# LMD Hardware
# - Mainz Teststation -

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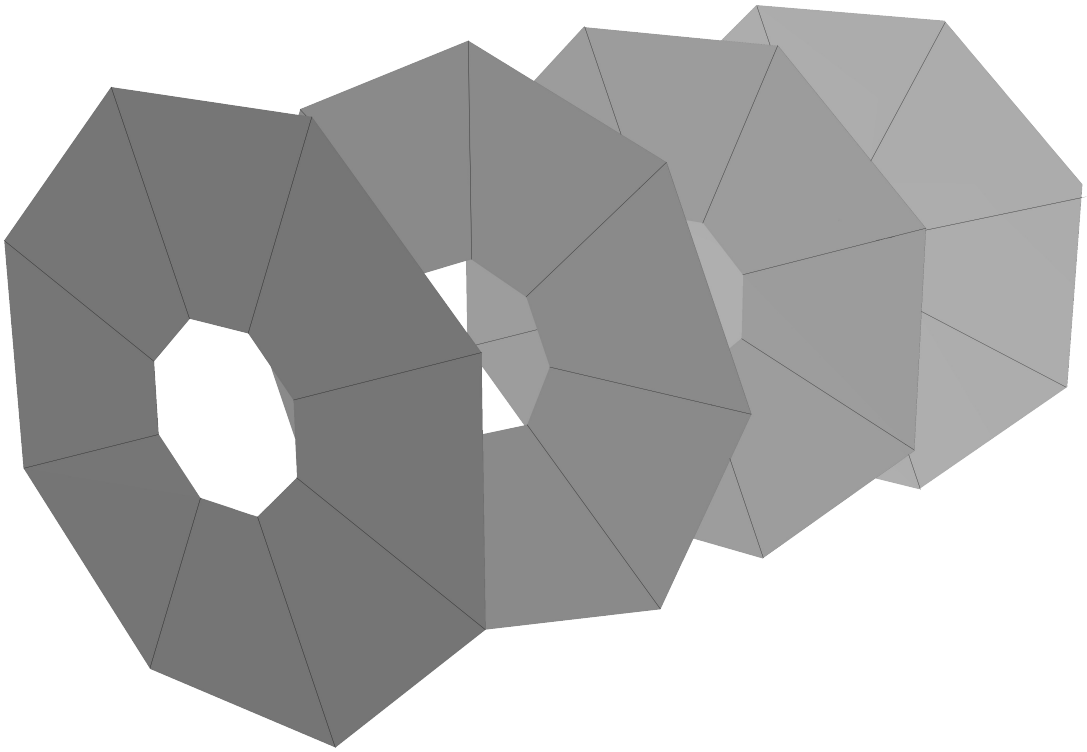
# Reminder: LMD Concept

- 10 - 50 cm between planes
- sensors:
  - 150 / 300 µm thick
  - double-sided
- strips:
  - 50 µm pitch
  - stereo angle ~90°

