Integrated LED calibration

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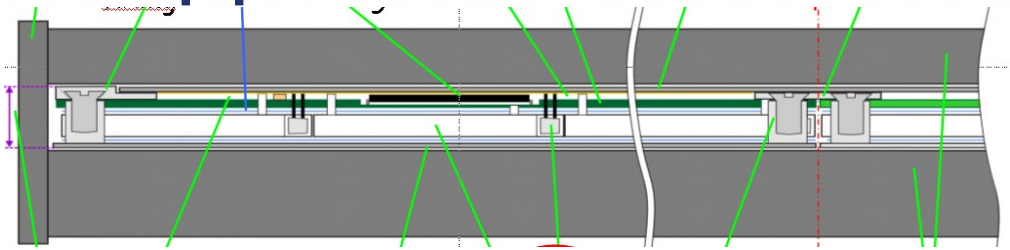
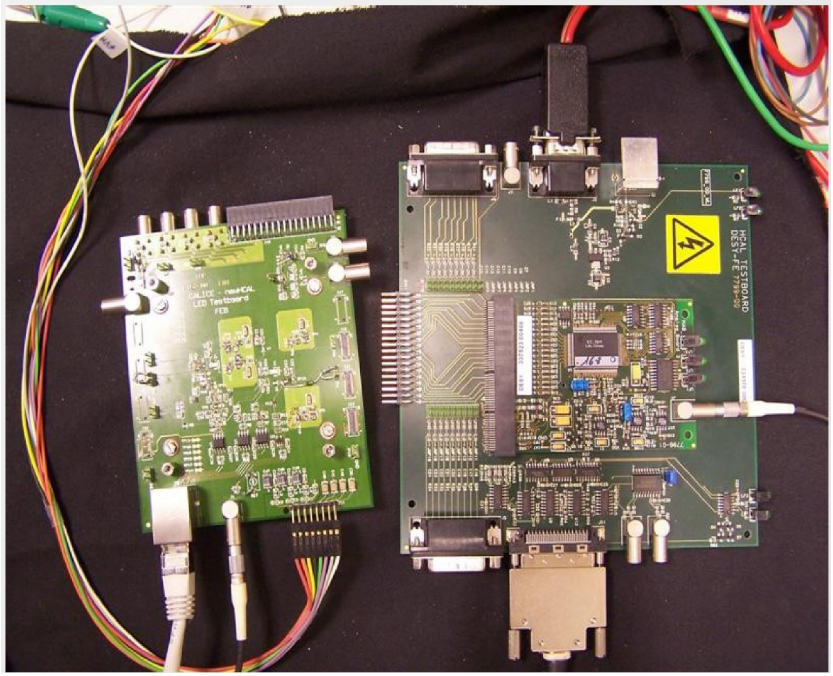


- Join ILC and proceed developement of „integrated LED“ calibration system
- start with existing test system
- optimize
  - circuit
  - LED position & color
- develop robust, scalable & simple calibration sytem

