AHCAL Electronics.

Status Commissioning and Integration

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for the AHCAL developers
CALICE meeting
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HELMHOLTZ GEMEINSCHAFT

CALICE Calorimeter for ILC

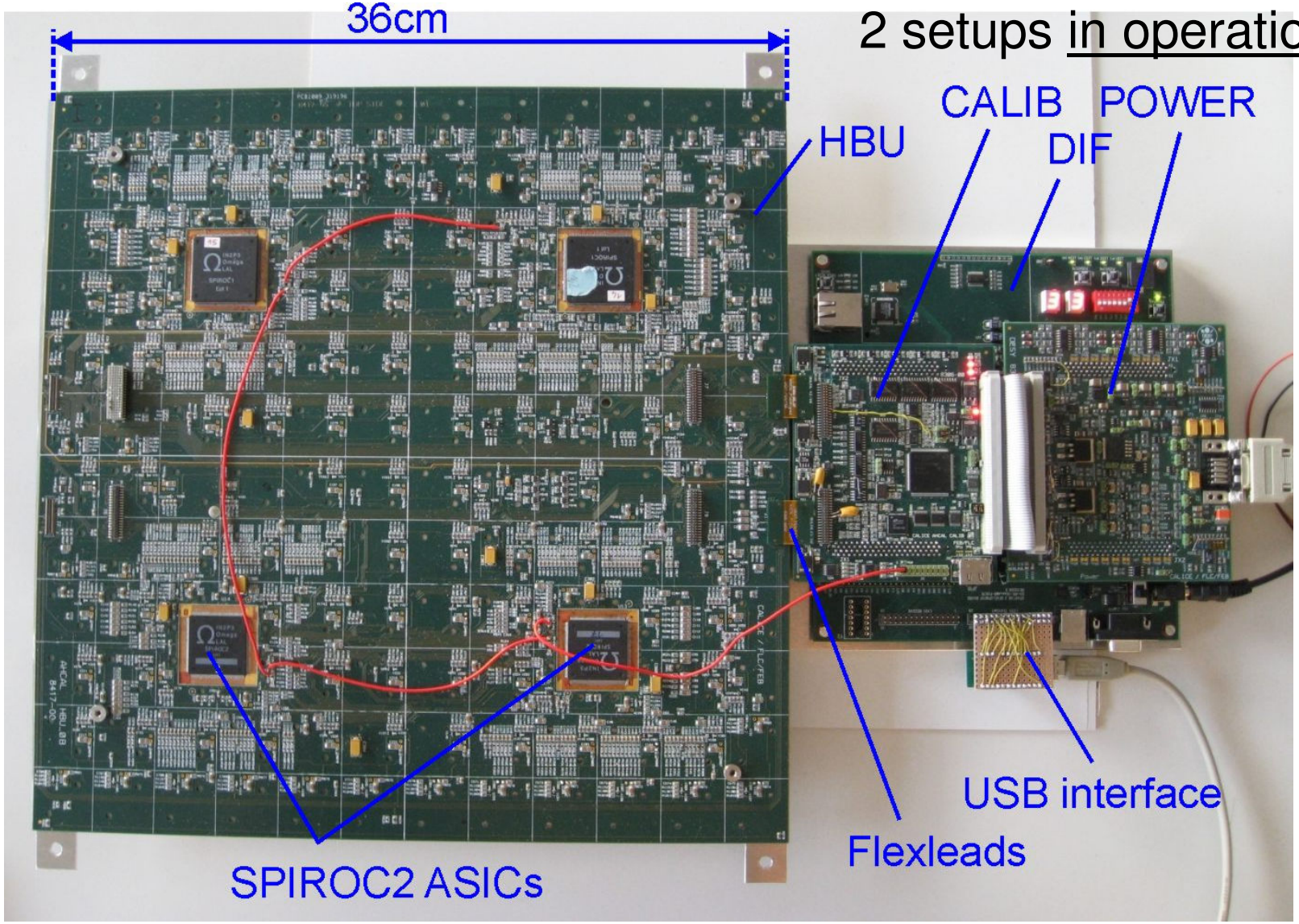
EUDET

DESY

Outline

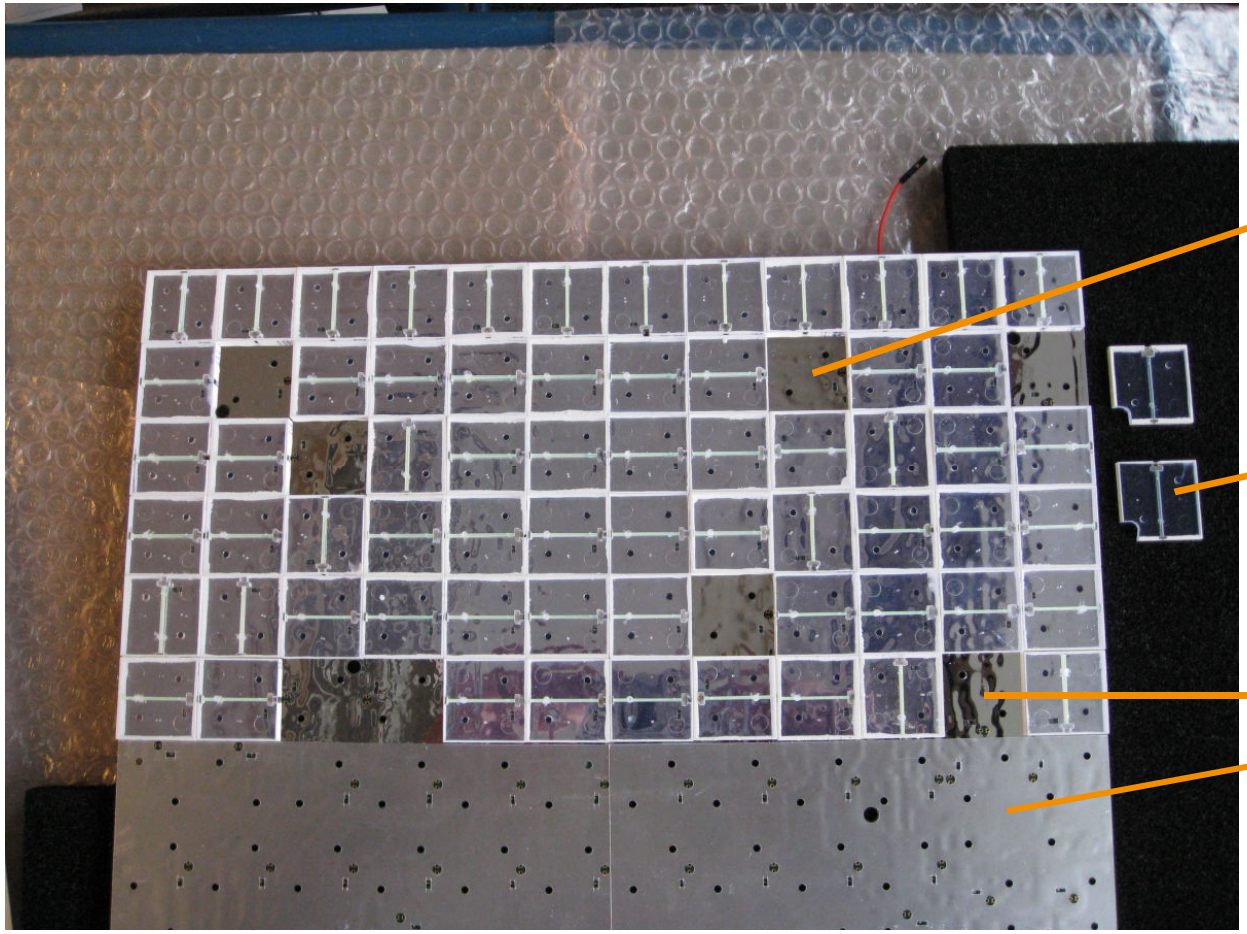
