



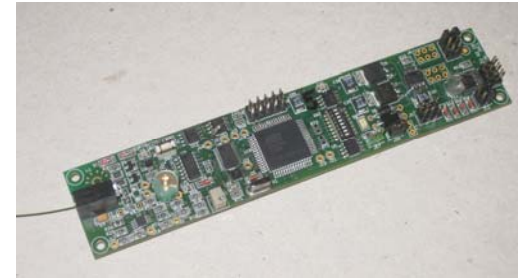
LED notched fibre distributing system

QMB1 single LED slice

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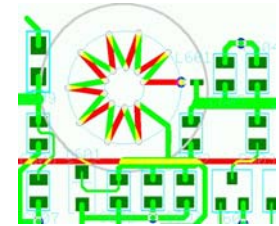
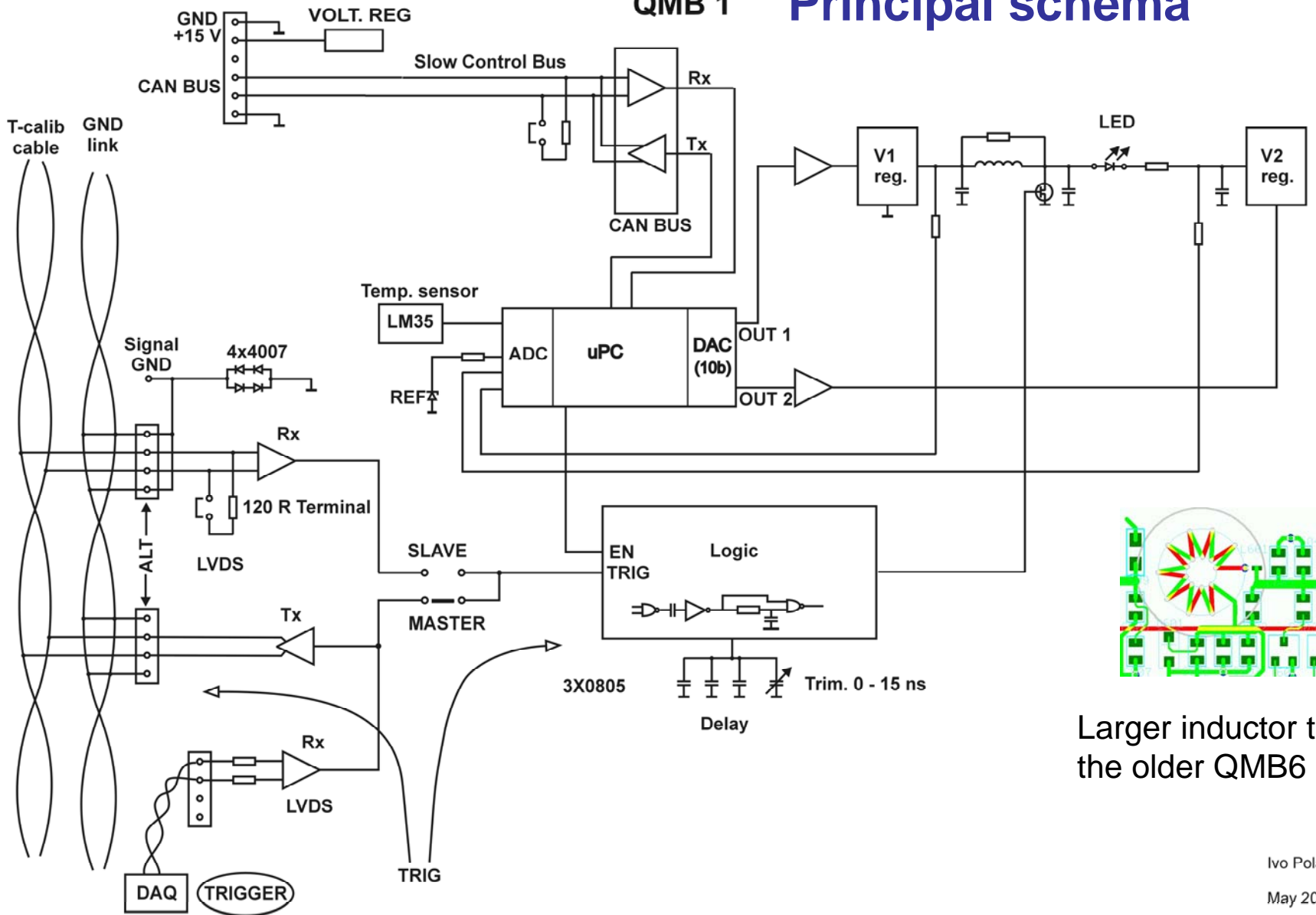
1. **QMB1 specifications**
2. **QMB1 with Trigger distribution**
3. **First test with HBU2**
4. **Notched fibre, semiautomatic machine**
5. **Resume**

