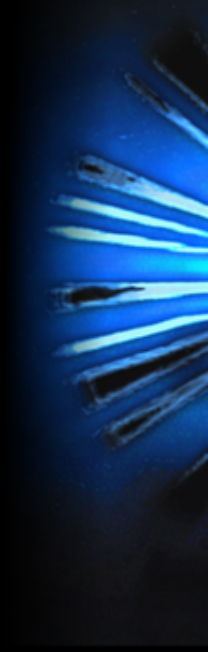
Low cost Silicon Photmultiplier readout electronics using the Arduino



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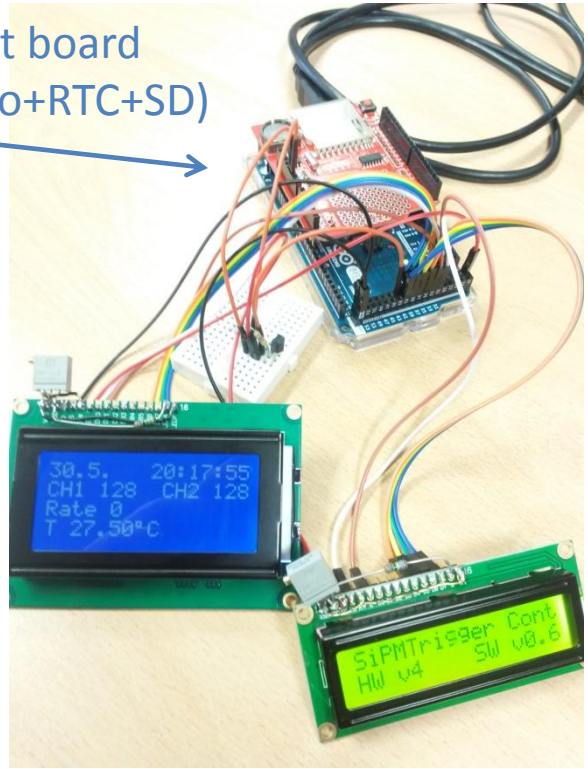
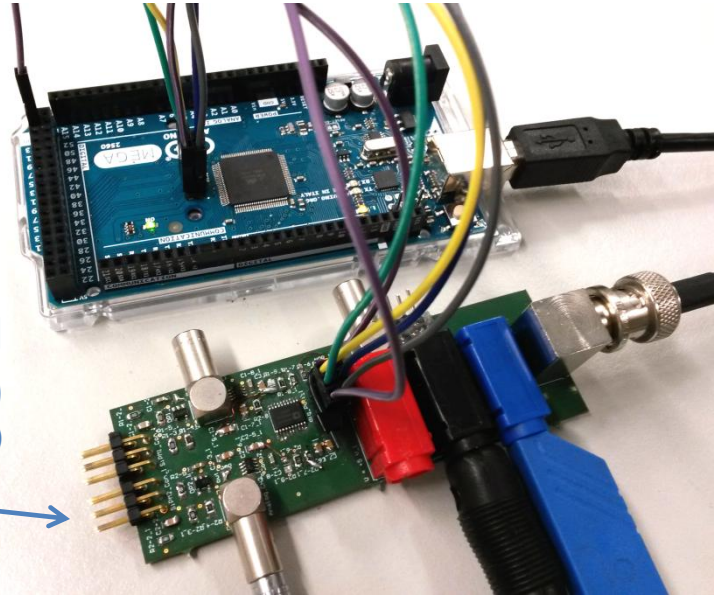
The Setup

