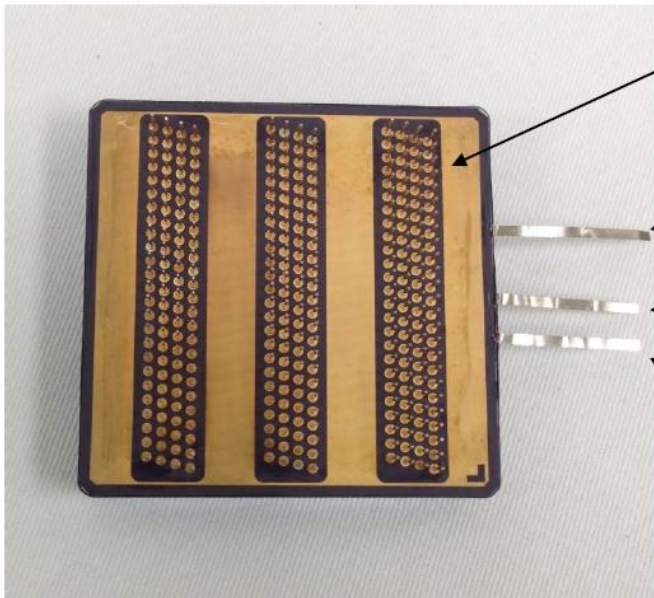


TESTING OF HIGH RESOLUTION PHOTONIS MCP-PMT

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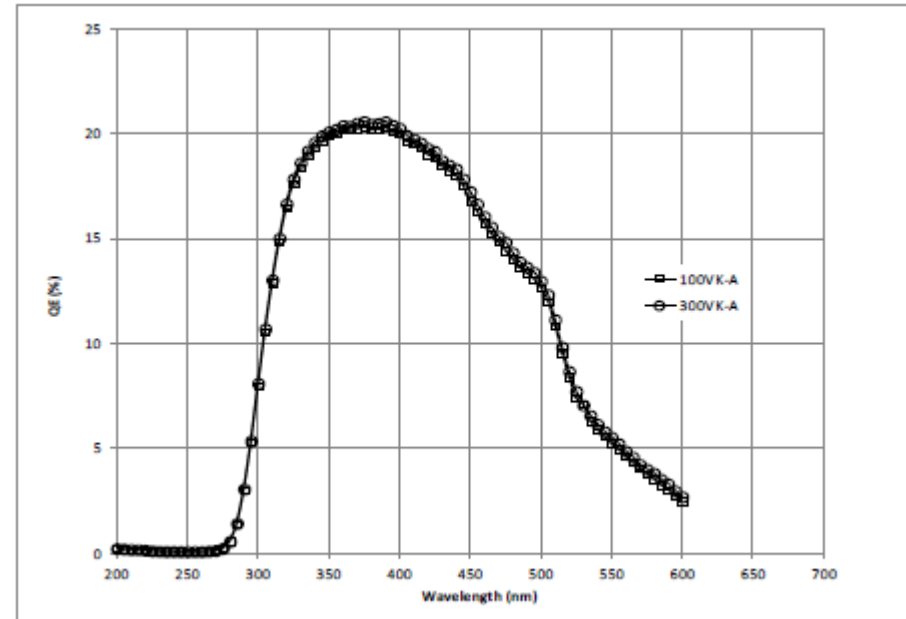
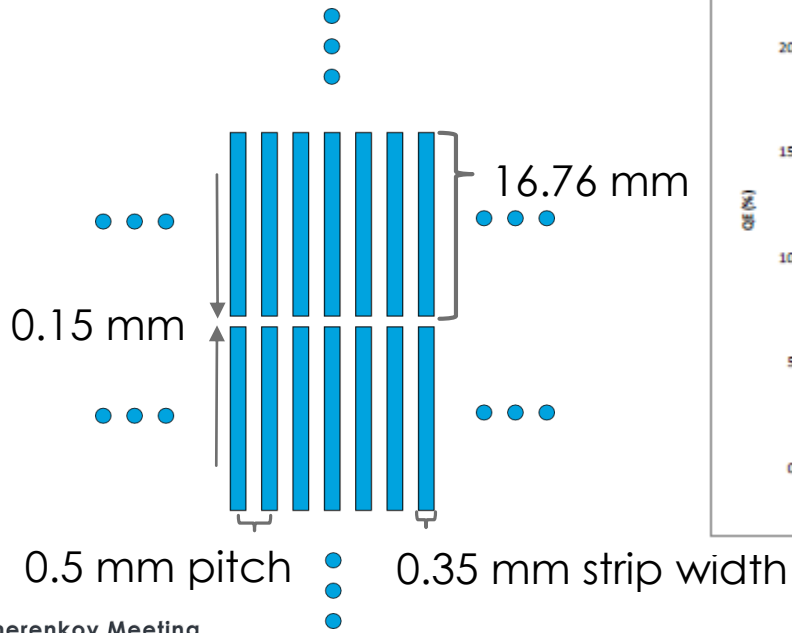
Maintain metalized backplane at anode potential (typically ground) to prevent DC leakage currents to anode strips

