JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN

GCS GIESSEN COSMIC STATION

ATLAS PANDA HERMES AG Düren

Disc-DIRC and GCS Status Update

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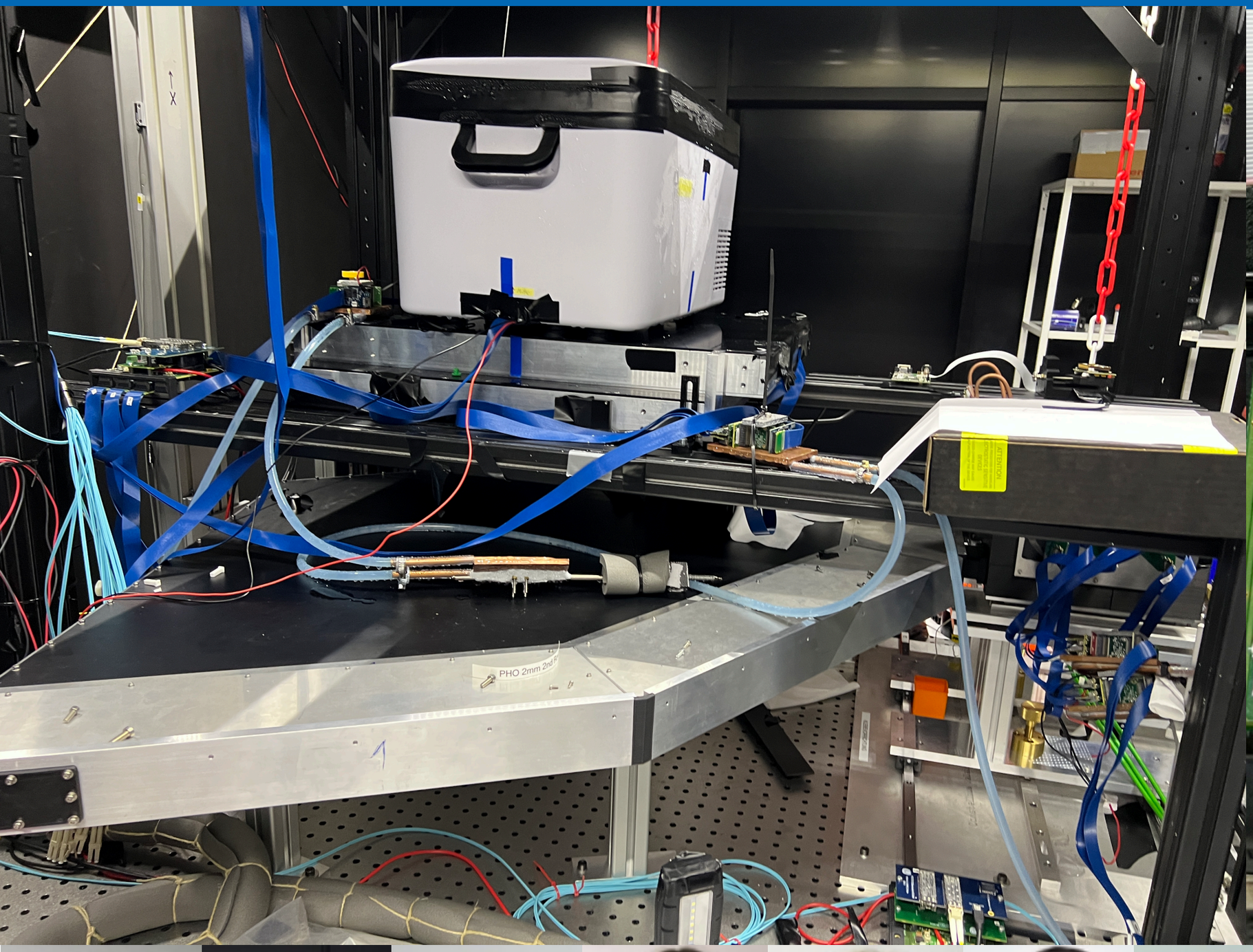
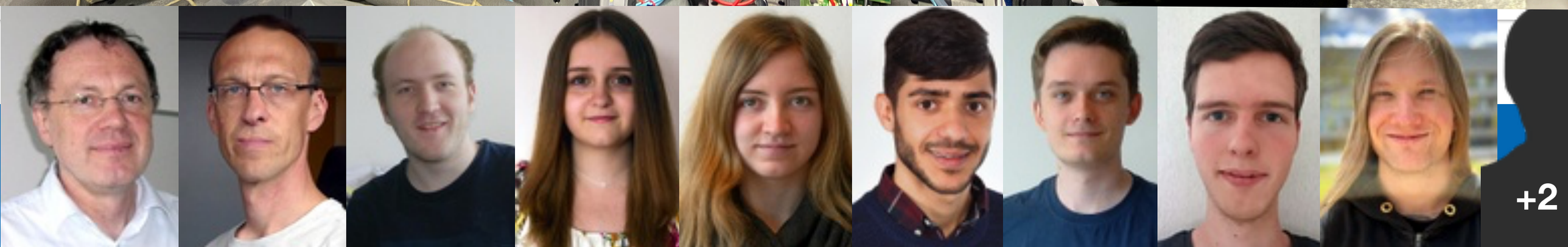
PANDA Meeting

March 31, 2022

DIRC group Giessen

JLU
NEUE WEGE. SEIT 1607.