- System Commissioning
  - Setup
  - First SPIROC2/system results
- DESY testbeam – first step
- The next generation – Redesigns @ DESY

HCAL Base Unit (HBU) and system setup



Tile Assembly – HBU-II SPIROC2 area

Both HBUs are assembled with tiles (SPIROC2 regions)

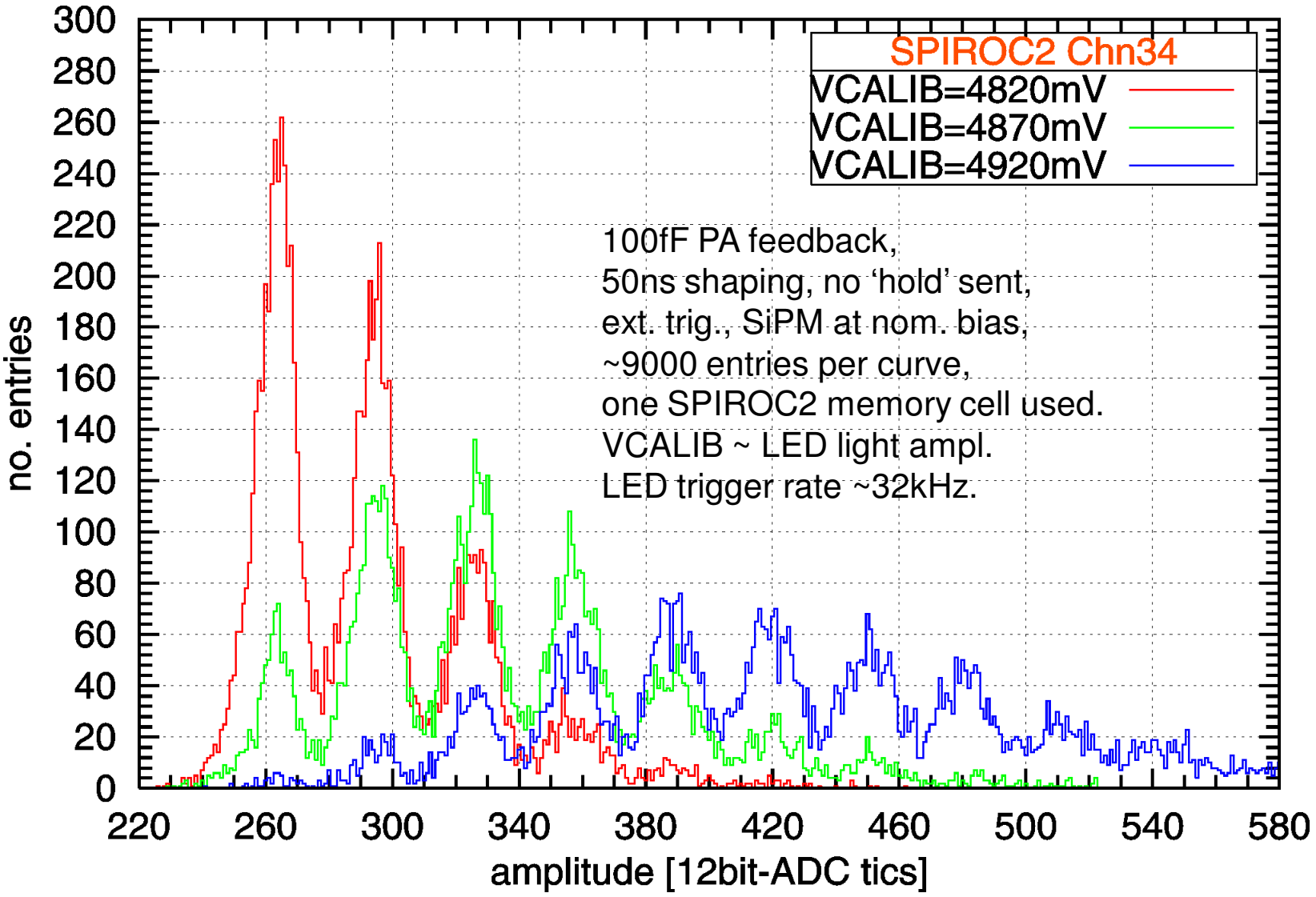


Some positions cannot be assembled (tiles do not fit in)

