Integrated LED calibration

Status of Work in Wuppertal

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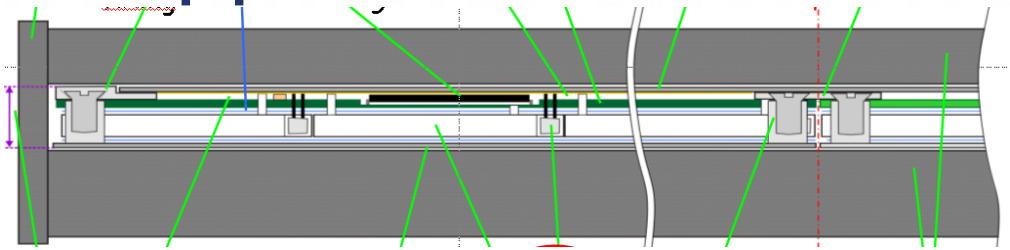
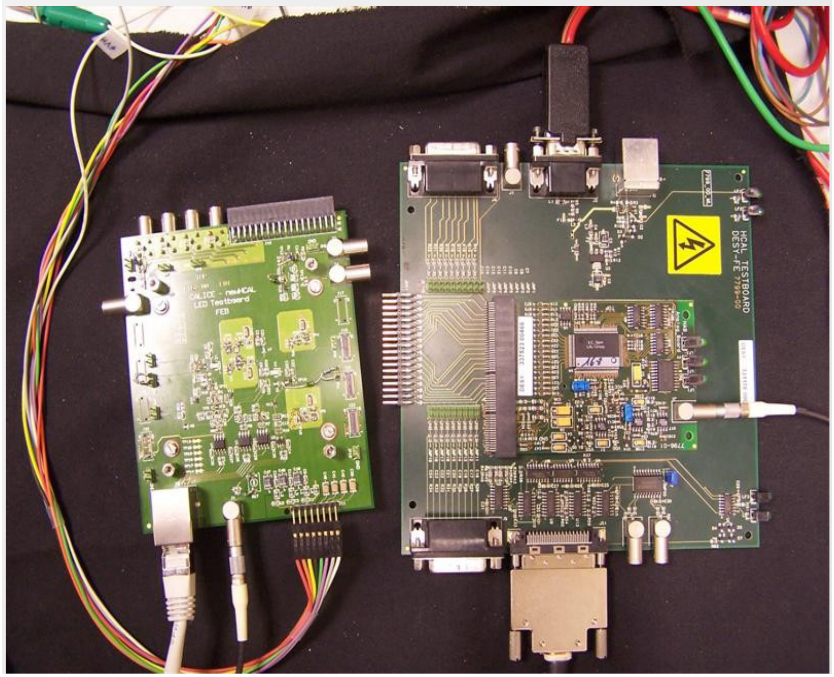


- Developement of „integrated LED“ calibration system
- start with existing test system
- optimize
  - circuit
  - LED position & color
- develop robust, scalable & simple calibration sytem