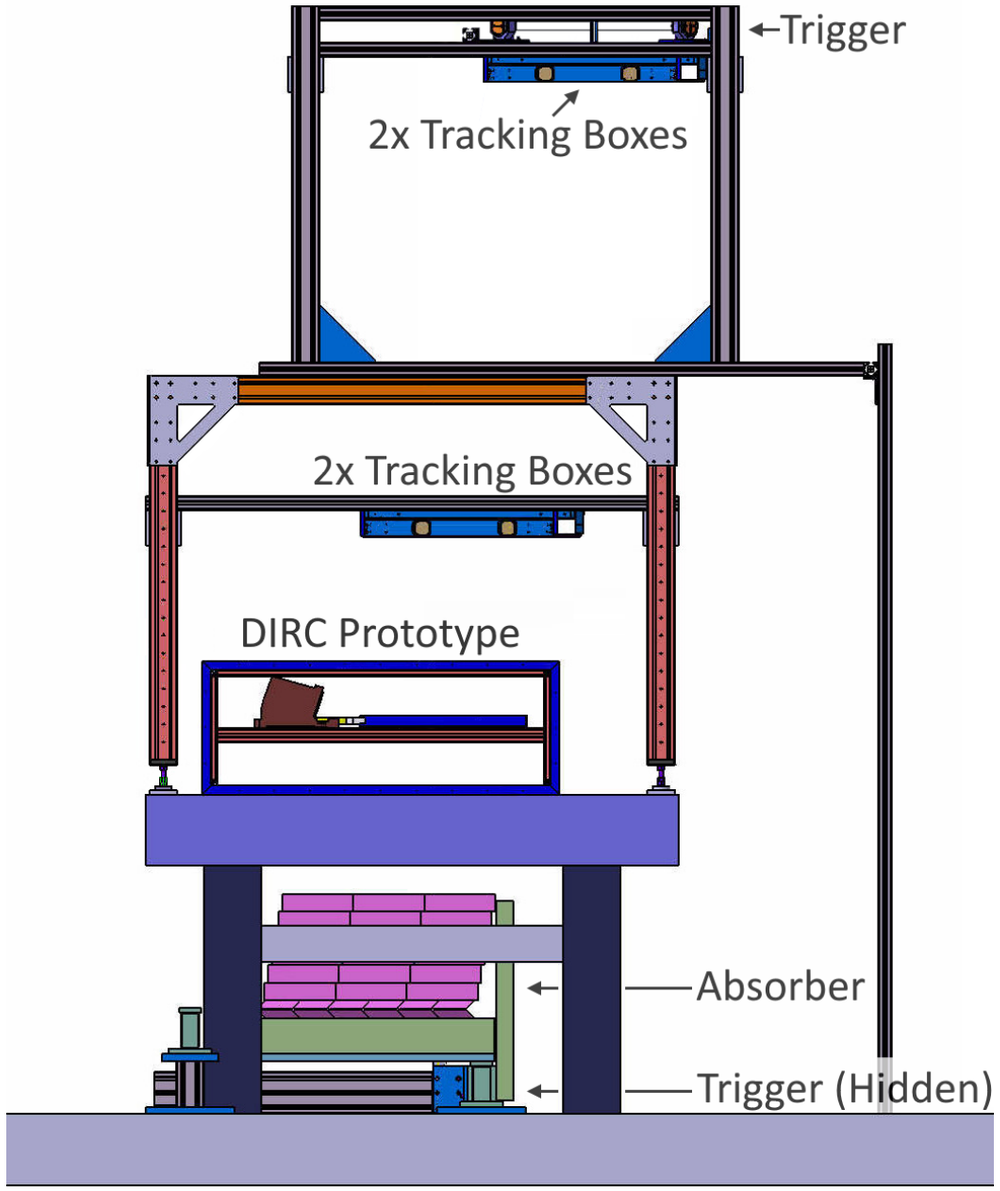
Prototype Measurements in the GCS

Previous Setup

- Full scale radiator in GCS
- Single ROM with 4 ASICs

Updated Setup

- Additional ROM with the new readout-board



Location: II. Physikalisches Institut JLU Giessen (5th floor)