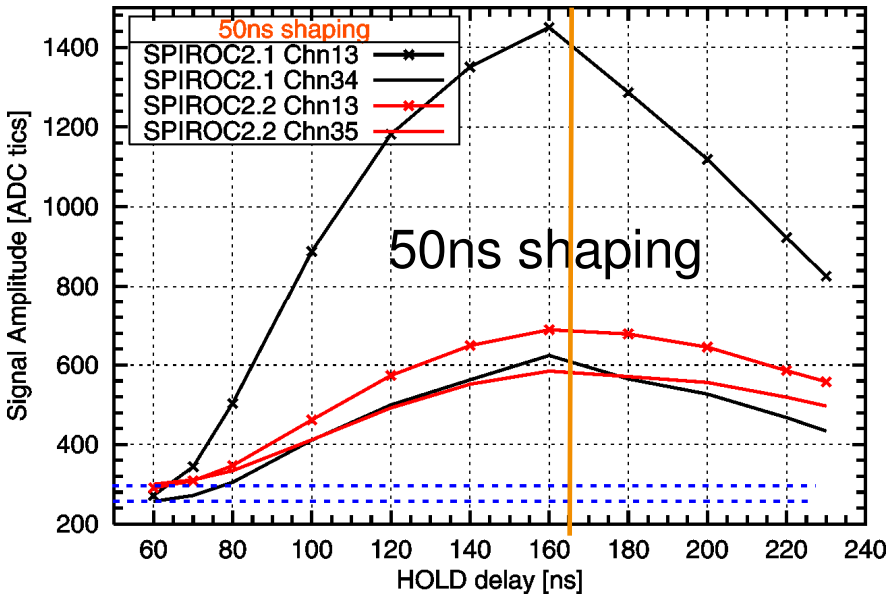
“mechanics tiles” (cassette construction)

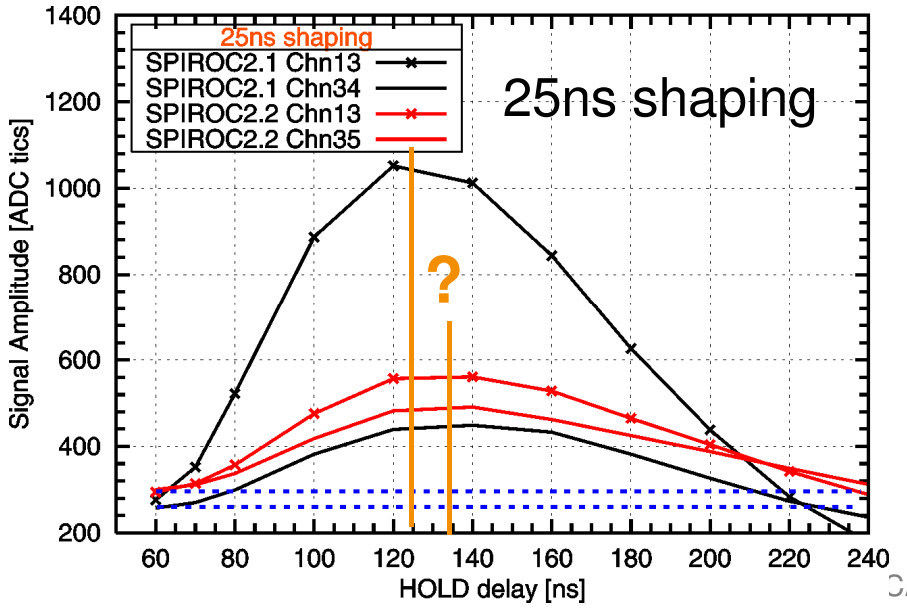
Reflector foil:
without cover (blank)
still with cover

Single-Photon Peaks (taken with Labview DAQ)



HBU hold scan (preliminary)





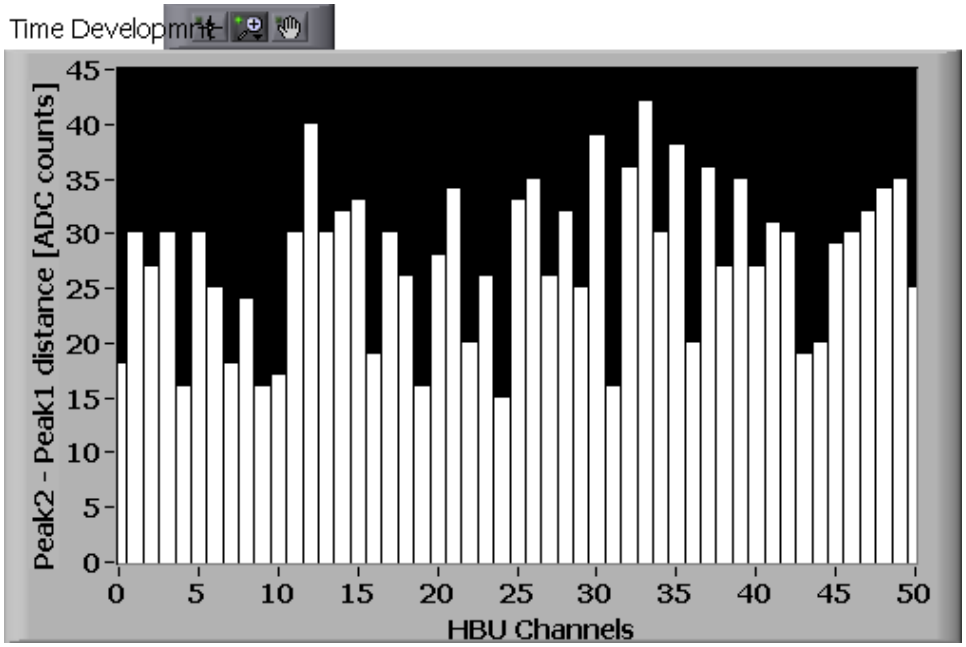
Parameters of this measurement:

- External Hold implemented, LED system as signal source.
- SPIROC2 preampl: 100fF feedback. All channel triggers enabled.
- **amplitude-dependent maximum? Has to be checked with more channels.** 160ns is large …

