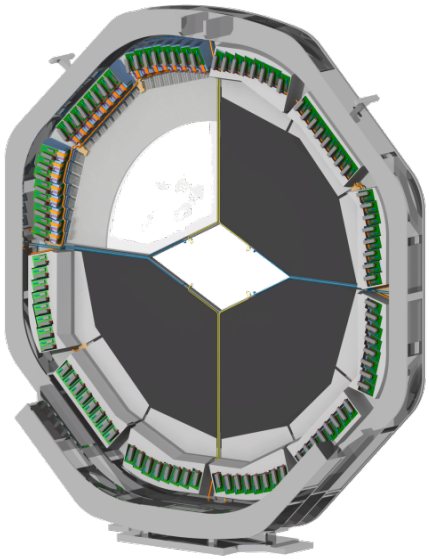
Update on the Endcap Disc DIRC



Simon Bodenschatz, Lisa Brück, Michael Düren, Erik Etzelmüller, Klaus Föhl,

Avetik Hayrapetyan, Jan Hofmann, Sophie Kegel, İlknur Köseoğlu,

Jhonatan Pereira de Lira, Mustafa Schmidt, Marc Strickert

PANDA CM 18/2 – PID-Cherenkov - 2018/06/05

Bundesministerium für Bildung und Forschung

JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN

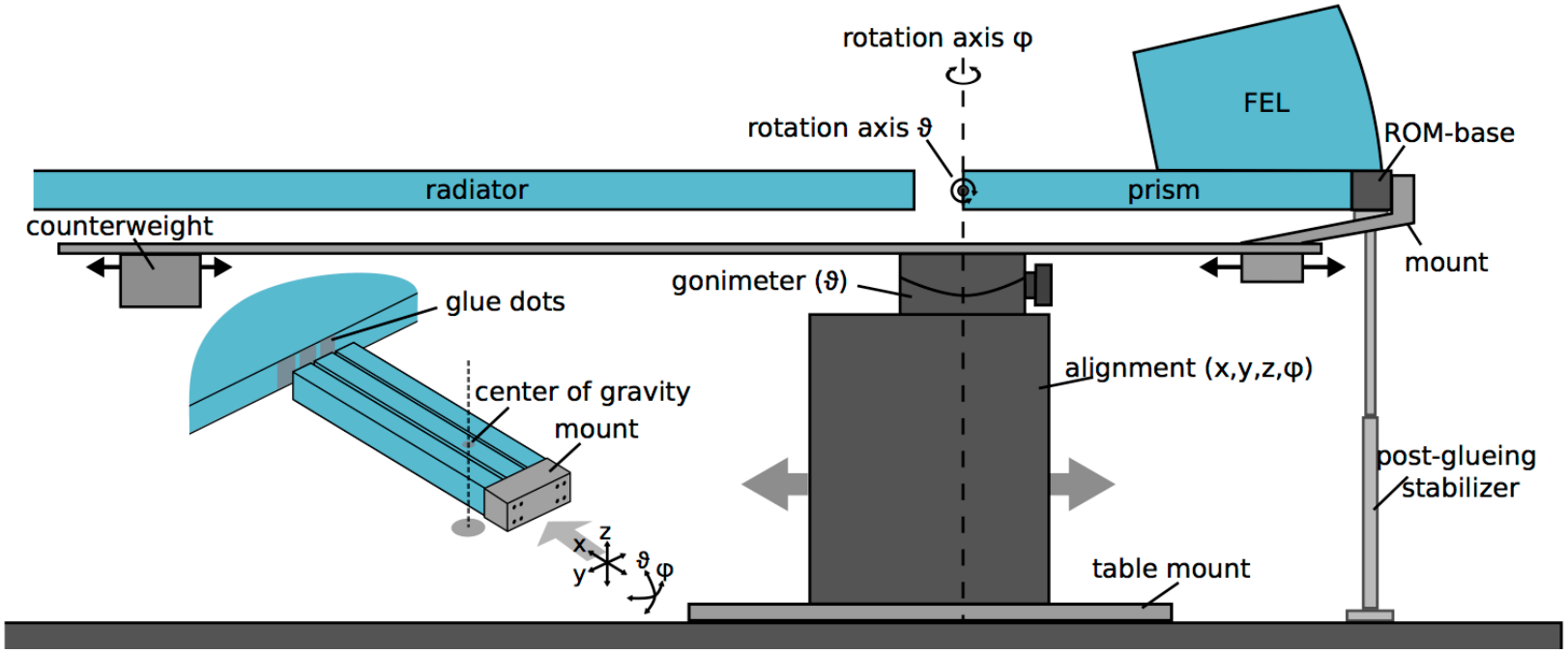
HGS-HIRe for FAIR
Helmholtz Graduate School for Hadron and Ion Research

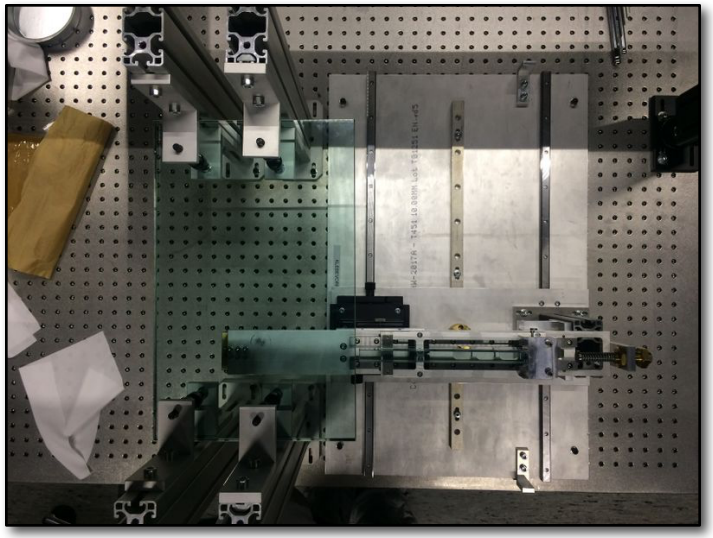
HIC for FAIR
Helmholtz International Center

