AHCAL Integration (JRA3).

Status and Outlook

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for the AHCAL developers
EUDET annual meeting
Geneva, Oct. 19th – 21st, 2009

HELMHOLTZ GEMEINSCHAFT

CALICE Calorimeter for ILC

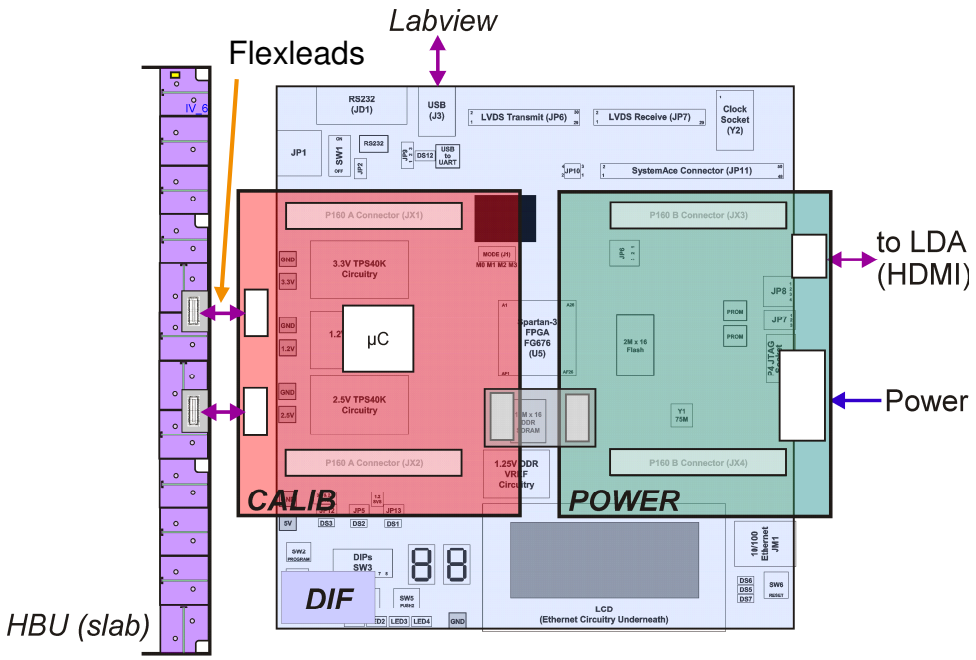
EUDET

DESY

Outline

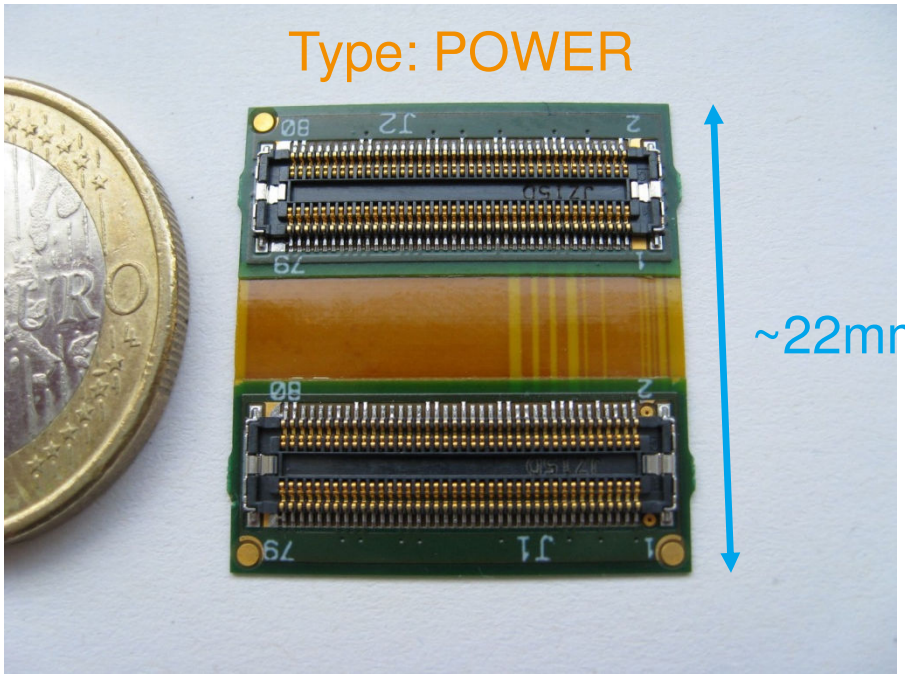
- JRA3 Hardware Developments at DESY
  - CALIB, POWER, Flexleads
  - HBU0
  - DIF0 and DAQ interface (USB)
  - Tiles integration
- System Commissioning
- The Next Generation
- Conclusions and Outlook

'old-fashioned overview'