QMB1



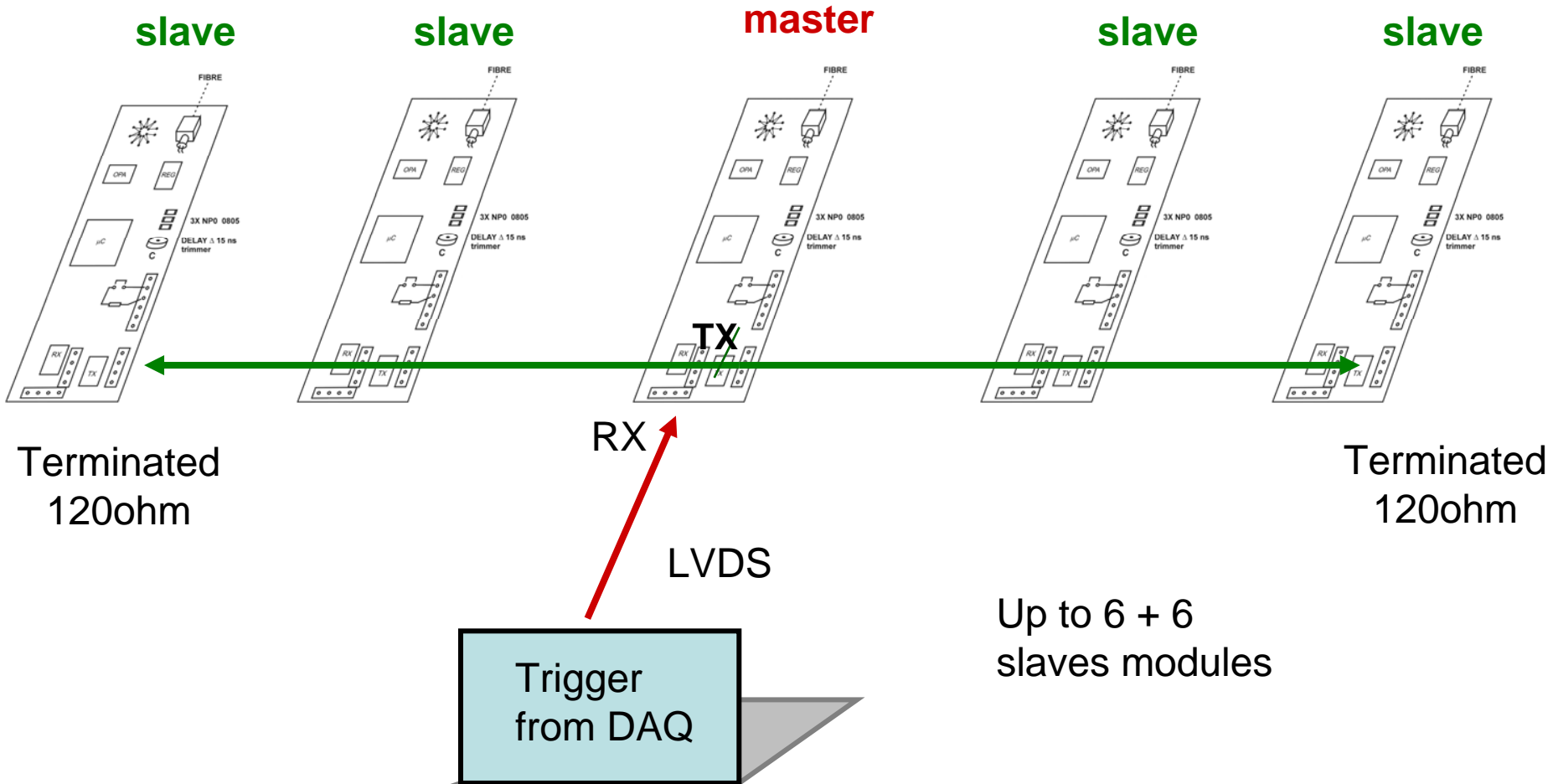
- Quasi resonant Main Board
 - Modular system, 1 LED per board
 - Operation mode:
 - DAQ + CANbus control
 - stand-alone mode
 - LVDS Trigger distribution system
 - Variable amplitude, zero to maximum (~1Amp) smooth
 - Pulse width fixed to ~ 5ns (UV or blue LED)
 - Voltages and temperature monitoring
 - Size of PCB: width 30mm, depth 140mm

