

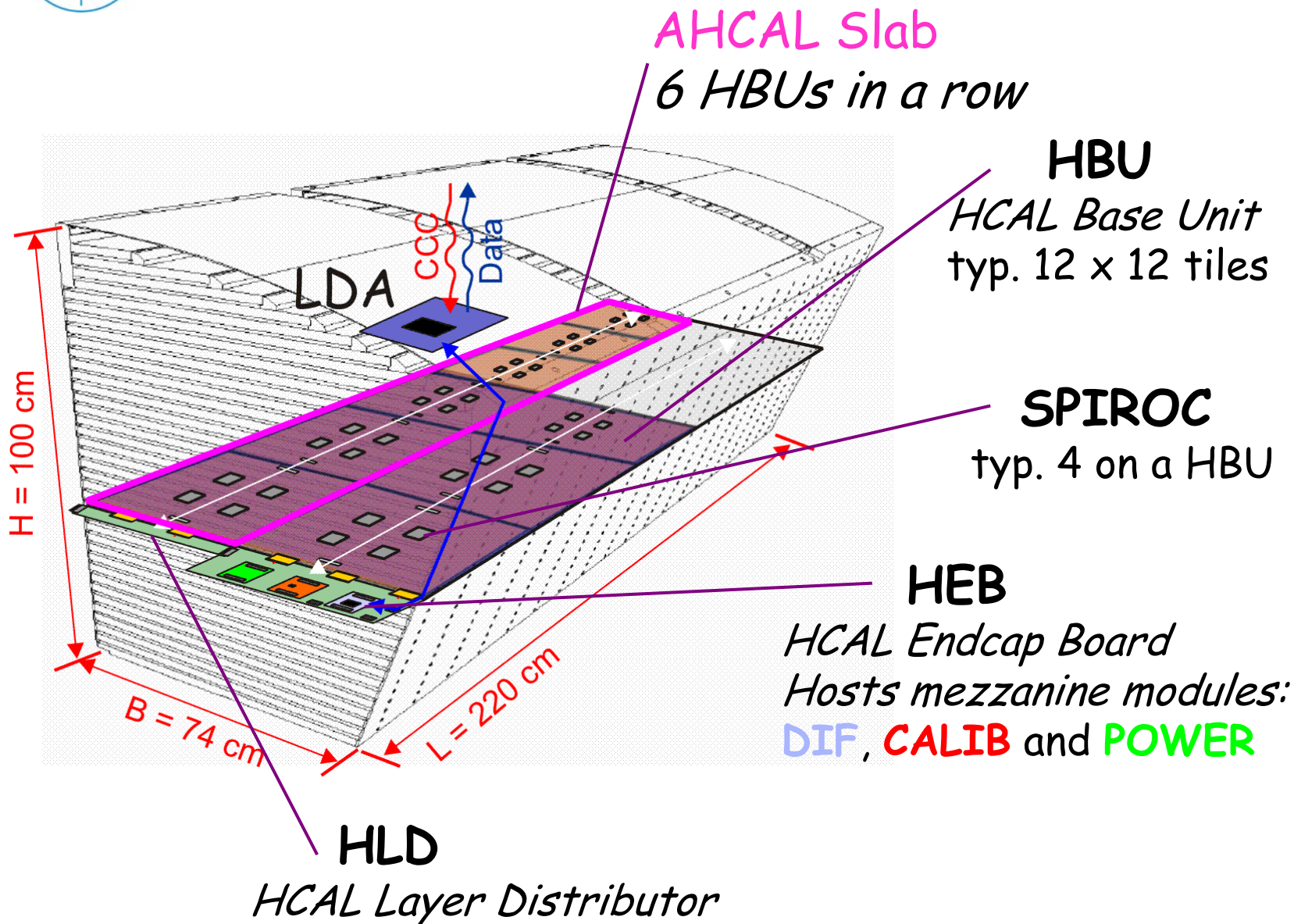
2nd Generation Electronics Integration

Peter Göttlicher

Power point from Mathias Reinecke

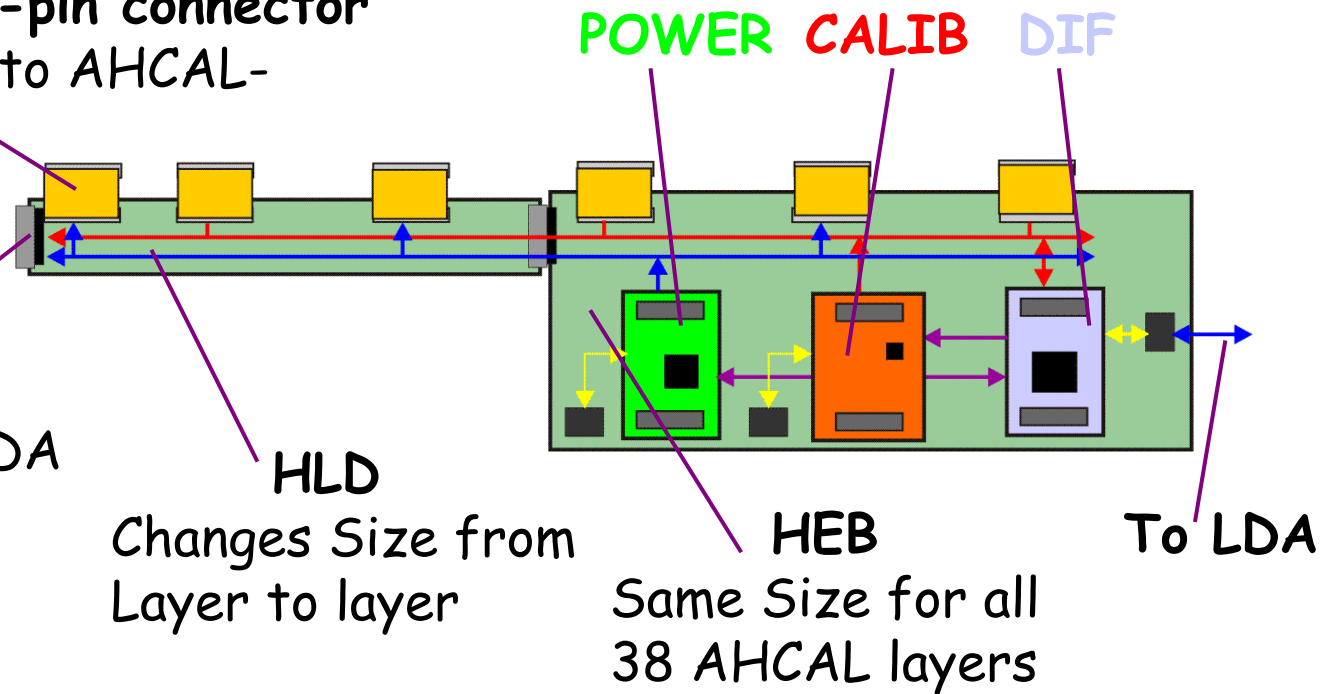
on behalf of the AHCAL partners





Flexlead and 80-pin connector
Interconnection to AHCAL-
Layer (HBU)

DIF-DIF conn.
Redundancy against
failures of DIF or LDA



HLD

Changes Size from
Layer to layer

HEB

Same Size for all
38 AHCAL layers

To LDA

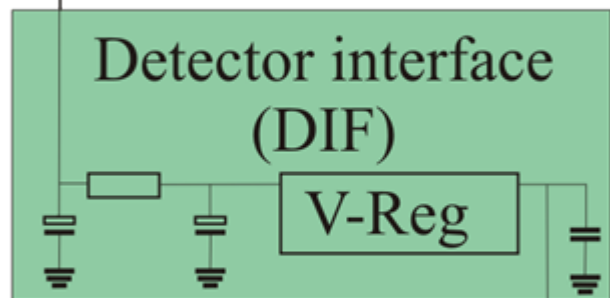
- DIF** - *Detector Interface (Configuration and Operation)*
- CALIB** - *Light and/or Charge calibration and monitoring*
- POWER** - *Layer power and temperature monitors*

Mezzanine setup allows independent development of different groups.