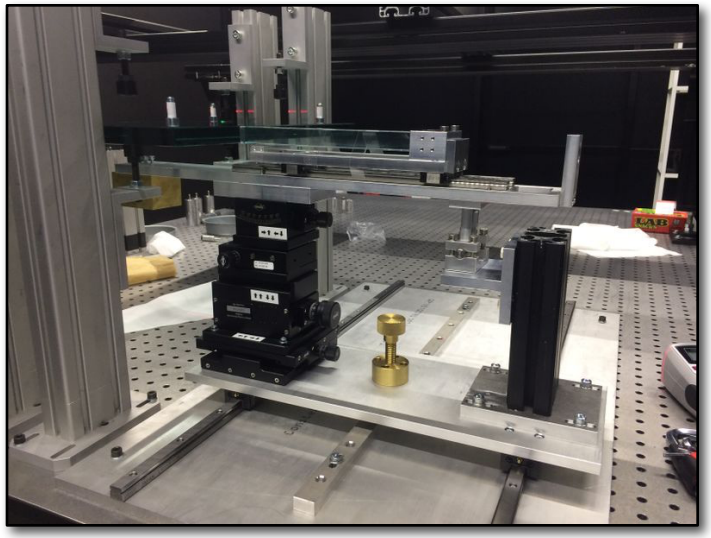
panda

Optical Gluing Tests

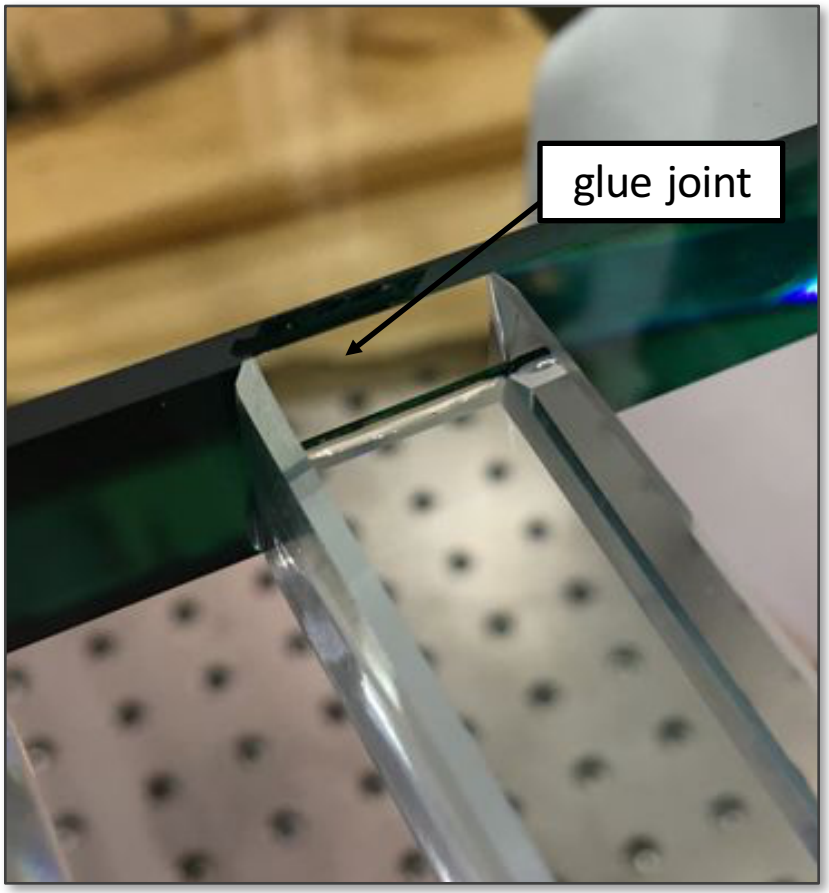
Optical Gluing tests - Setup





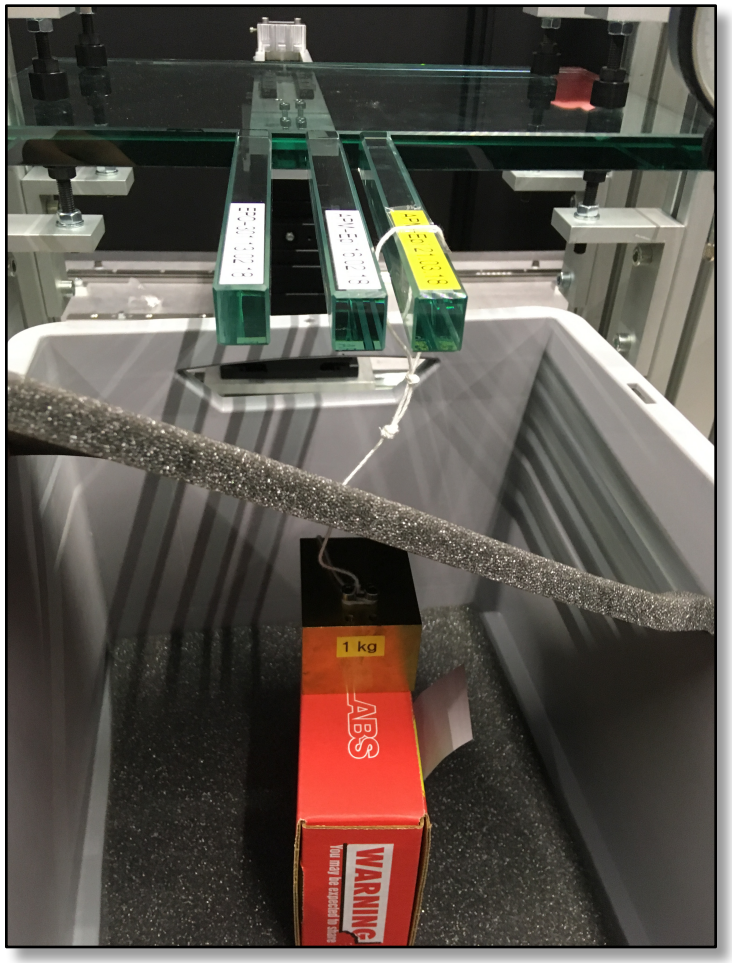


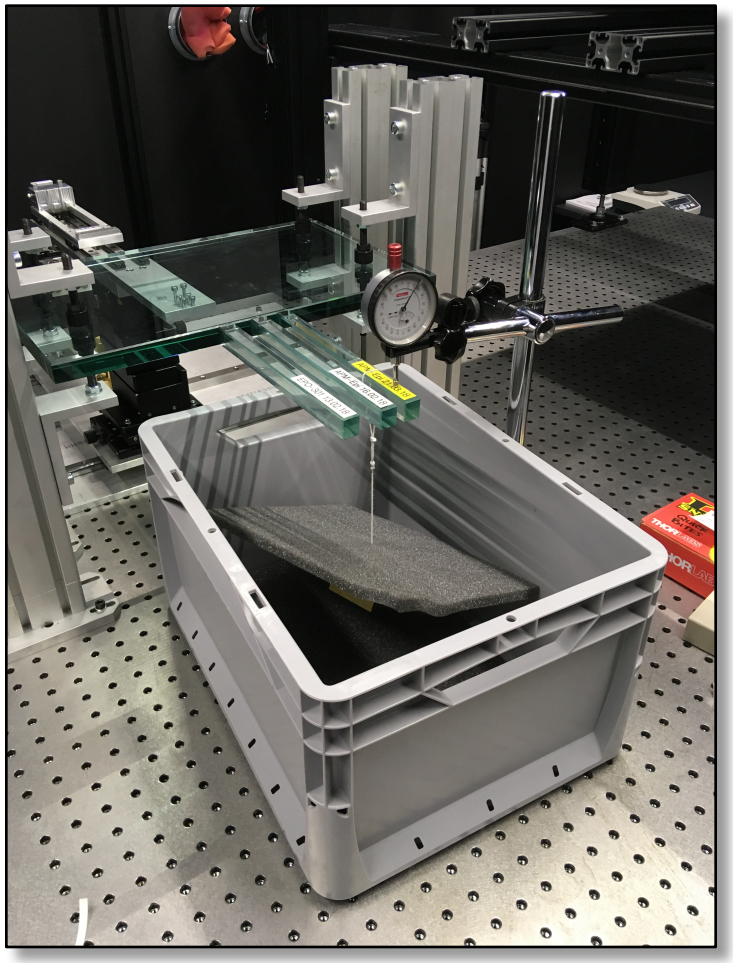
Optical Gluing tests - Results



- Tests done with float glass samples
- Different glues were tested:
  - APM Epicol (2k)
  - Epotek 301-2 (2k)
  - NOA-61 (UV)
- High quality glue joints with all three adhesives were achieved (NOA-61 required some careful treatment)