Prototype Measurements in the GCS

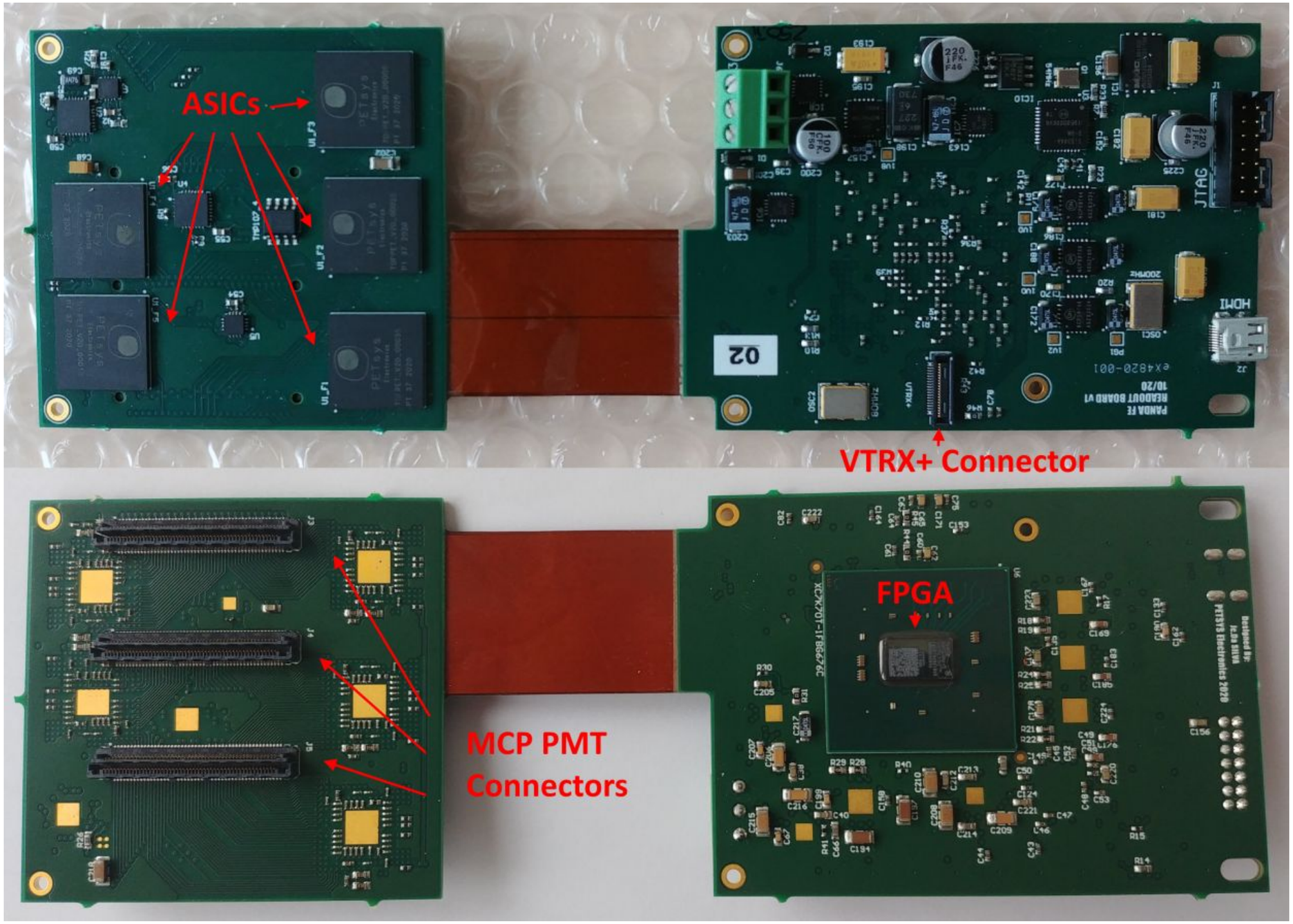
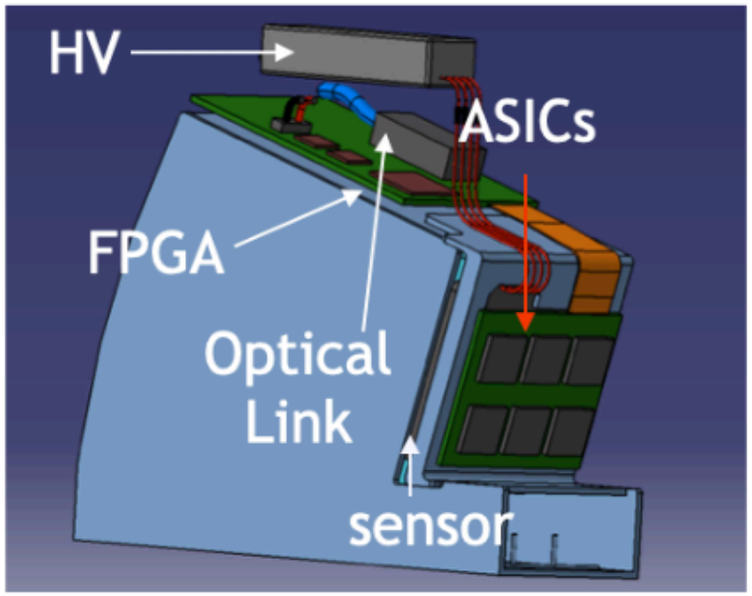
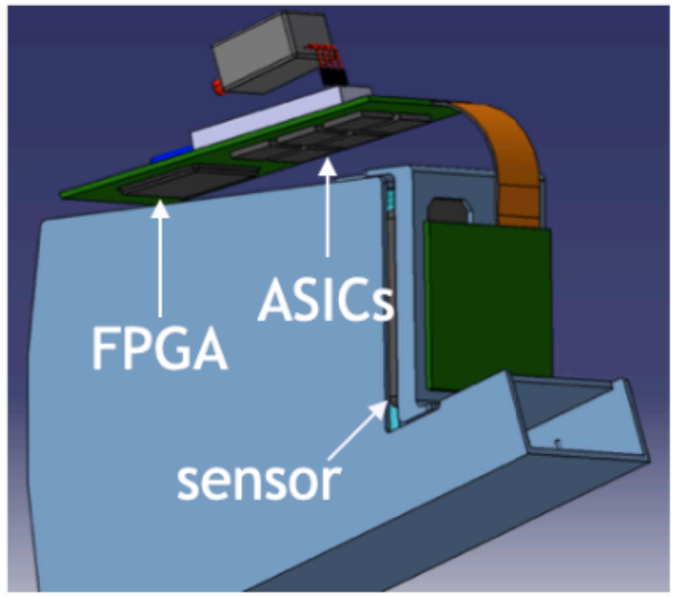
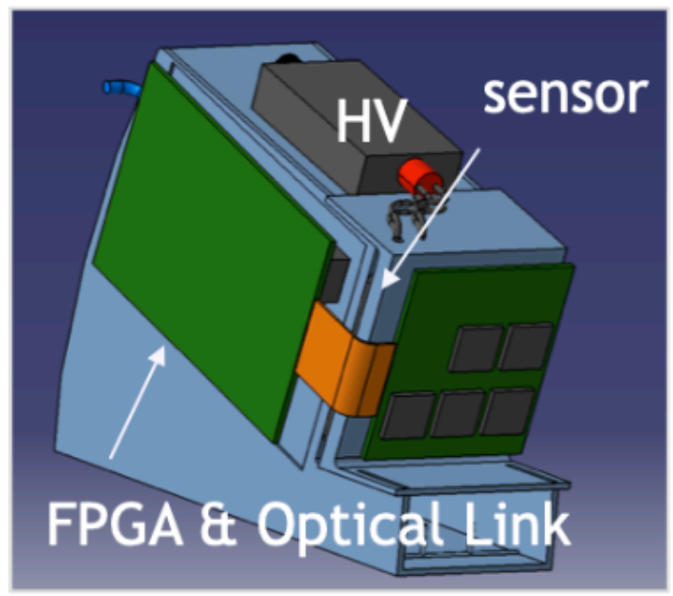