Example for
HCAL half-octant

power supply
outside of the
detector

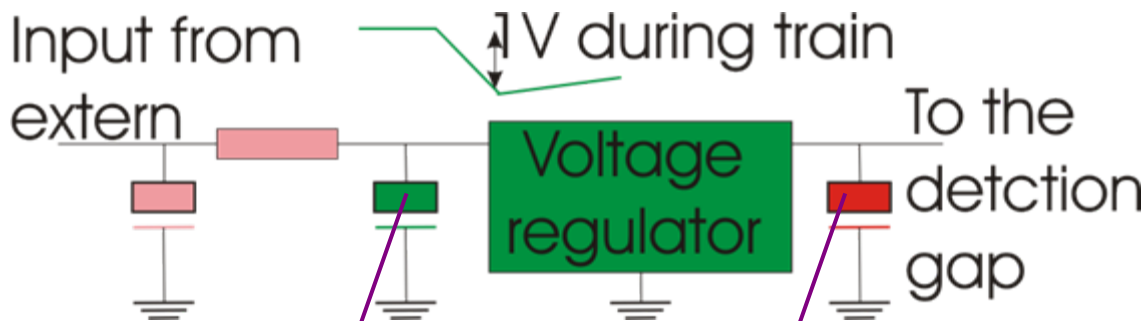
outside of the
detector



Multiple PCB's in gap
with interconnects



Components on HEB, HLD