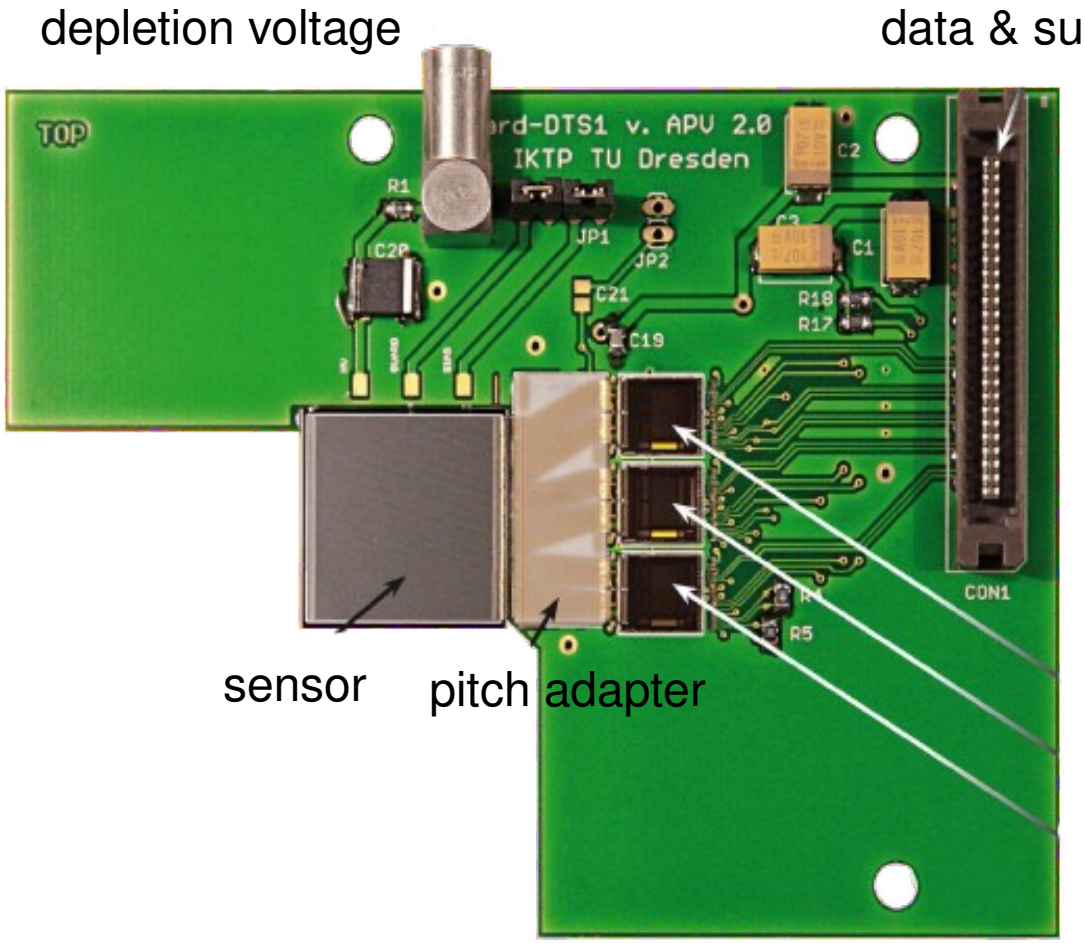


- rotate e.g. second and fourth plane to reduce ambiguities

# Reminder: First Test Sensors

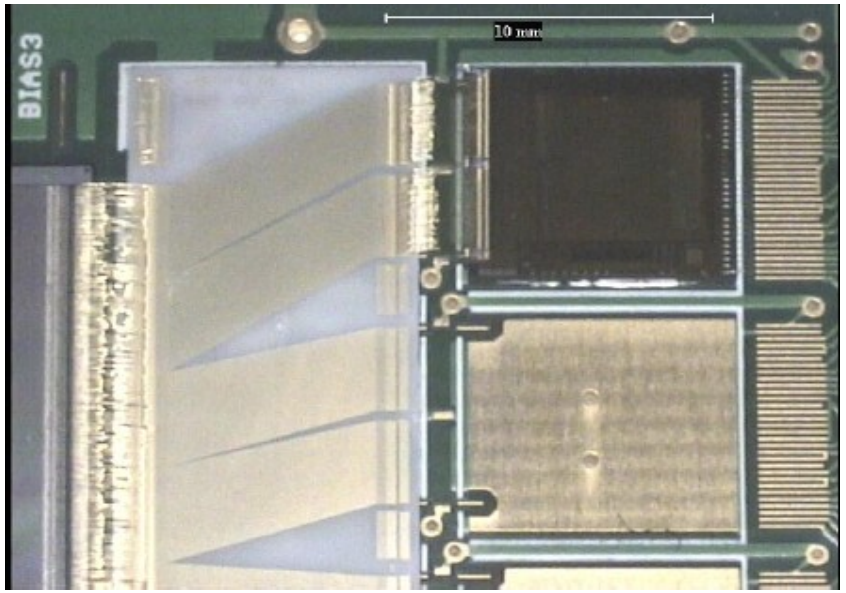
from ATLAS

- 20.82 x 20.82 mm²
- 300 µm thick
- 50 µm pitch
- 385 strips
- double-sided, BUT
  one-sided readout
- every 64th strip is not connected

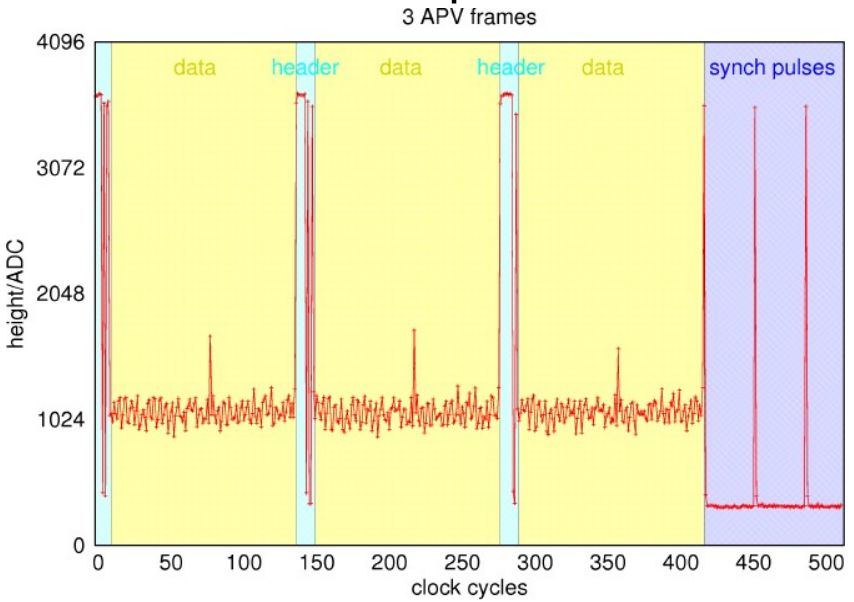


# APV25-S1 - Frontend Chip

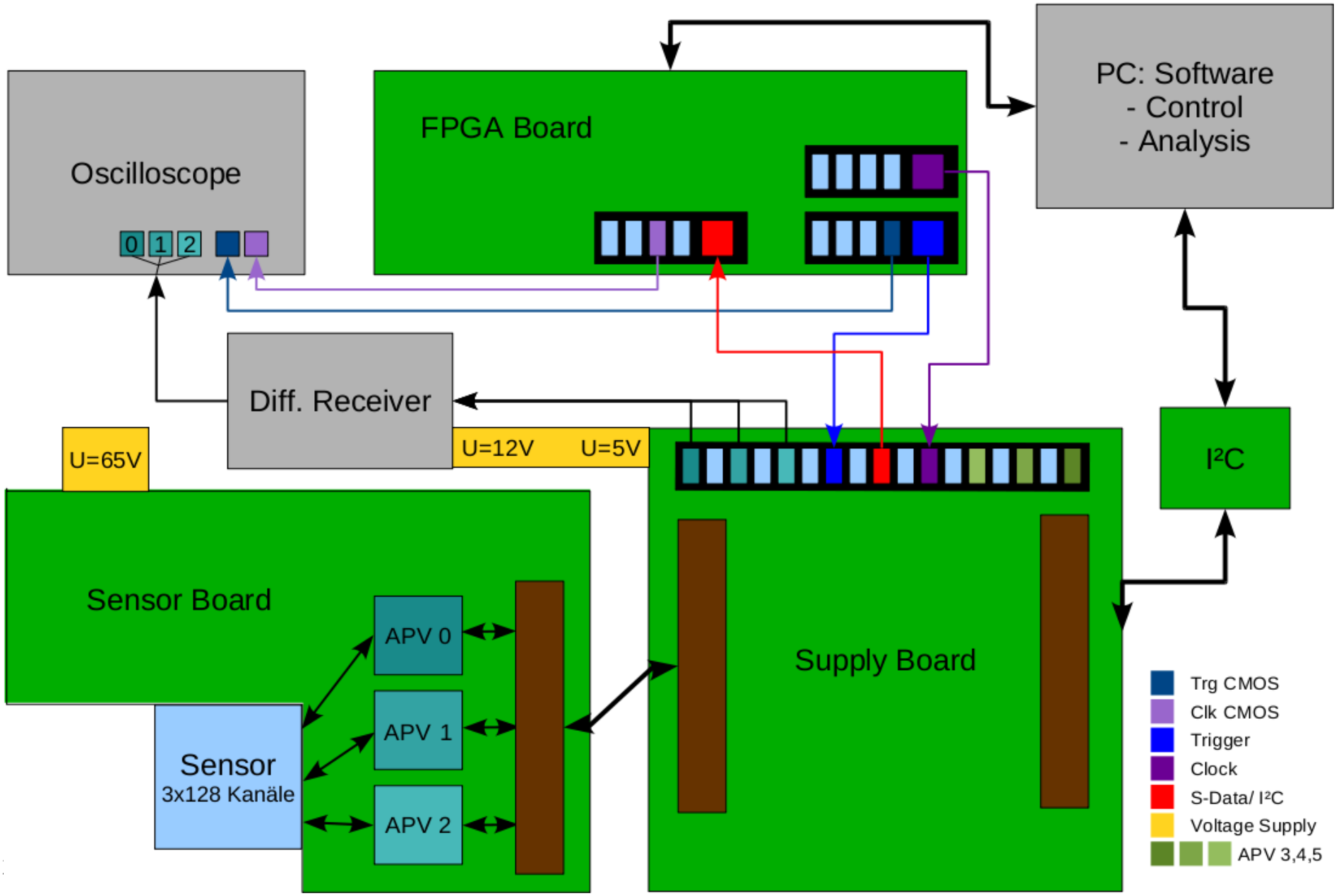
- developed for CMS @ LHC
- 128 channels
- pitch 44 µm
- Preamp + Shaper + Analog-MUX