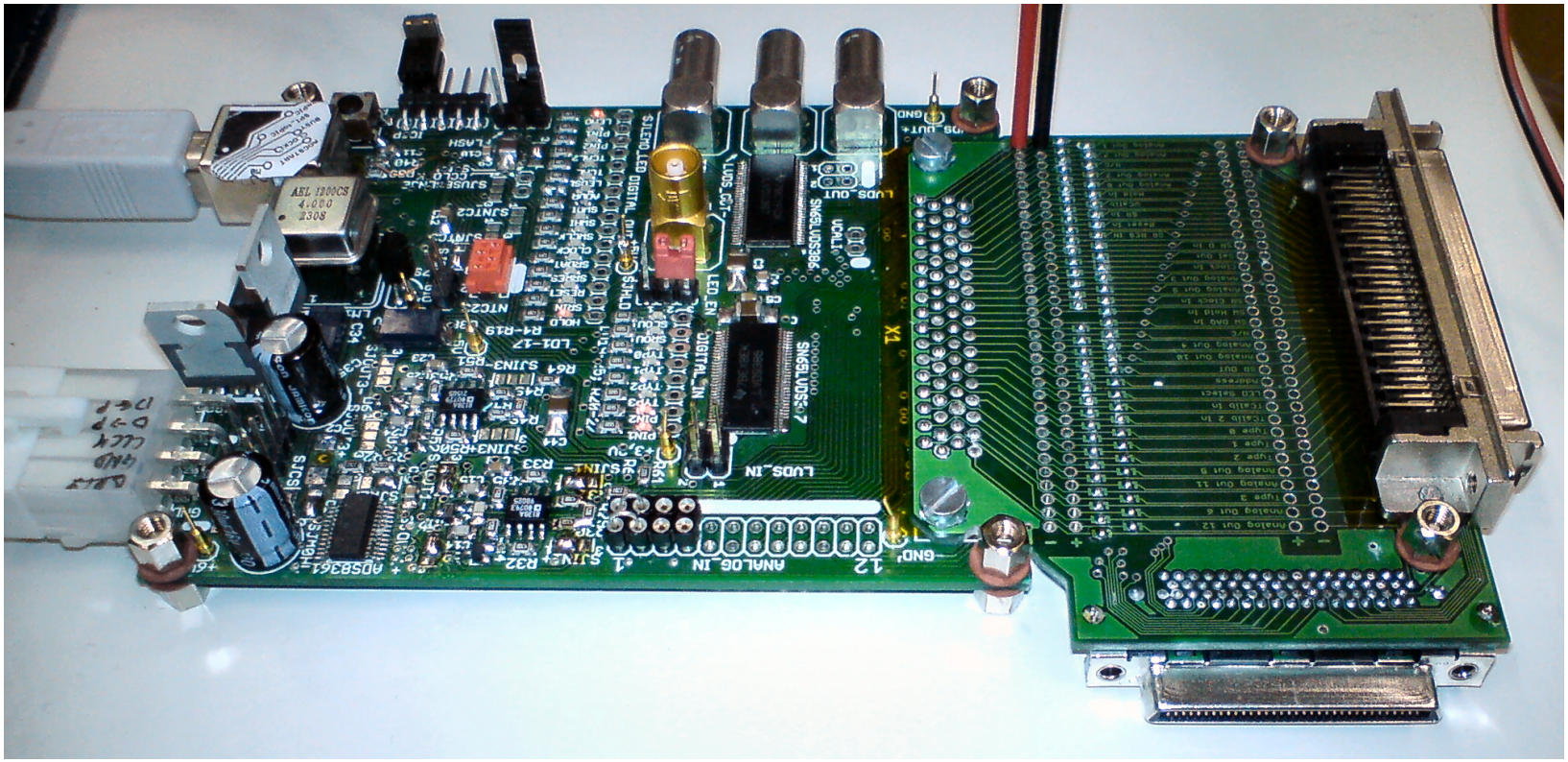
DAQ

- 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