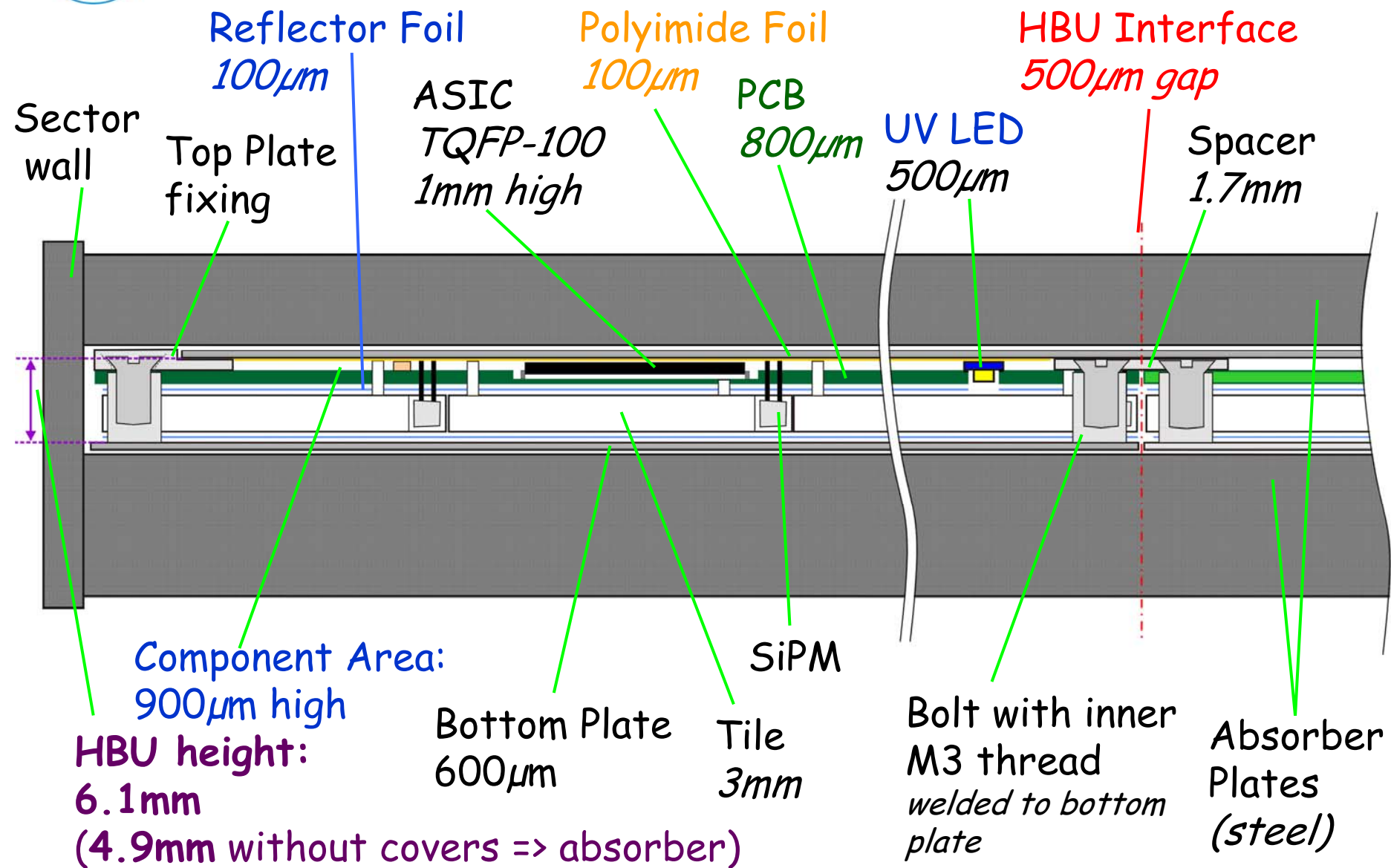


For 1 V in 2ms:
3.4mF
10 SMD tantal

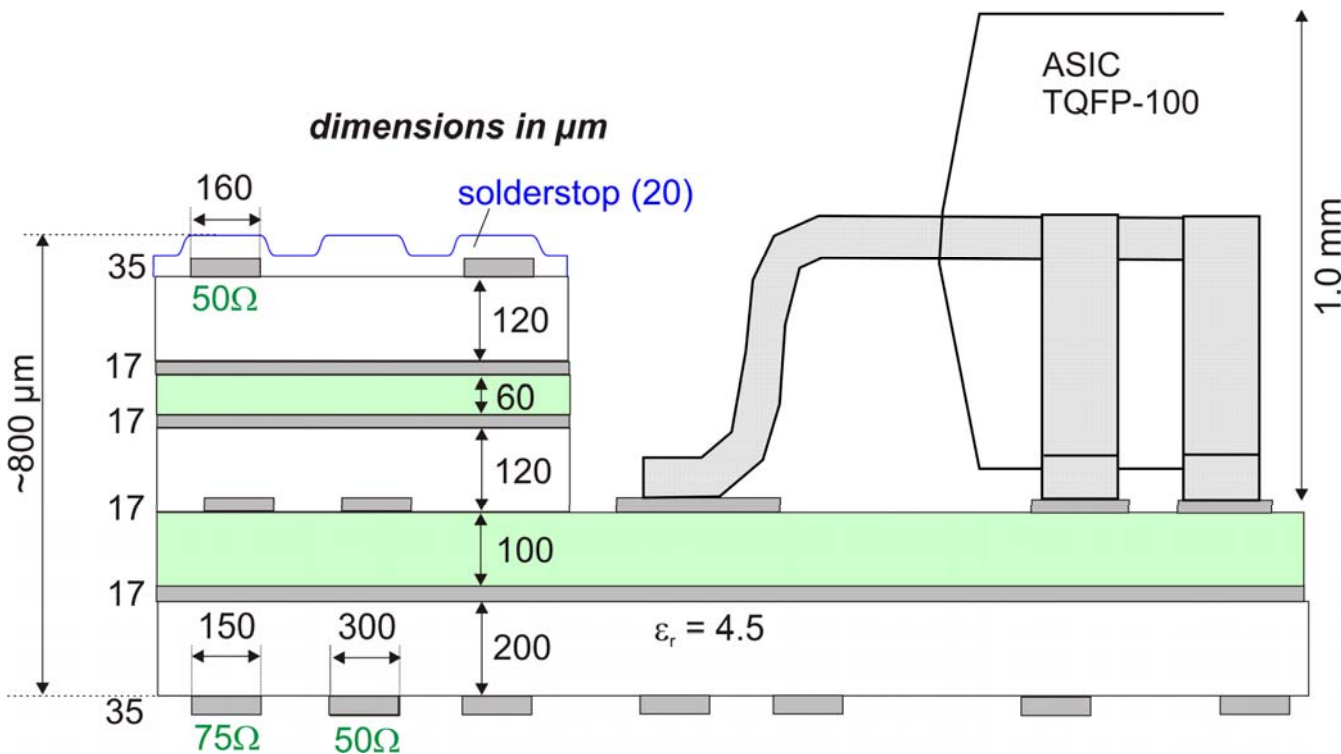
,Slow'

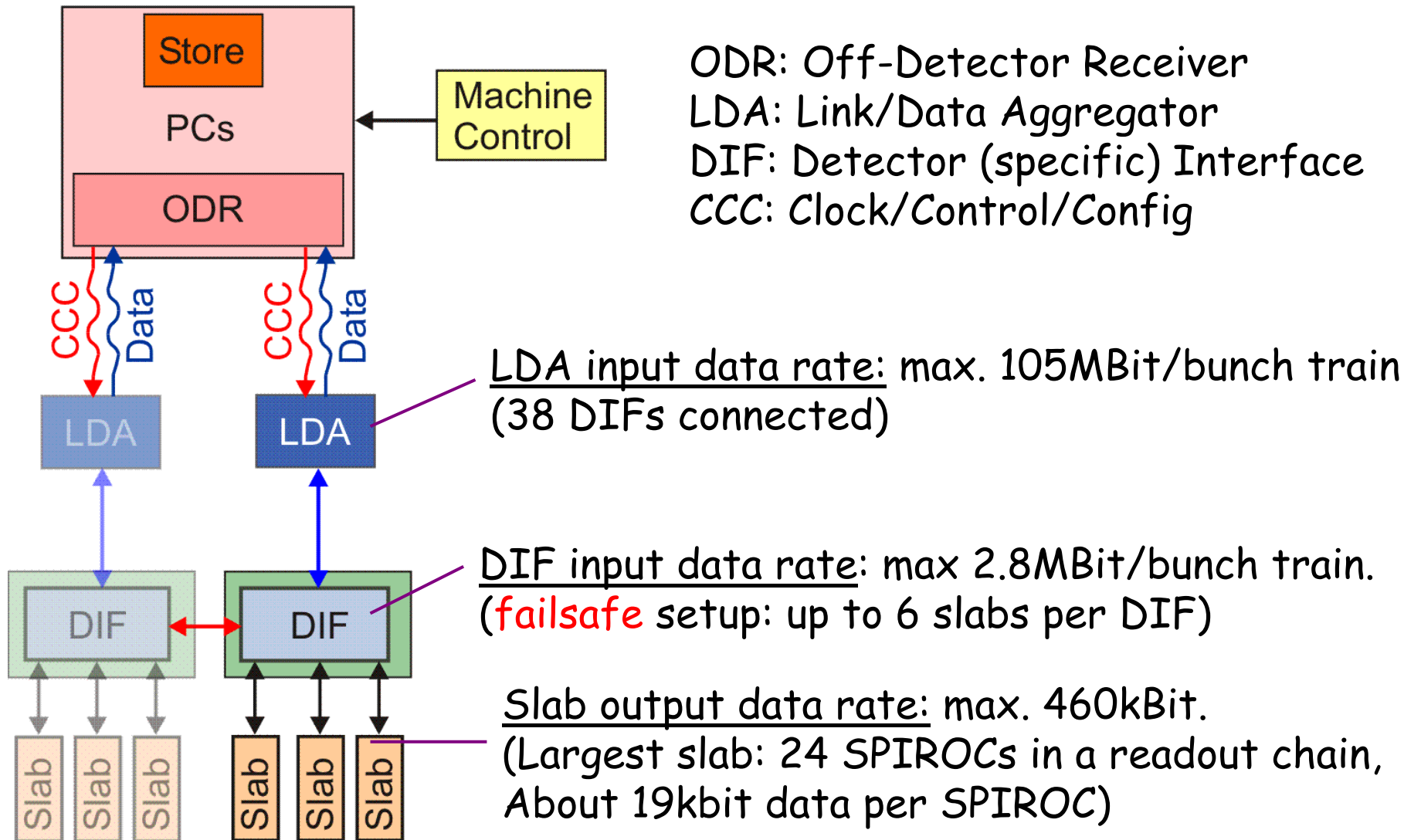
For 5mV in $1 \mu\text{s}$:
340 μF
40 large ceramic