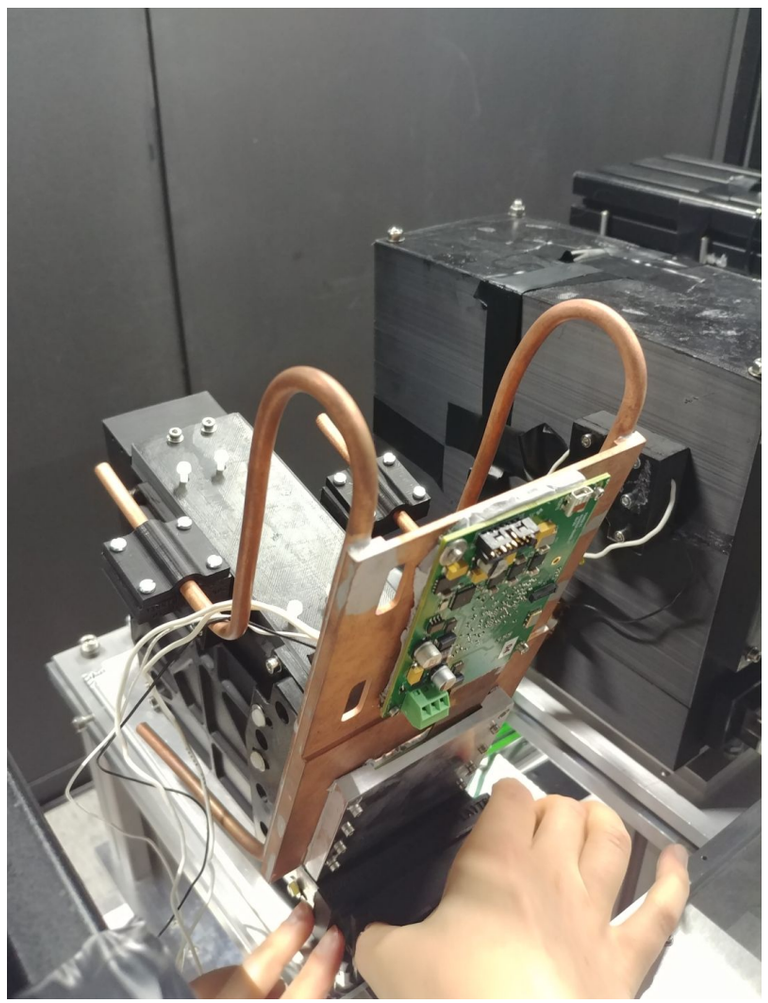
Figure: The to be installed readout board with 5 ASICs.