QMB 1 Principal schema



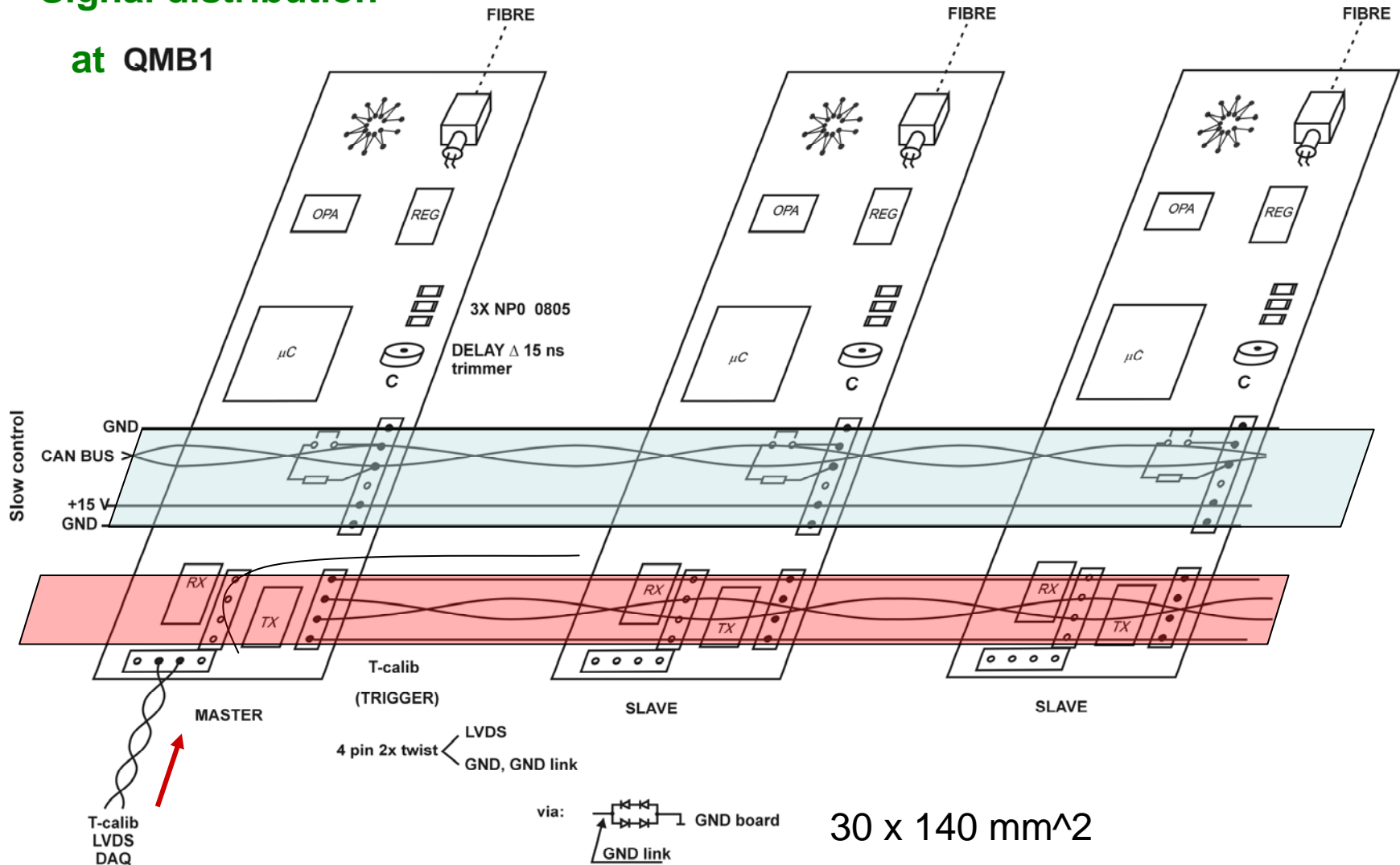
Larger inductor than the older QMB6

TRIGGER (T-calib) LVDS distribution to QMB1



Signal distribution

at QMB1



Two flat cables,
Twisted pair for Trigger

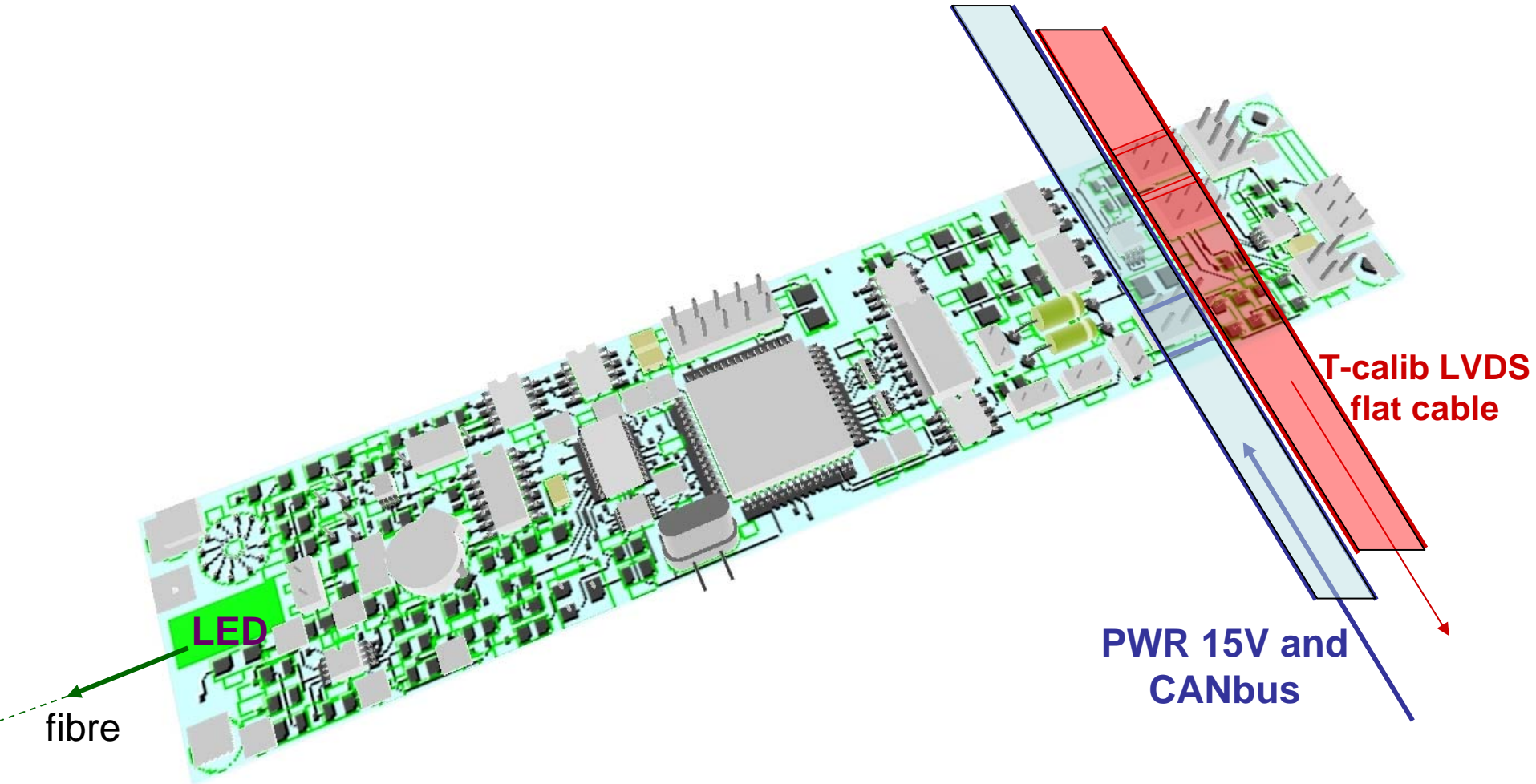
Ivo Polák

May 2011

