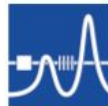


# Mechanics

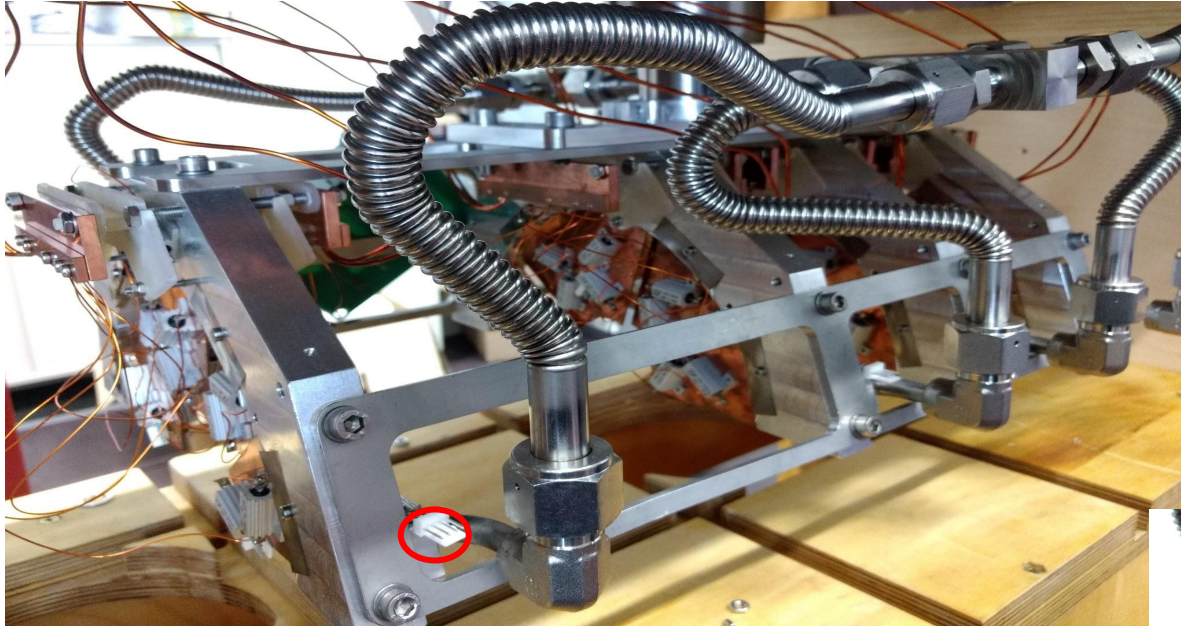
Christof Motzko  
on behalf of the Luminosity Detector Group

Helmholtz-Institut Mainz  
Johannes Gutenberg-Universität Mainz

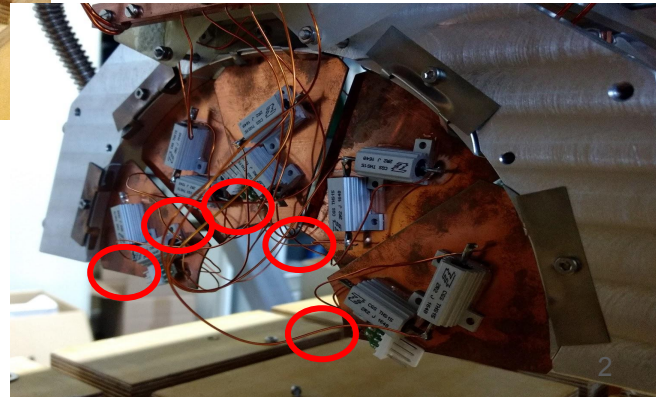
PANDA Collaboration Meeting  
June 25, 2019