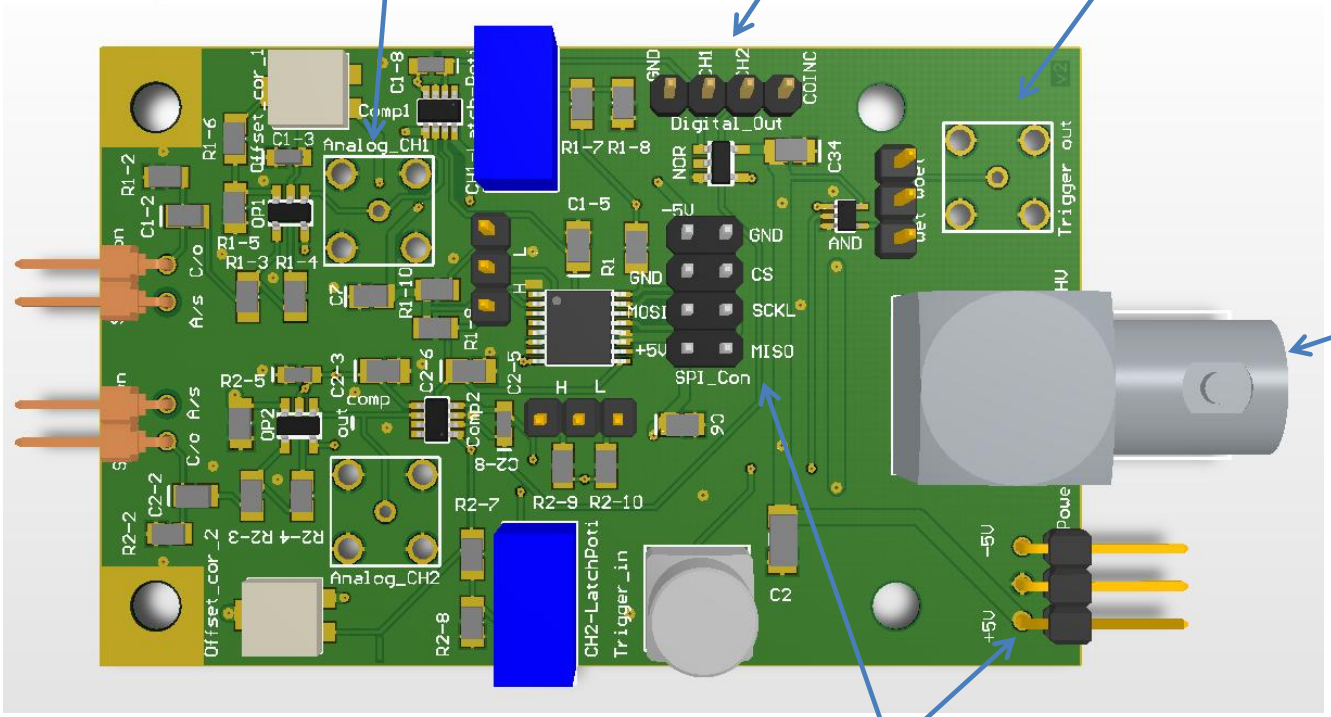
Readout board
(Arduino+RTC+SD)