Frame with 5 (and 1 spare) QMB1



3D draw of QMB1



Real single LED board QMB1

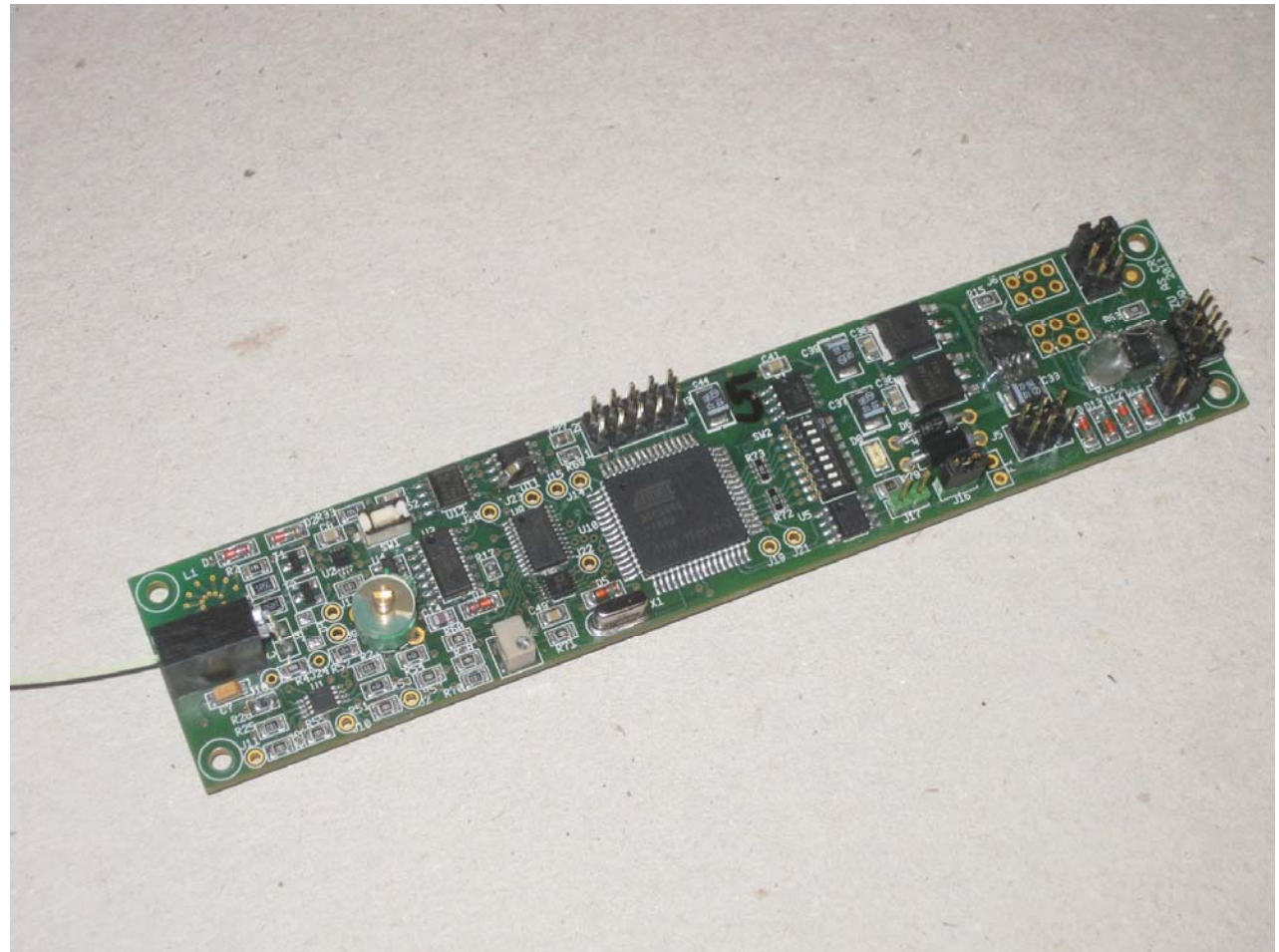
Power 15V 60mA

High level of LED peaks, 1.7A in pulse

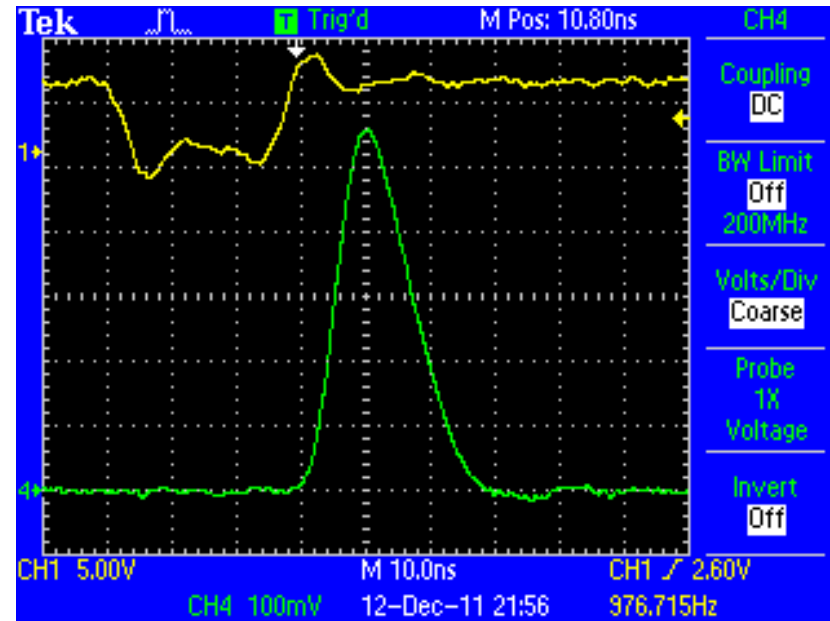
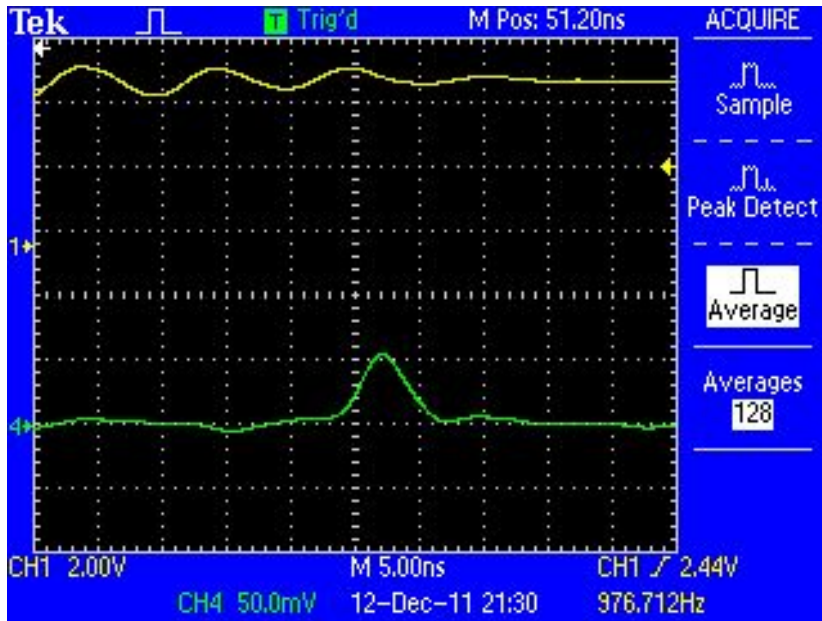
Delay can be easily trimmed within 9ns