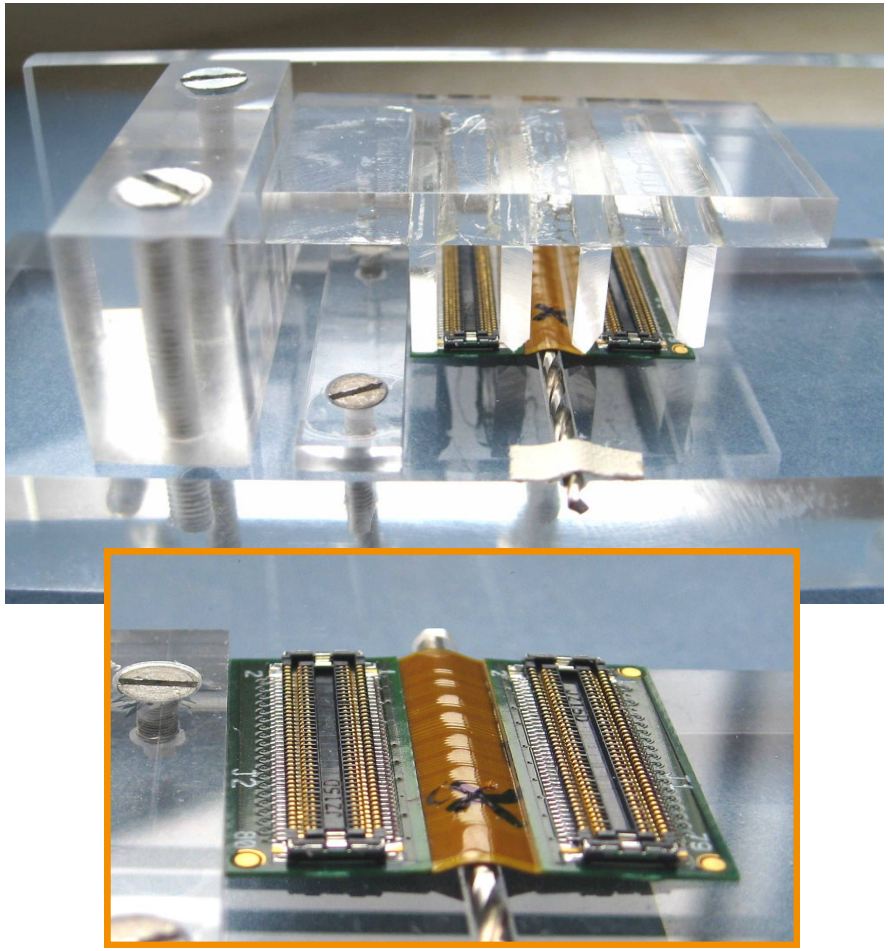


Flexleads – SIGNAL and POWER

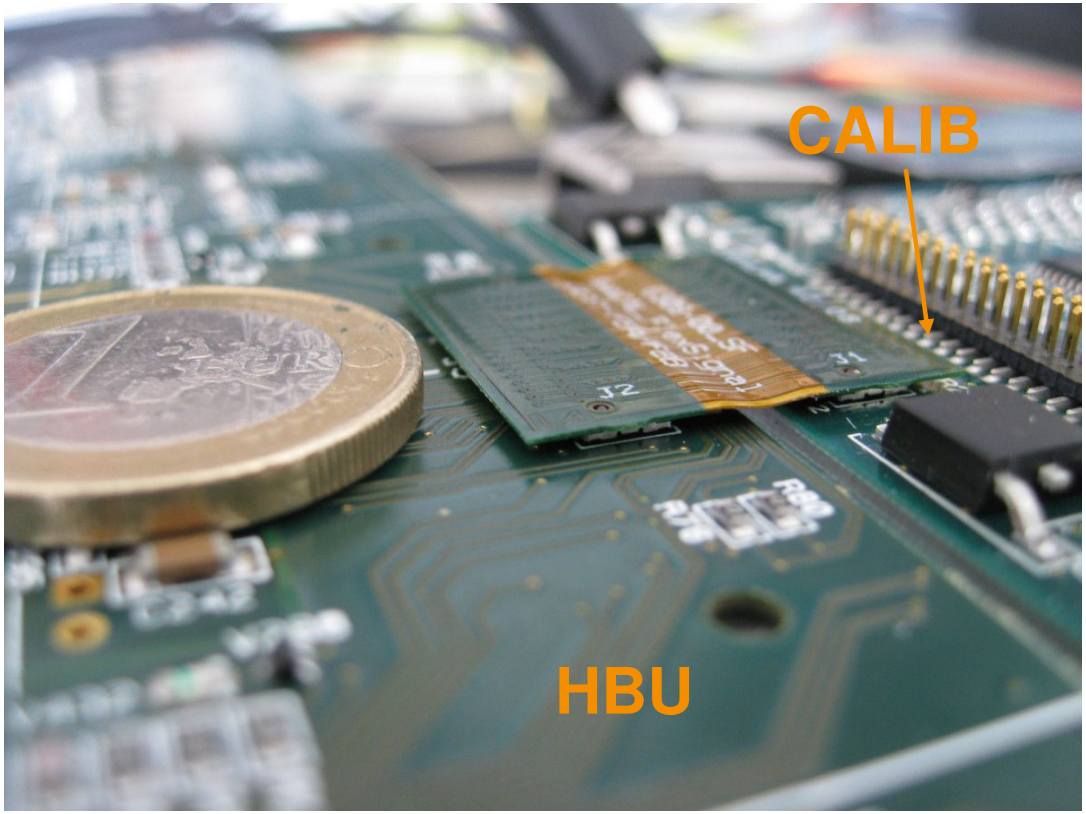
- 20 pieces of each type finished.
- Pre-bending procedure ok.



Flexlead Pre-Bending:



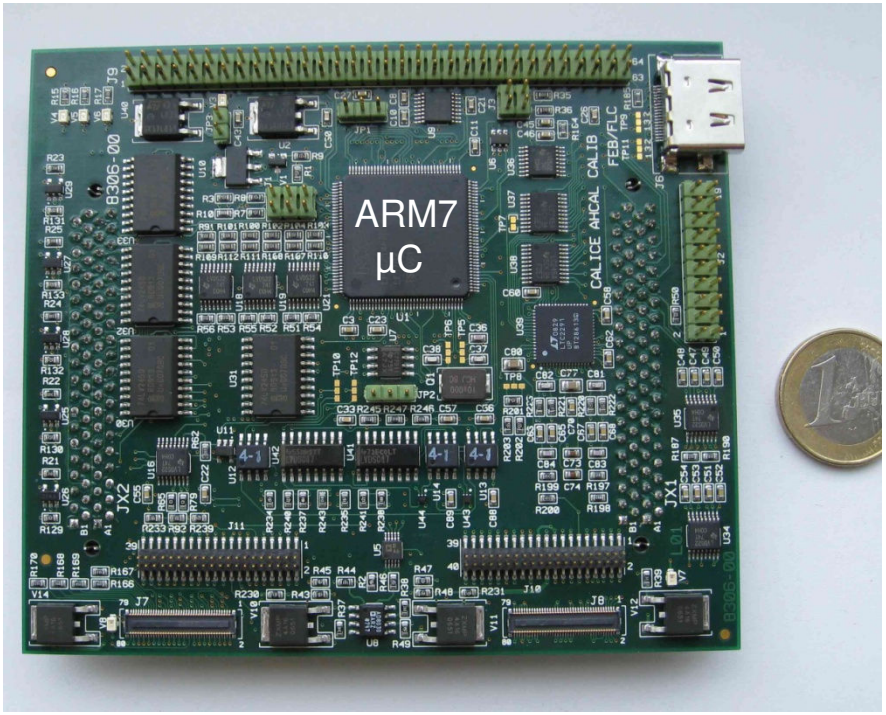
Flexleads – SIGNAL and POWER



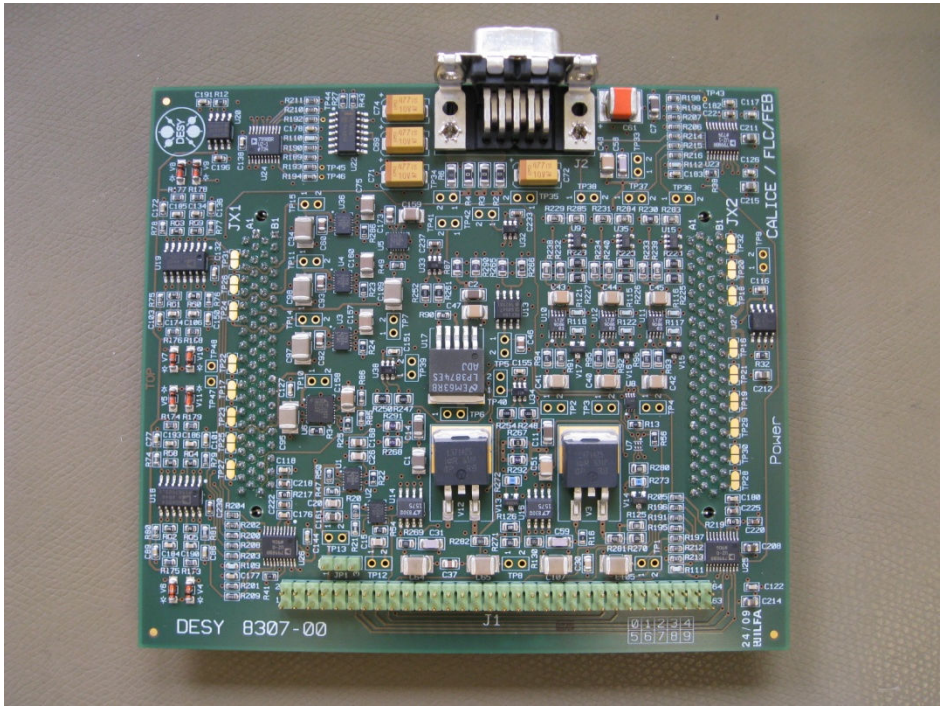
- About 80 connection cycles up to now - still ok.
- Compensate HBU misalignments in distance.
- Fulfill AHCAL height requirements.
- Tests ok concerning:
  - Signal allocation
  - Signal quality
  - Resistance for power