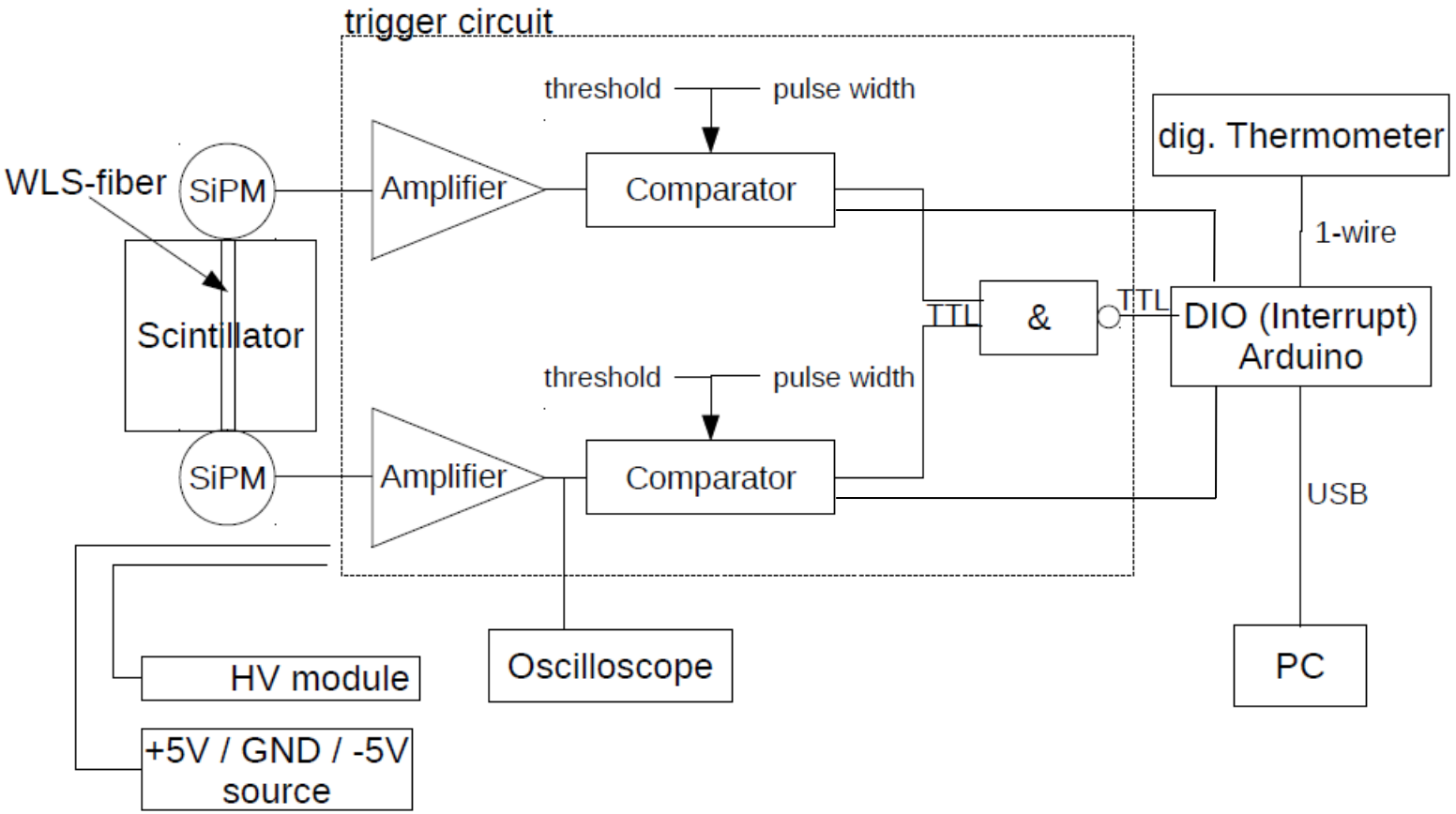
SiPM Board
(old version)
(new version next slide)



SiPM Board


Analog out
Comparator out
Coincidence out
SiPM #1
SiPM #2
SiPM (HV)
Input
Voltage supply &
communication
Comp1
Analog_CH1
Digital_Out
GND
CH1
CH2
COINC
SPI_Con
GND
CS
SCKL
MOSI
+5V
MISO
Trigger out
Analog_CH2
Offset_cor_1
Offset_cor_2
CH2-LatchPort
Trigger_in
-5V
+5V