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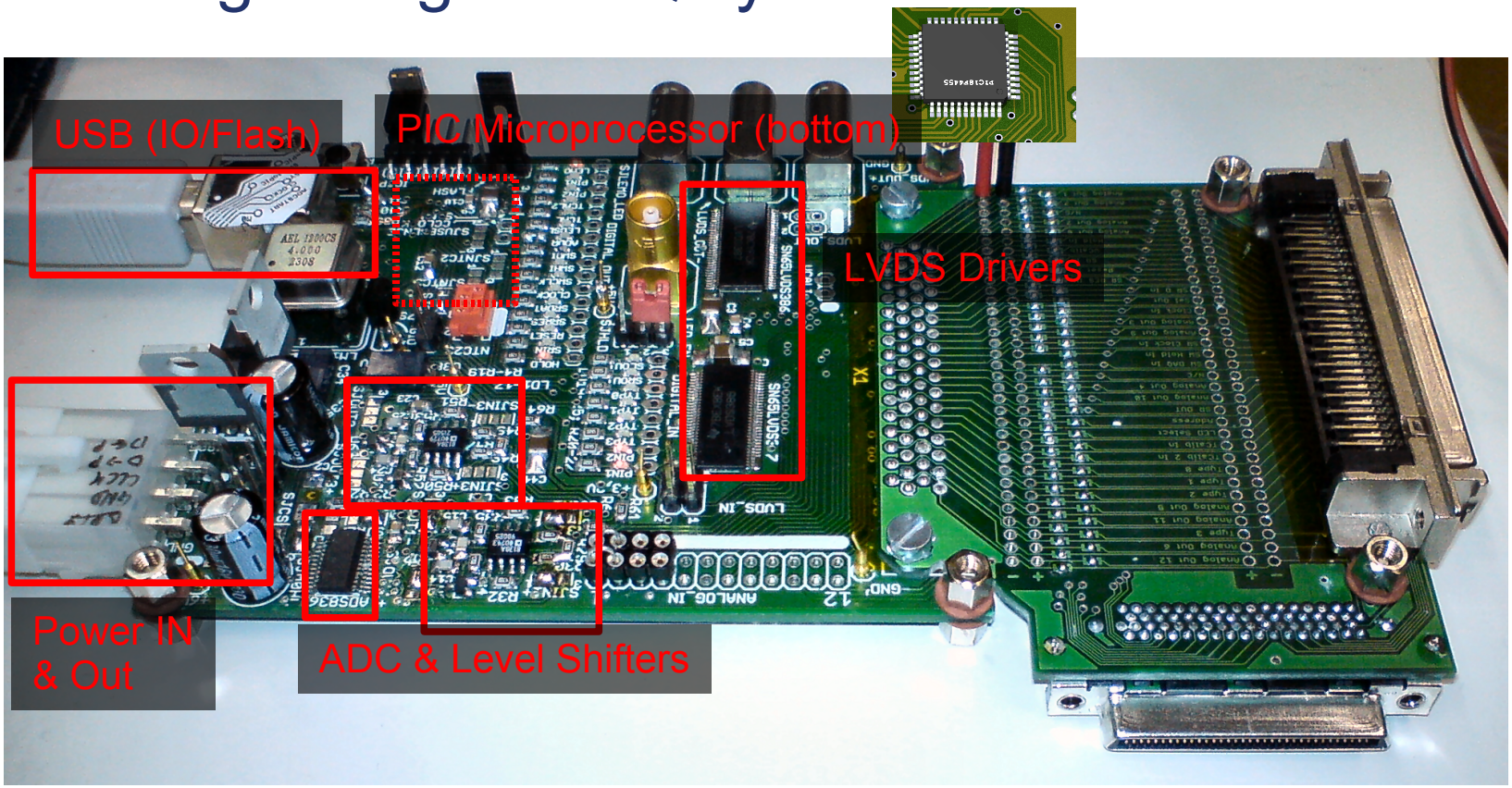
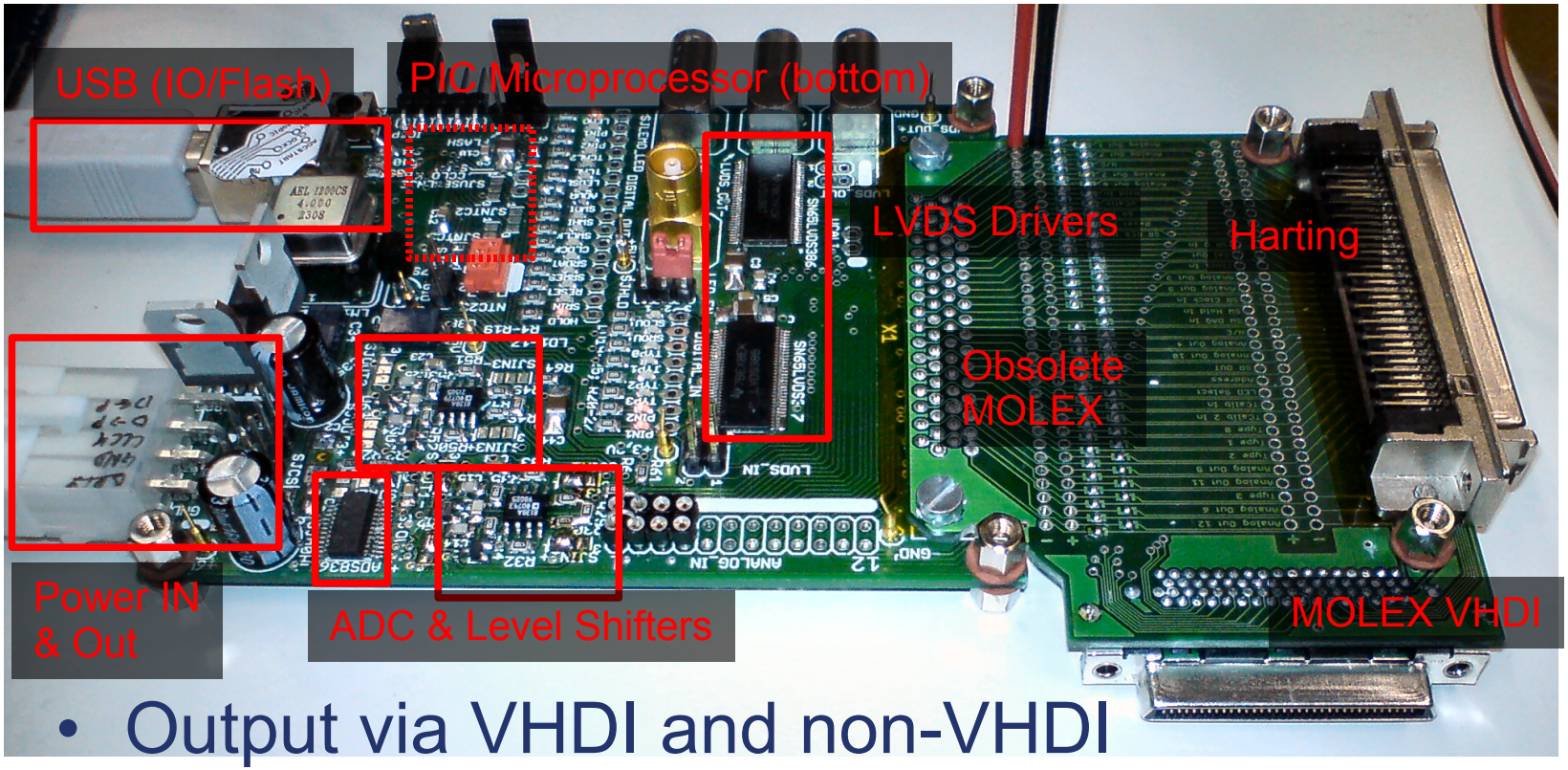