Result fits quite well to a measurement in SPIROC2 manual

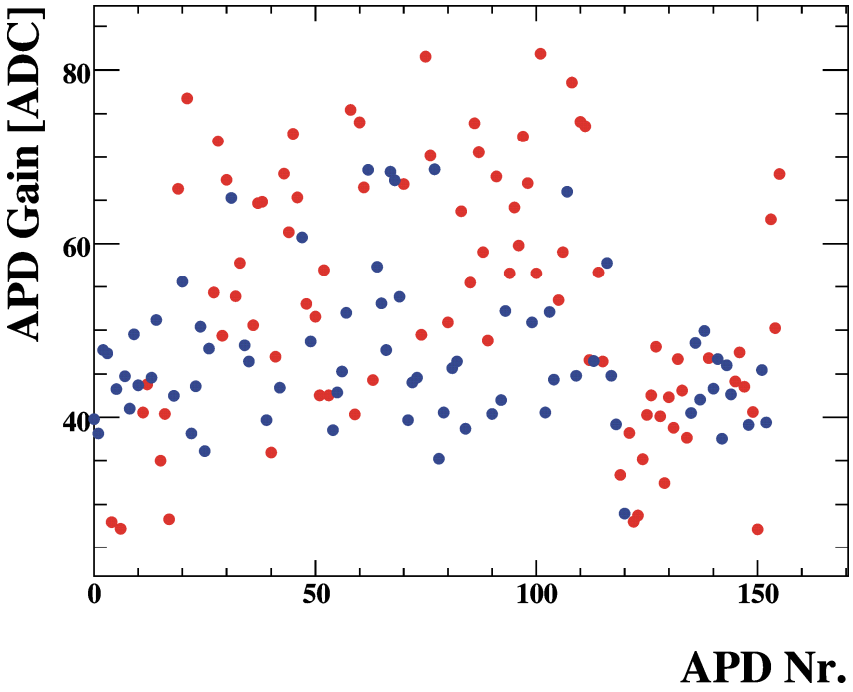
HBU - Single Pixel distances for 51 channels

- Large spread in gain, but spread also in ITEP SiPM information.



HBU measurement

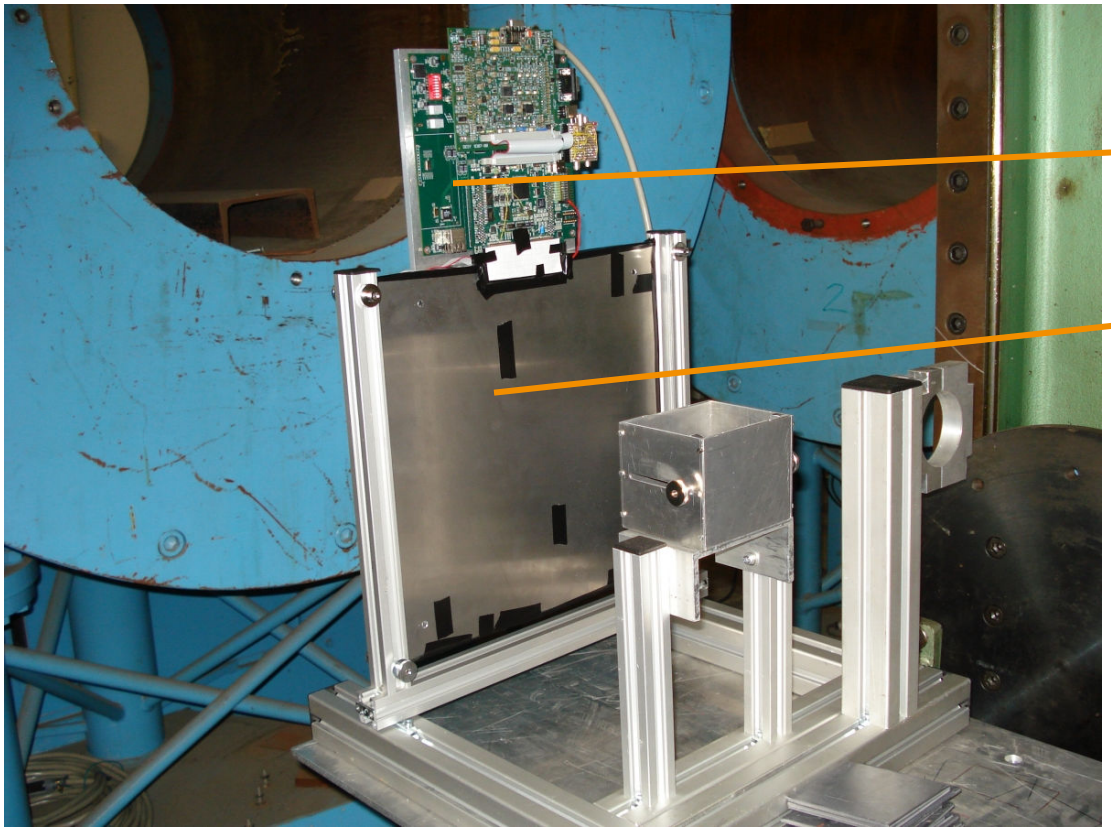
blue dots: used for this HBU-II
(SiPMs of similar Bias-V grouped together)