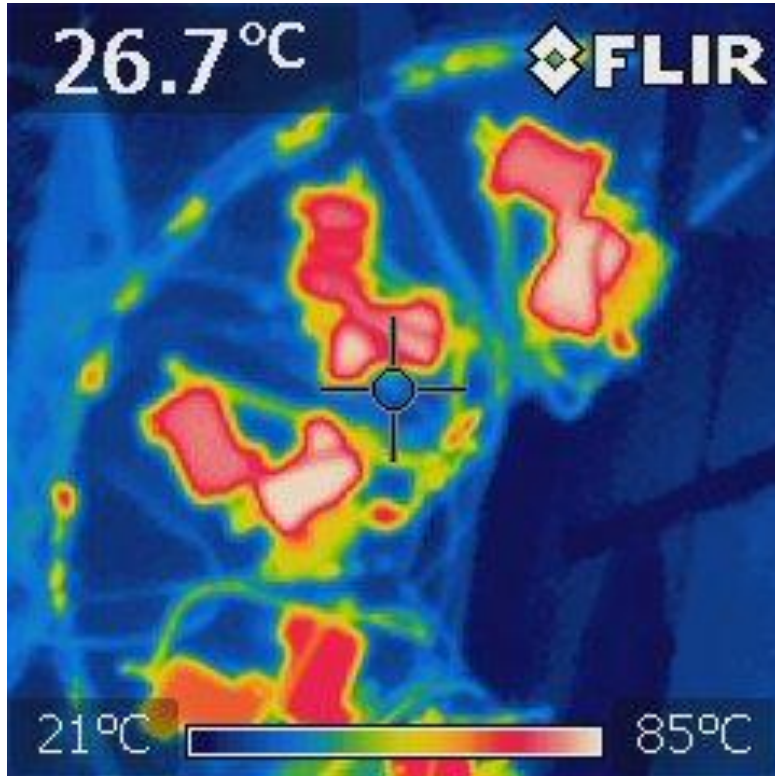
# Test of the Cooling System



- For cooling test: copper dummies and high power resistors
- Temperature sensor on each module
- Additional temperature sensors on the half planes



# Results



## Test in air:

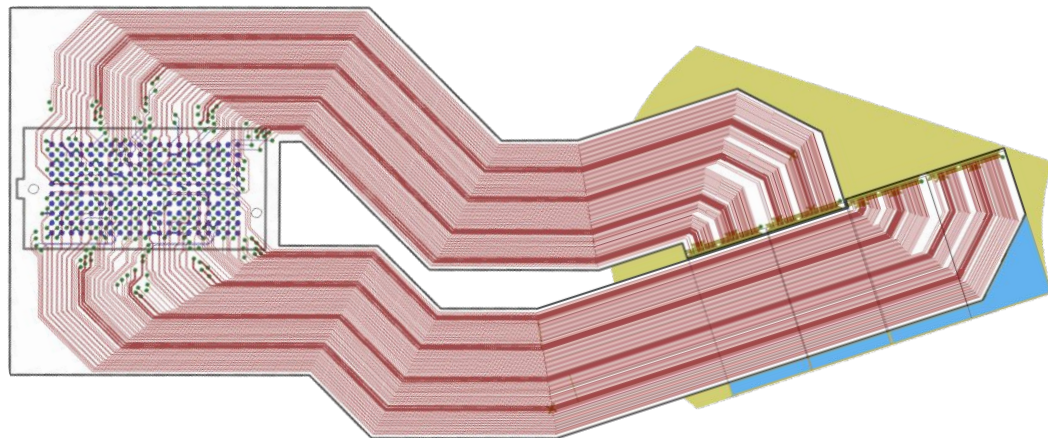
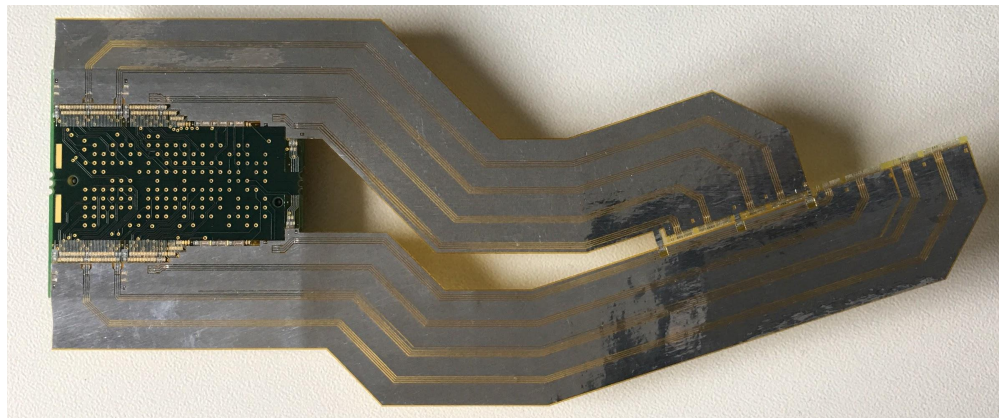
- Test of the cooling and heating elements (resistors) in air
- Total power:  $\sim 500$  W
- Measurement with thermal camera:
  - Resistors:  $T \sim 100$  °C
  - Copper dummies:  $T \sim 25$  °C

## Test in Vacuum Box (only fore pump):

- About 1000 cycles ( $-20$  °C to  $+20$  °C)
- Total power:
  - 340 W ( $>500$  cycles)
  - 470 W ( $>500$  cycles)
- Max. temperature: 25 °C (350 W)
- No leakage

