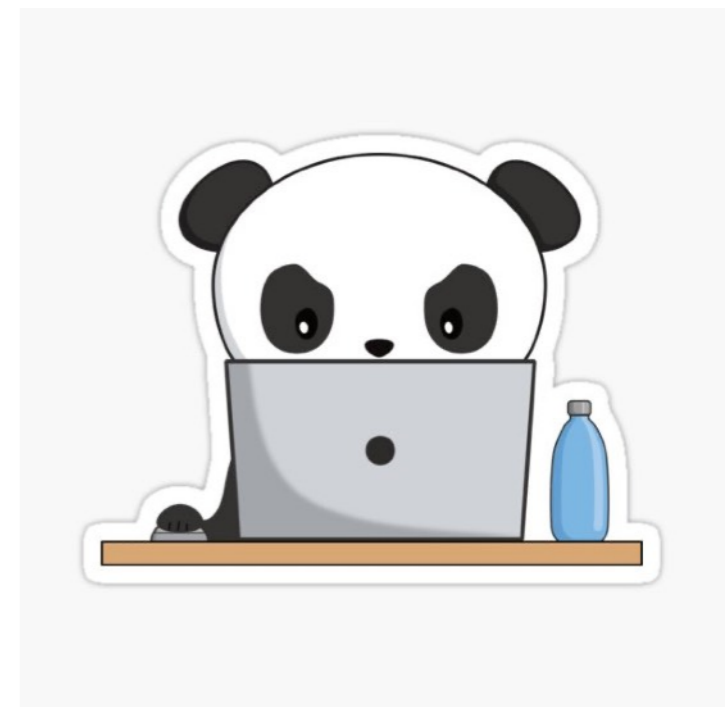
Cables through one feedthrough



For one of the last signal cable connectors, it becomes hard to push the connector through the feedthroughs.

Summary

- Sleeves of the signal cables should not cover the top high voltage board.
- The spacing required by the connectors should be kept in mind while deciding the gluing process.
- Production phase of signal cables is moving forward. We will start building cables for side A SADC crate 1, 2 and 3.



Additional Slides

Routing through insulation slit