,Fast'



- 6 layer design with cut-outs for ASICS and connectors
- 75Ω Lines for high-gain SiPM setup
- Two signal layers for impedance-controlled routing
- Total height (PCB + components): 1.5mm**
- Two companies agreed on structure !!**







A „**DIF Task Force**“ has been established in order to exploit the synergies of the detector- and DAQ designs.

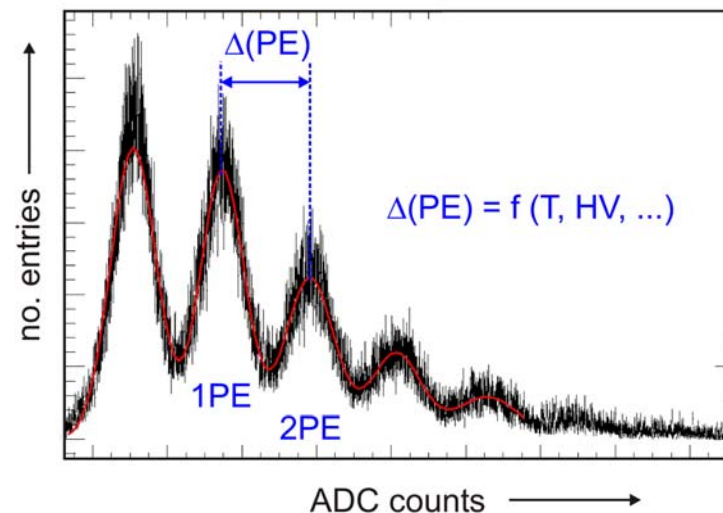
- Bart Hommels (Cambridge) for the DAQ
- Remy Cornat (Clermont) for the ECAL
- Julie Prast (Annecy) for the DHCAL
- Mathias Reinecke (DESY) for the AHCAL

A preliminary result might be expected at the EUDET Meeting in Paris, Oct. 8-10, 2007

SiPM response strongly depends on temperature and bias voltage.

LCS (based on UV LEDs) needed for:

- Calibration (ADC counts per PE)
- Gain Monitoring

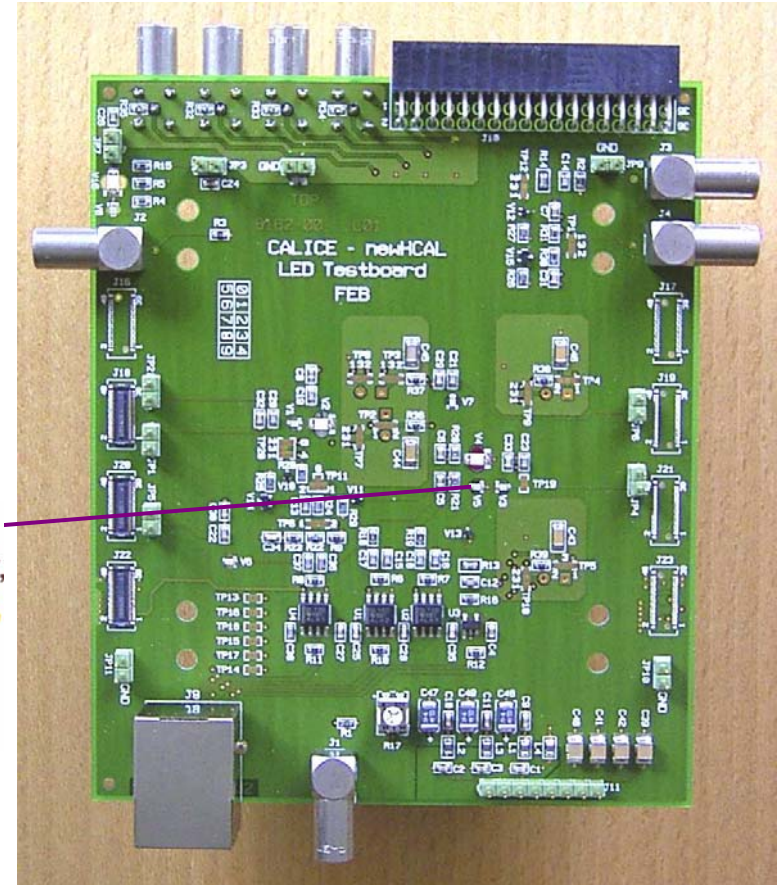
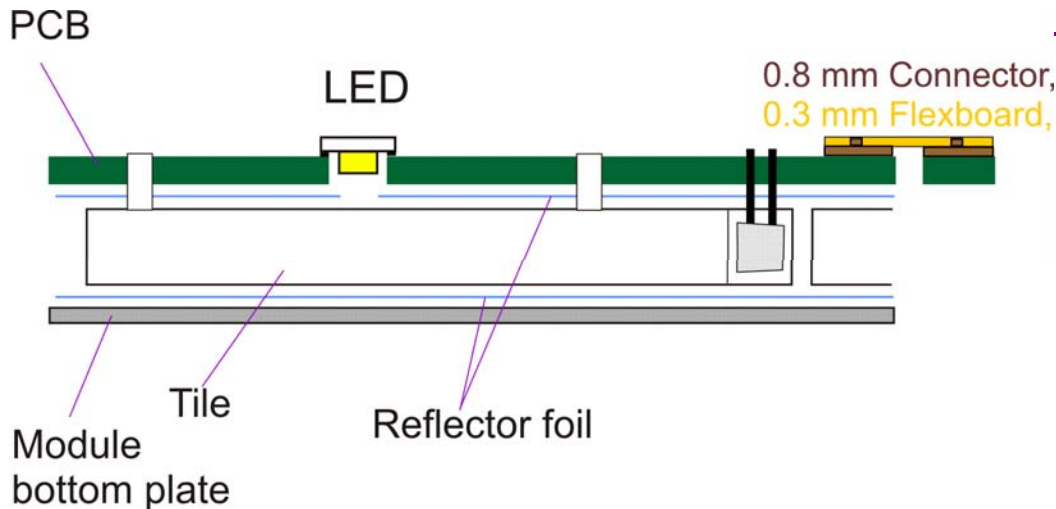


Two different concepts under investigation:

- Quasi-Resonant LED driver setup on DIF, fibers into AHCAL gaps (see: our Prague colleagues, I. Polak et al.)
- One LED per tile, direct coupling without fibers (currently tested at DESY)

Test LED integration into HBU (LCS):