ITEP SiPM information

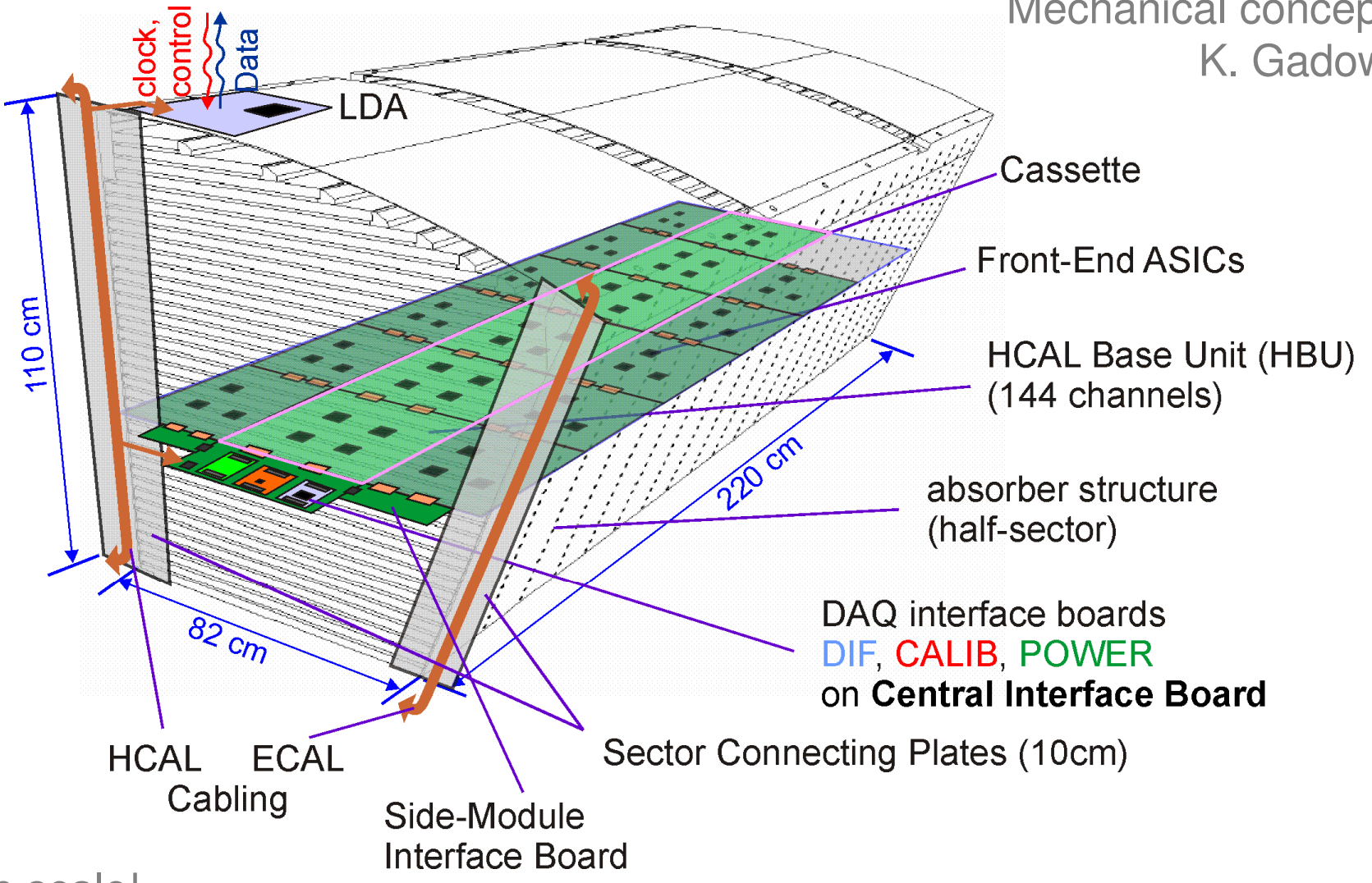
DESY testbeam (HBUII)

- First module has arrived at DESY testbeam.
  Operation still with Labview-USB DAQ.
- Still a few Control-Software functions needed (e.g. automatic HOLD Scan)