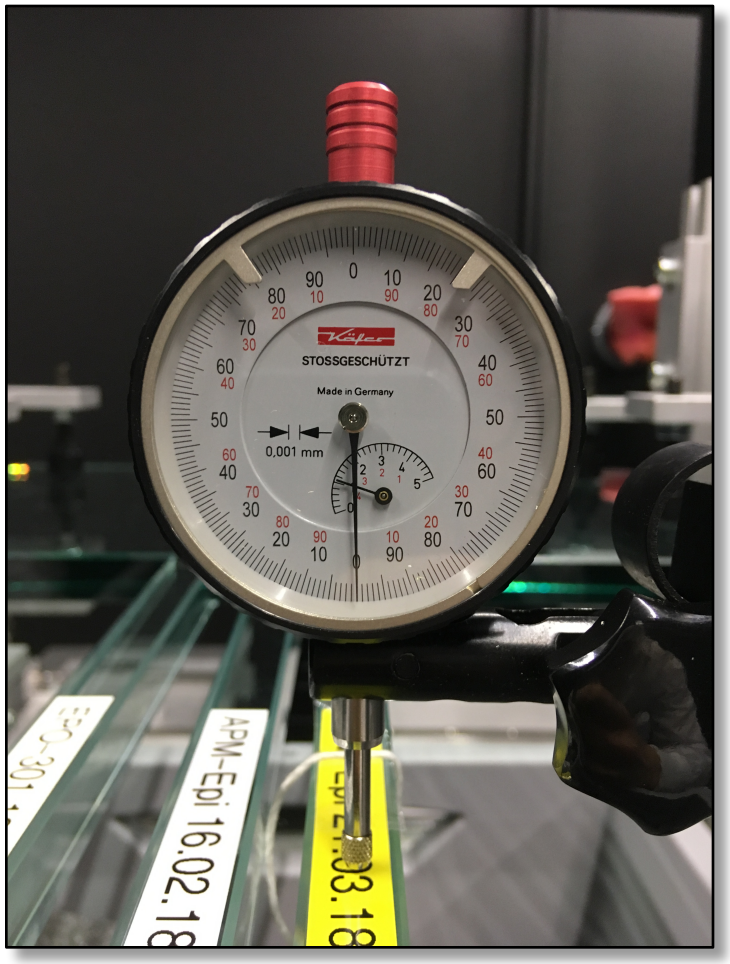
Optical Gluing tests – Load tests





- First load test with 15 Nm (expected force due to magnetic field)
- Precision scale shows elastic deformation of about 80 um
- NOA-61 failed even at low weight!

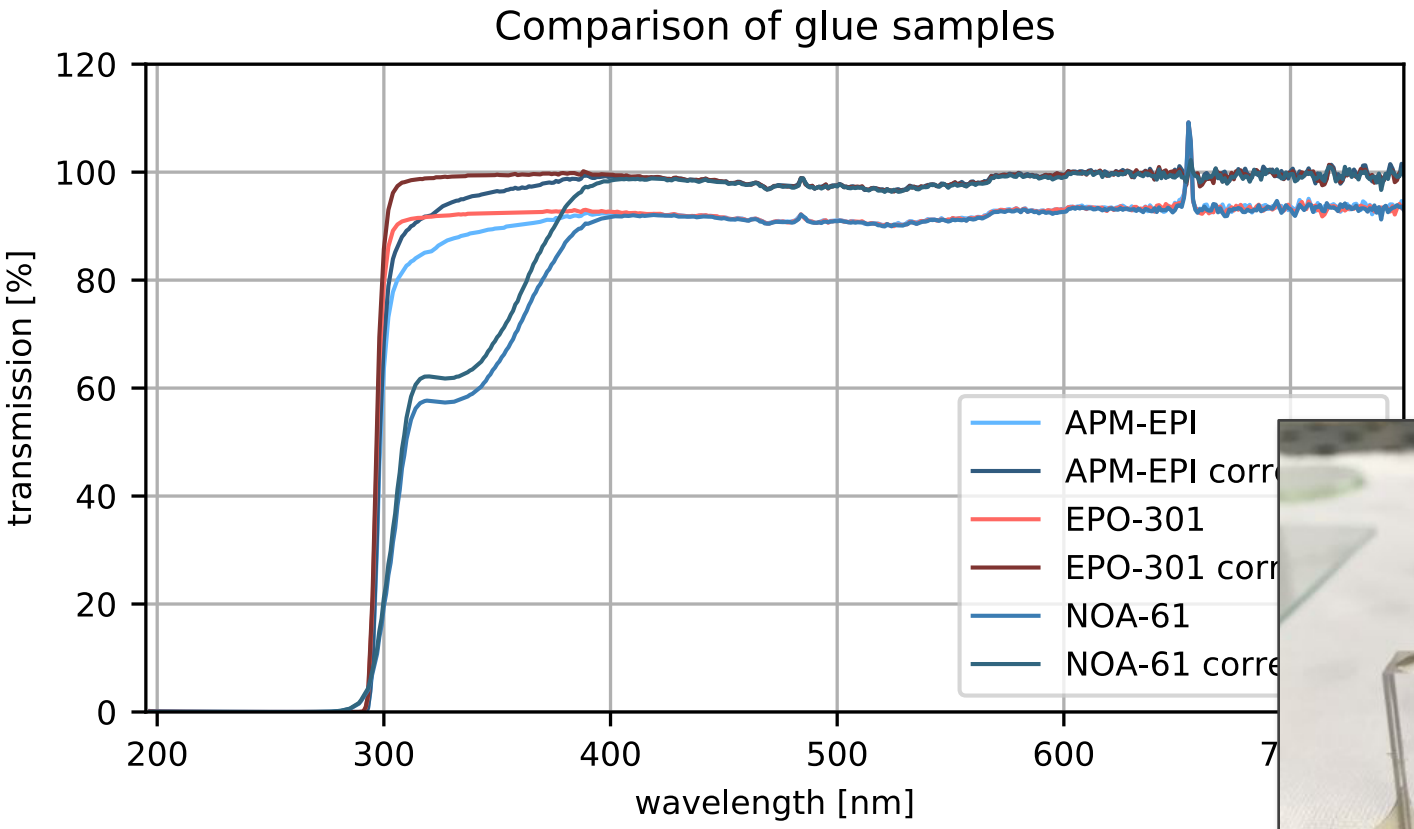
Optical Gluing tests – Load tests

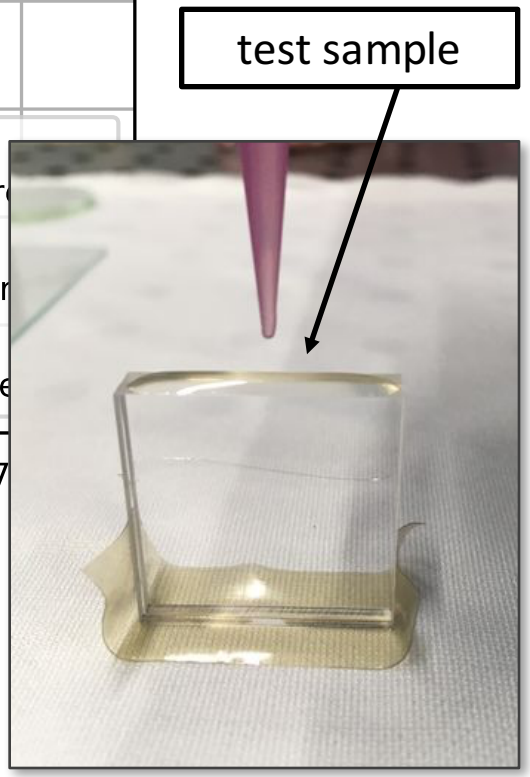


- Extended tests with up to 45 Nm (current status)
- Deformation up to 300 um observed