LED pulse width is shorter than expected 2ns, seen with current probe

Tested now in stand-alone mode



PIN-PD response to QMB1 flash

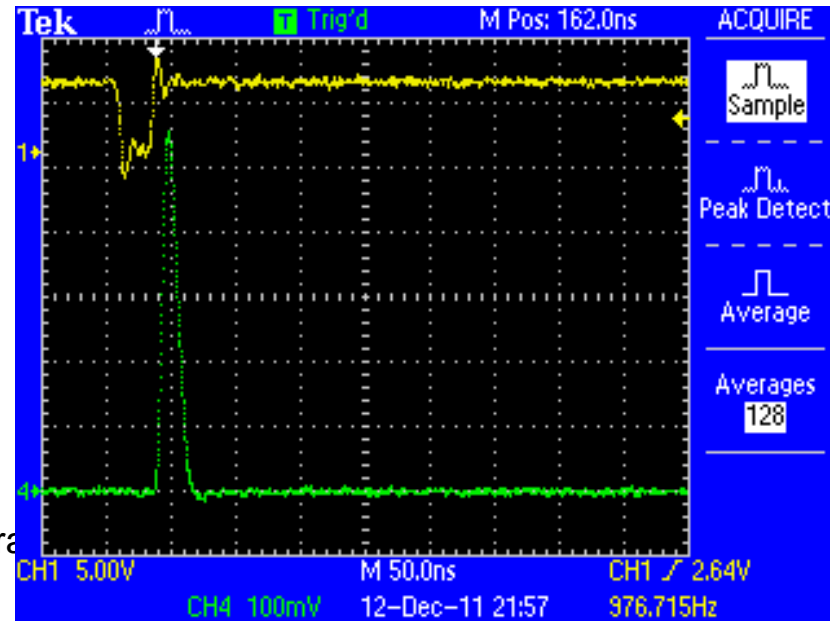


PIN-PD only, no preamp 5ns/div

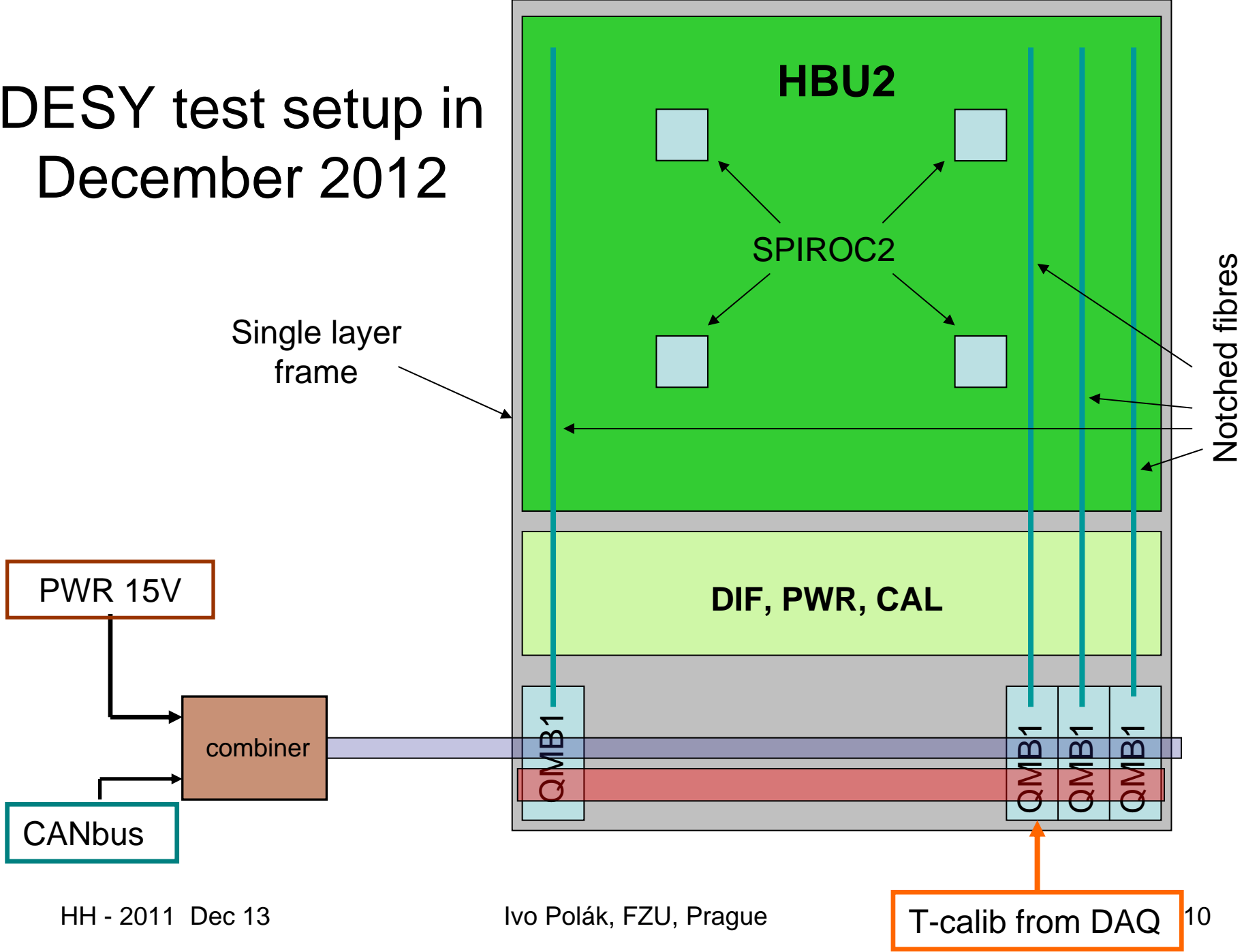
Upper: PIN-PD w preamp 10ns/div

Lower: PIN-PD w preamp 50ns/div

Maximal LED amplitude, LED airgap to PIN-PD



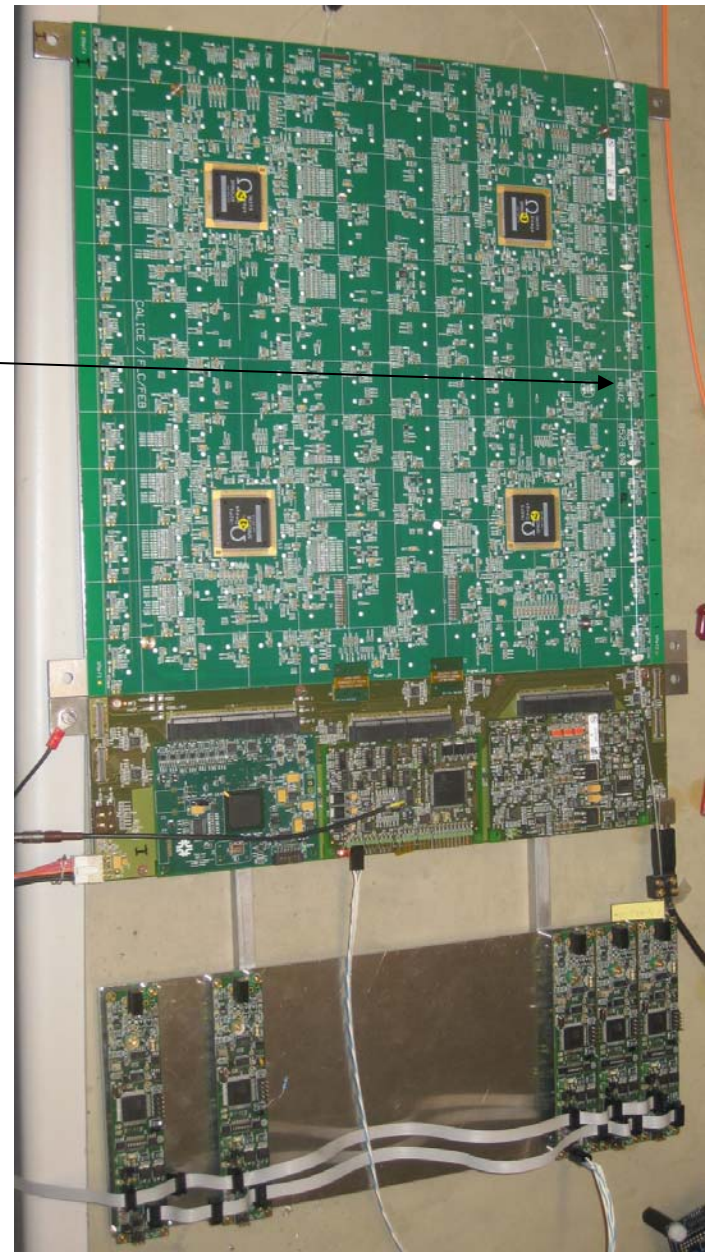
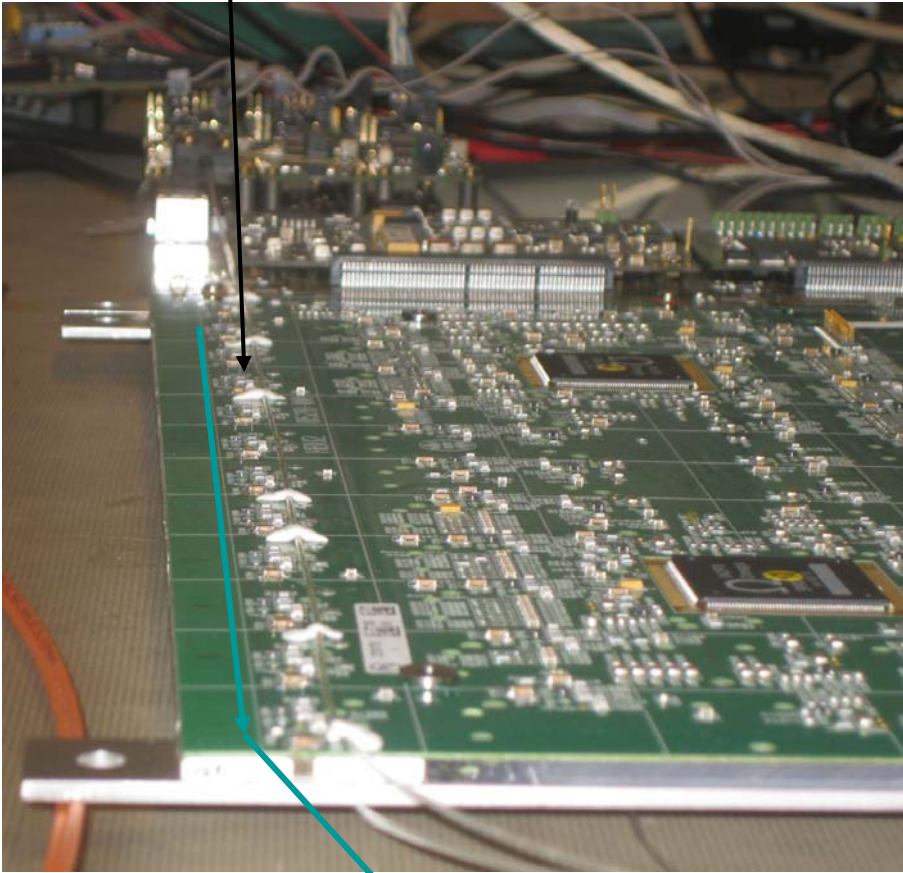
DESY test setup in December 2012