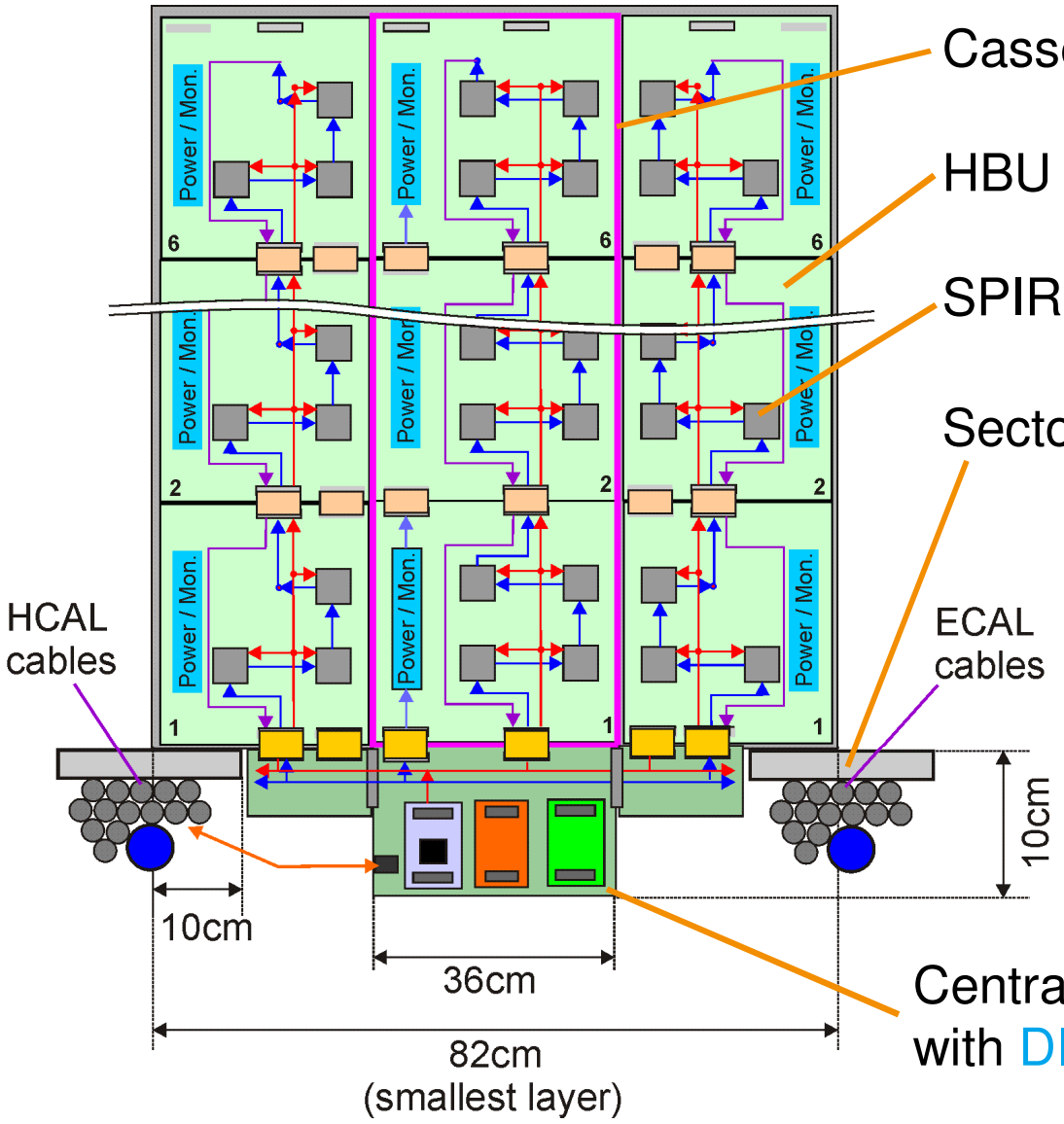
The Next Generation - Reminder

Mechanical concept:
K. Gadow



Not in scale!

The Next Generation - Reminder



Cassette (=slab)

HBU

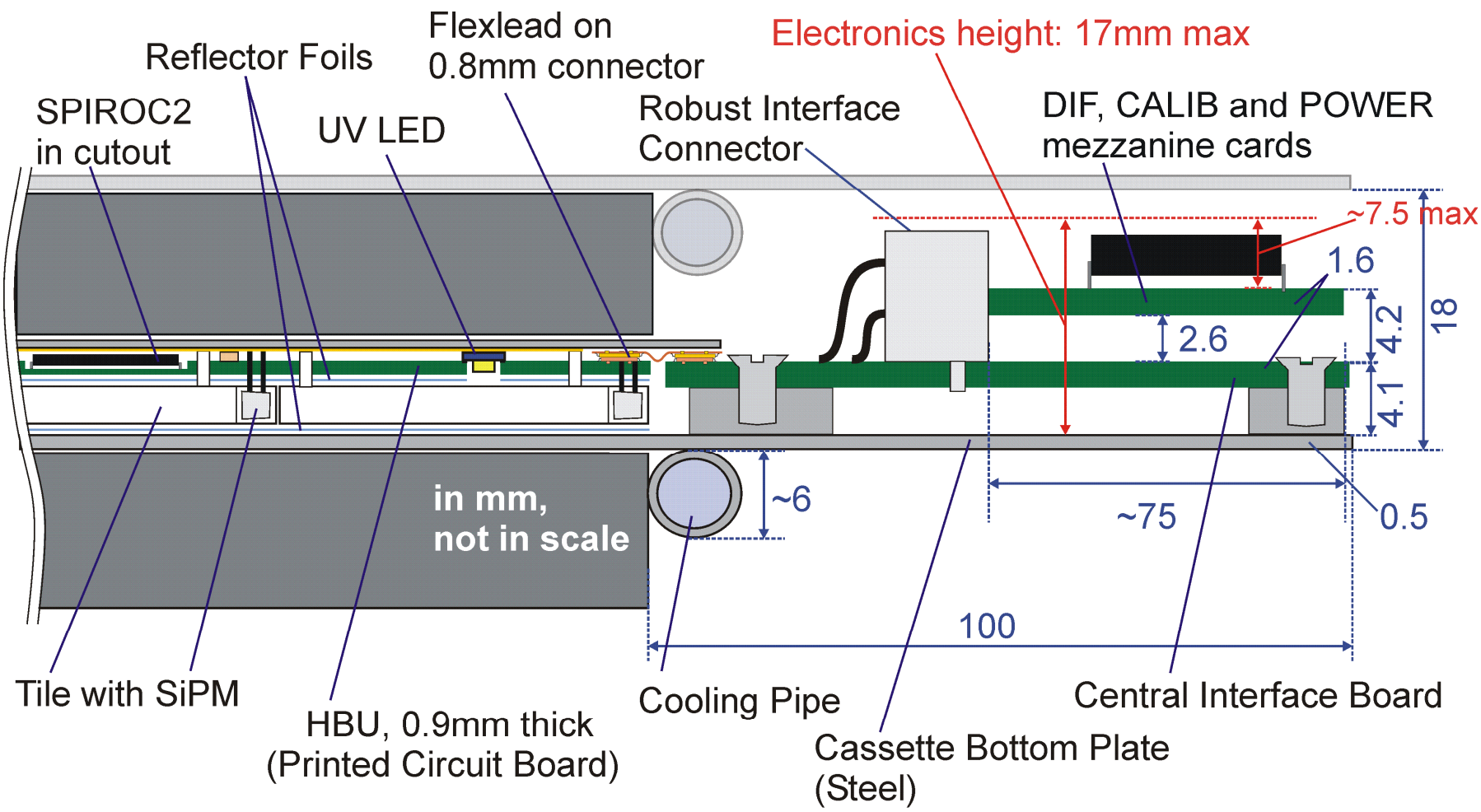
SPIROC

Sector Connecting Plate

Not in scale!!