Optics

Optics – Glue Transmission Measurements

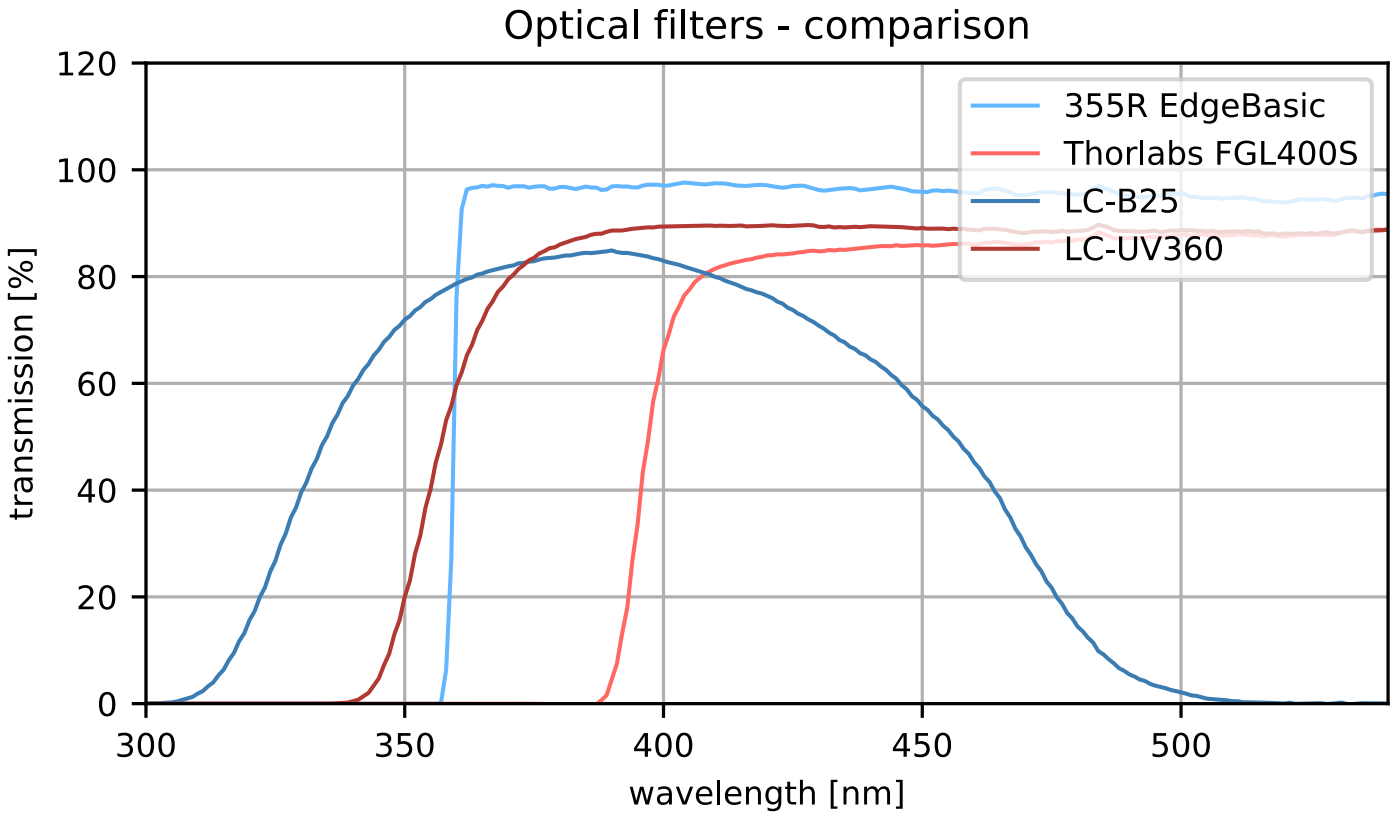




- Test samples have a thickness of about 80 um
- AMP-Epicol has not a sharp edge like EPO-301 at 300 nm
- NOA-61 shows a clear drop below 400 nm

measurements and plots were done by Lisa Marie Brück

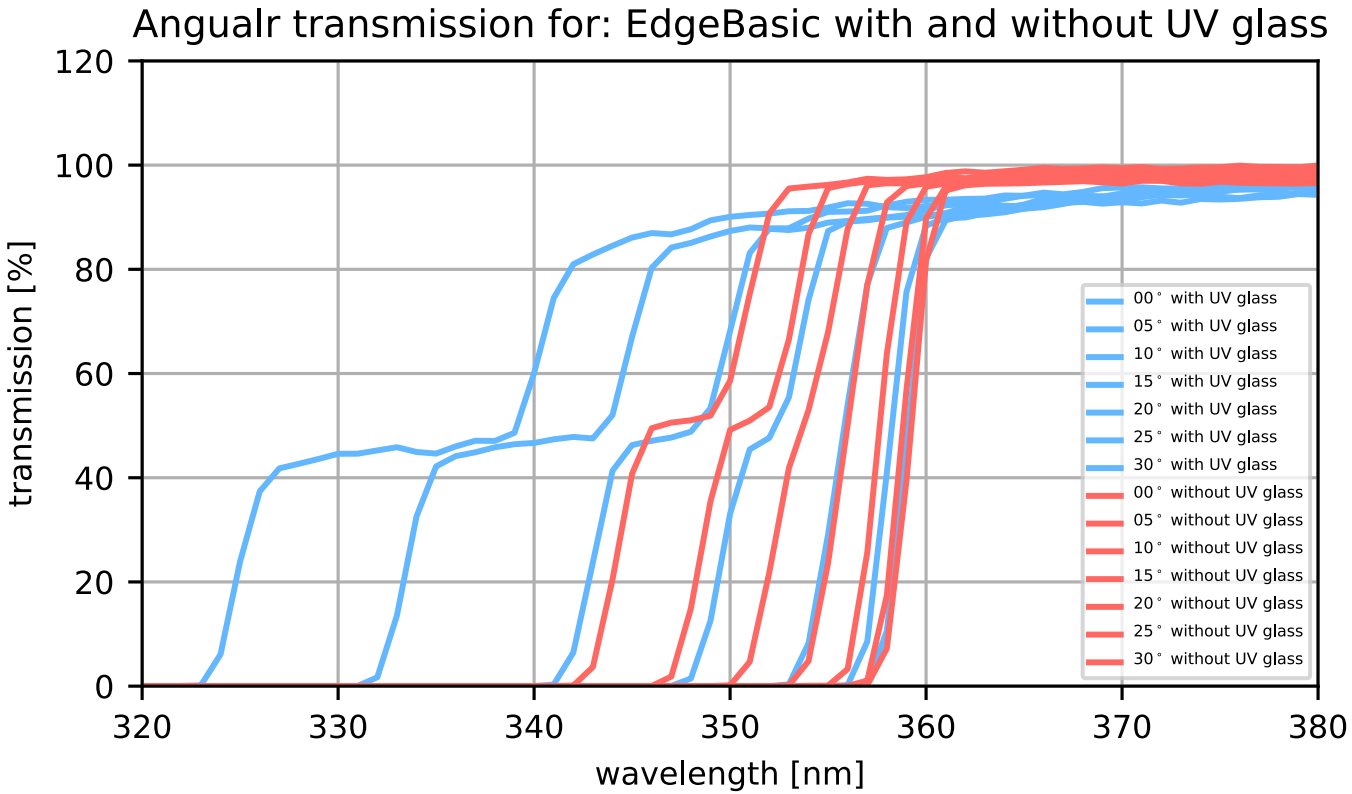
Optics – Filter transmissions



- 355 Edge Basic by Semrock is a dielectric filter with anti-reflective coating
- The remaining samples were color filters
- Transmission values are not corrected for Fresnel-losses