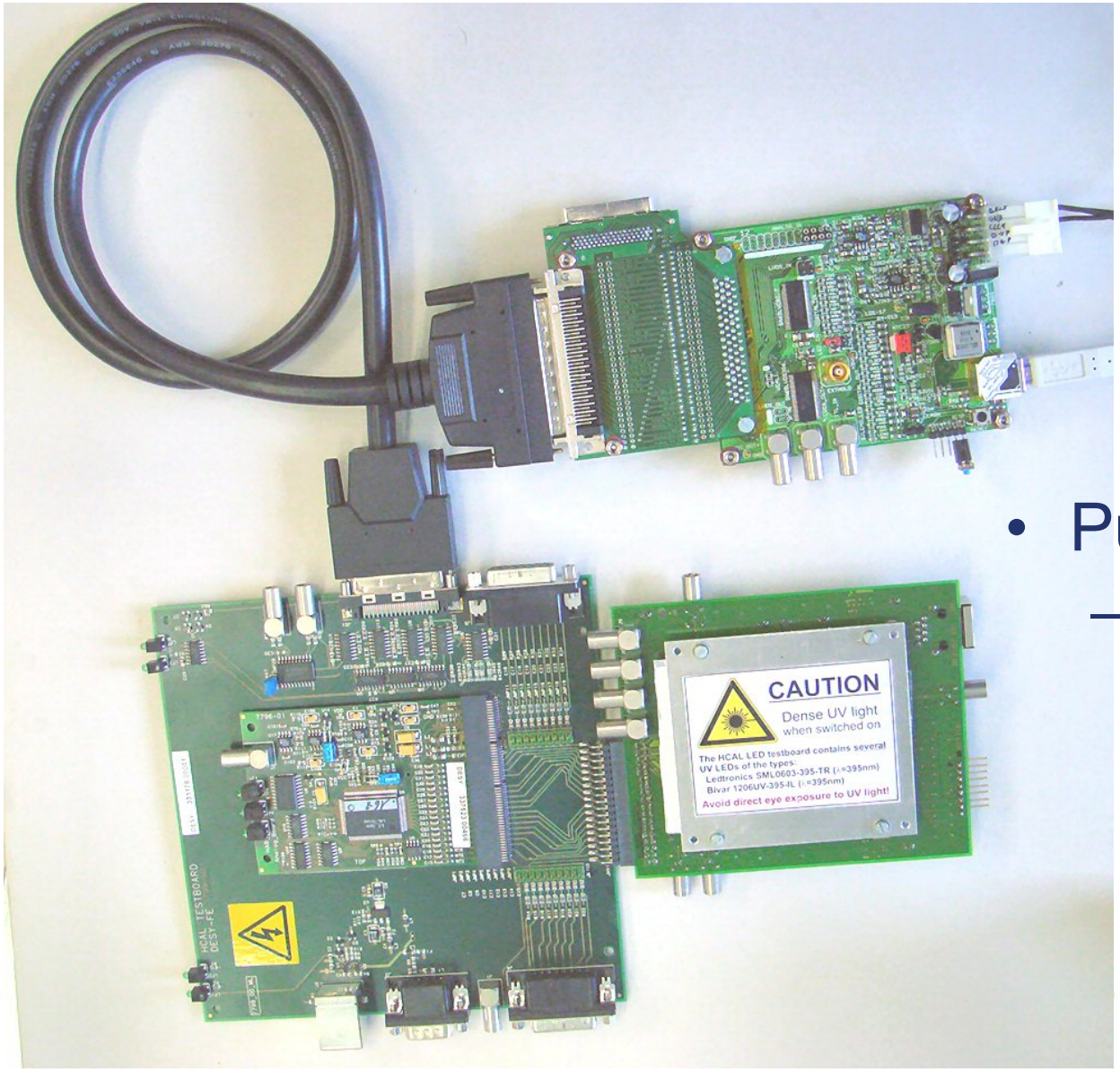
µDAQ

- A lightweight DAQ system on ~~100x80mm²~~



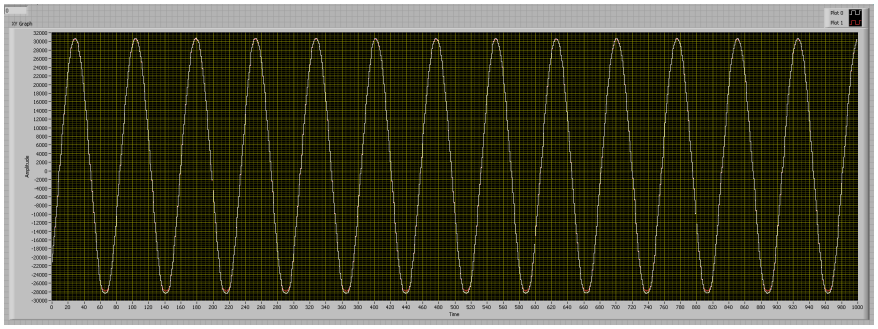
- Output via VHDI and non-VHDI
  - VHDI ↔ VHDI cable: 870€/cable @ MOLEX ☹
  - VHDI ↔ non-VHDI: 13€ @Reichelt