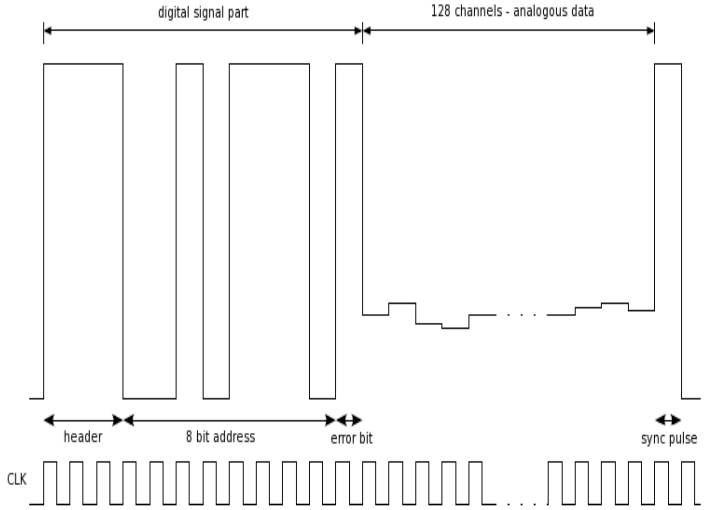

- no internal trigger
- external trigger required
- ➔ scintillator & photomultiplier
- ➔ APV25 in 3 sample mode:

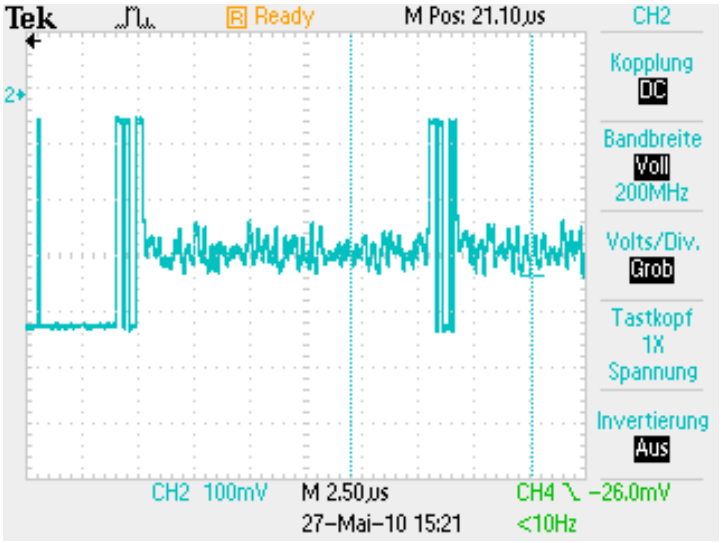


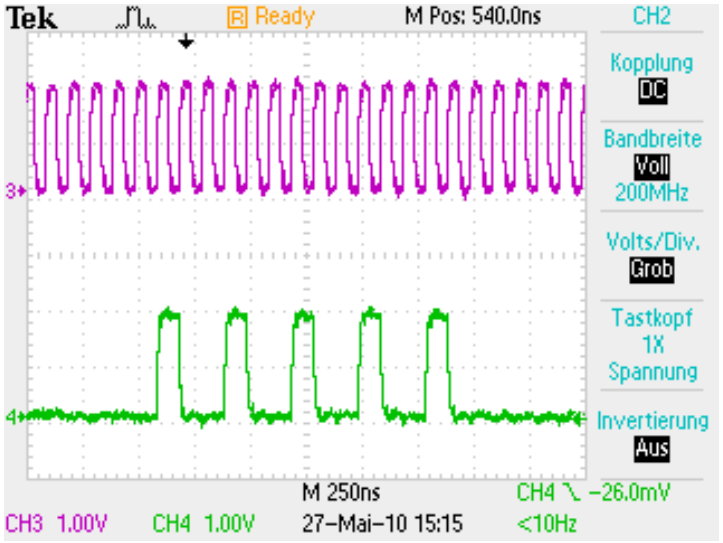
# Readout via Oscilloscope

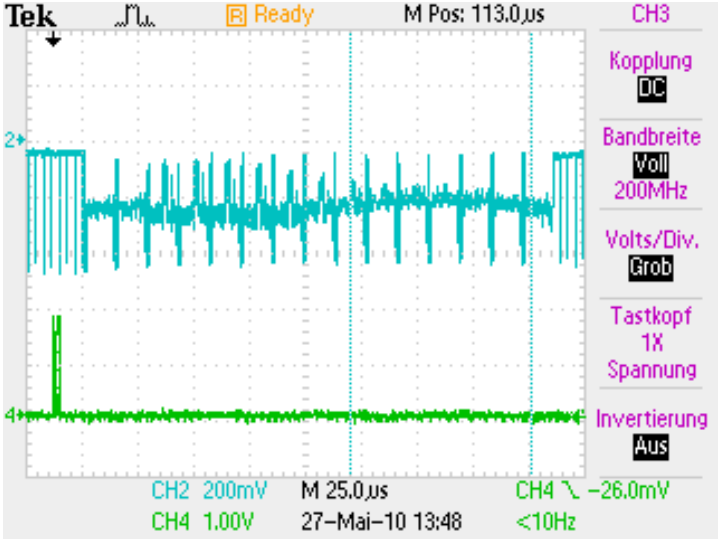


# APV - clock, trigger, frames



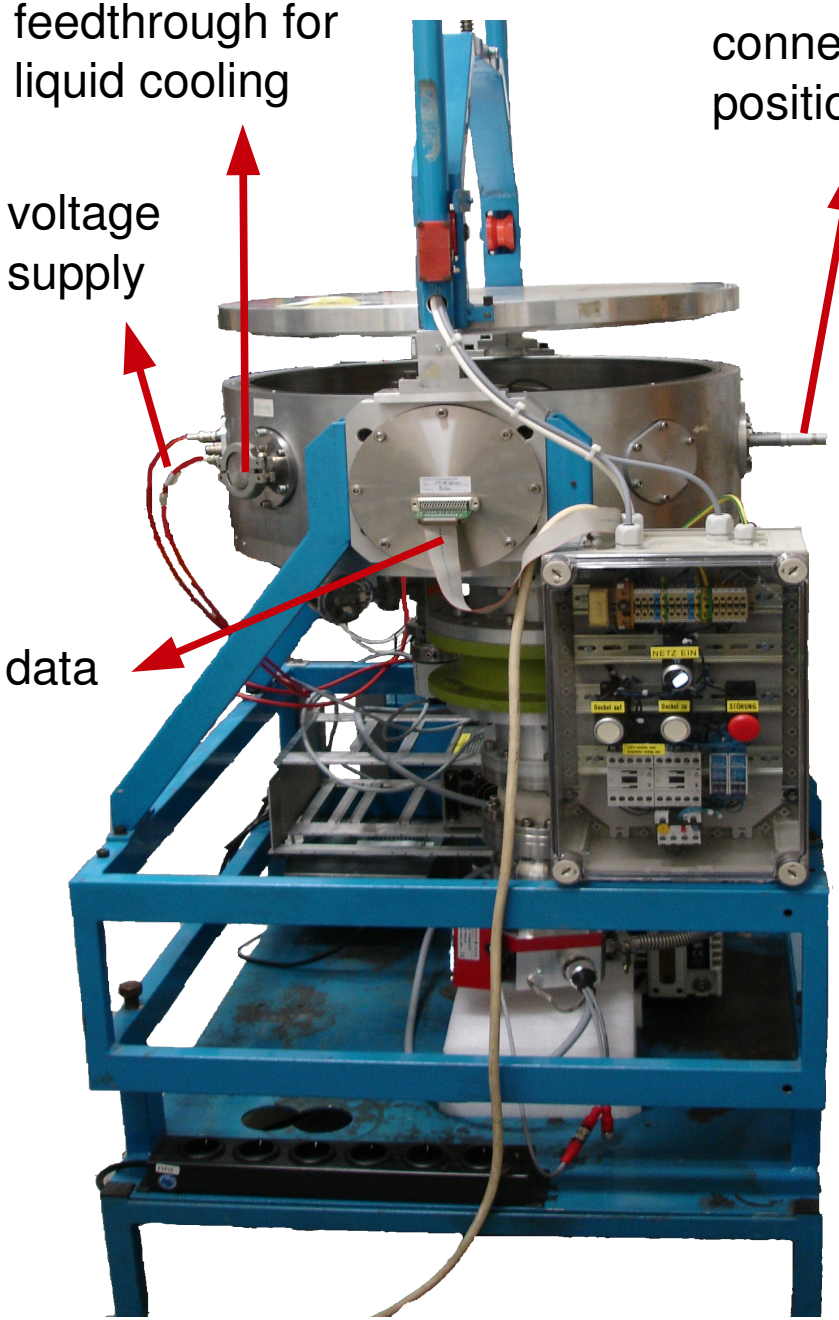



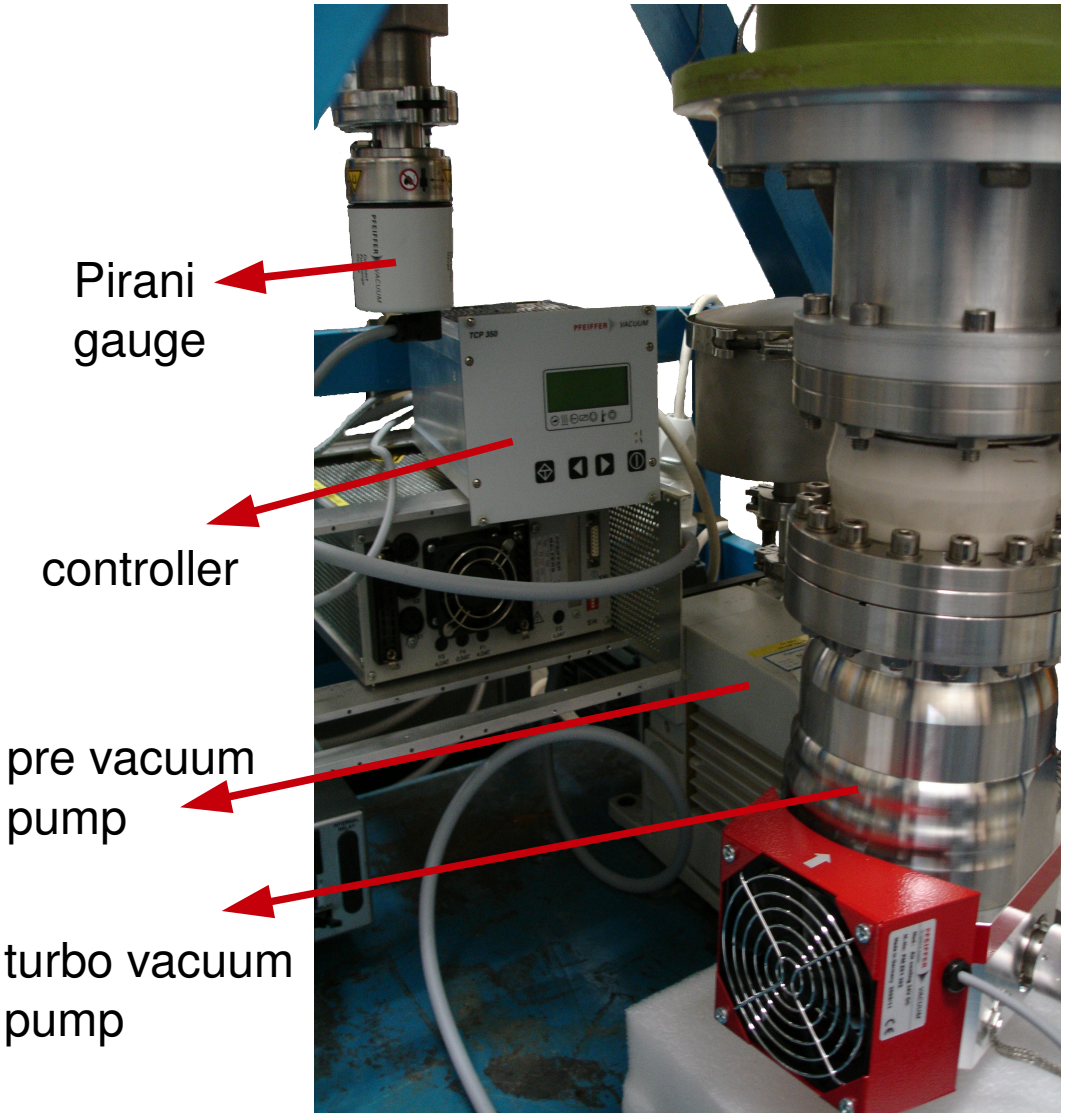