measurements and plots were done by Lisa Marie Brück

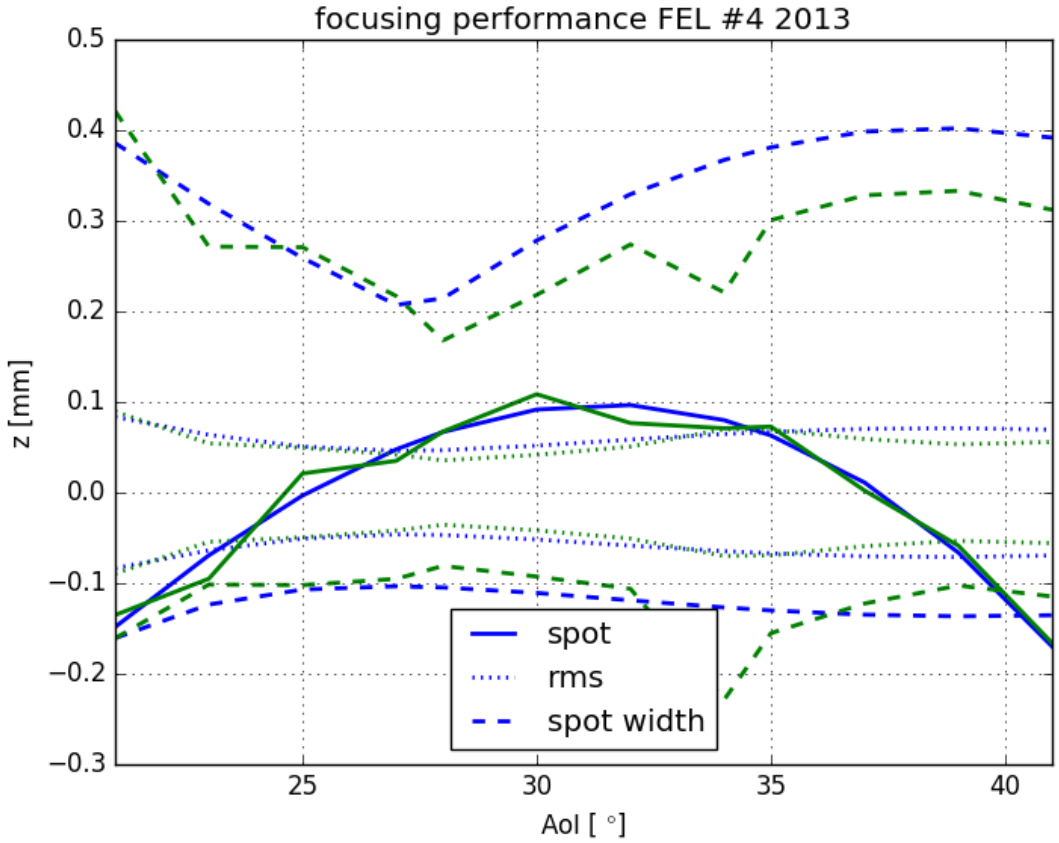
Optics – Filter transmissions



- Transmission of dielectric filter depends on the angle of incidence
- Significant shift if filter is placed between fused silica windows
- We are going to test other dielectric filters to see if they match our requirements better

measurements and plots were done by Lisa Marie Brück

Optics – Focusing Elements



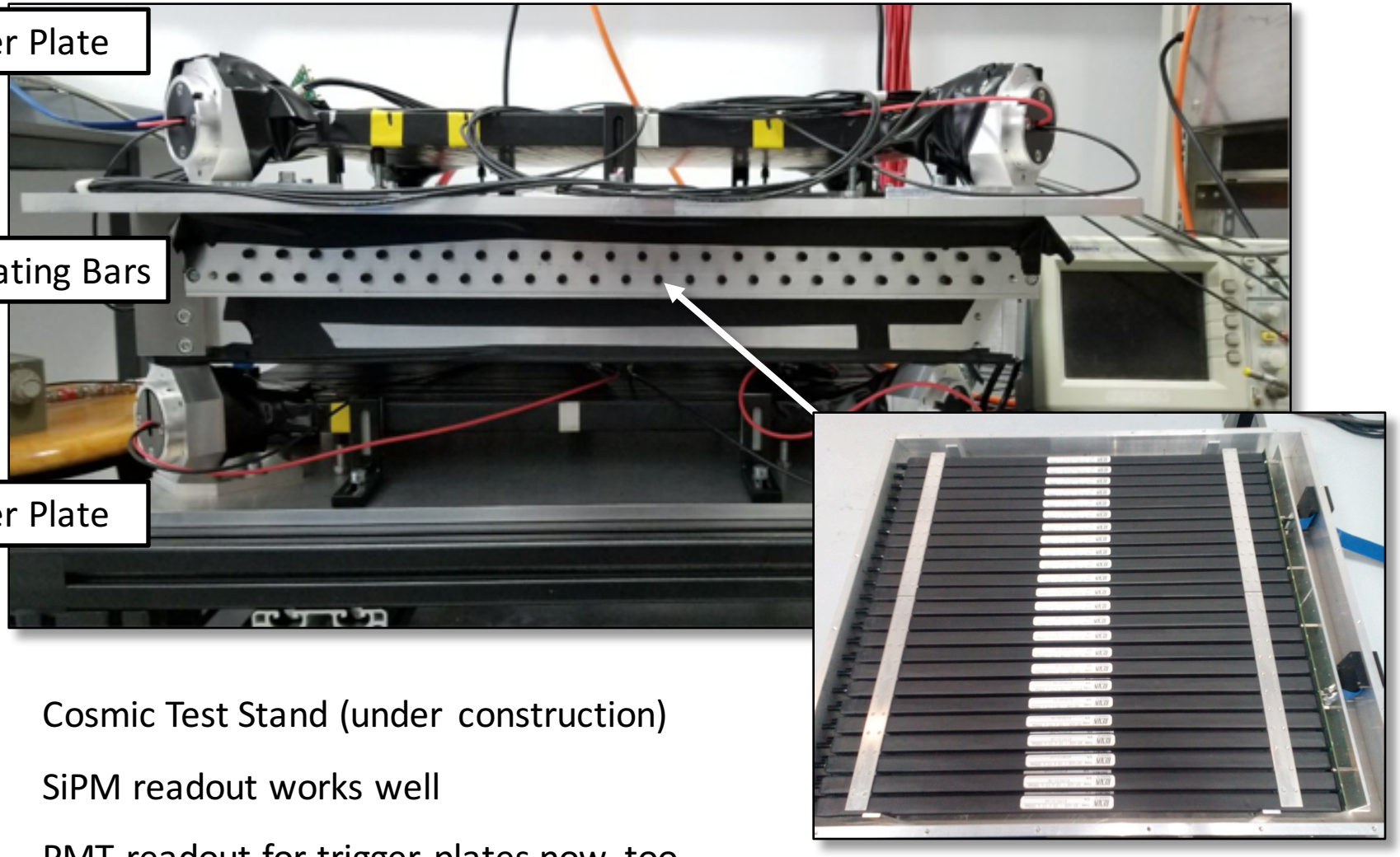
- New setup for FEL qualification is being developed
- Blue shows simulation
- Green shows data
- Good agreement
- Measurement can be done mainly automatically (CCD sensor has to be shifted)

- solid lines correspond to the deviation from a linear fit to the imaging function