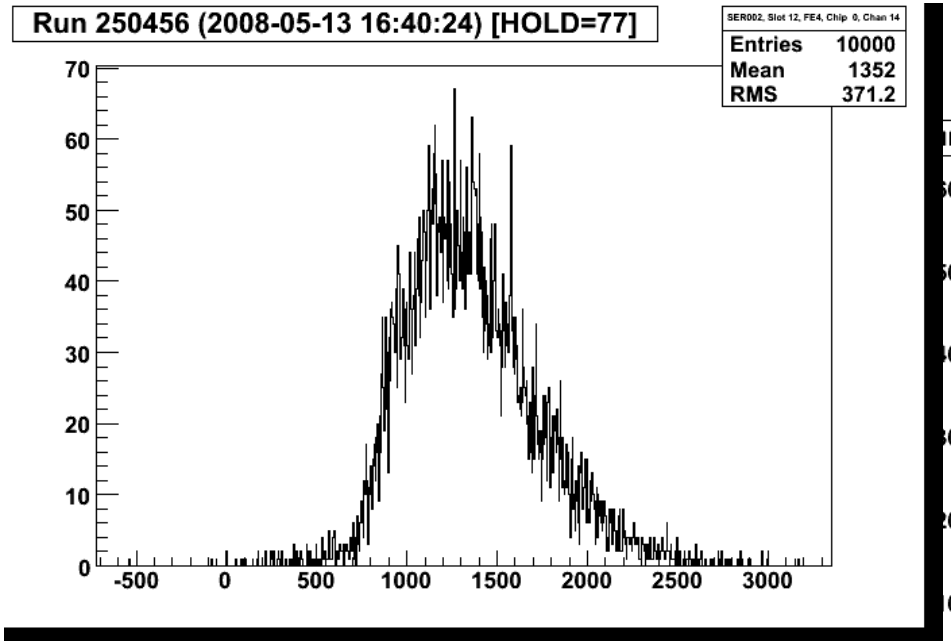


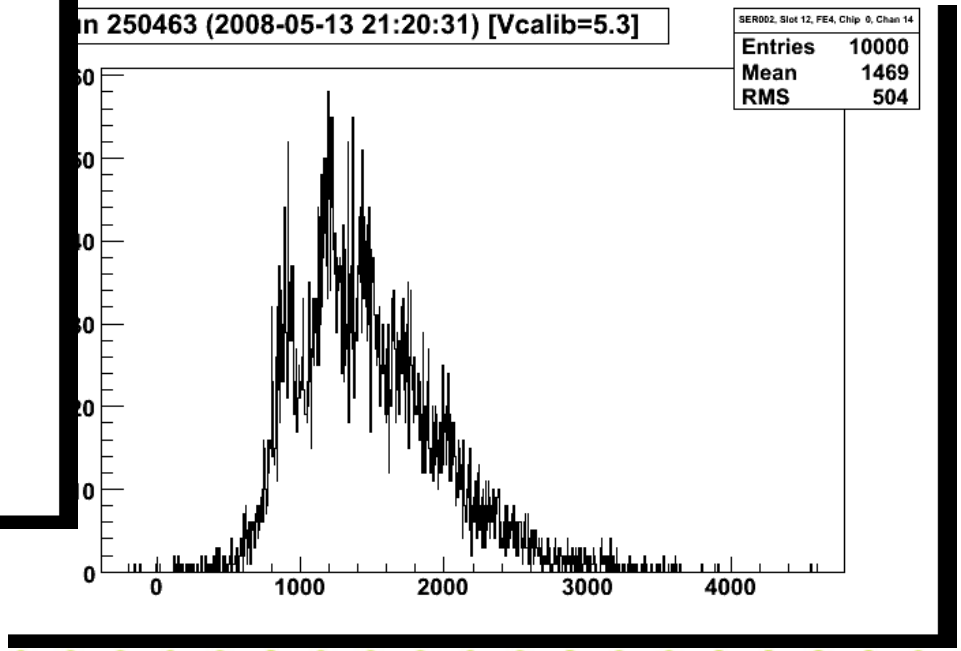
Plans

- xy table
  - **high resolution** homogenity test
  - LED position
  - β-rays
  - edge of tiles?
- highly automated system
  - scan through a set of parameters in short time

Plans

- Temperature controlled box
  - reproducibility
    - actual system highly sensitive to temperature
  - temperature studies