CALIB and POWER Modules

CALIB module: 11 x 10 cm²



POWER module: 12.5 x 11 cm²

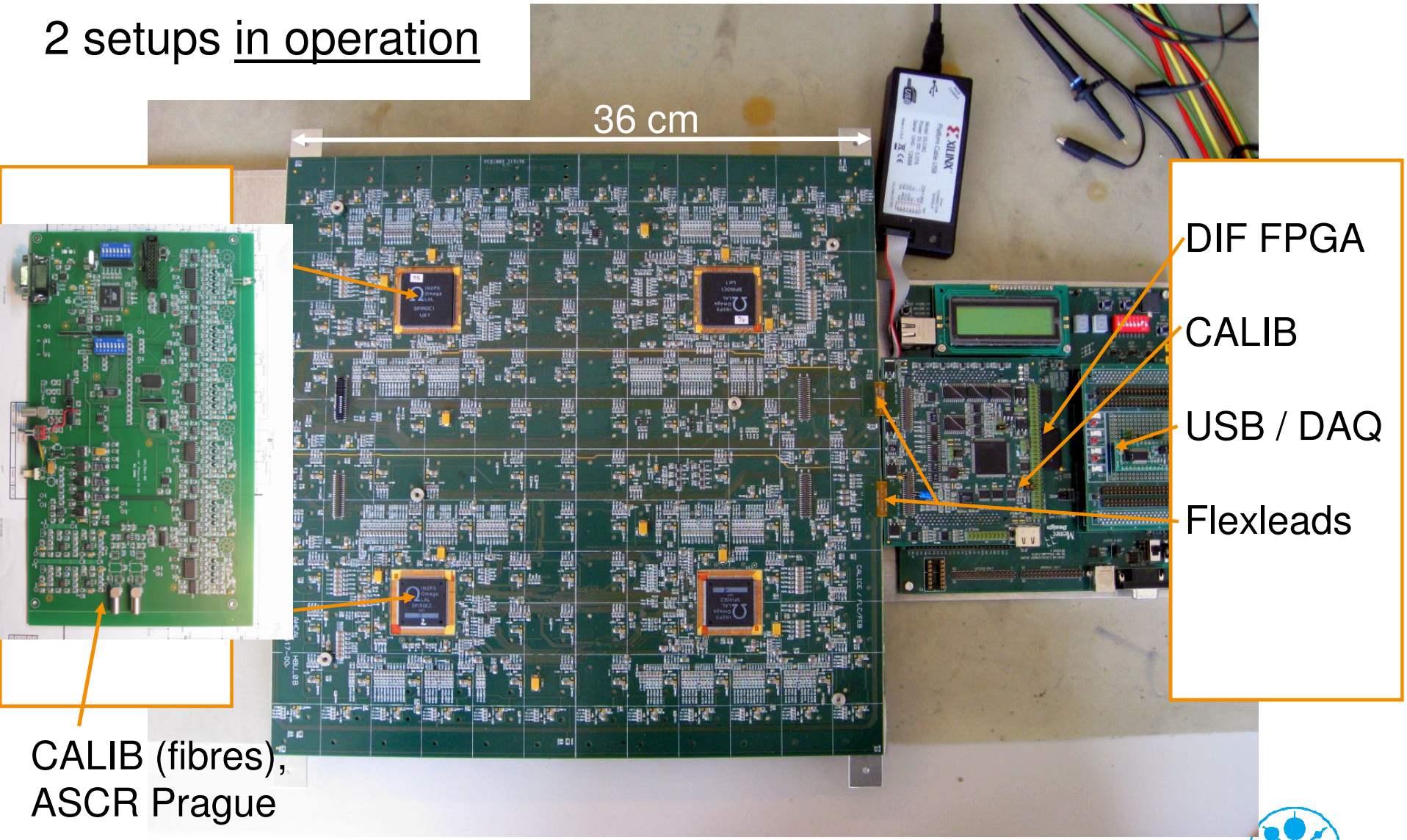


> 4 Modules of both types finished, in operation.
> First tests successful.

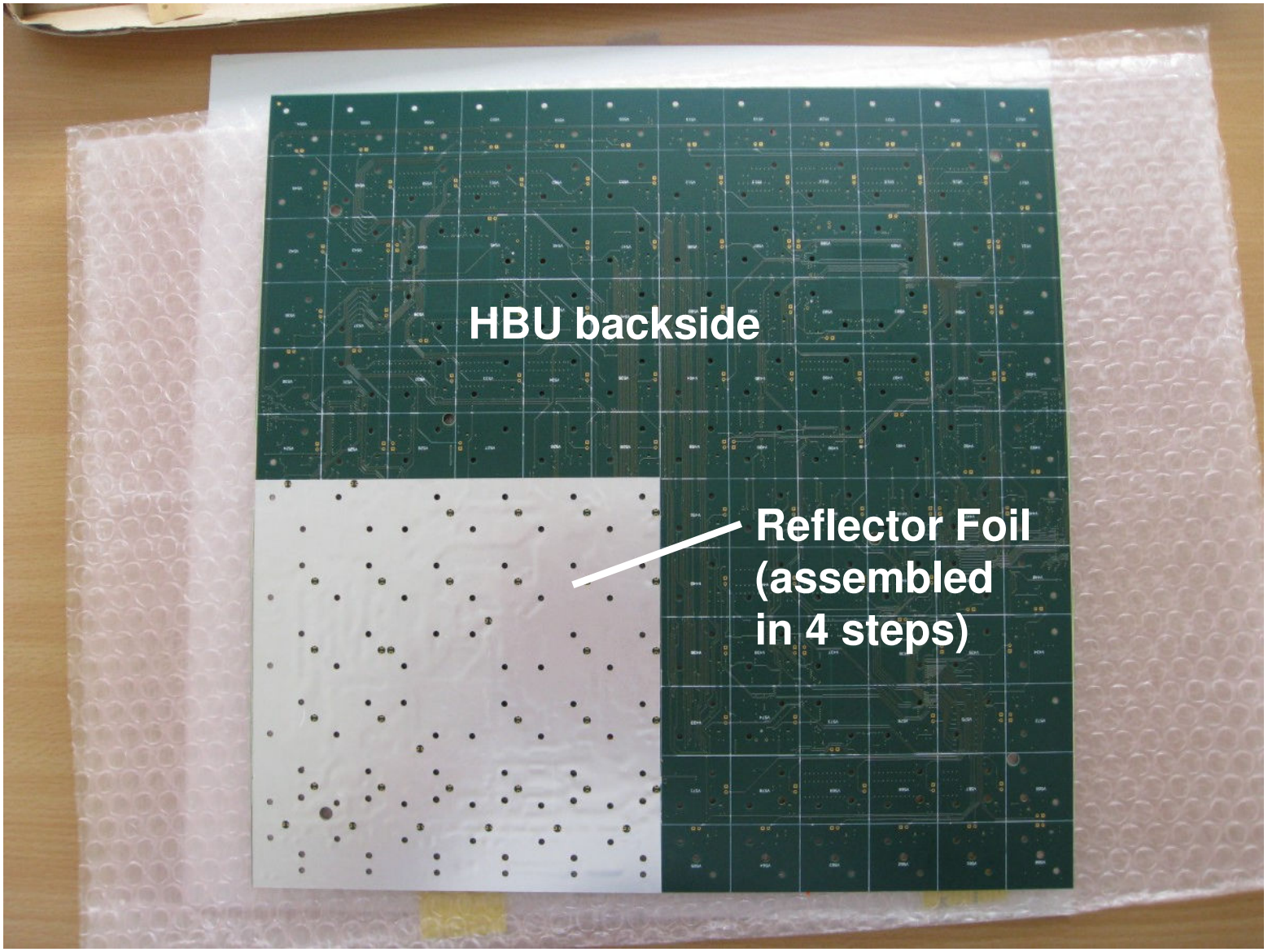
Sizes and heights: To be adapted to ILC mechanics later.