DESY test setup in December

Only 11 points
were illuminated
properly

Notched fibre (routed in paralel with blue line)

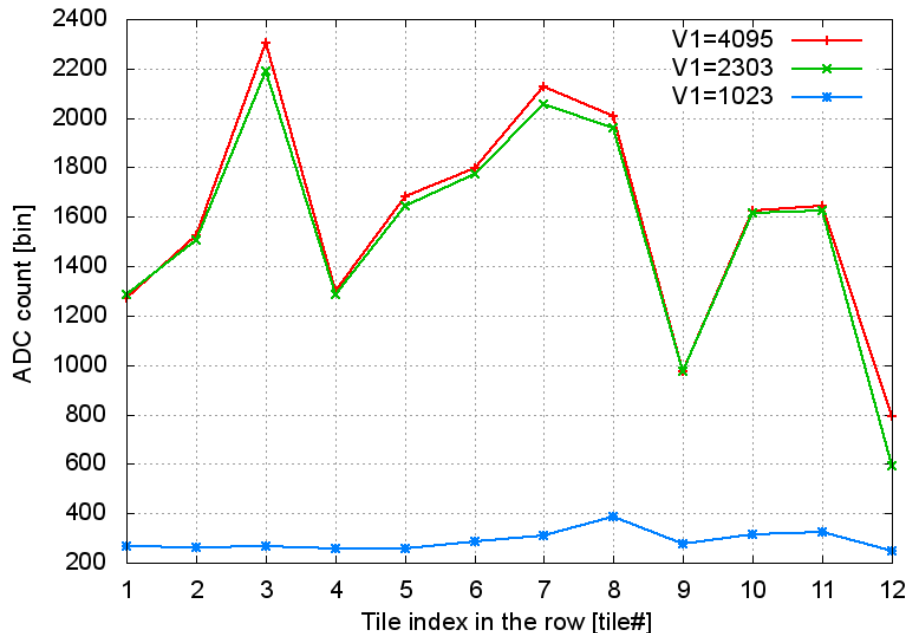


Quick Friday's QMB1 test with HBU2

System is working! 😊 , but
Big spread due to combination
of factors: Bad fibre, hold scan
did not matched

Distribution will be better, do not
worry!

Response of QMB1 with 12-notched fibre, LG_100fF



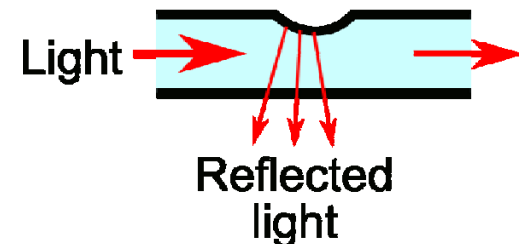
- Some config troubles occurred
- Generally, system is working easily, run in stand-alone mode
- Pulse position at different LEDs can be easy tuned within 1ns
- Near future plans (tomorrow)
 - Hold scan
 - Better notched fibre to install
 - Single p.e. peak spectra
- Next year plan (February)
 - More channels equipped with scintillators
 - Xtalk and light spread study

illuminated by
Green laser

24 notches

Notched fibres

- external company Safibra preparing the setup (semiautomat) to produce precise notches in the fibres
- We assume to have fibres made by new technology in 1.Q 2012, we assume less spread of the light at taps (<15%).
- prototype fibres showed some systematic error (decay) in distribution of light, two test methodes → two results: flat and with decay. Under investigation now.