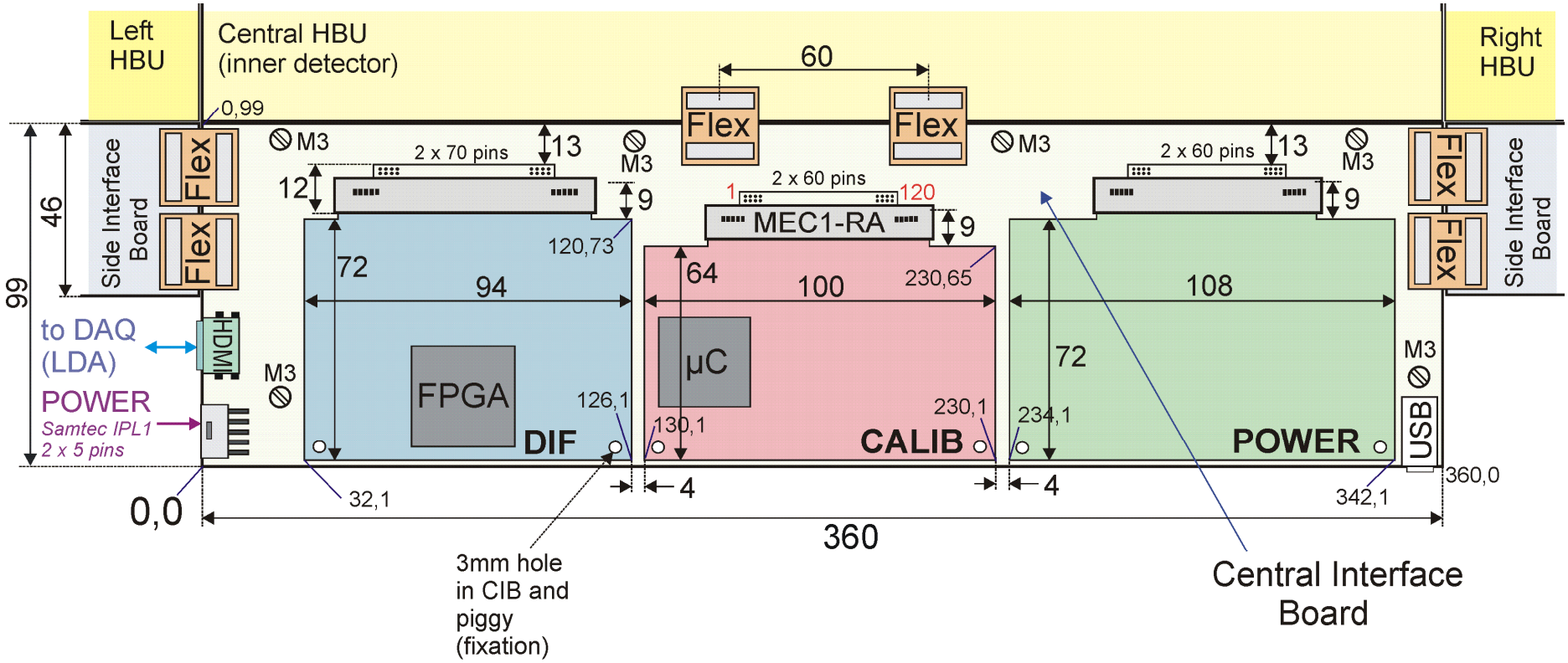
Central Interface Board with DIF, CALIB and POWER

AHCAL Cross Section - Update



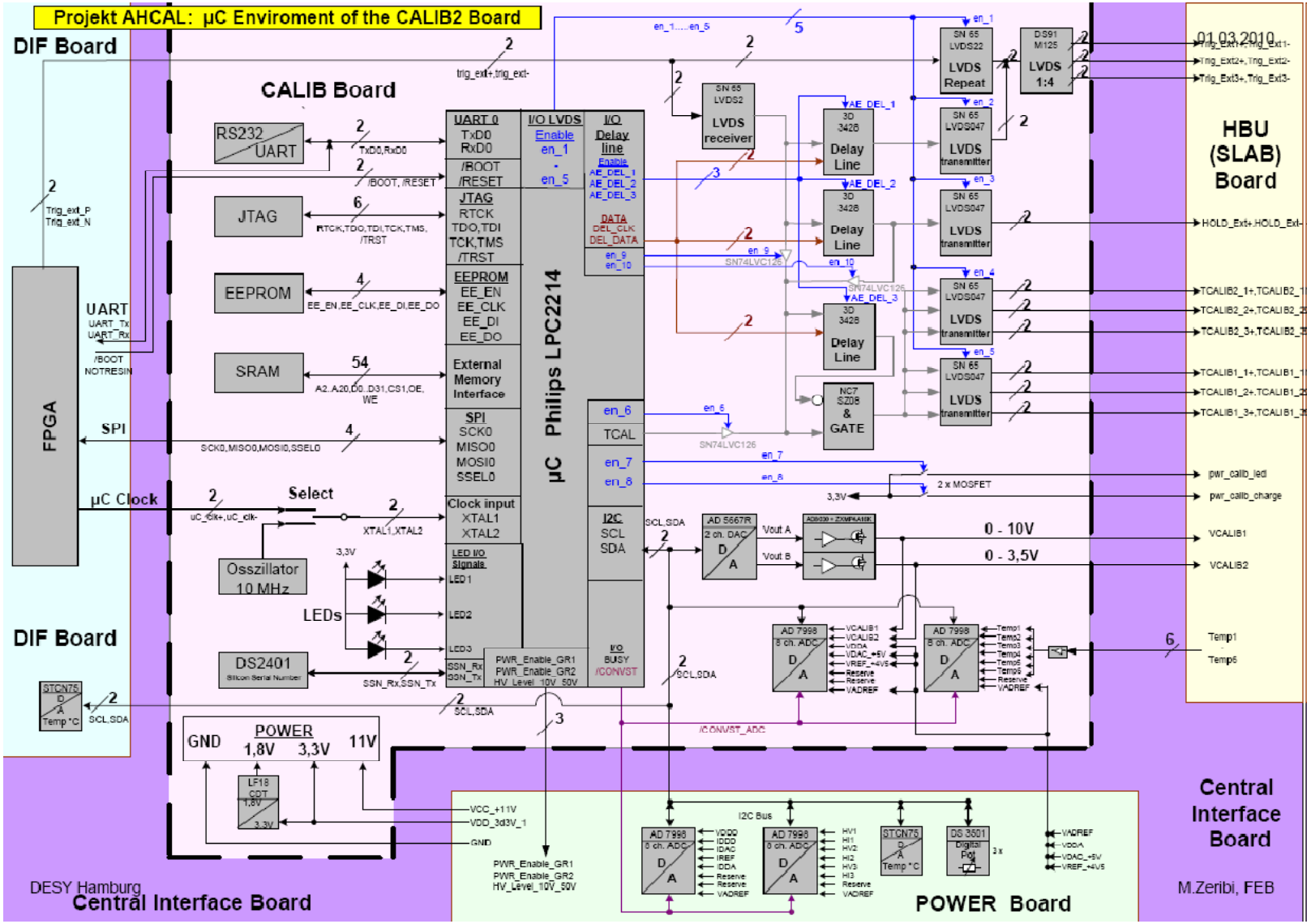
Endface electronics fulfils W-HCAL height requirements!