Prototype Measurements in the GCS





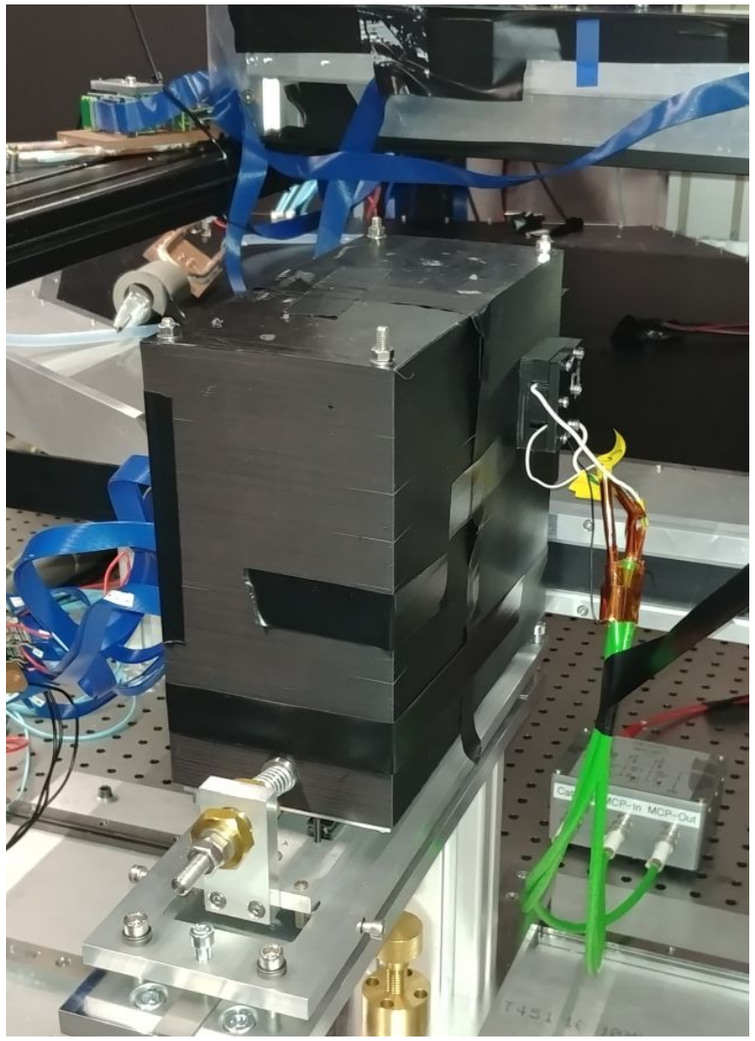




Installation Steps and Encountered Problems

Installation Steps

- Detach previous ROM and move it to the left
  - Detachment showed broken optical bonding of middle FEL