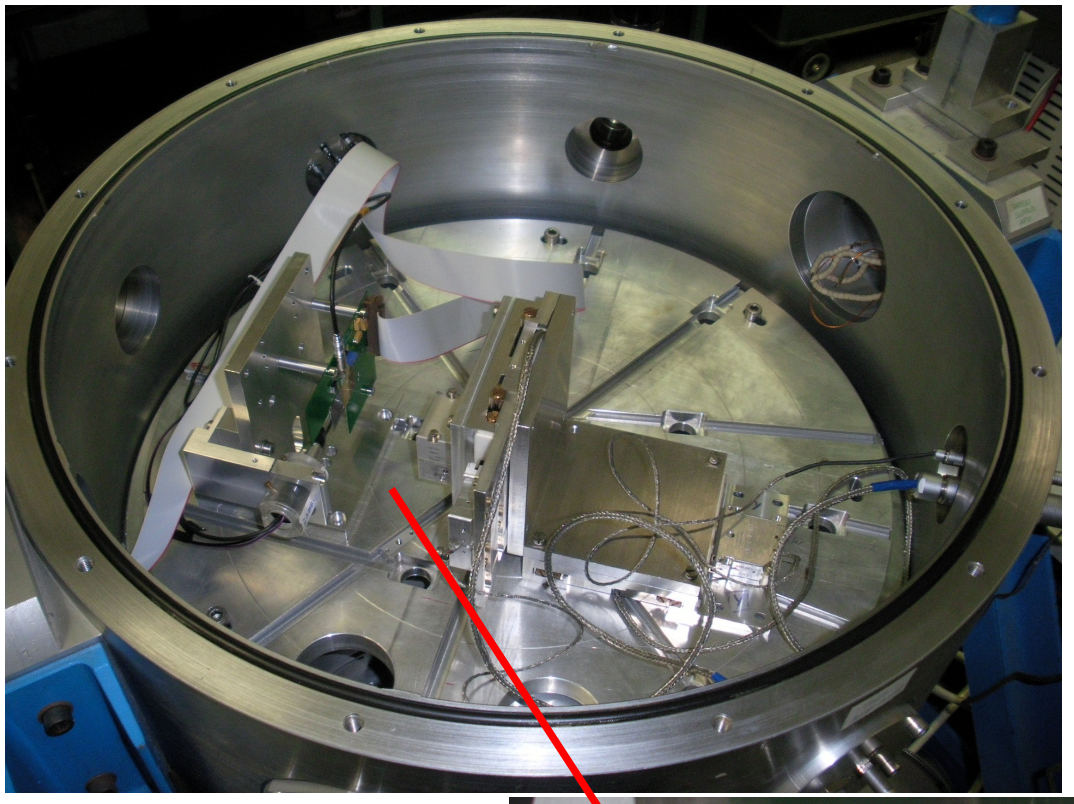



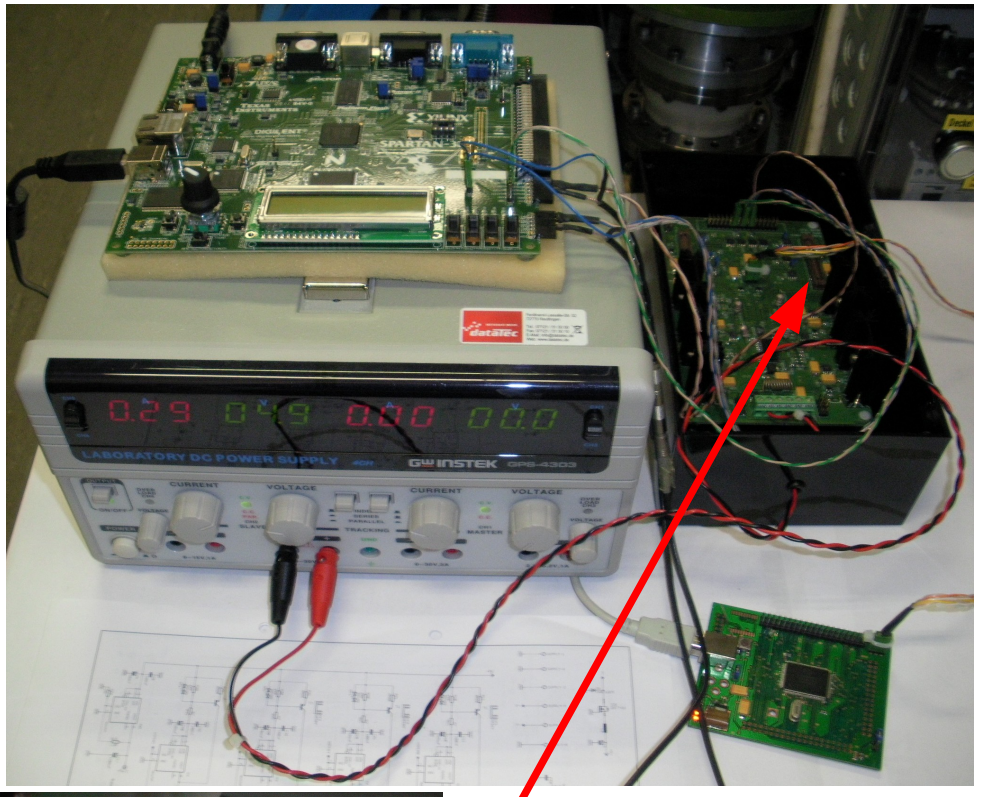
# Experimental Setup

# Chamber and Vacuum

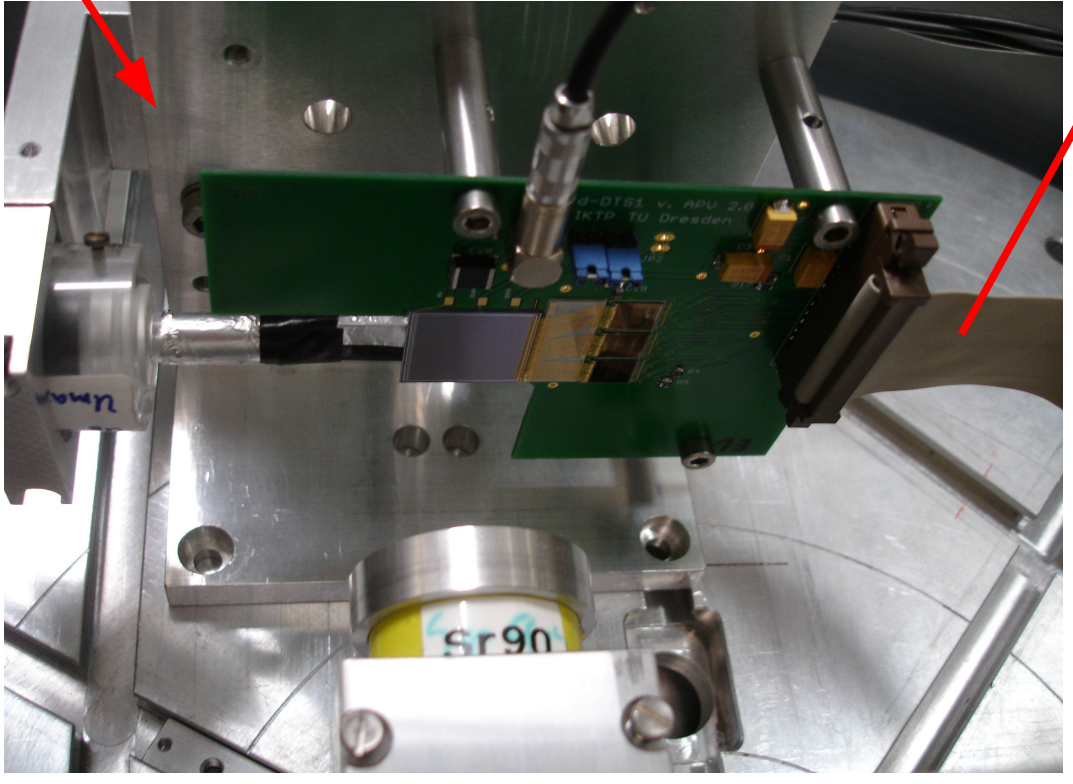







vacuum chamber



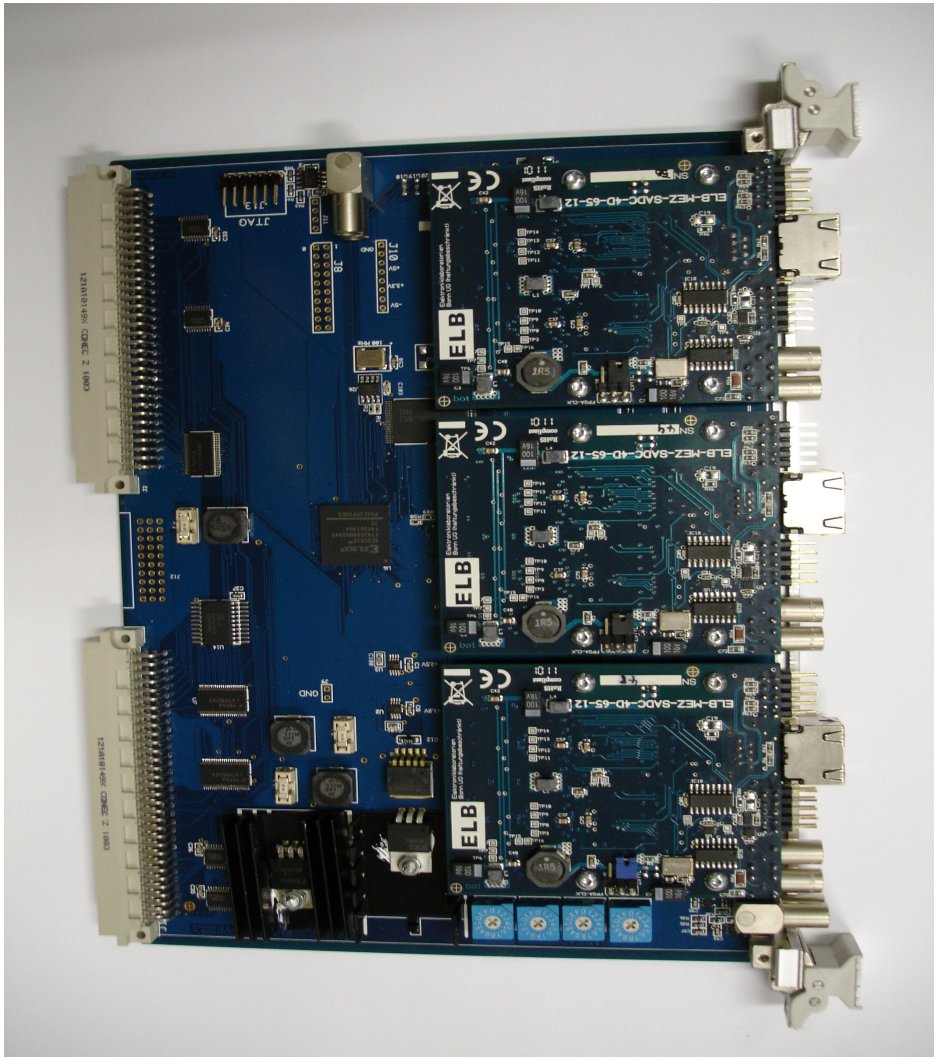

I²C Master
Supply &
FPGA Board