LED Testboard, HAB & µDAQ



- Pulse generator!
  - µDAQ not able to produce tunable LED driving pulse

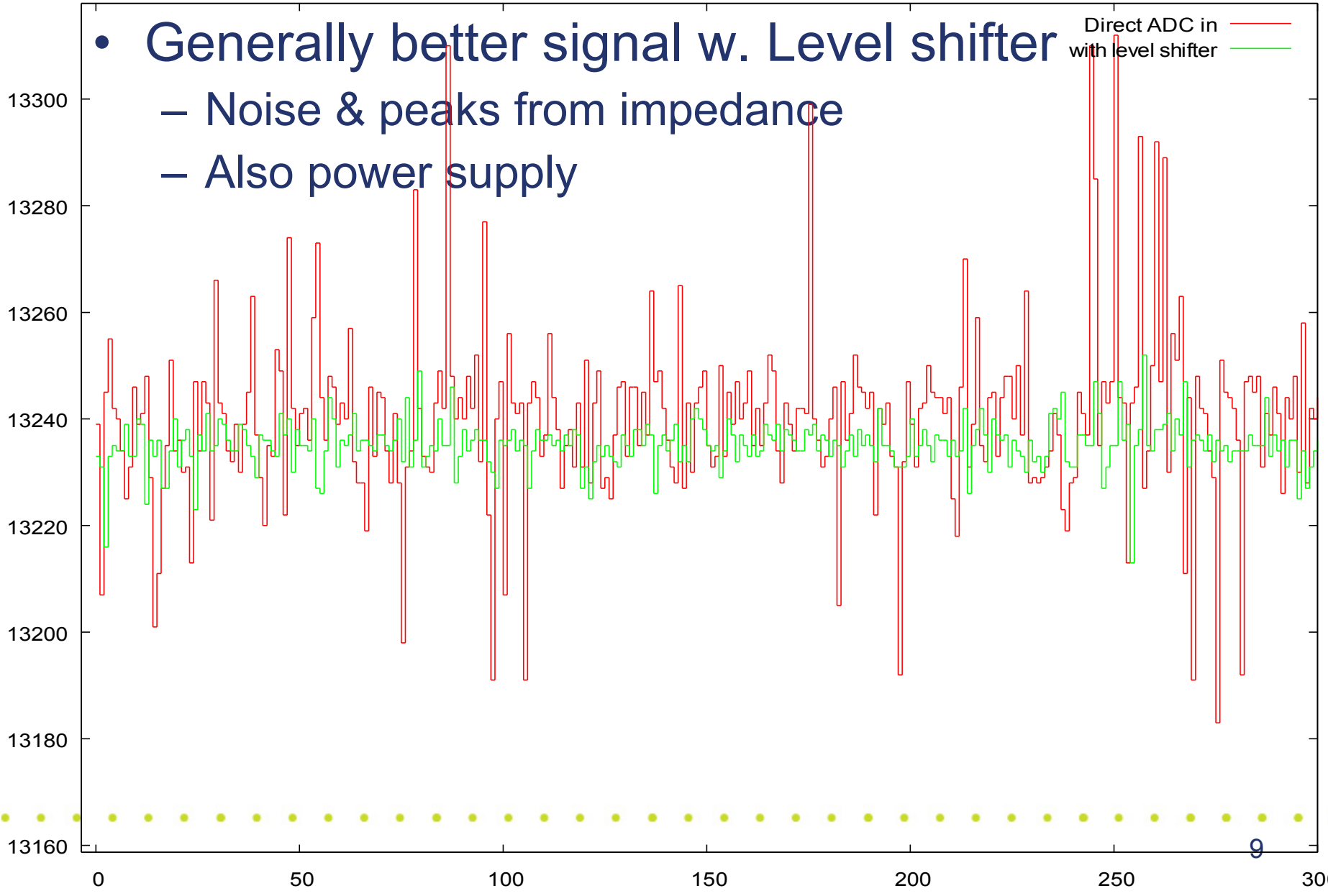
µDAQ status



- Board is fully operational
  - All LVDS I/Os
  - 2(x2)-channel ADC with levelshifter (→Noise)
- Firmware fully operational
  - Signals, configuration, pulse generation, readout ADC, complete DAQ-chain (pulse + 2(4)x18 readouts)
  - 2 HABs, extendable to 4 HABs (360-720 Channels)
  - Speed sufficient (>300Hz, 500Hz seems possible)
- Software just being developed (Labview)
  - Driver for pulse generator & power suppies (HV)
  - Read out ADC
  - DAQ-chain missig but no problem