Prototype Measurements in the GCS

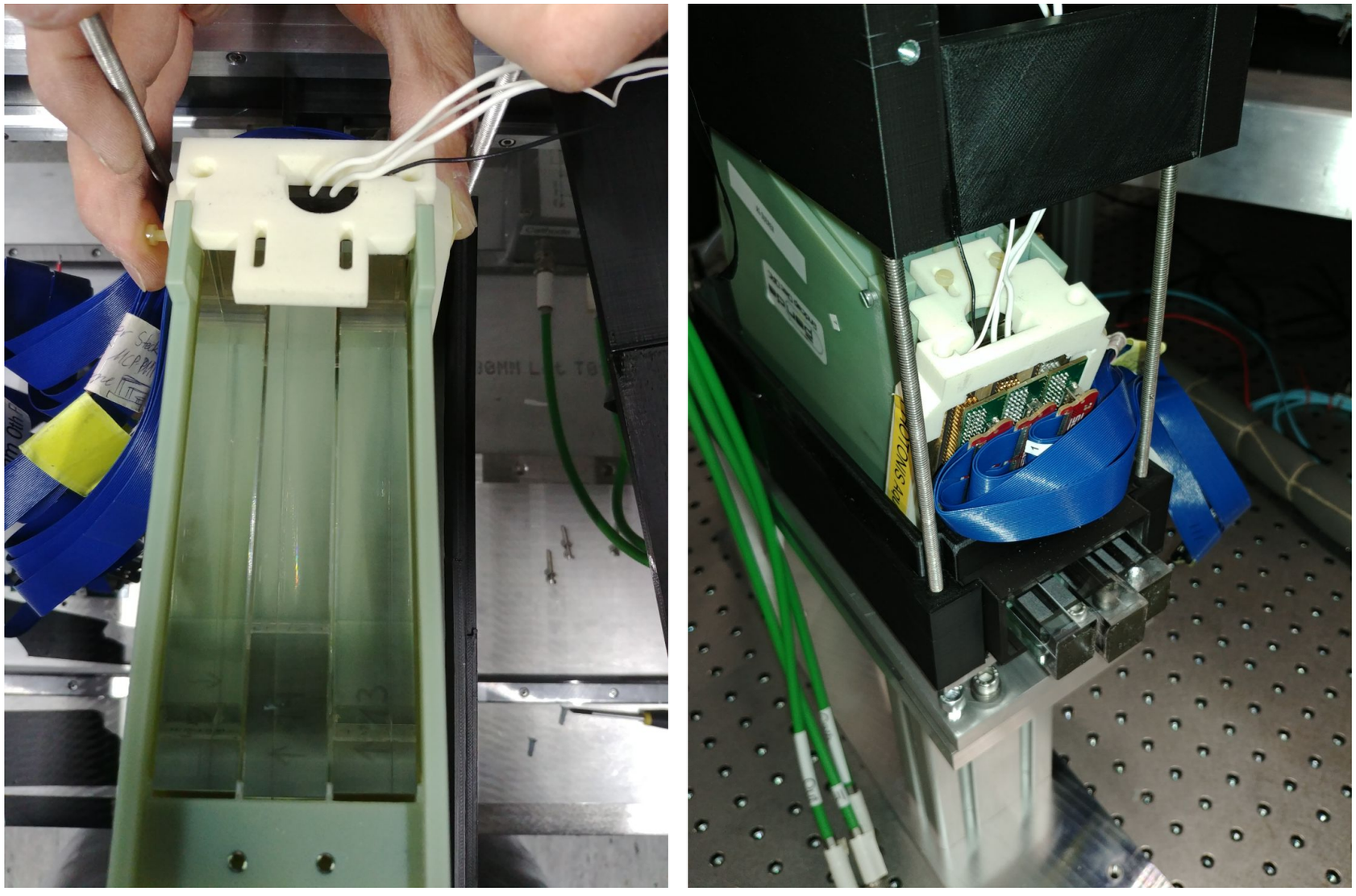
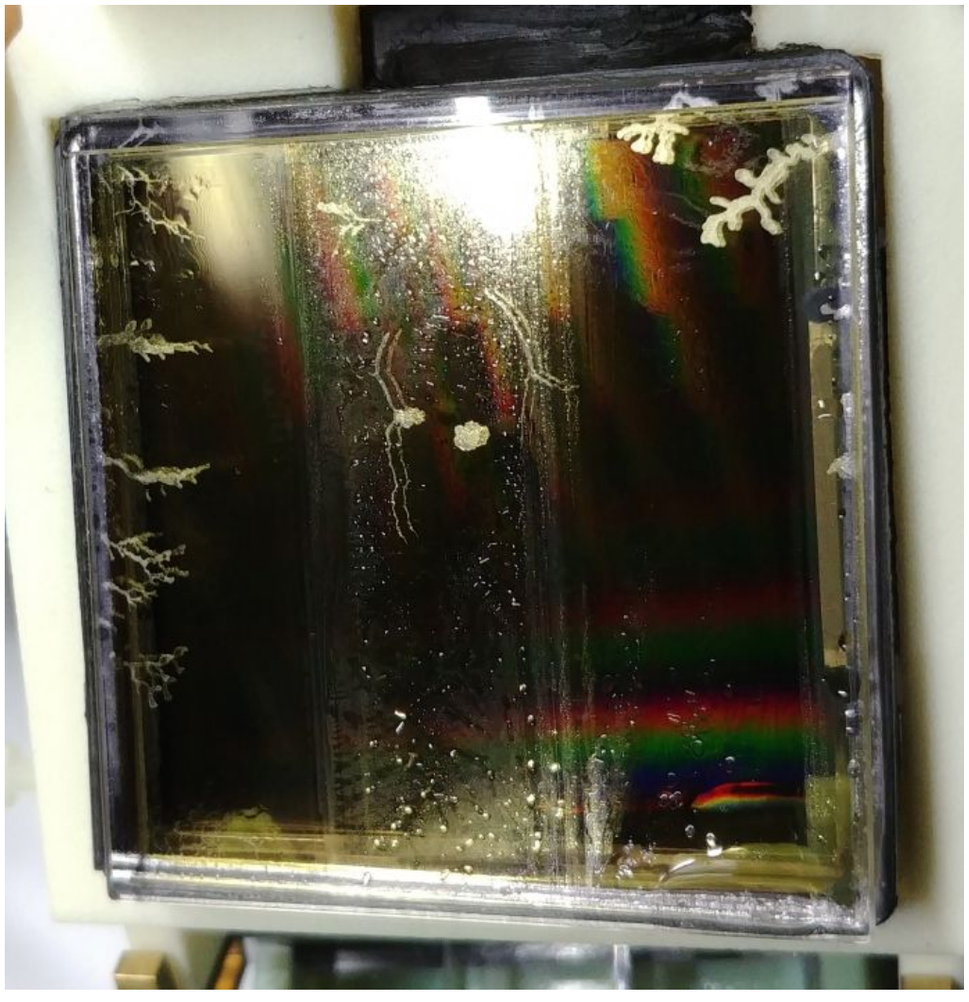