Sensor Board
Sr Source &
Photomultiplier

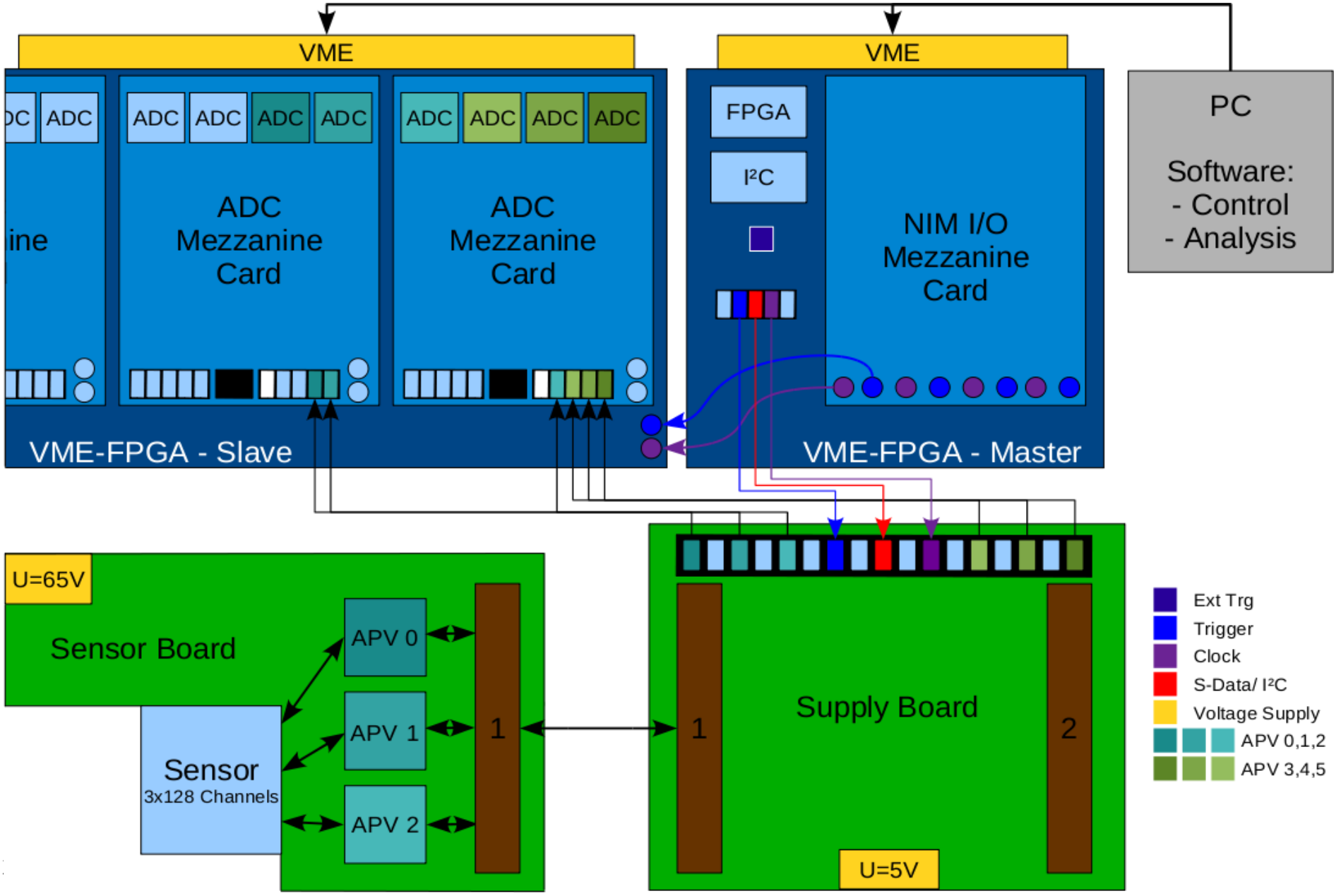
31/8/2010

# VME-FPGA with Mezzanine-ADCs

- designed by Bonn MVD group
- combined solution for FPGA and ADC
- → VME-FPGA boards (VFB2) with ADC daughter cards
- → 3 x 4 frontends/ channels per board