HCAL Base Unit (HBU) setup

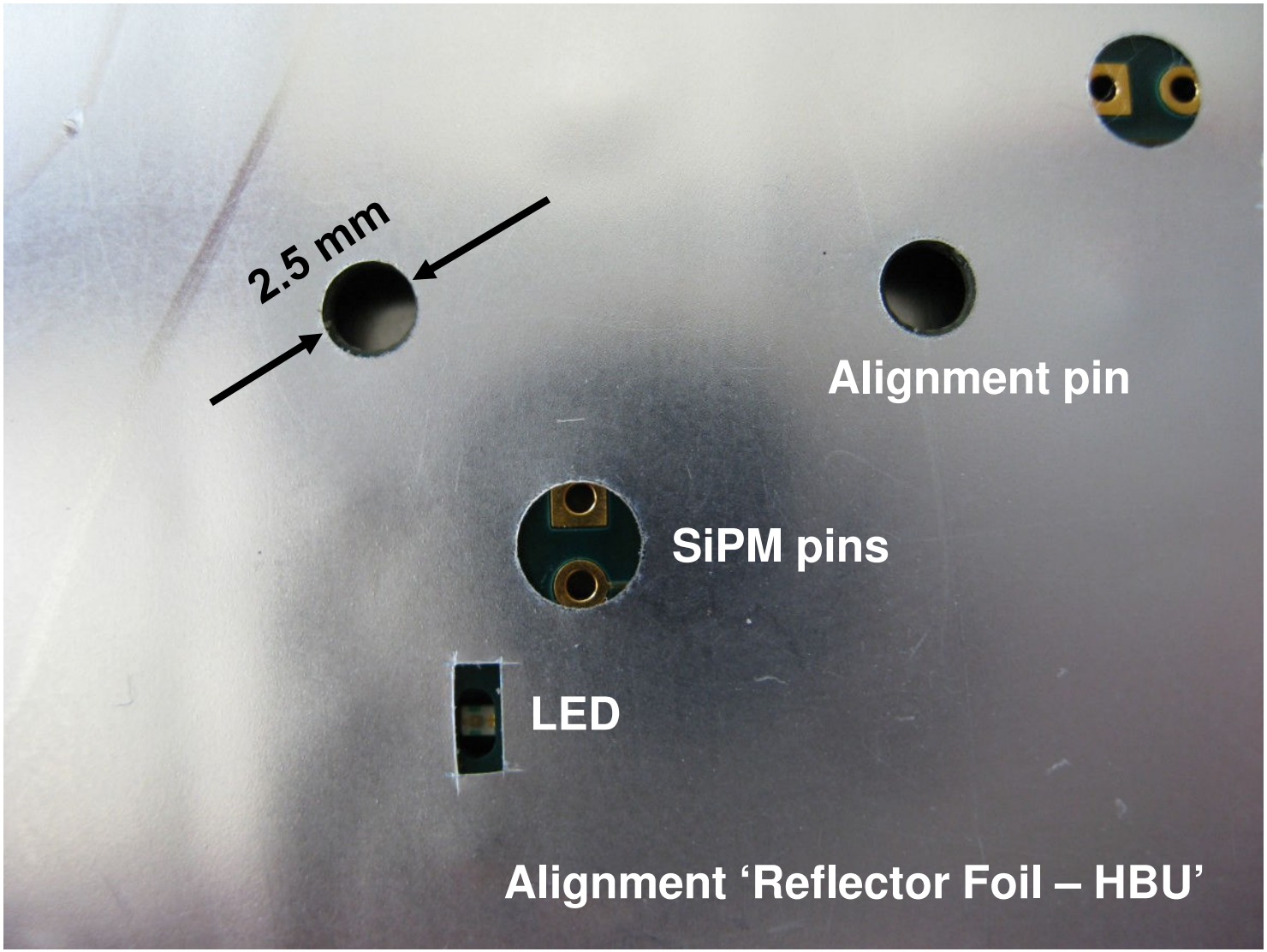
2 setups in operation



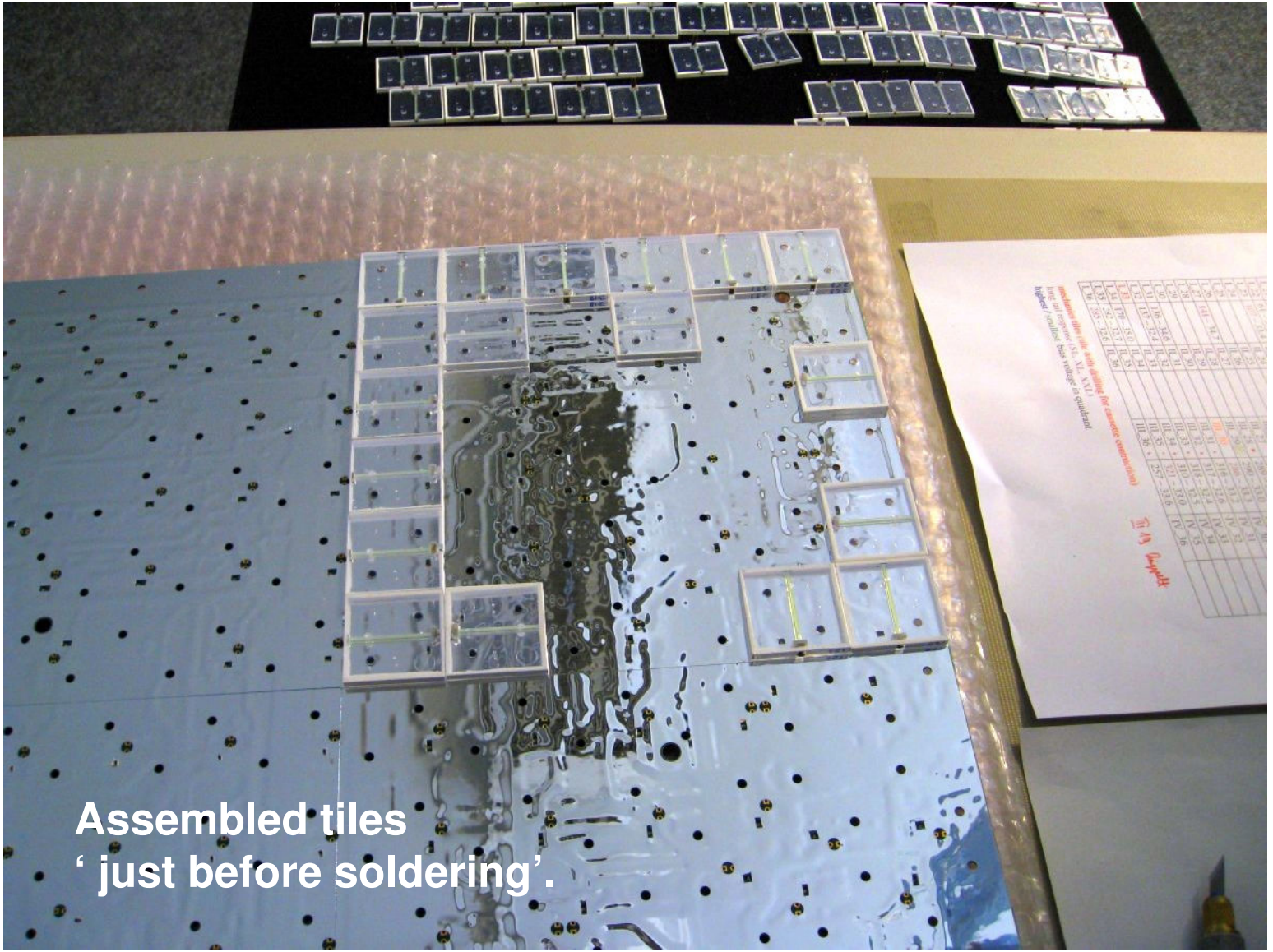
Reflector Foil Assembly



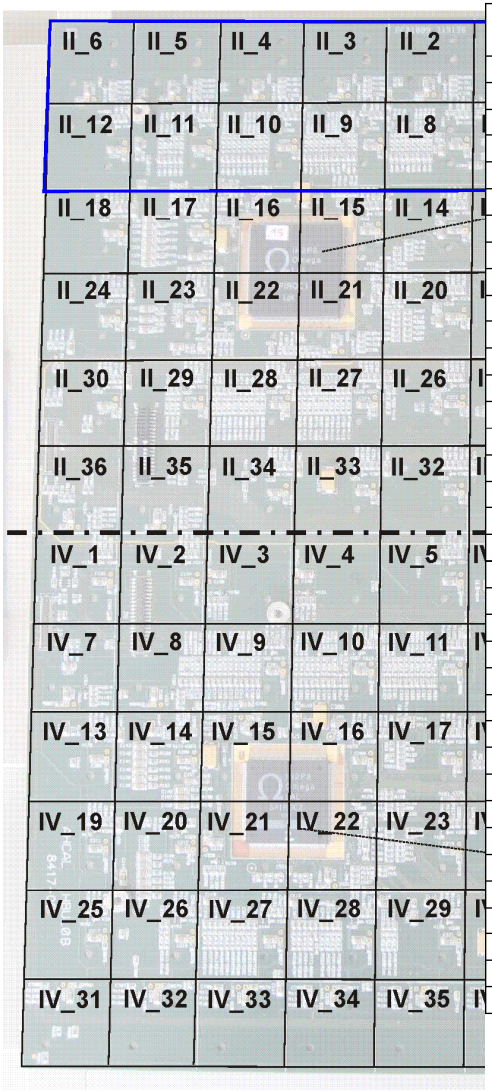
Reflector Foil Assembly



Tile Assembly (the first 18)