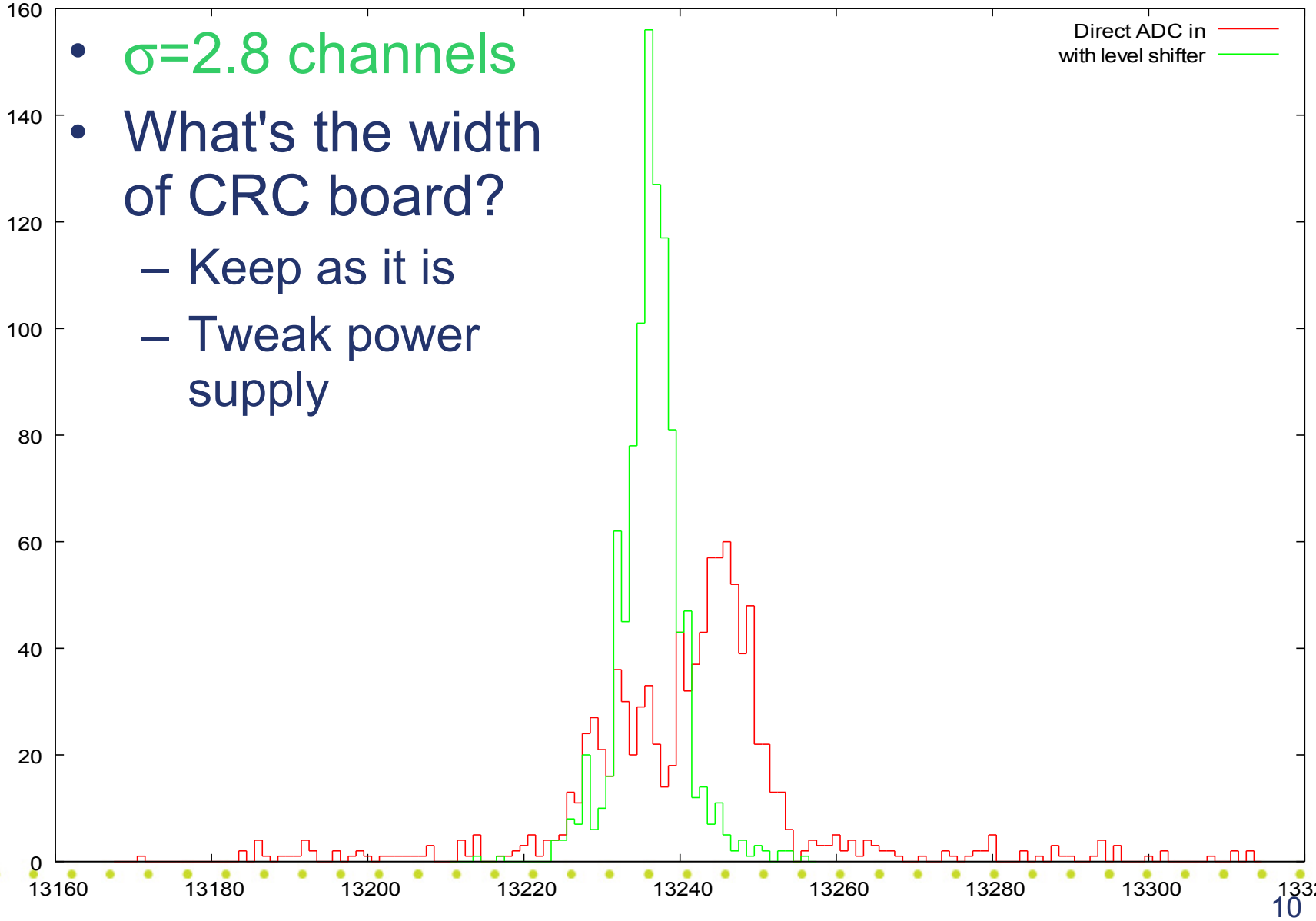
µDAQ ADC performance

- Generally better signal w. Level shifter
  - Noise & peaks from impedance
  - Also power supply



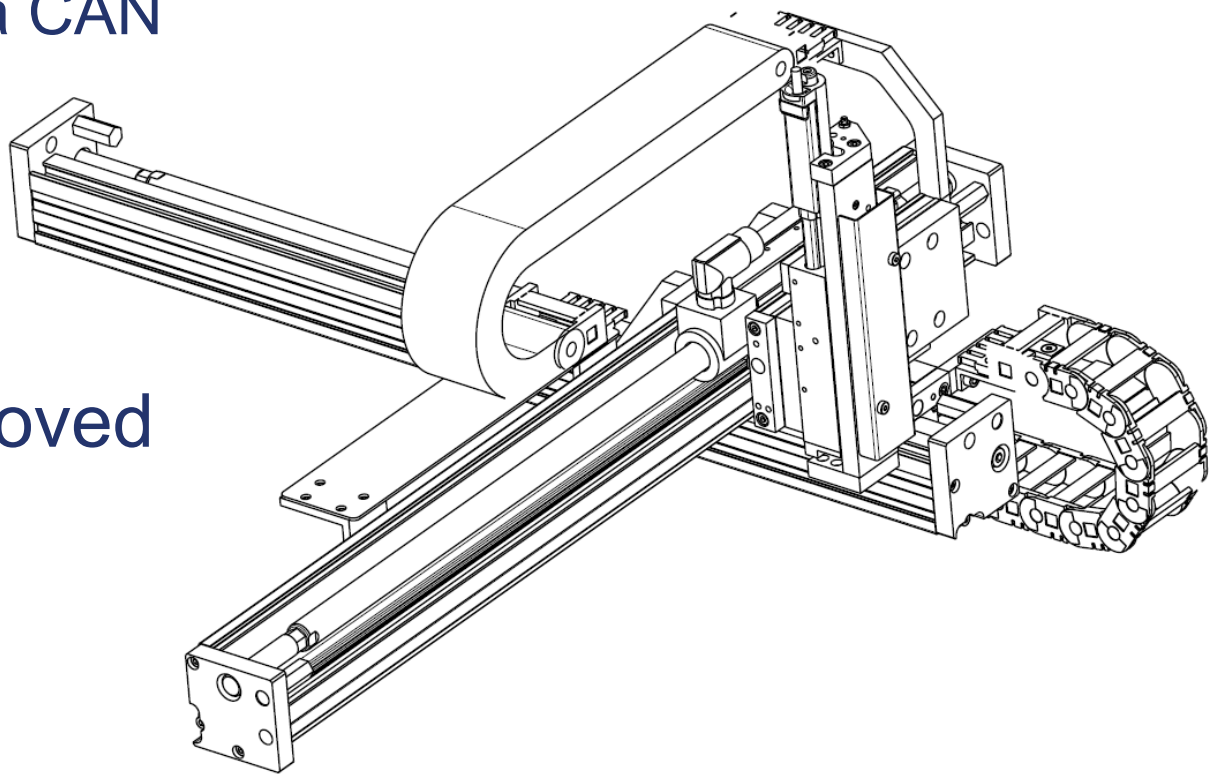
μDAQ ADC performance

- σ=2.8 channels
- What's the width of CRC board?
  - Keep as it is
  - Tweak power supply