Schematic setup



nCatcher Board Features

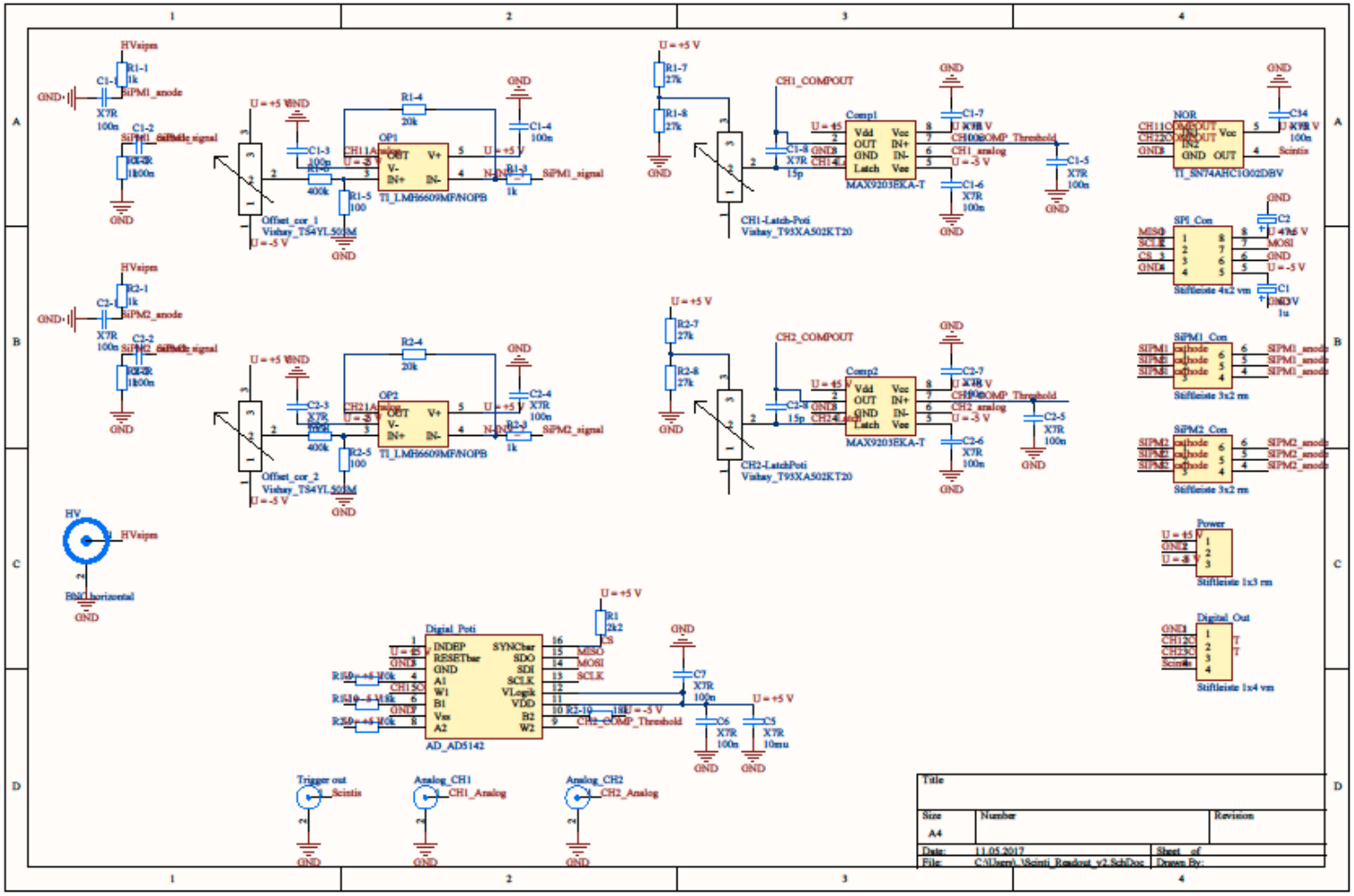
It‘s a Pulse Height Analyzer:

- Designed to read out proportional chambers
- Featuring:
  - Integrating Preamplifier + Mainamplifier
  - Comparator (Schmitt-Trigger)
  - Arduino nano
    - Pulse length and pulse height measurements via time over threshold and internal 10-bit ADC
    - Schmitt-Trigger threshold configuration via 12-bit DAC

It‘s a Single Channel Analyzer:

- Comparator triggers nano‘s Input Capture Unit (ICU) if a pulse > a THL voltage
- The ICU measures the time for which the THL voltage is exceeded (Pulselength)
- The ICU also triggers the ADC which needs between 250 ns and 16mus to sample the Pulseheight

Electronic Schematic



Cost Calculation

Main Components:

PCB: ~20 €
PCB Components: ~28 €
Arduino MEGA: ~15 €
Arduino Box: ~10 €
SiPM ~80 € (x2)

Optional:

Coaxial Cable/Jacks: ~30 €
SD Card and RTC Shield: ~ 25 €
DC-DC Converter: ~ 15€

High Voltage Source:
Actually a lab scale HV source is used. For low cost projects we can also try to find a cheap (low current) solution?

Contact

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