Tile Map



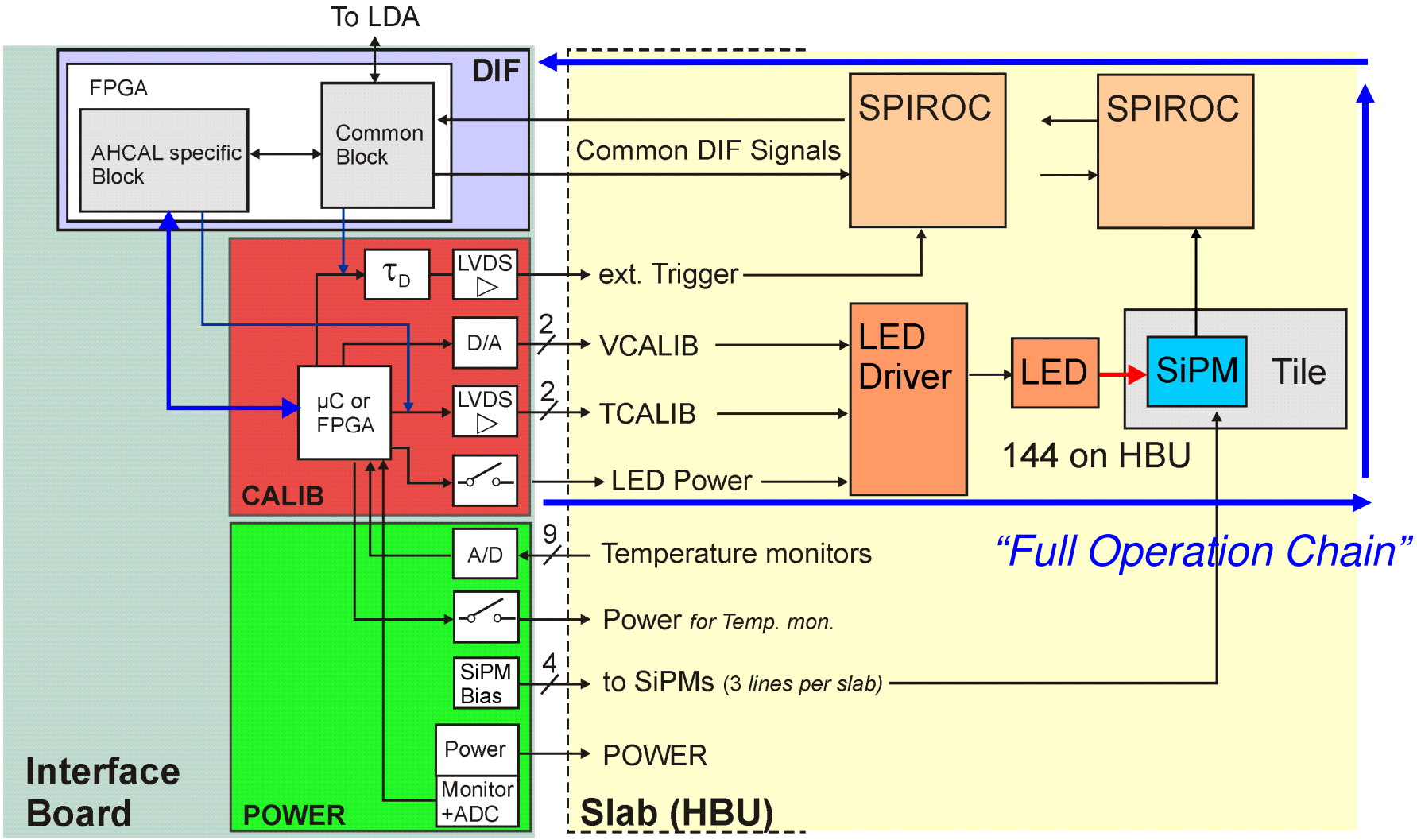
Module HBU0_II

Pos.	Tile – Bias [V]	Pos.	Tile – Bias [V]	Pos.	Tile – Bias [V]	Pos.	Tile – BiasV [V]
I_1		II_1		III_1	26 – 33.5	IV_1	152 – 33.1
I_2		II_2		III_2	33 – 33.3	IV_2	14 – 33.0
I_3		II_3		III_3	41 – 33.3	IV_3	55 – 32.8
I_4		II_4		III_4	43 – 33.6	IV_4	42 – 33.0
I_5		II_5		III_5	50 – 33.4	IV_5	46 – 32.7
I_6		II_6		III_6	81 – 34.0	IV_6	24 – 32.5
I_7		II_7		III_7	90 – 33.9	IV_7	326 – 33.5
I_8		II_8		III_8	95 – 33.5	IV_8	88 – 31.9
I_9		II_9		III_9	98 – 33.9	IV_9	89 – 33.3
I_10		II_10		III_10	272 – 33.5	IV_10	248 – 33.0
I_11		II_11		III_11	133 – 33.8	IV_11	320 – 34.0
I_12		II_12		III_12	138 – 33.3	IV_12	314 – 32.2
I_13		II_13		III_13	147 – 33.8	IV_13	312 – 33.3
I_14		II_14		III_14	157 – 33.7	IV_14	188 – 33.2
I_15		II_15		III_15	166 – 33.5	IV_15	193 – 32.8
I_16		II_16		III_16	167 – 33.5	IV_16	235 – 33.6
I_17		II_17		III_17	168 – 33.9	IV_17	200 – 34.1
I_18		II_18		III_18	173 – 33.6	IV_18	206 – 33.8
I_19		II_19		III_19	178 – 33.7	IV_19	205 – 32.6
I_20		II_20		III_20	184 – 33.8	IV_20	207 – 33.1
I_21		II_21		III_21	249 – 33.8	IV_21	221 – 32.4
I_22		II_22		III_22	186 – 33.5	IV_22	225 – 32.7
I_23		II_23		III_23	252 – 33.7	IV_23	242 – 33.2
I_24		II_24		III_24	264 – 33.6	IV_24	258 – 33.0
I_25		II_25		III_25	241 – 33.6	IV_25	265 – 32.9
I_26		II_26		III_26	213 – 33.6	IV_26	305 – 32.3
I_27		II_27		III_27	227 – 33.7	IV_27	277 – 33.1
I_28		II_28		III_28	185 – 34.0	IV_28	267 – 32.9
I_29		II_29		III_29	240 – 33.4	IV_29	313 – 33.1
I_30		II_30		III_30	208 – 34.0	IV_30	164 – 33.3
I_31		II_31		III_31	196 – 33.2	IV_31	306 – 33.1
I_32		II_32		III_32	201 – 33.2	IV_32	307 – 33.1
I_33		II_33		III_33	194 – 33.3	IV_33	308 – 33.3
I_34		II_34		III_34	87 – 33.3	IV_34	311 – 32.8
I_35		II_35		III_35	125 - 33.3	IV_35	315 – 33.0
I_36		II_36		III_36	181 – 33.3	IV_36	325 – 32.6

mechanics tiles (tile with drilling for cassette contruction)
long tail response (SL, XL, XXL)
highest / smallest bias voltage in quadrant

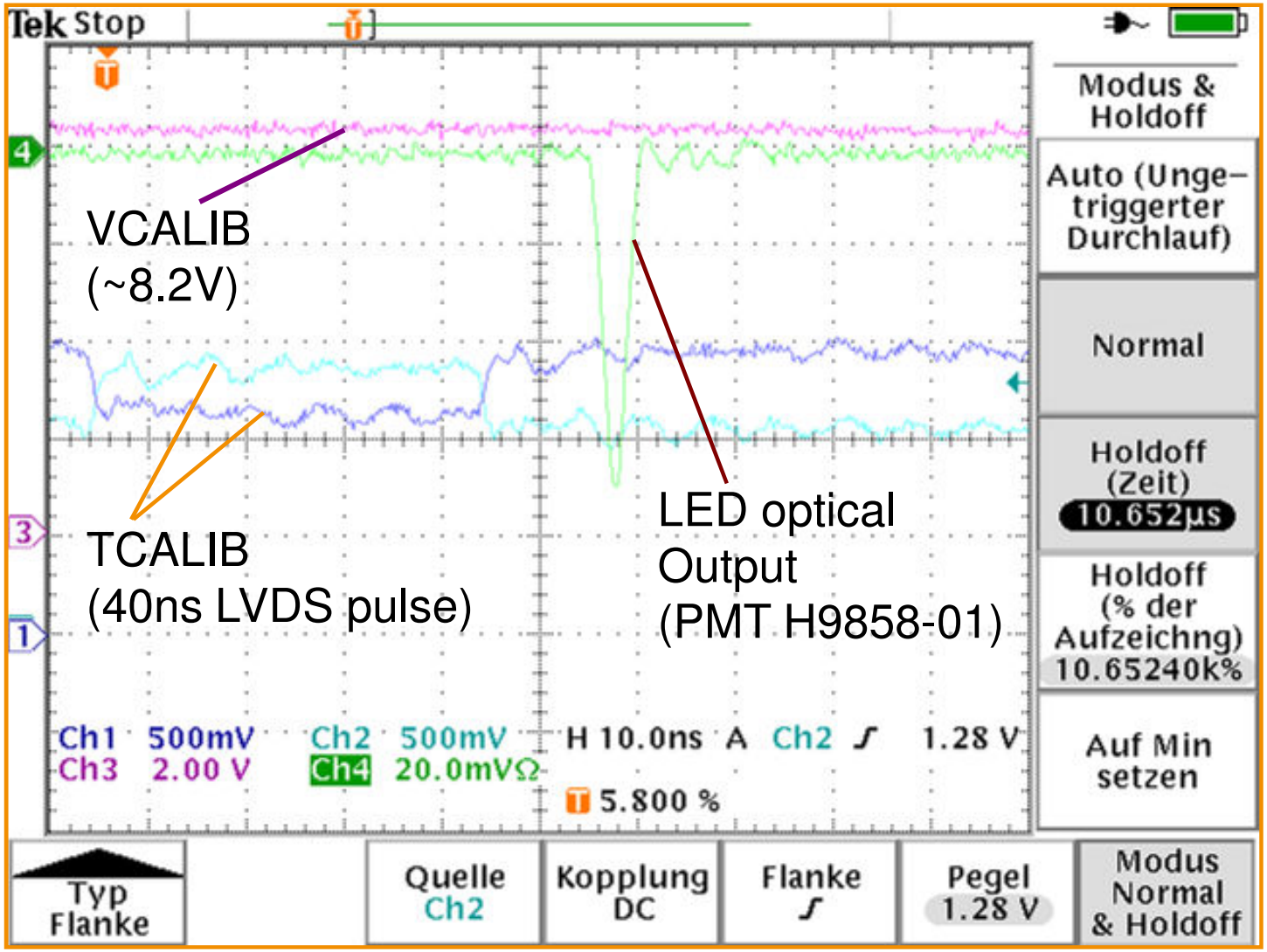
Each quadrant can choose between 3 SiPM bias voltages