- → future online zero suppression and hit and cluster finder on VME-FPGA boards
- documentation coming next week
- Bonn software has to be adjusted to Mainz VME-CPU



# New Readout via VME



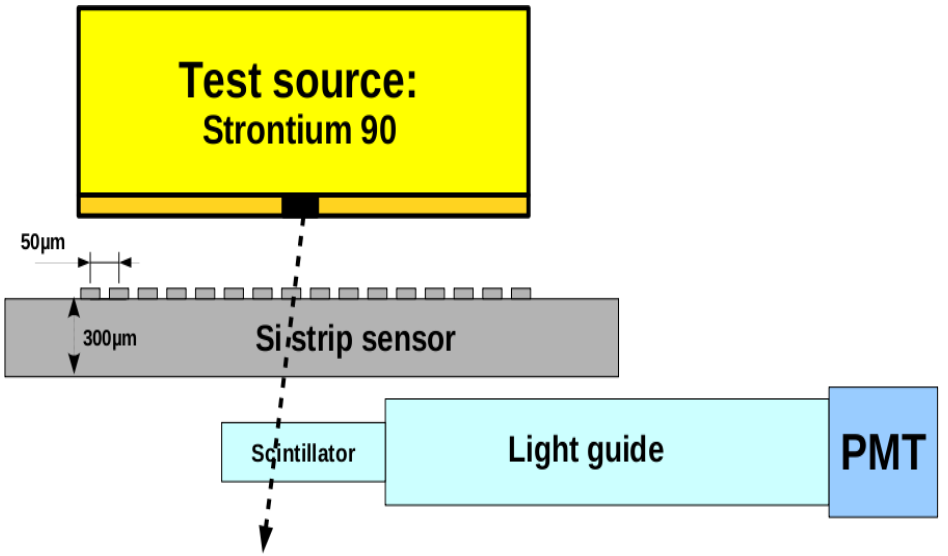
# Tests Planned

testing:

- spatial resolution
- temperature dependent SNR
- different sensor types
- radiation hardness

test beams/ radiation sources:

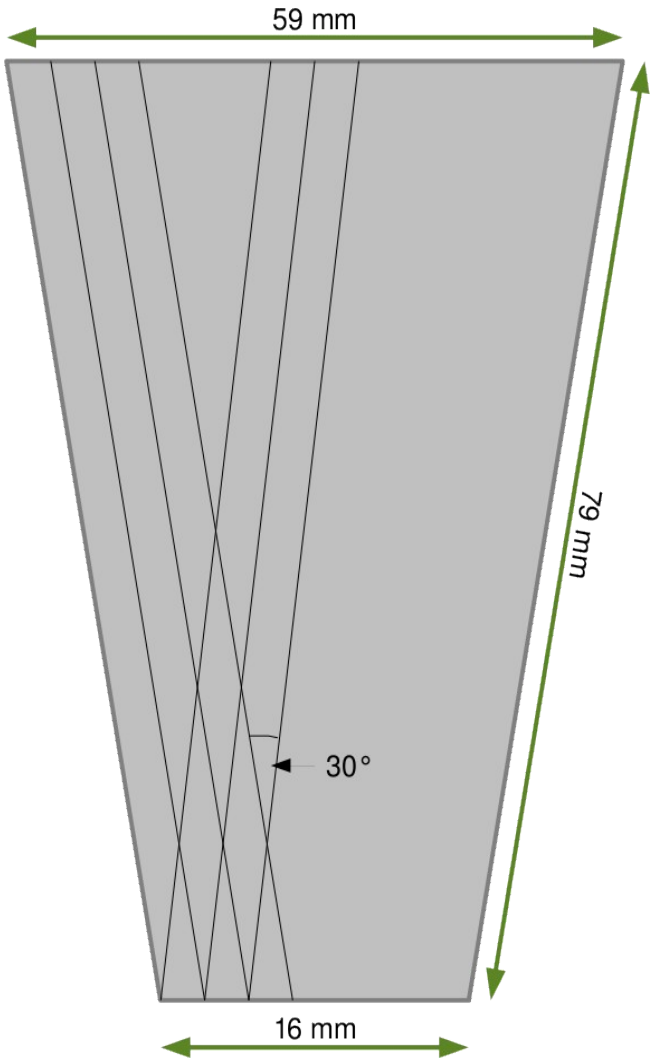
- Sr 90 - $\beta$ source
- Electrons @ MAMI
- Protons @ COSY



# New Sensors and ...

double-sided sensors from

- Micron Semiconductors „YY2“
- 300 µm sensors have arrived




➔ wedge sensors used at the Dzero experiment @ Fermilab

➔ cooperation with Dzero people

- connected to readout via flexible circuits: tracks and electronic parts on multiple layer bands

# … alternative Frontend ?

frontend FSSR 2 from Fermilab:

- Si Strip Readout Chip
- Self-triggered

- we got some chips (exact four!) for testing from Ray Yarema
- still to examine if they match our specifications and what Fermilab means with „self-triggered“

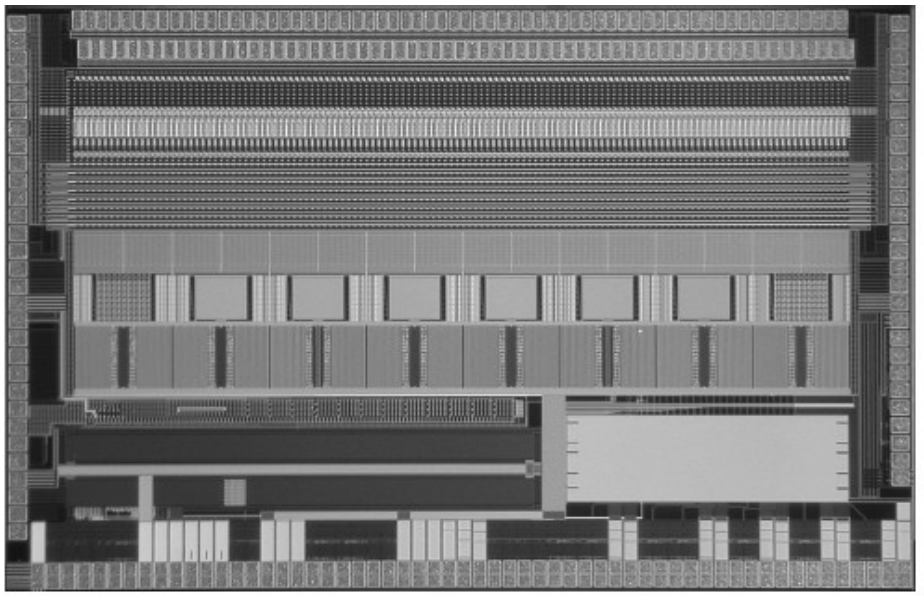


Fig. 1. Photograph of the FSSR2 chip with input pads at the top. The chip measures 7.5 mm x 5 mm and the input pads have an effective pitch of 50 µm.

*FSSR2, a Self-Triggered Low Noise Readout Chip for Si Strip Detectors – Re, Manghisoni, Yarema et. al.*

# Summary

- Setup of a Test Station for double-sided silicon strip sensors in Mainz
- FPGA based readout for APV25 frontends
- Bonn software for VME readout will be adjusted to Mainz VME-CPU

➔ thanks to Bonn Group – Karsten and Hans – for their help !!

➔ first experimental setup including electronics is (almost) ready

discussions about new sensors

and electronics are ongoing

Mainz PANDA Lumi Group