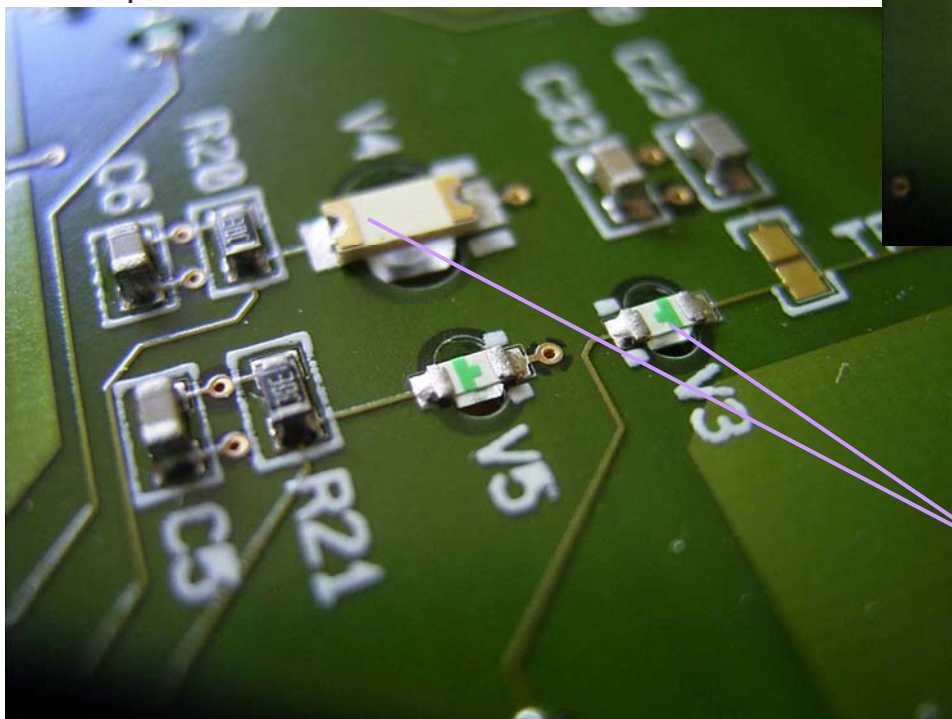
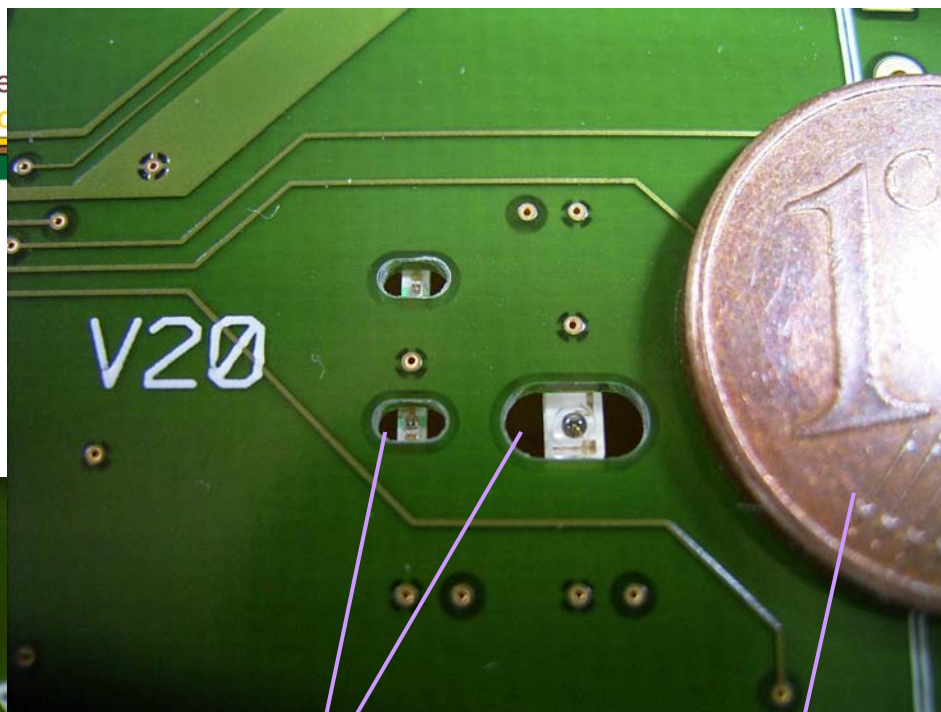
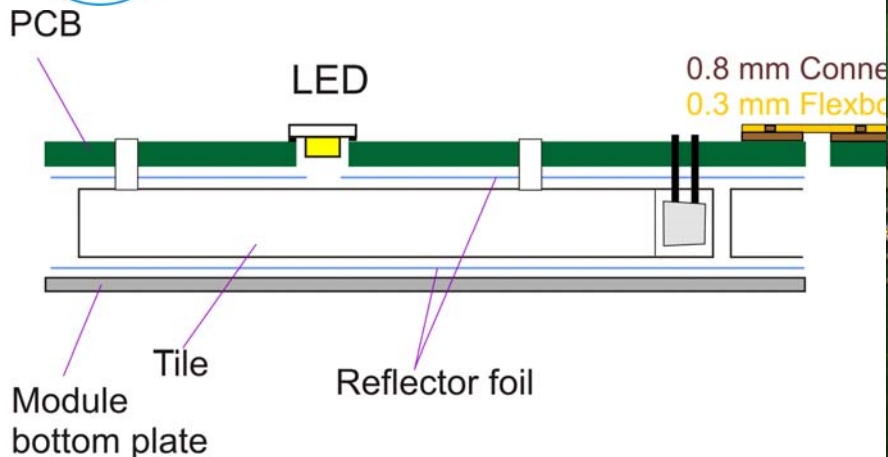
- Crosstalk of driving circuit to SiPM?
- Integration to PCB / coupling to tile?
- Connector test: stability, number of connection-cycles?





LED Testboard (direct coupling)

FEB



LEDs radiate through holes in PCB

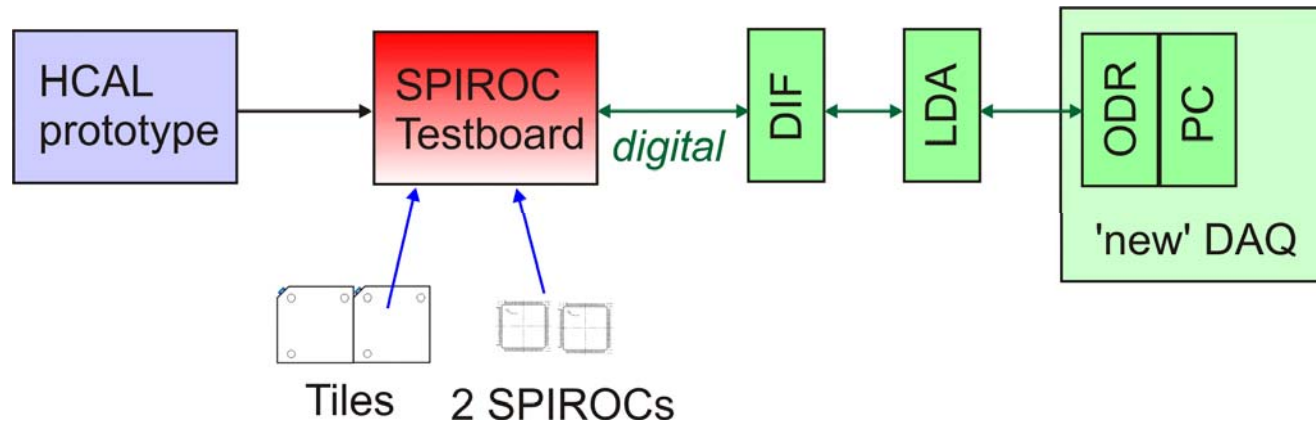
1 Cent

Two different types of LEDs assembled on PCB (top)