Commissioning – Signal Chain for LED operation



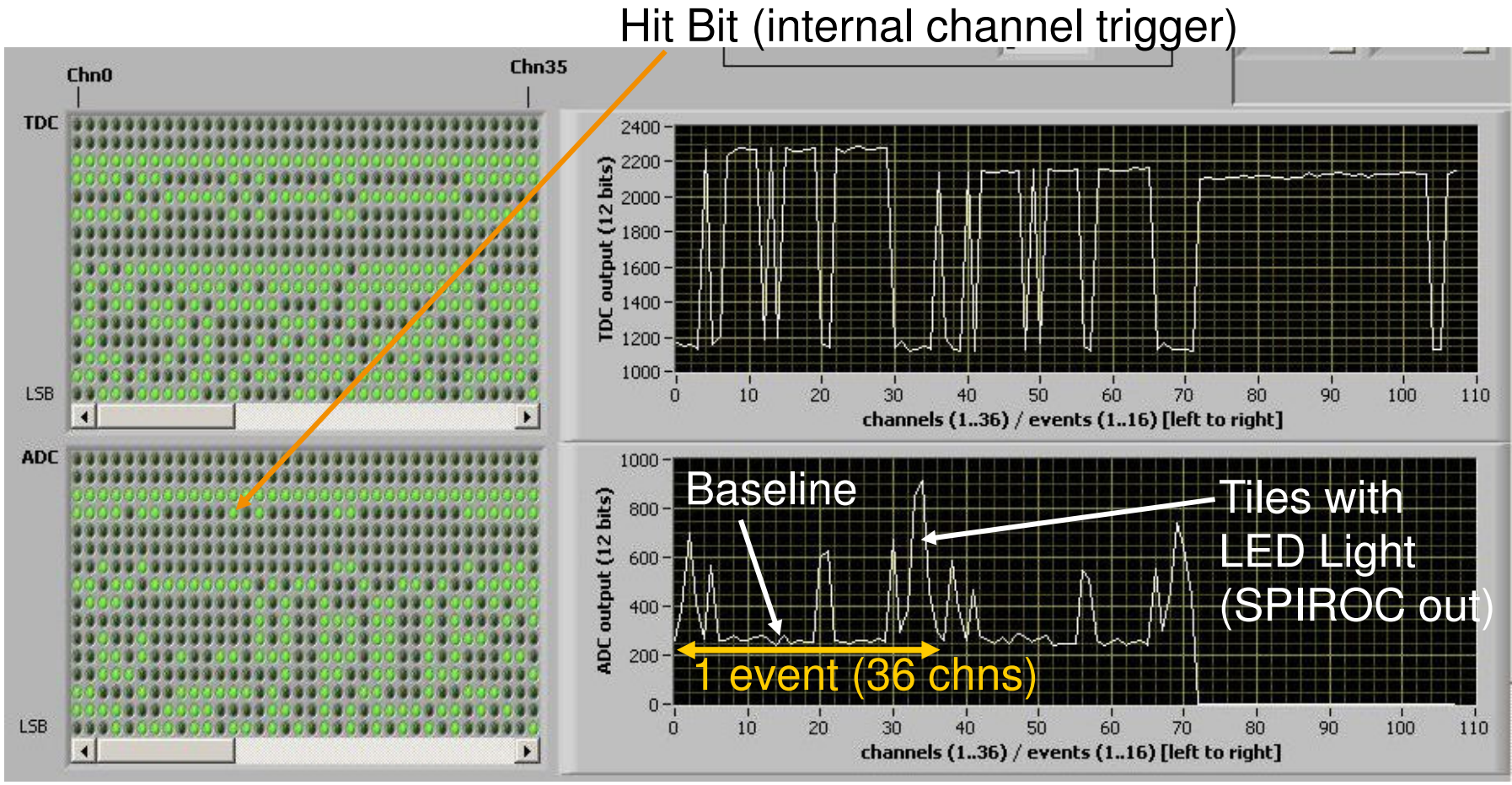
Concept : December 2007

LED Pulse shape (measured on HBU)



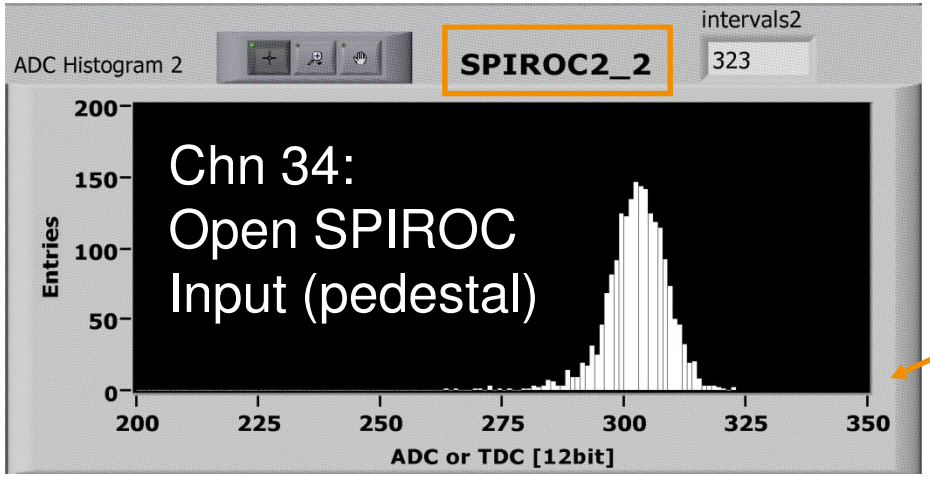
Commissioning

SPIROC2 output: LEDs firing, 3 events (triggers), 18 tiles assembled

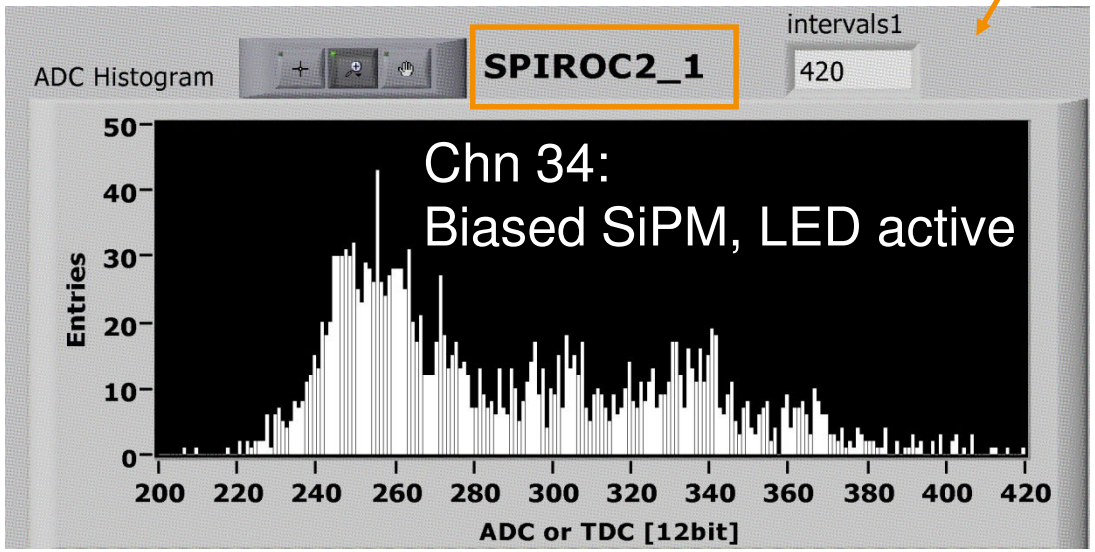


Commissioning (status last Friday)