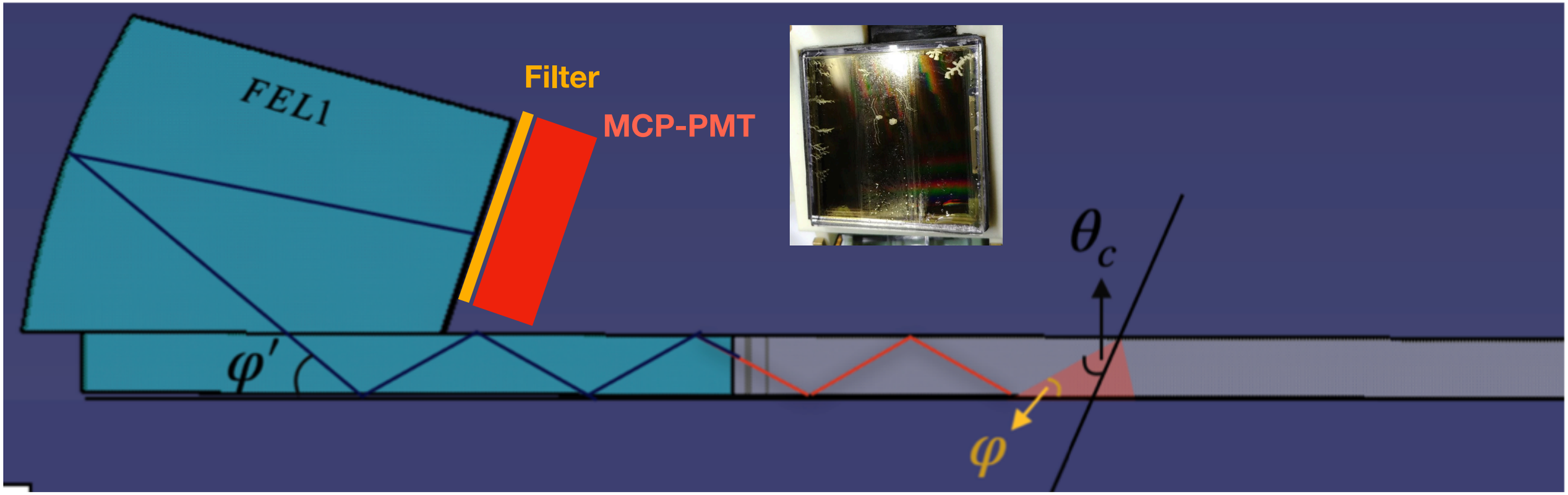
Figure: ROM after detachment from the radiator and removing the cover. The loose and shifted bar is clearly visible.

Observations: Filter Coupling

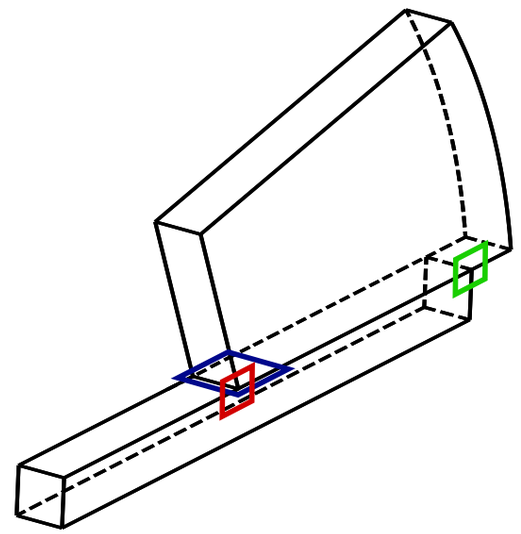
Optical Coupling

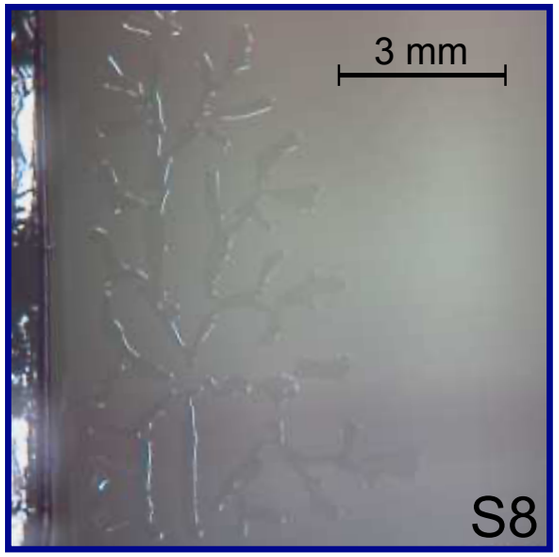
- Coupling of filter and MCP-PMT showed white structures
- Identified as air inclusions in the grease
- Likely caused during disassembly (slightly pulling the stack apart)