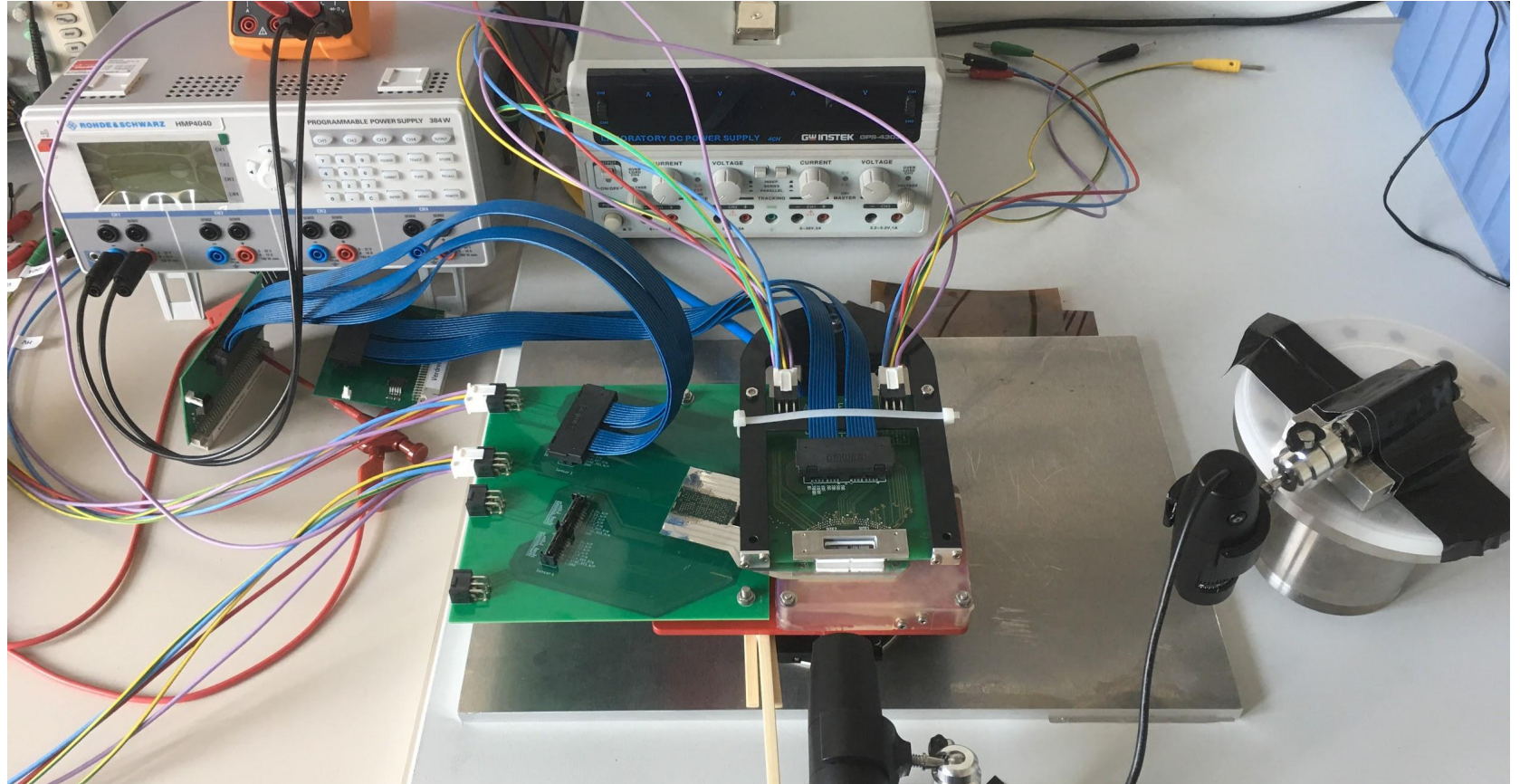
# Aluflex Cable

- 4 MuPix sensors
- Pad size =  $80\ \mu\text{m}$
- Min. pad distance =  $70\ \mu\text{m}$
  
- Differential pairs (600 Mbit/s)
- HV lines (60 V)
- LV lines ( $<1.6\ \text{A}$ )
  