SPIROC2 output: LEDs firing, 2000 events (trig.), 18 tiles assembled



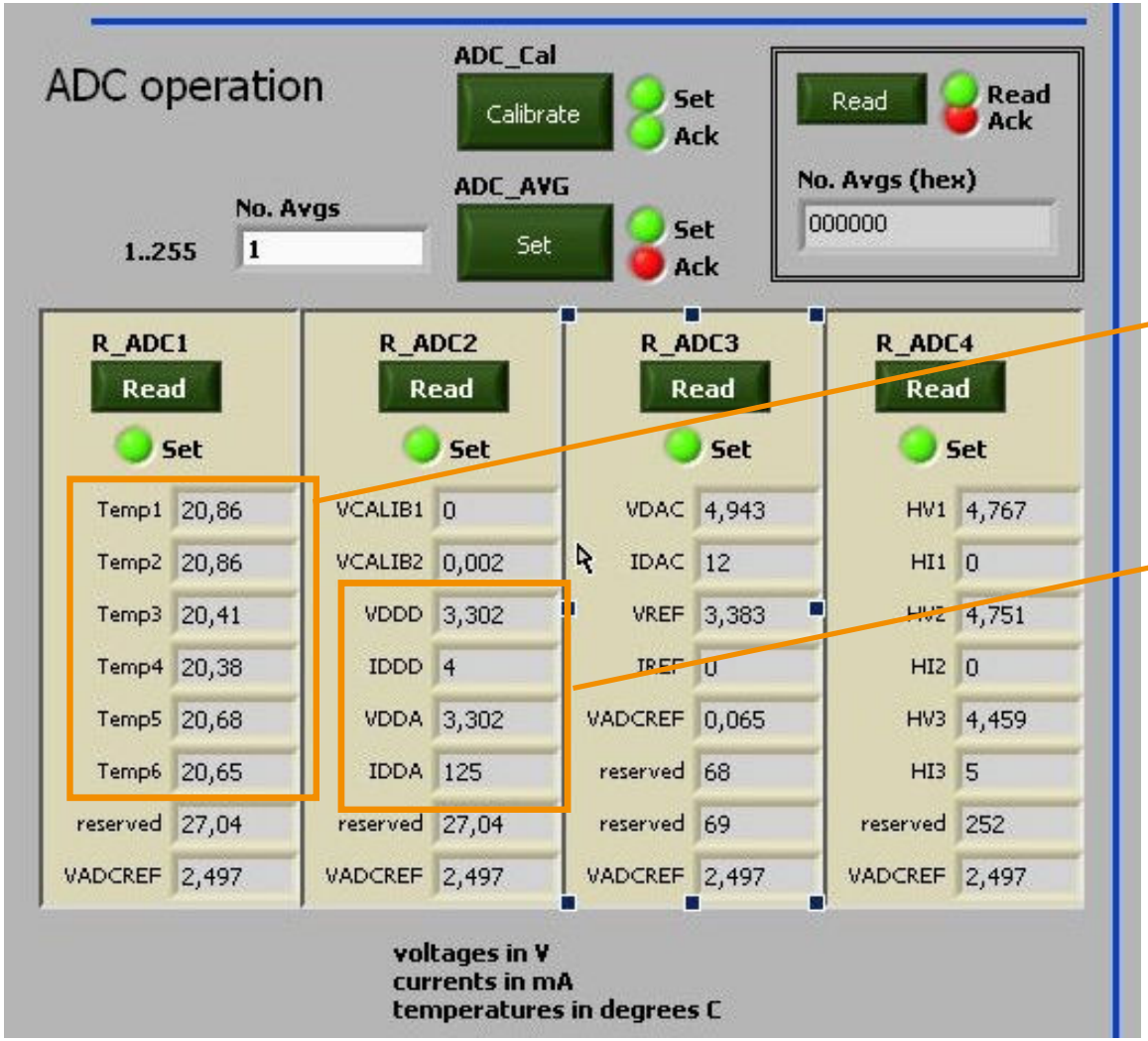
Labview Software extended to multi-cycle data taking => **histograms**



we try to get single peak spectra now to get an idea about global channel gain and noise margin