measurements and plots were done by Sophie Kegel

Front-end Electronics

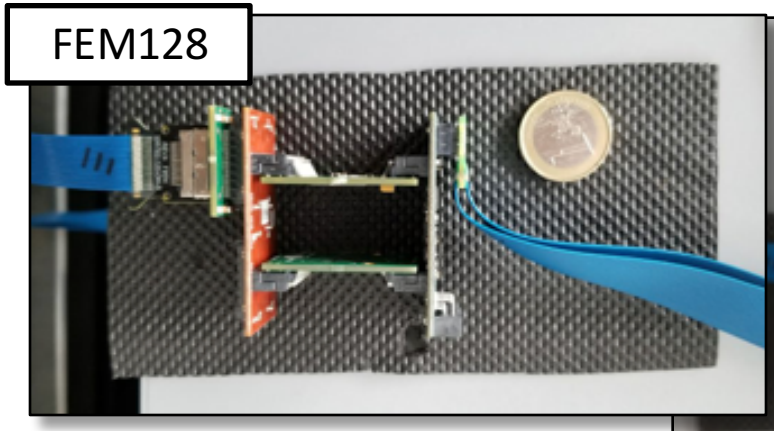
Front-end Electronics

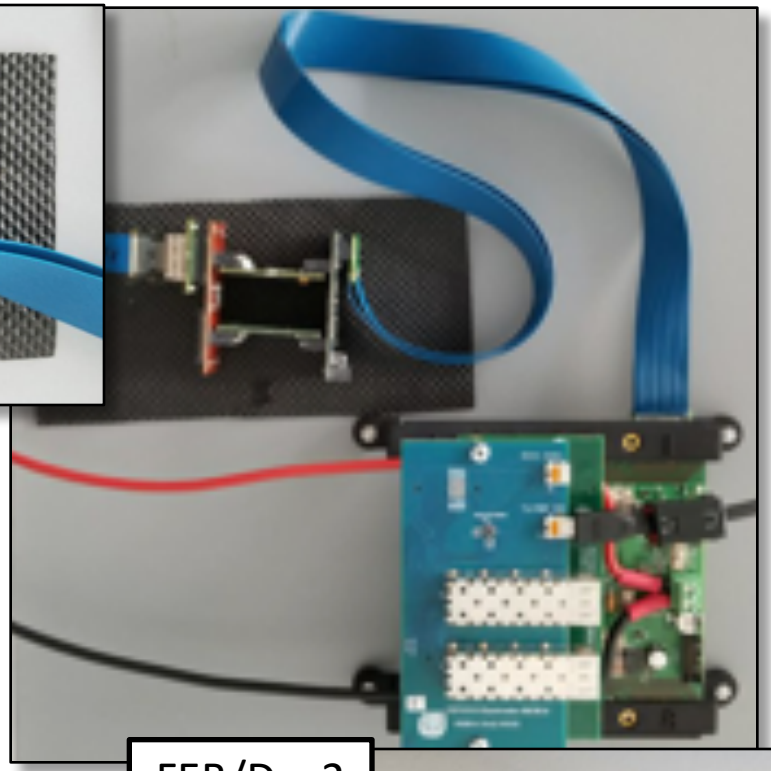


- Cosmic Test Stand (under construction)
- SiPM readout works well
- PMT readout for trigger plates now, too

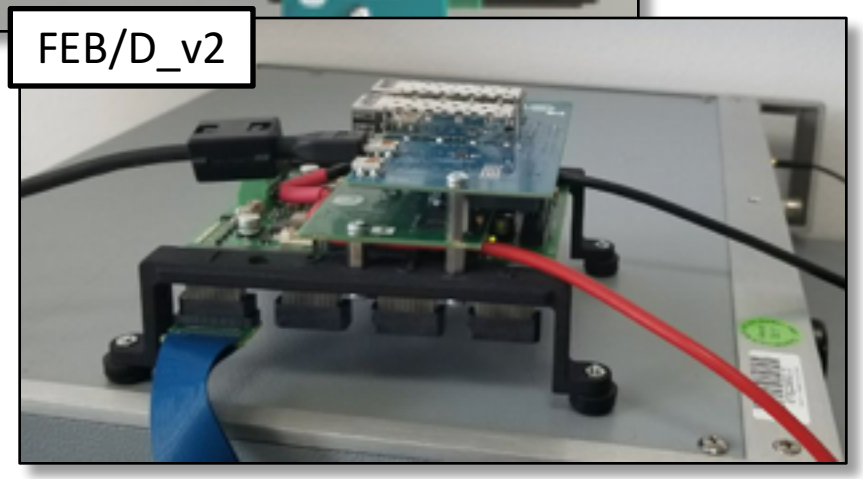
scintillating bar box by S.Bodenschatz, supported by I.Köseoğlu and A.Hayrapetyan, M.Strickert

Front-end Electronics



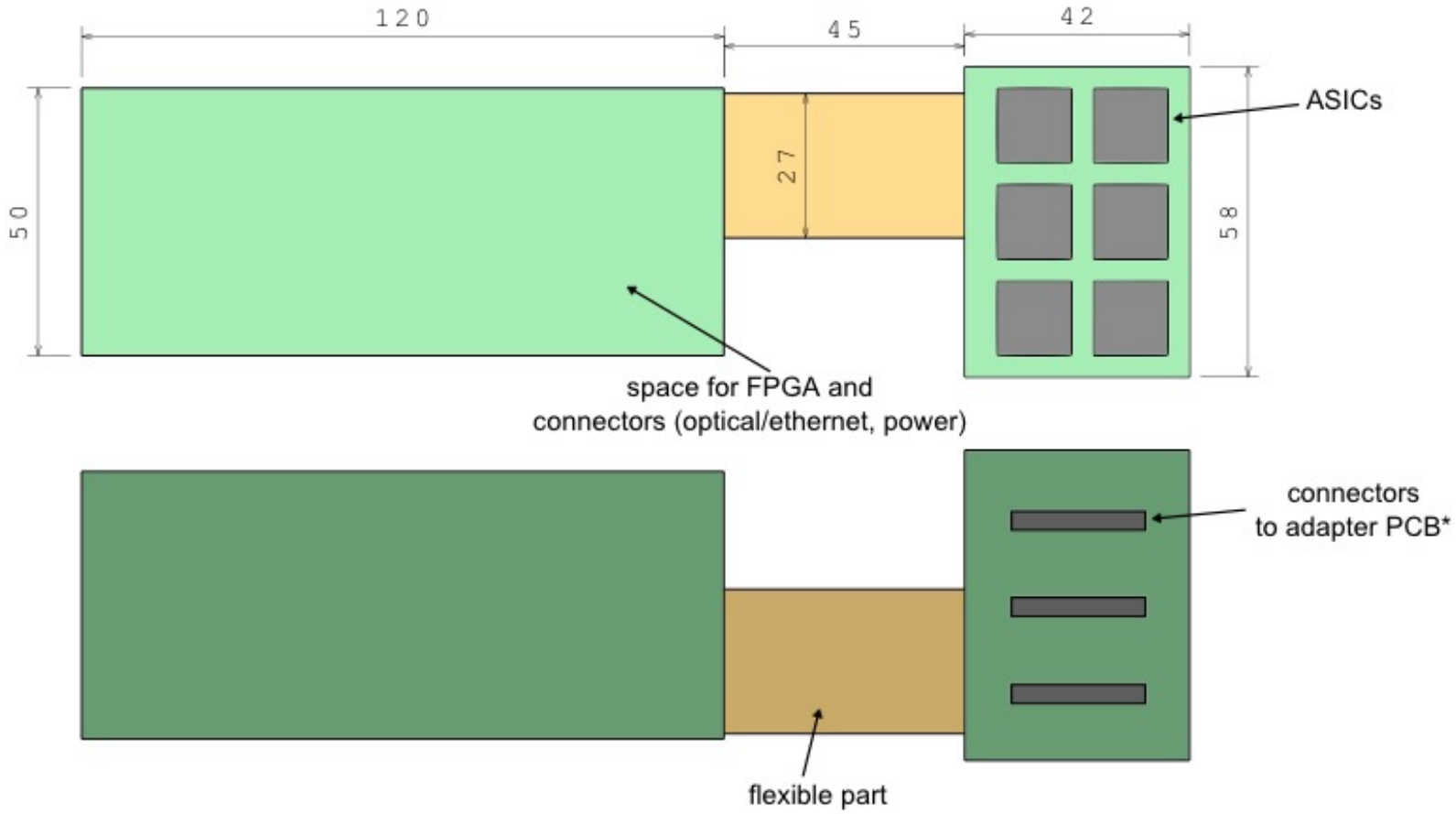


- FEM128 contains two FEB/A_v2
- 128 channels available
- Another 8 boards (1024 channels) to arrive by mid-June
- Tests ongoing