SPIROC Testboard (HBU prototype):

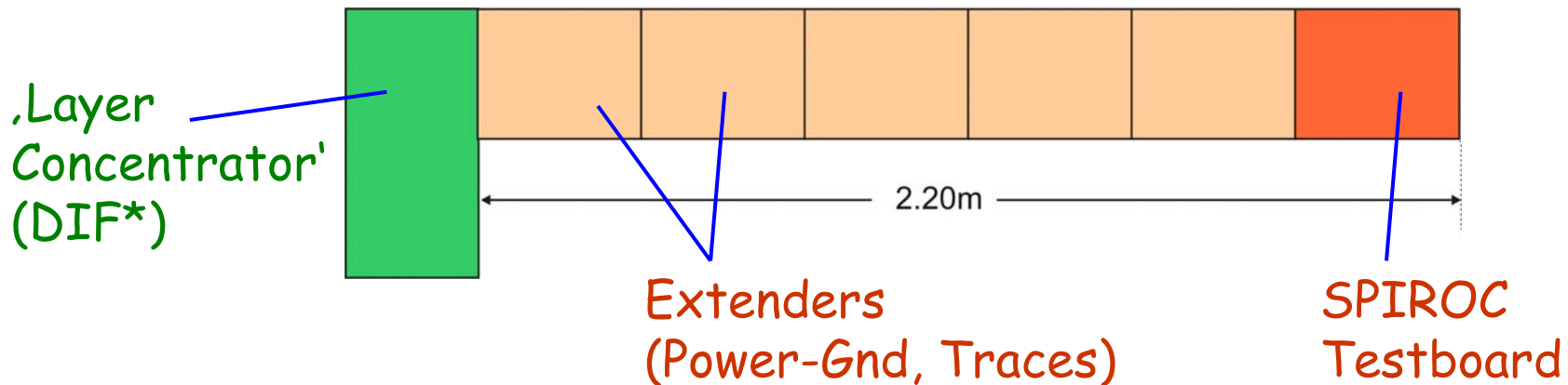
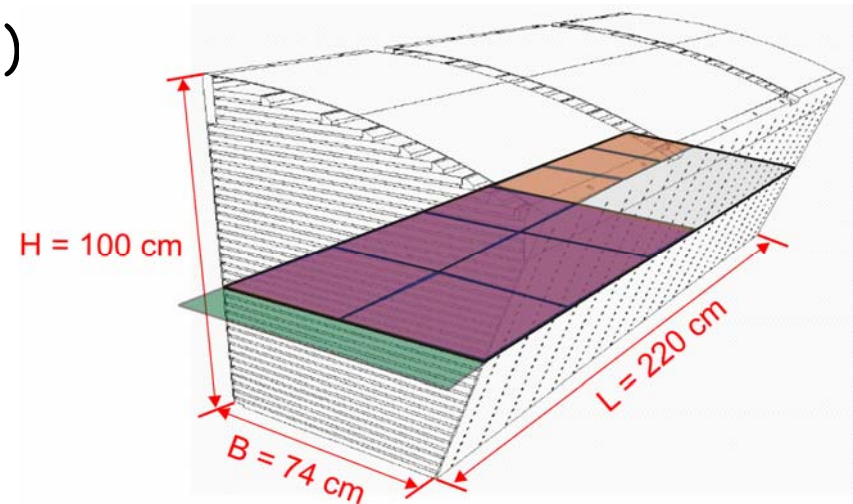
- Assembly (Tiles, PCB, ASICs, LEDs), Cassette Construction
- Performance in the dense HBU setup:
Noise, gain, crosstalk, power and signal integrity
- DAQ Interface
- LCS with LEDs on board.

Timescale for the first DAQ prototype is under discussion (coupling to the analogue interface of the current DAQ?)



Test Power-Ground System (2.20m)

- Oscillations when switching?
- Voltage drop, signal integrity (traces, connectors)?
- SPIROC performance @ far end (blocking caps sufficient)?





- First ideas about the next generation AHCAL develop to a promising concept.
- Feasibility of many design aspects (e.g. PCB structure) have to be proved.
- Testboard Design I (LCS) is set alive now!
- Testboard II (HBU prototype) design starts in spring 2008.
- Testboard III (power plane test) runs in parallel (beginning of 2008).