- 5 cables for the prototype to test





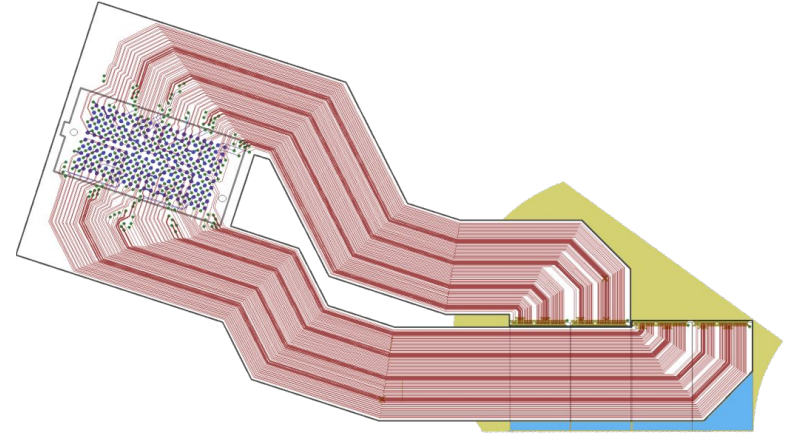
# Test bench of aluflex cable



# Test: Voltage lines

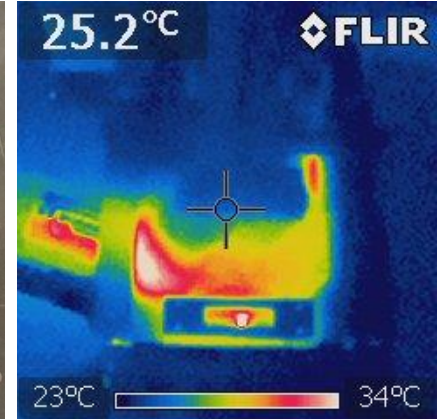
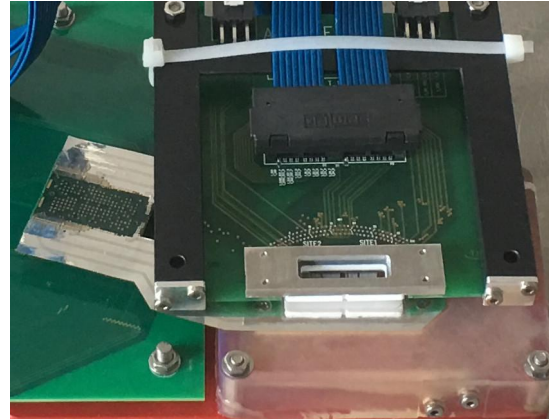
## LV:

- Current per sensor:
  - Expected: 0.4 A
  - Worst case: 1.6 A
- Tests were done with 1.2 A
- Only 2 of 4 lines were used due to contact problems



## HV:

Test of the HV lines with up to 100 V



# Test: Data Signals

Test of the differential lines (LVDS) and single lines

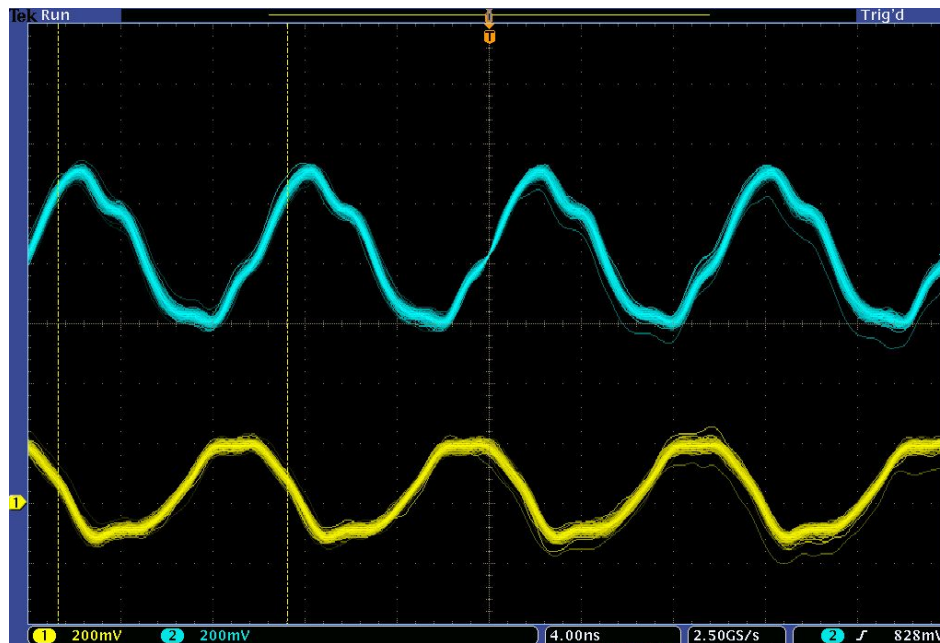
Planned tests:

- Eye-diagram
- Bit error test

First tests were done with a 100 MHz clock

FPGA broke after first tests:

- First eye-diagrams were measured
- Bit error test not possible



# Radiation Hardness Test

type	part number	# planned
LDO regulator	MCP1727-1.8	90
	MCP1727-ADJ	90
LVDS repeater	DS25BR100	45
clock driver	ADCLK846	32

- Test in May cancelled
- Test will be done in September in Jülich with 2.9 GeV protons





# Conclusion

- Cooling test of half detector successful
- First tests with test bench of the aluflex cable done
  
- Programming of the PLC for the vacuum control
- Portable CMM will be delivered in July
- CMM will be delivered in August