Development of a EDD-FEE-Board

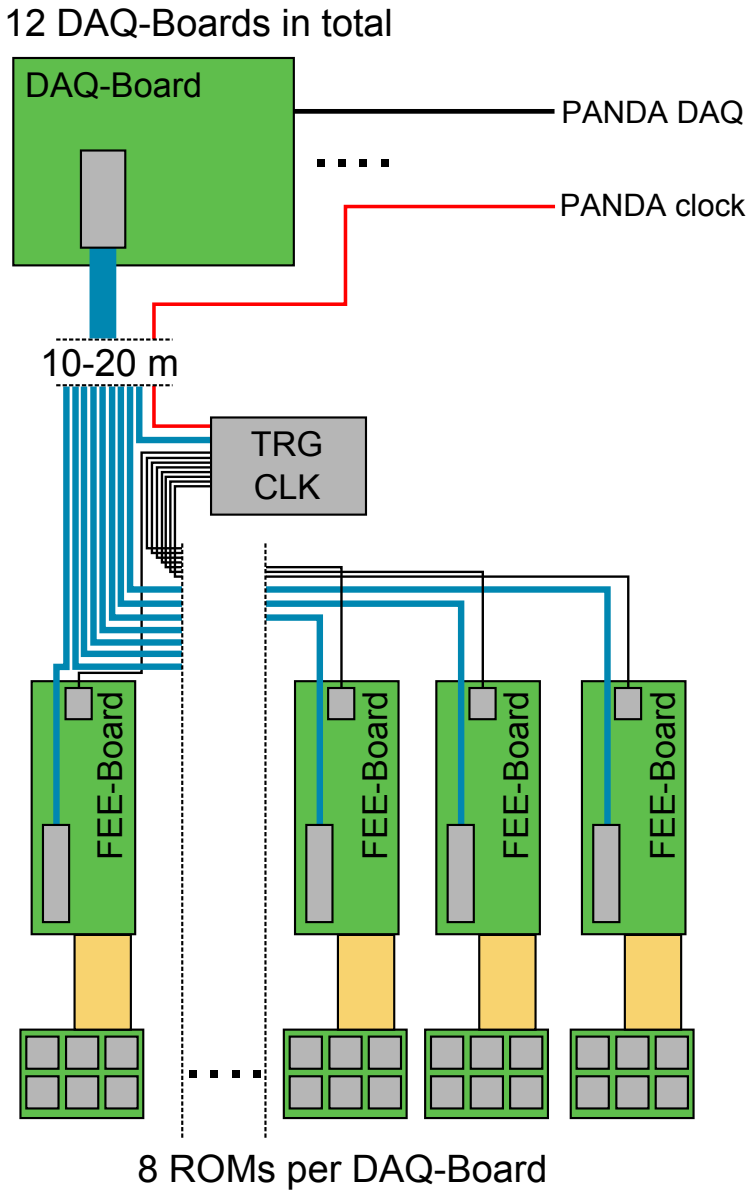
Sketch: Available Space for Front-End Electronics (side view) 13.03.2018



*positions nd type yet have to be defined

E. Etzelmüller

Development of a EDD-FEE-Board



Requirements:

- at maximum 100 kHz per channel
  → converts to 30 MHz per ROM

✓ FEB/D allows up to 10^8 events/s

✓ DAQ-Board allows up to $2.5 \cdot 10^8$ events/s

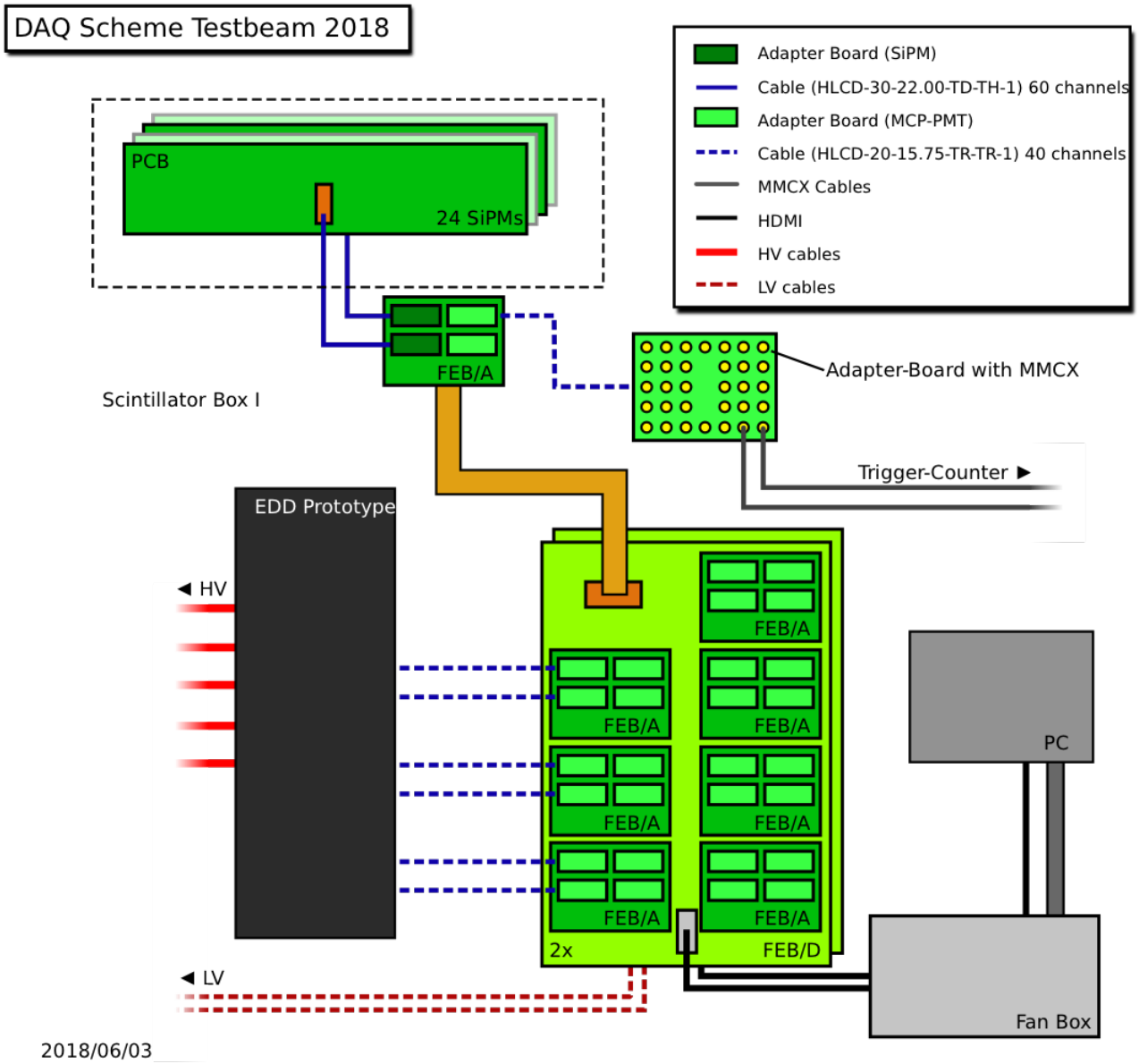
- ➢ 8 ROMs per DAQ-Board
- ➢ 3 DAQ-Boards per Quadrant
- ➢ 12 DAQ-Boards in total (72 FEE-Boards)

Development of a EDD-FEE-Board

- Meeting with PETsys in Lisbon at the end of April
- Boundary conditions were discussed and open questions addressed
  - DC-DC convertes: Use some LDOs? Alternatives inside the magnetic field?
  - Optical link: Versatile link needed?
    - ➢ detailed radiation map in preparation by M.Schmidt
- Meeting at CERN with electronic engineer
- Project will be supervised/pushed forward by İlknur Köseoğlu