FEL1
Filter
MCP-PMT
φ'
θ_c
φ

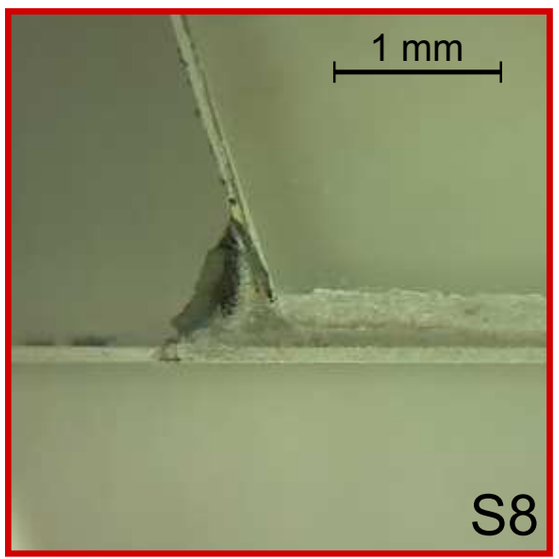

S2




3 mm
S8


S2


S6


1 mm
S8

Observations: Broken Optical Bonding

Broken Optical Bonding

- No damage on neither bar nor focus visible
- But middle bar was drenched in optical oil
  - Slowly crept down from MCP-PMT coupling
- Reason for separation not clear

Prototype: Current Status

Current Status of the Prototype

- Broken FEL has been replaced and ROM reassembled
- New readout board installed
- Alignment done

Further Studies: Cherenkov Measurements with SiPMs

Cherenkov Measurements with SiPM-Matices

- Measurement of Cherenkov light with SiPM arrays
- Angled setup with glass radiator
- Cooled to -18 C° to reduce dark counts
- Placed in GCS for muon trigger and track information

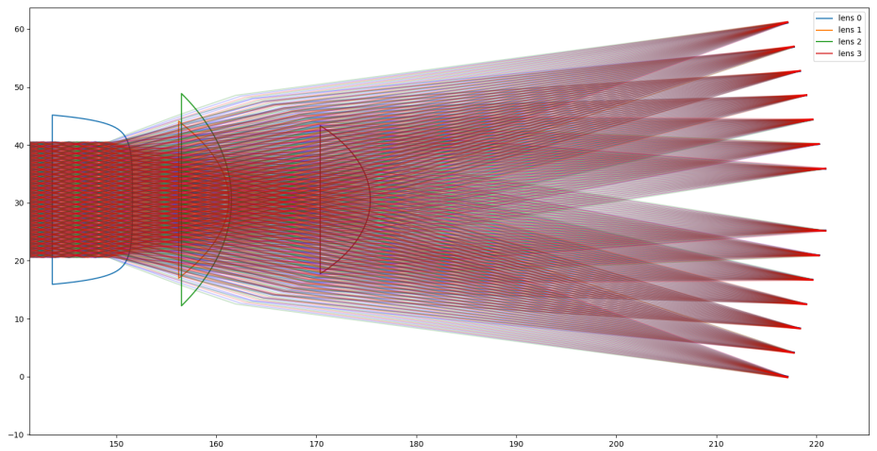
Radiators: Aerogel, Suprasil, Mag. Fluoride

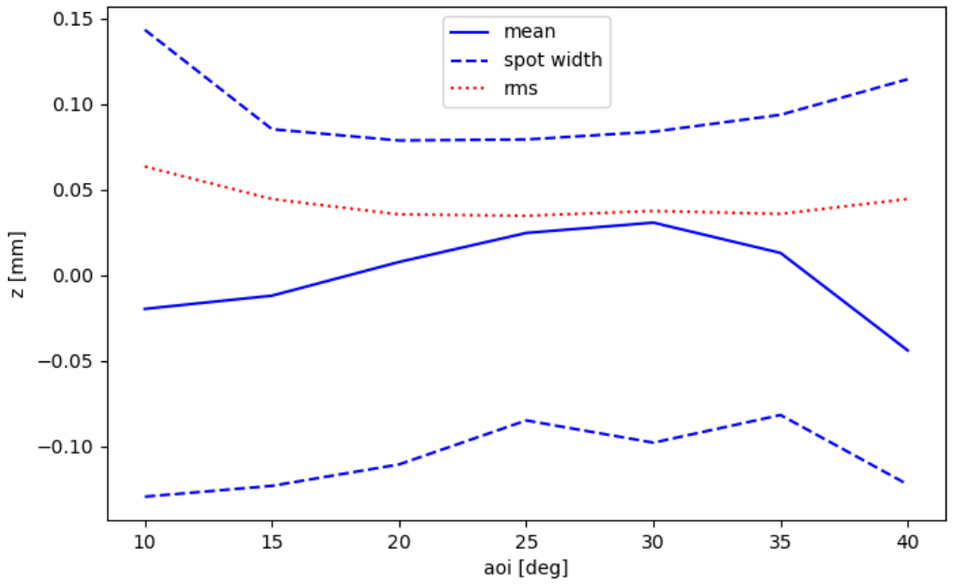
Next: DIRC with FEL and SiPM Matrix

Further Studies: Design Iterations for Future Experiments

Disc DIRC in SCTF

- μ/π separation required
- Similar design to PANDA Disc DIRC, but higher resolution requirements
- Focus optic is being iterated on
  - Dispersion correction using different lenses and materials (e.g. LiF and NLAK)





Thank you!