AHCAL Endface – Detailed View



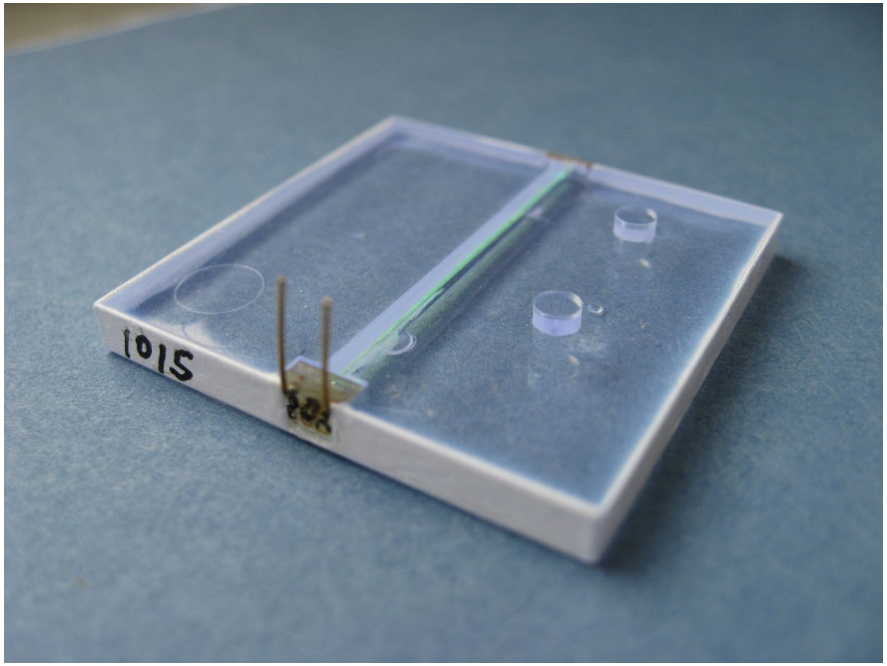
- Board Dimensions fixed.
- Redesigns about to start.

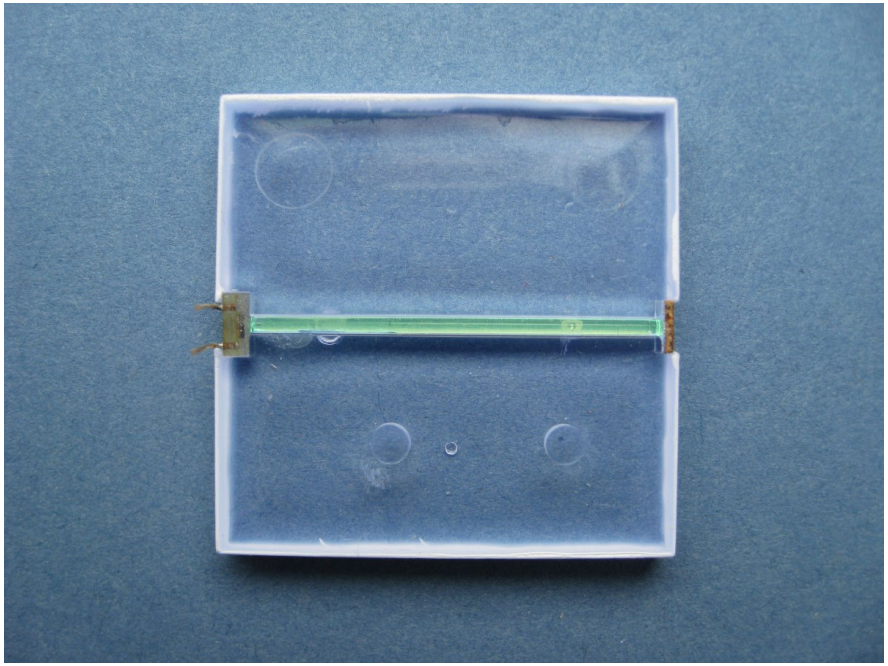
Redesign Status: Block Diagram Level (here: CALIB2)



Design:
M. Zeribi

EUDET Tiles – Dimensions for HBU Redesign





Measurements of many tiles should give dimensions used in HBU design.
Measurements underway, results eagerly awaited for redesign of HBU!

Thanks to ITEP for all the electrical SiPM parameter information!!

Redesigns (A lot of work ahead…)

- HBU1 (HCAL Base Unit) – Detector Module
  - Contains 4 ASICs of new SPIROC2a/b (just ordered by LAL) generation.
- CALIB2 – Light Calibration System
  - based on ARM7/9 microcontroller
- POWER2 – Front-end detector power supply module
  - Enables ILC power-pulsing
- AHCAL DIF
  - Replacement of commercial FPGA board
- CIB (Central Interface Board)
  - Motherboard for CALIB2, POWER2 and AHCAL DIF
- SIB (Side Interface Board
  - To be done later (not needed for slab/tower setup)
- Other calorimeter types
  - Scintillator strip ECAL , direct coupling of scintillator to SiPM

Conclusions and Outlook

- AHCAL prototype in full operation! 2 setups realized for different tests.
- USB/Labview DAQ used so far. CALICE DAQ integration, when ..?
- First module now in DESY electron-testbeam.
- LED system works in principle.
  Compensate LED spread by calibration runs at 5 different VCALIBs.
  Analyze pedestal shift (20 ADC counts for 5V change on VCALIB)
- Redesigns of boards and new SPIROC2a/b generation ahead.
- Power cycling: to be tested (urgently, before redesigns).
- Suitability of HBU concept for ScECAL under investigation.
  - open points: mechanical interface to DAQ, cassette construction
- A lot of system's and SPIROC analogue and digital tests ahead.