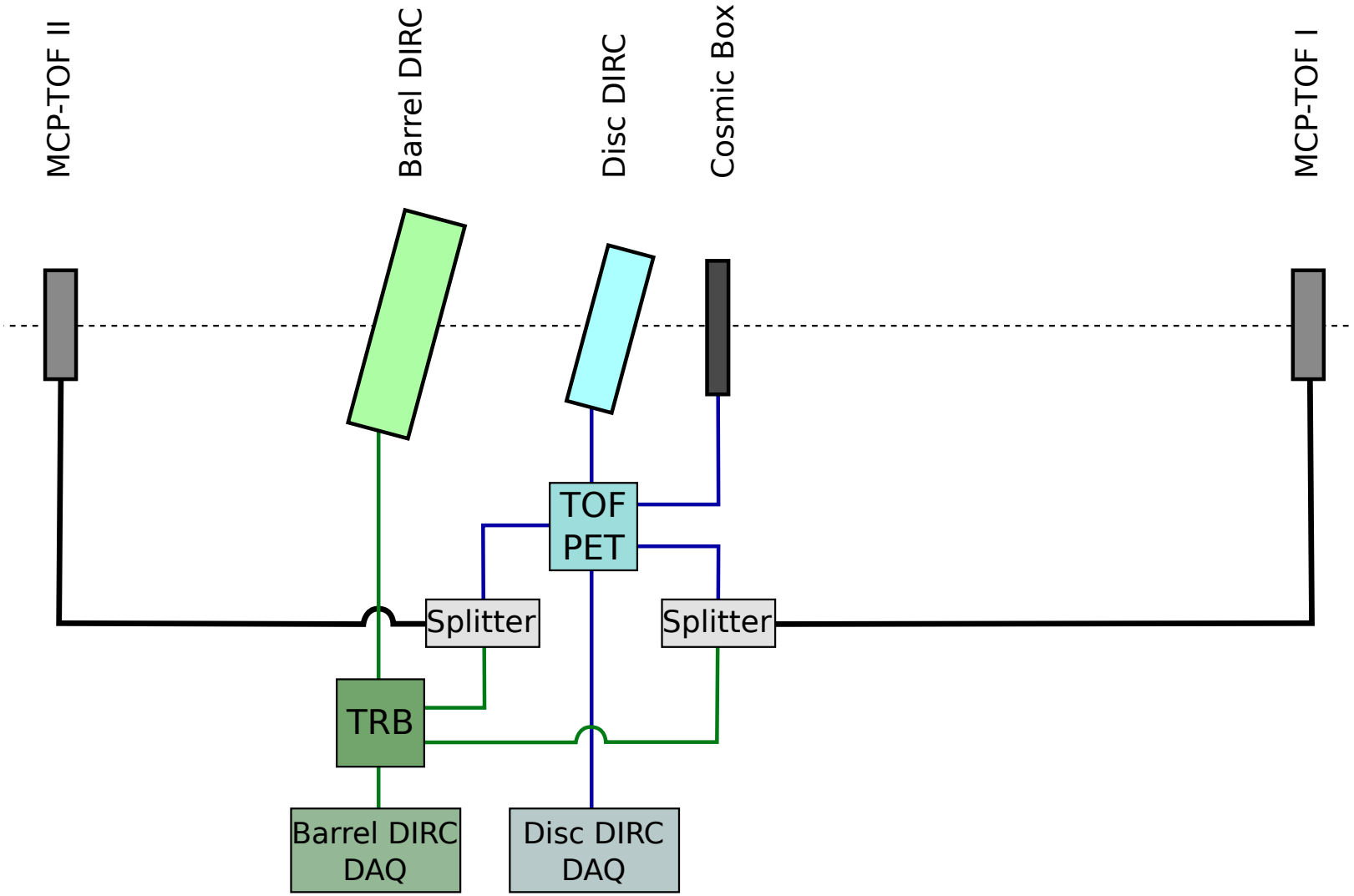
Testbeam

Testbeam - EDD prototype readout scheme



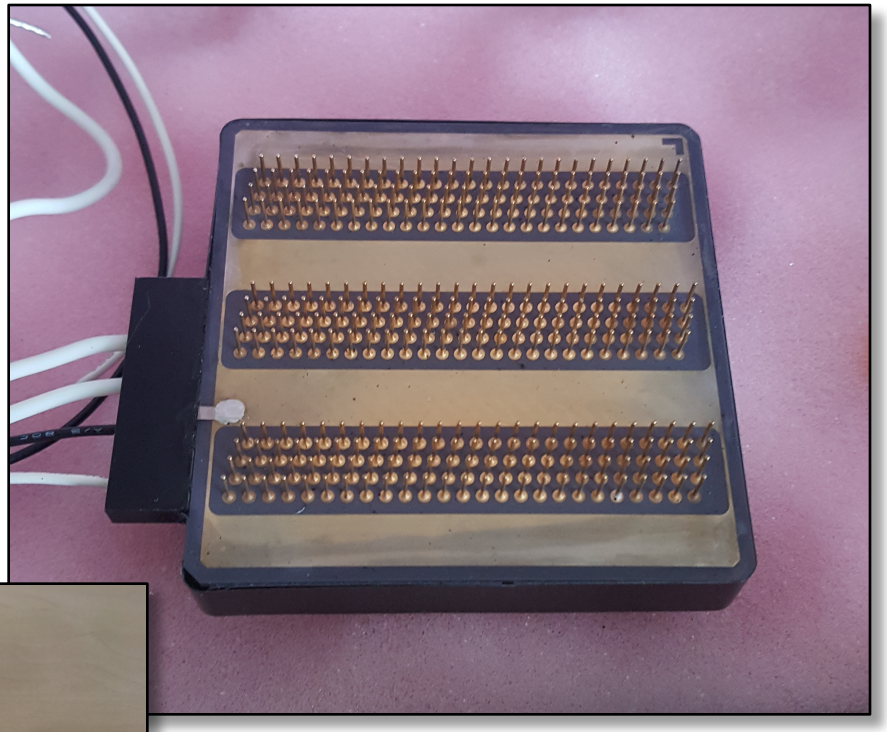
Testbeam - EDD prototype readout scheme

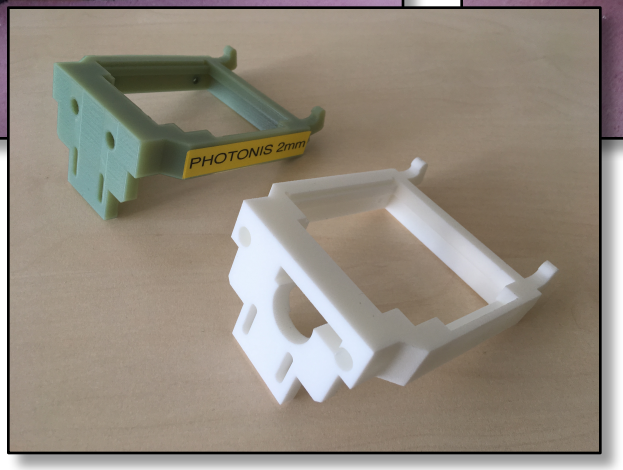
DAQ overview Testbeam CERN 2018



Testbeam – New MCP-PMT

New MCP-PMT (PHOTONIS Aqua) was just shipped to Erlangen for a first evaluation





Thanks to Markus for the sensor pictures

Testbeam preparations

- Preparations are ongoing
- Setup similar to DESY 2016, but
  - more channels
  - TOFPET version 2
  - new MCP-PMT (Aqua)
- TOFPET version 2 still has to be tested in more depth
- Remaining boards should arrive until Mid of June according to PETsys
- Some PCBs missing
- Great man (and woman) power available during testbeam
- Preparative simulations are getting started
  - J.Hofmann and J.Pereira de Lira supervised by M.Schmidt