Notched fibres

Semi-automatic tool

Now in operational debugging
& sw development stage

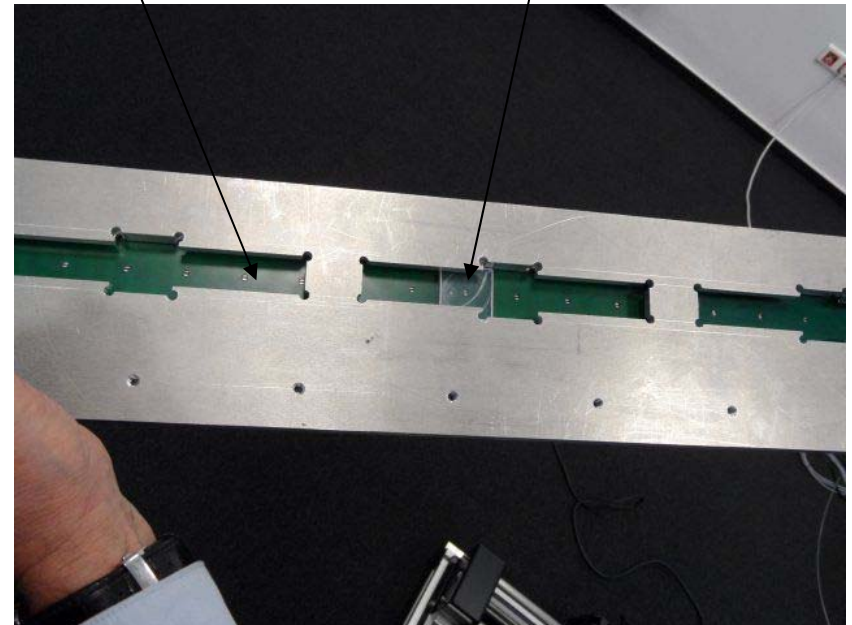
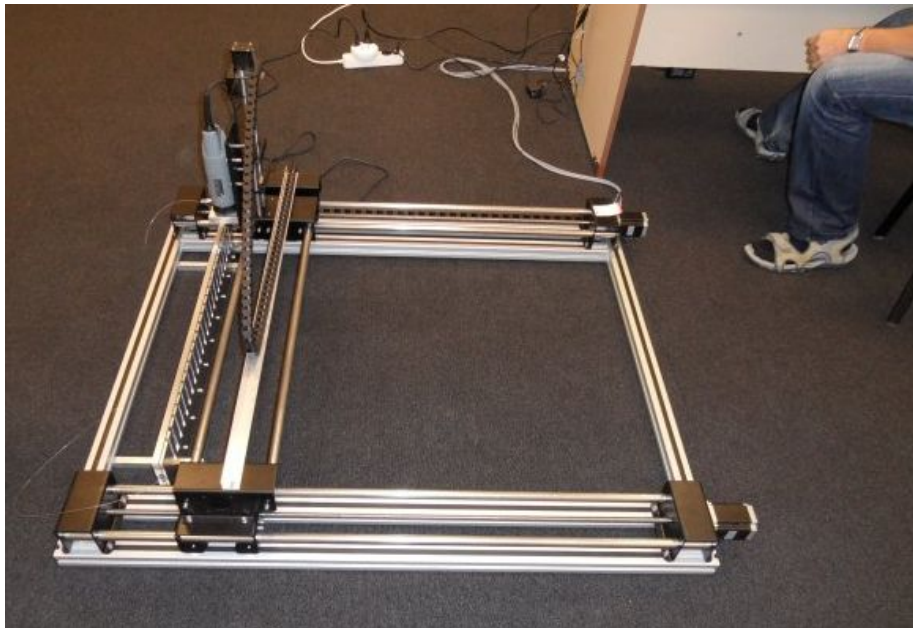
Frame with x-y stepper motors

Drill machine used as milling cutter
to groove the notch

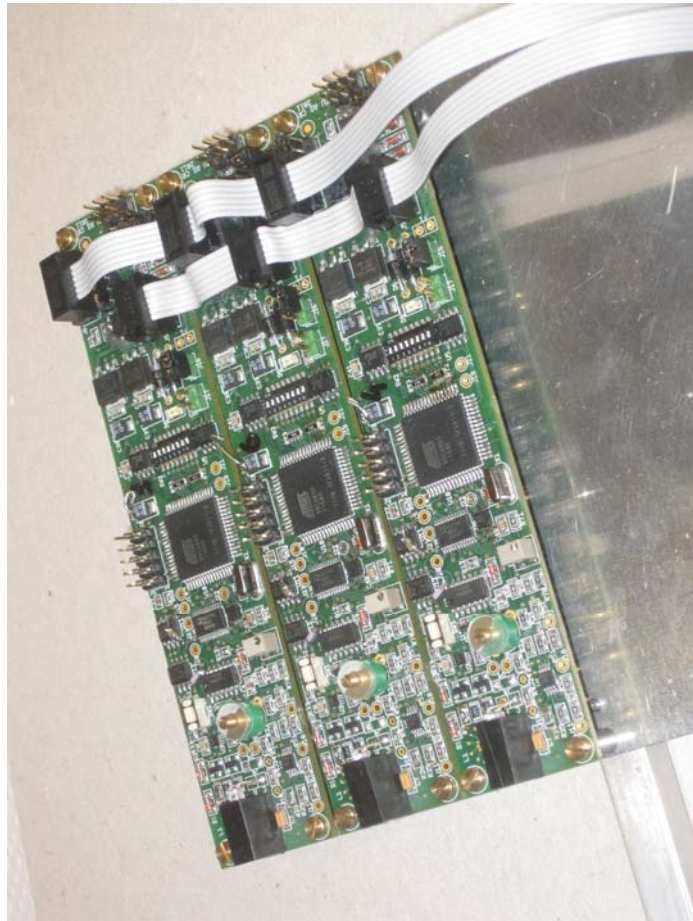
Alu/PCB Template with moving
scint tile

PCB with 3mm
holes

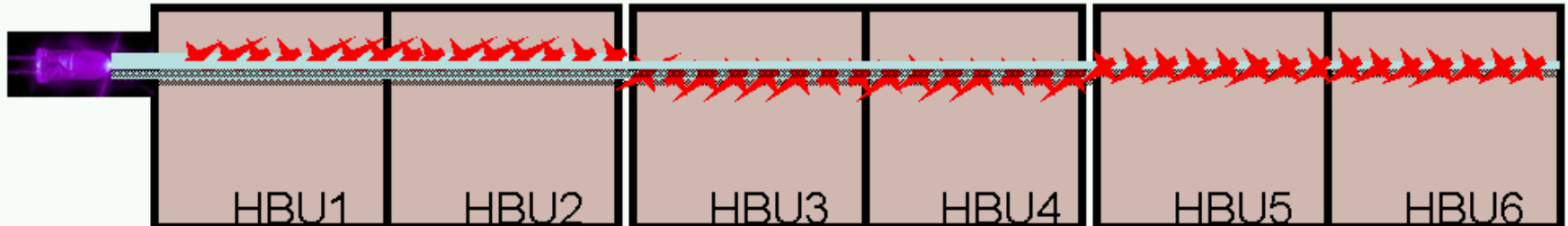
Scintillator tile w SiPM
holes



work at autumn of 2011



- **QMB1 (1-chanel LED driver):**
 - **Done**
 - 6 pcs of QMB1 in hand
 - Tune QRLED driver to 405nm LED
 - Trigger distribution (LVDS) proved
 - Trigger delay can be tuned by C trimmer (~10ns)
 - A few bugs in circuitry found
 - Still short 3ns pulse
 - **To be done:** finishing and debugging of fw – CANbus and monitoring
- **Set of notched fibers, semiautomatic machine in tuning procedure**
 - Set: 3*fibre with 24 notches, creating a line of 72 notches.
 - 3 sets of fibres will be delivered in 1.Q-2012