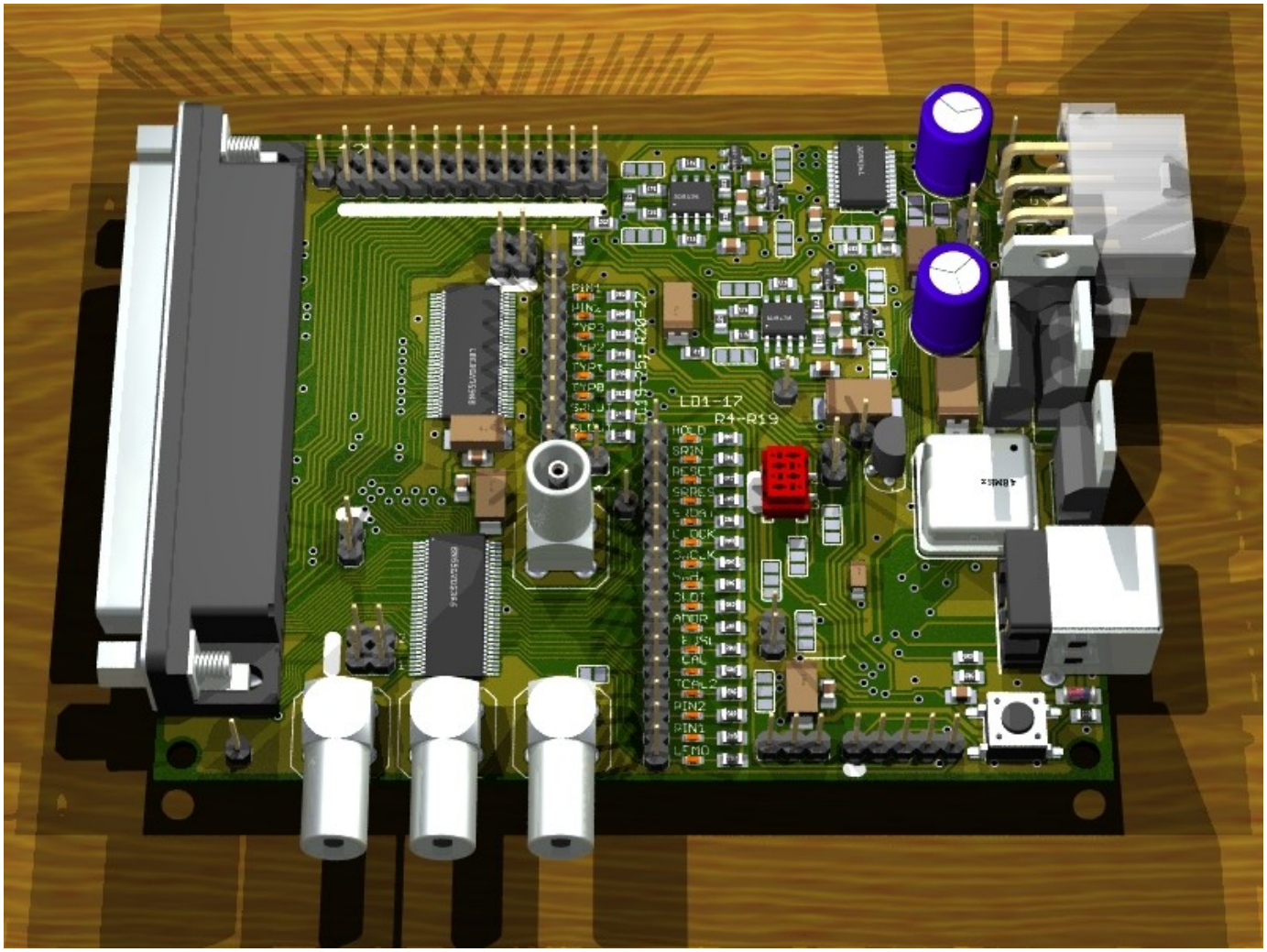
DAQ

- HCAL DAQ (VME+CRC) less convenient
  - CRC rare
  - complex
  - expensive
  - overkill (e.g. >1700 SiPMs)

- Our Requirements
  - small, easy to use and adaptable hard- and software
  - read out ~4 SiPMs
  - still as similar as possible to existing system

µDAQ

- A lightweight DAQ system on 100x80mm²

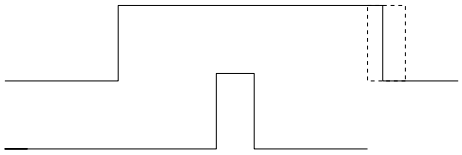


µDAQ Features

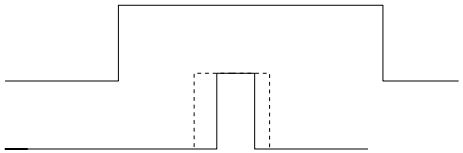
- Full support of HCAL LVDS signals
  - 68 pin VHD SCSI connector
- Analog part 1:1 identical with CRC
  - 4channel ADC: up to 72 SiPMs
- Generates all supply voltages except HV
- USB interface
  - RS232 emulation
  - Drivers for all OS → no pain for developers
- Up to 3 Temperatures
- Hardware developement completed
  - software no show stopper

µDAQ Features - timing

- CRC
  - HOLD signal: 200-1000ns, 6.5ns steps
  - 52ns LED pulse by 300MHz pulse generator
    - (fixed delay to HOLD)



- µDAQ
  - only 83ns steps
  - keep HOLD fixed
  - shift LED pulse delay instead (300MHz generator)



- *What's about jitter on µCs?*
  - *Measured to be less than 140ps*

Outline

- Integrated LED calibration system taken over by University of Wuppertal
- µDAQ hardware completed
- software less critical

- We can begin within next weeks!