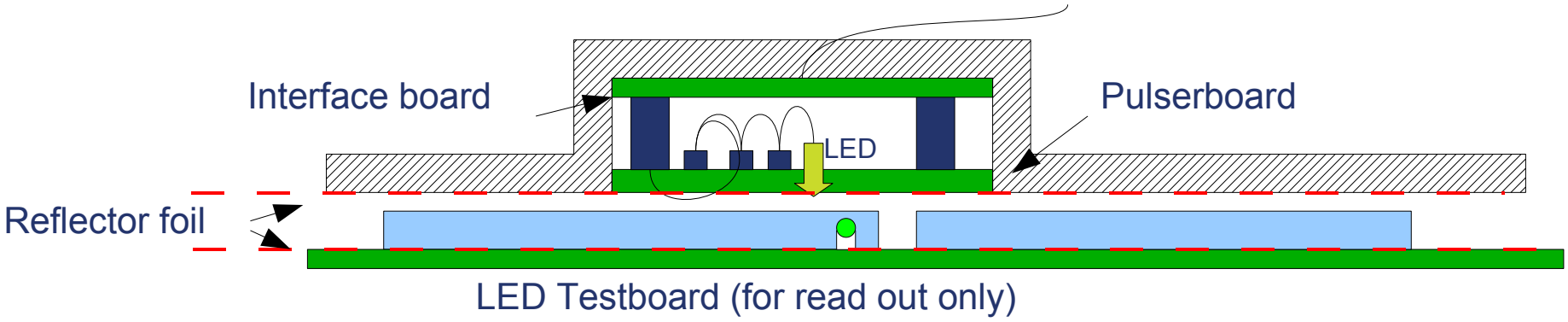
xyz positioning system

- Scan tiles for homogenity / best position for LEDs, also studies with β's in future
- Modular system of 3 axes from Schunk
  - ~10µm accurancy
  - Controlled via CAN
  - Delivered within next week!
- Control with LabView approved



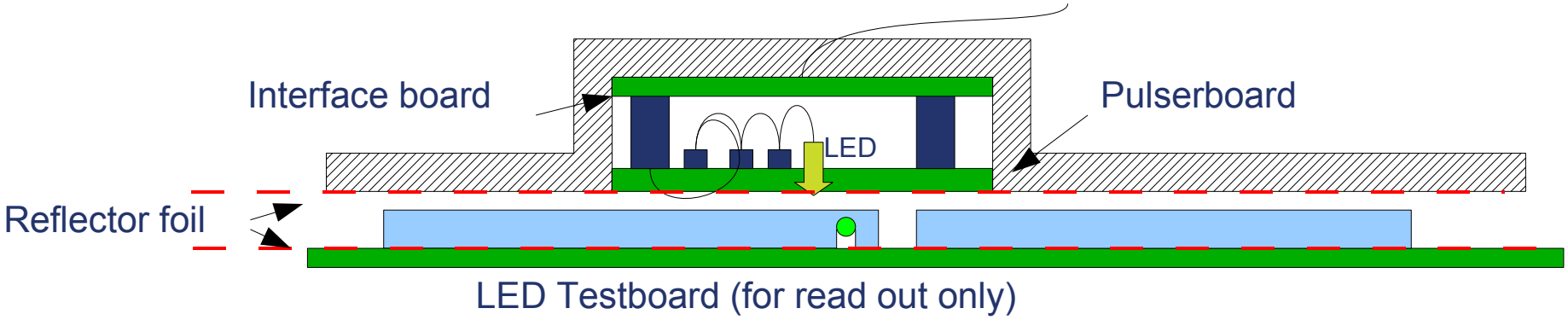
Scanning head

- „Backside injection“
  - Use LED Testboard for readout
  - Exchangable Pulserboard with electronics & LED
  - Precisely mounted to interface board via SMD connector for fast setup
- Easy way to scan tiles



Scanning head

- Comparable to „frontside injection“?
  - Optically yes except WLS fiber (mounting side of tiles)
  - Electrically not so well
    - Electrical and mechanical distance to readout
    - Leads to less crosstalk
    - ???



Air condition

- LED calibration system temperature sensitive
  - Setup will be placed in light tight box
  - 2000W Chiller
  - Liquid cooling (C_4F_{10})
  - Plates under board
  - Radiators for air
- Capability to set & keep temperature to moderate values 15-30°C & beyond

Outlook

- First measurements with orginal LED testboard within this year
- Positioning system delivered next week
  - Scanning head needs some time
- Temperature control under investigation