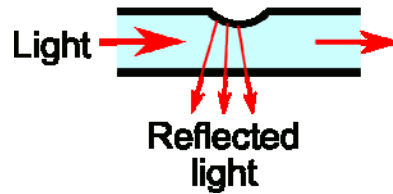


Resume

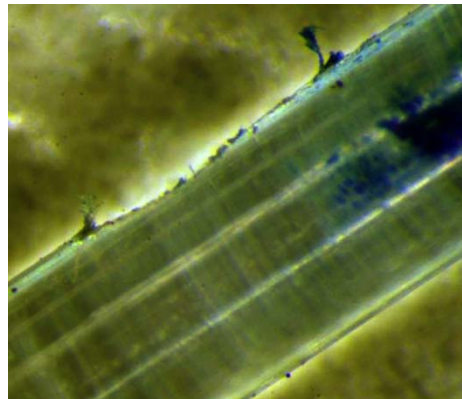
- QMB1 is in basic operational stage
 - It is working, no major troubles occurred
 - First 6 boards (version 1) we have in hand
 - More work on fw to be done
- Upgrade of QMB1(v2.0) is foreseen in mid of 2012
- Notched fibre semiautomatic machine is hw ready, its sw is under development

Distribution of light: Notched Fiber

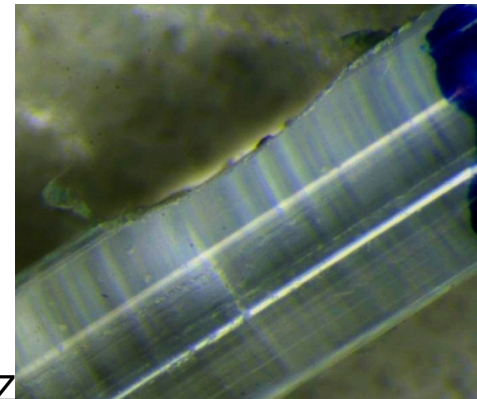
- Light is emitted from the **notches**
- The **notch** is a special scratch to the fiber, which reflects the light to the opposite direction
- The size of the notch varies from the beginning to the end of the fiber to maintain homogeneity of the light, which comes from notches



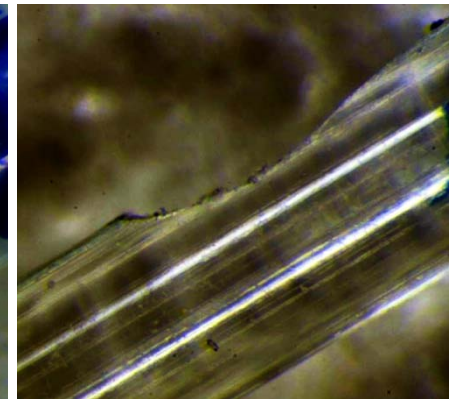
First notch



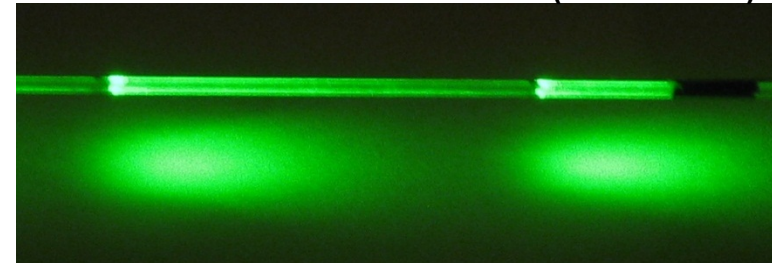
Middle notch



End position notch



Emission from the fiber (side view)



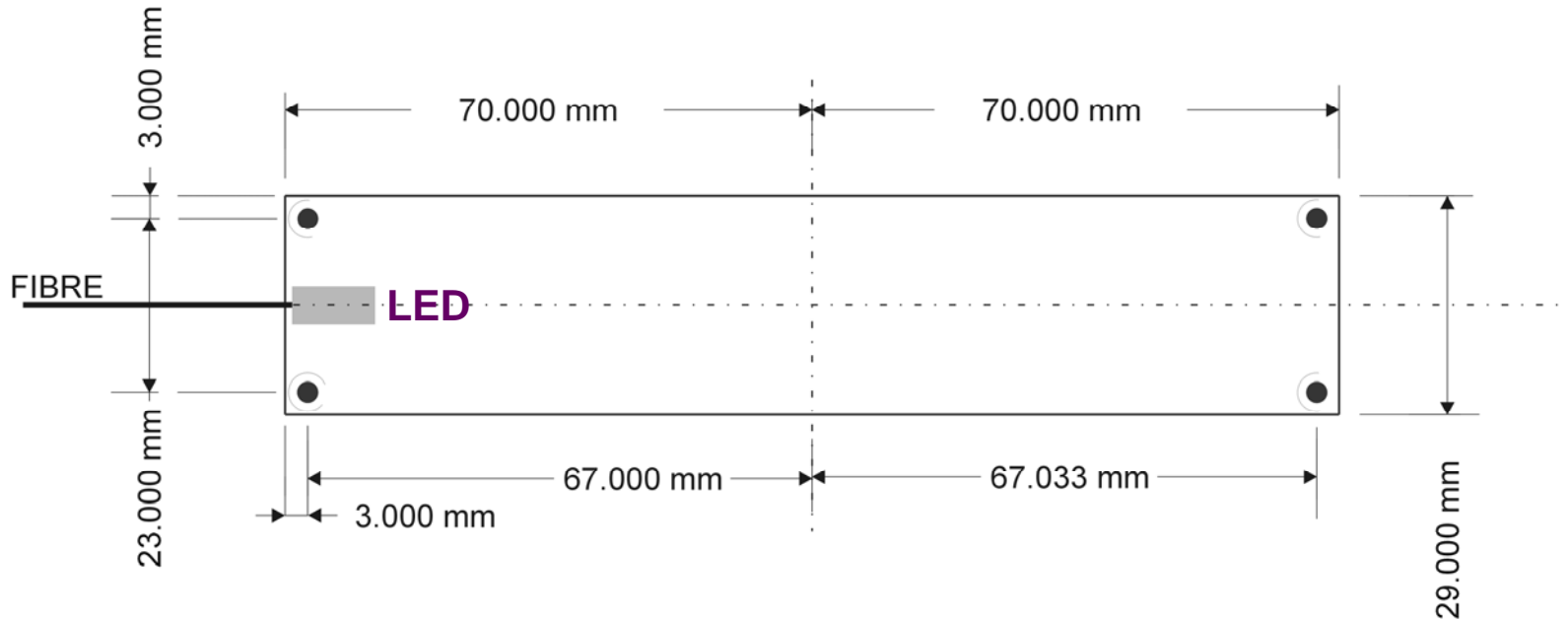
Illuminated by
Green laser

24 notches



Mechanical layout of QMB1

QMB1



Outer line: 30 (29) x 140 mm*2

4 mounting holes for M2.5 screw