Commissioning

Slow Control : Read detector's temperatures, voltages, currents



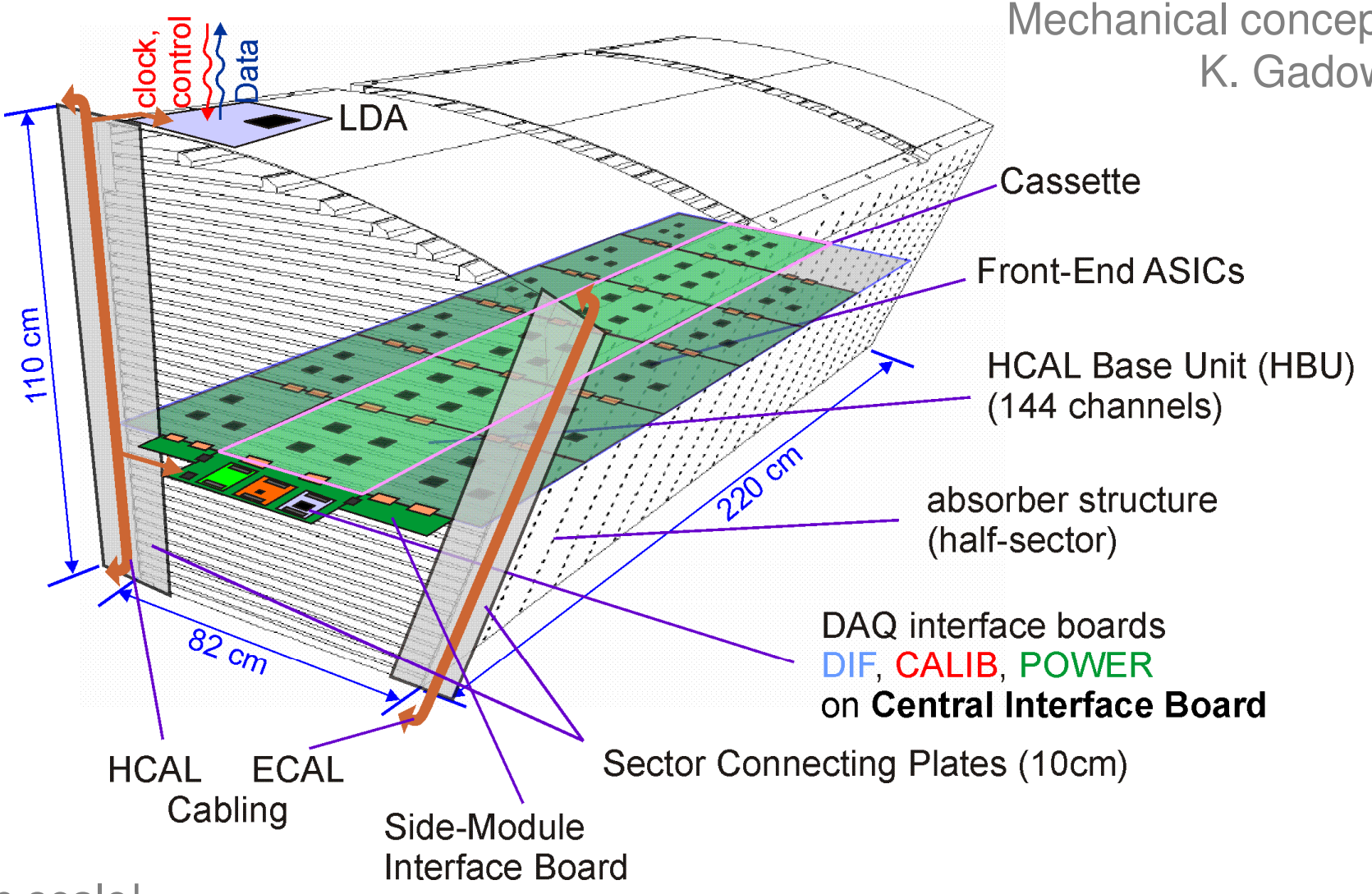
HBU temperature profile

VDDA, VDDD and currents

Slow-Control: Still under test

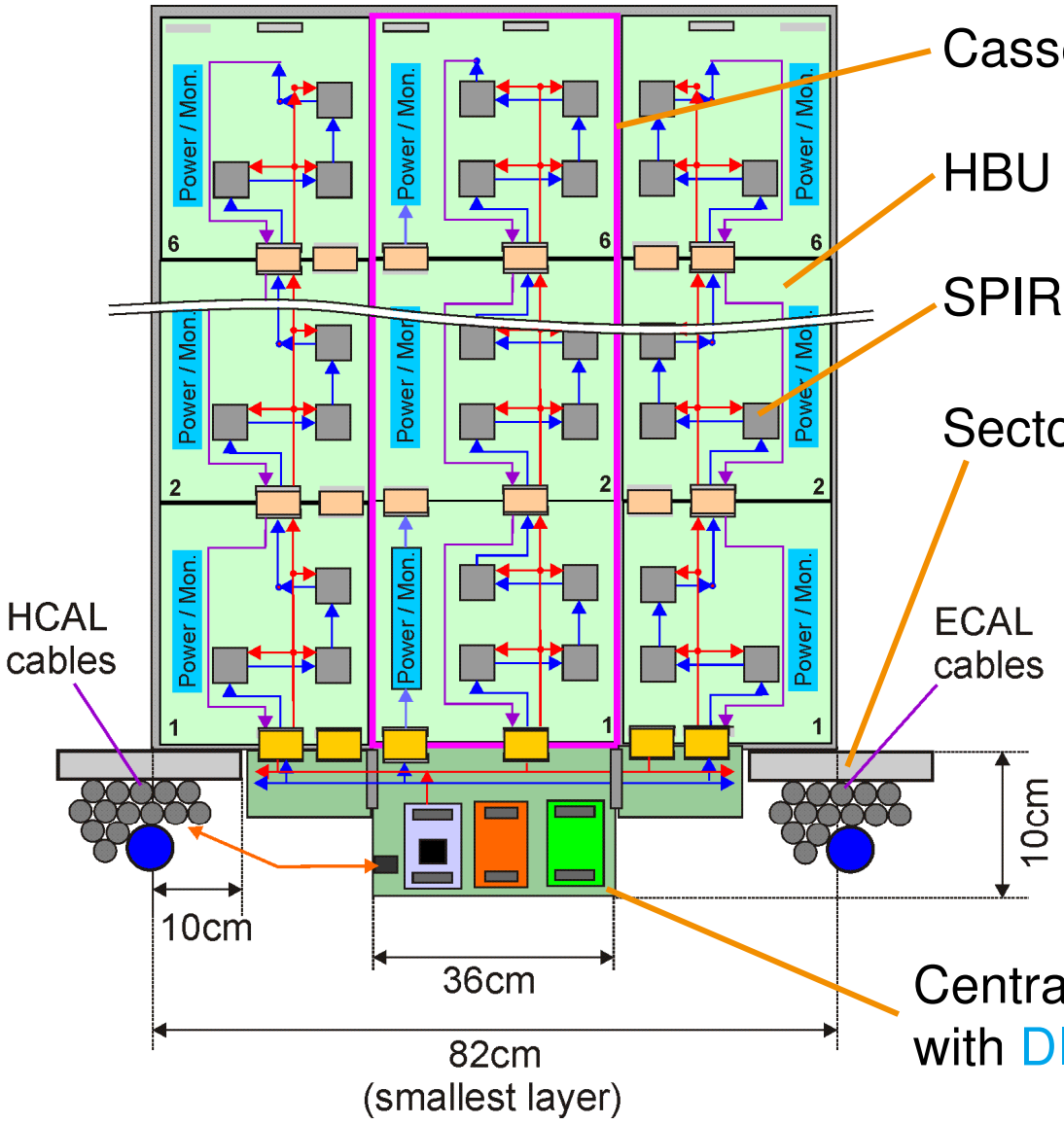
The Next Generation ('final' ILC setup concept)

Mechanical concept:
K. Gadow



Not in scale!

The Next Generation



Cassette (=slab)

HBU

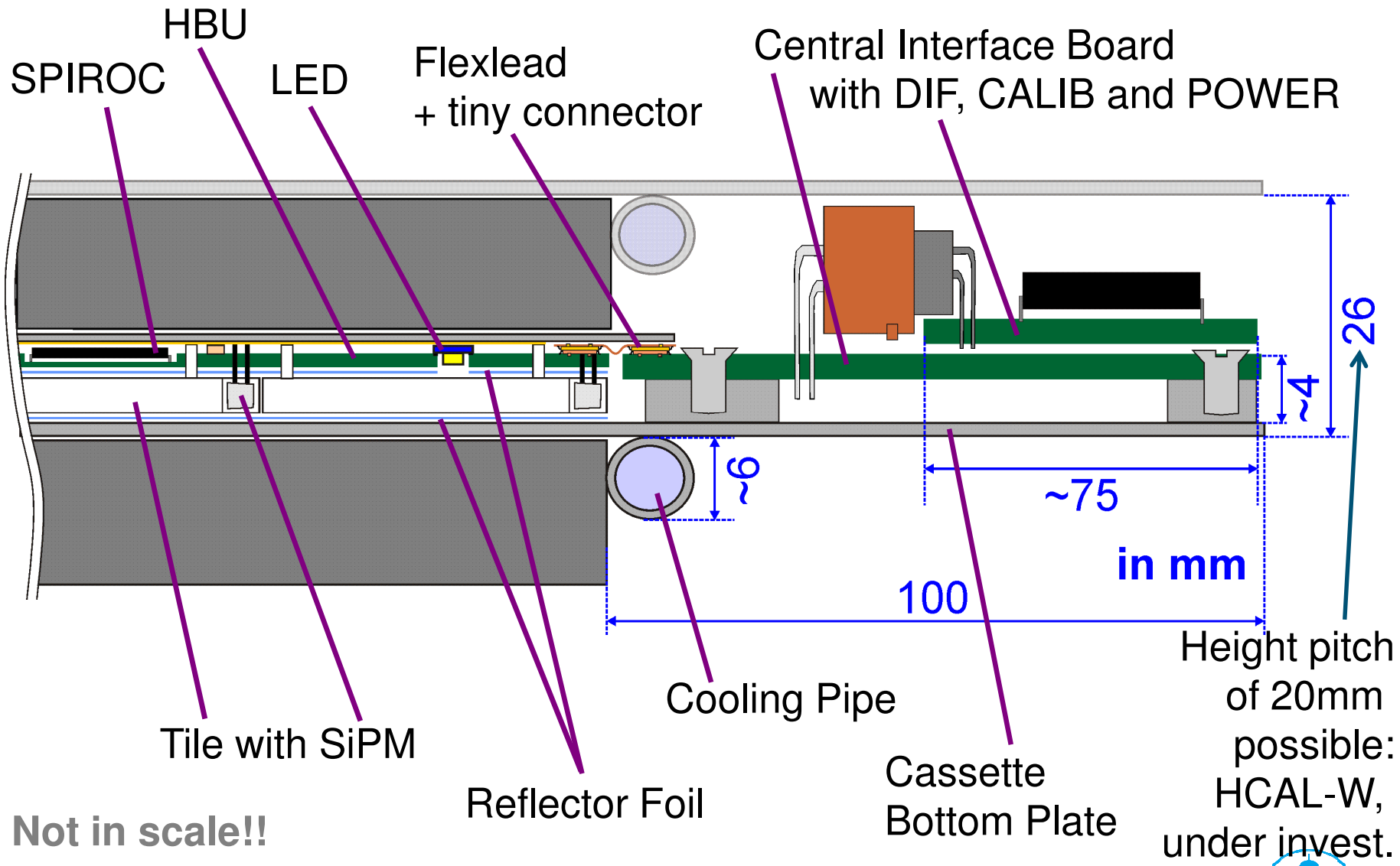
SPIROC

Sector Connecting Plate

Not in scale!!

Central Interface Board with DIF, CALIB and POWER

The Next Generation



Conclusions and Outlook

- AHCAL prototype delivers first test-data from LED system.
- British DAQ (hardware, DIF firmware) still has to be implemented.
- Full equipment of HBUs with tiles very soon now.
- DESY electron-testbeam preparation:

  => S. Christen: Labview extension for testbeam

  => small hardware changes (e.g. ext. trigger)

  => lab characterization of HBU (incl. LED system)
- Redesign concepts of AHCAL modules are prepared now.

- A lot of system's and SPIROC analogue and digital tests ahead.