MCP-out bias

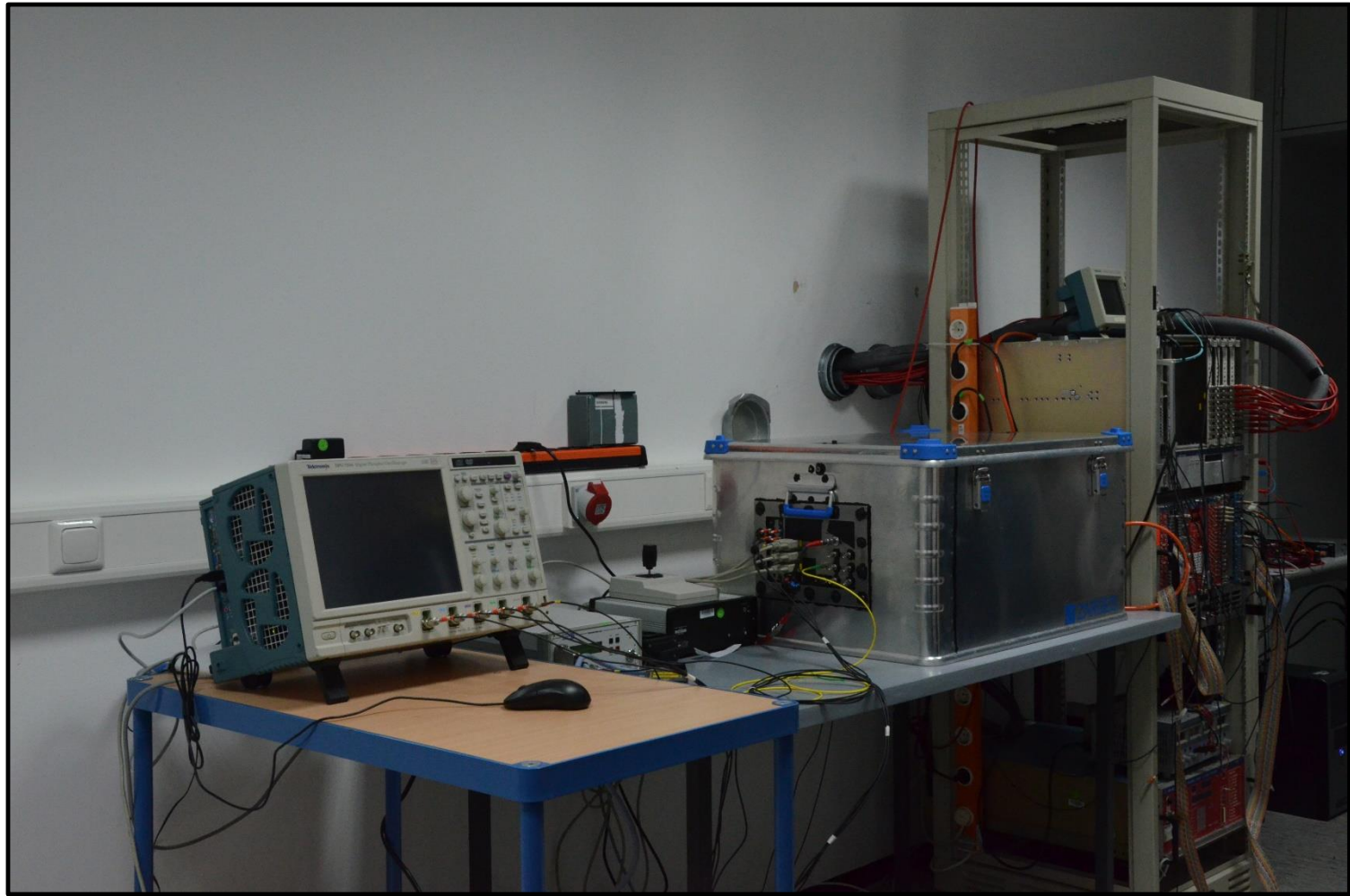
MCP-in bias

Photocathode bias

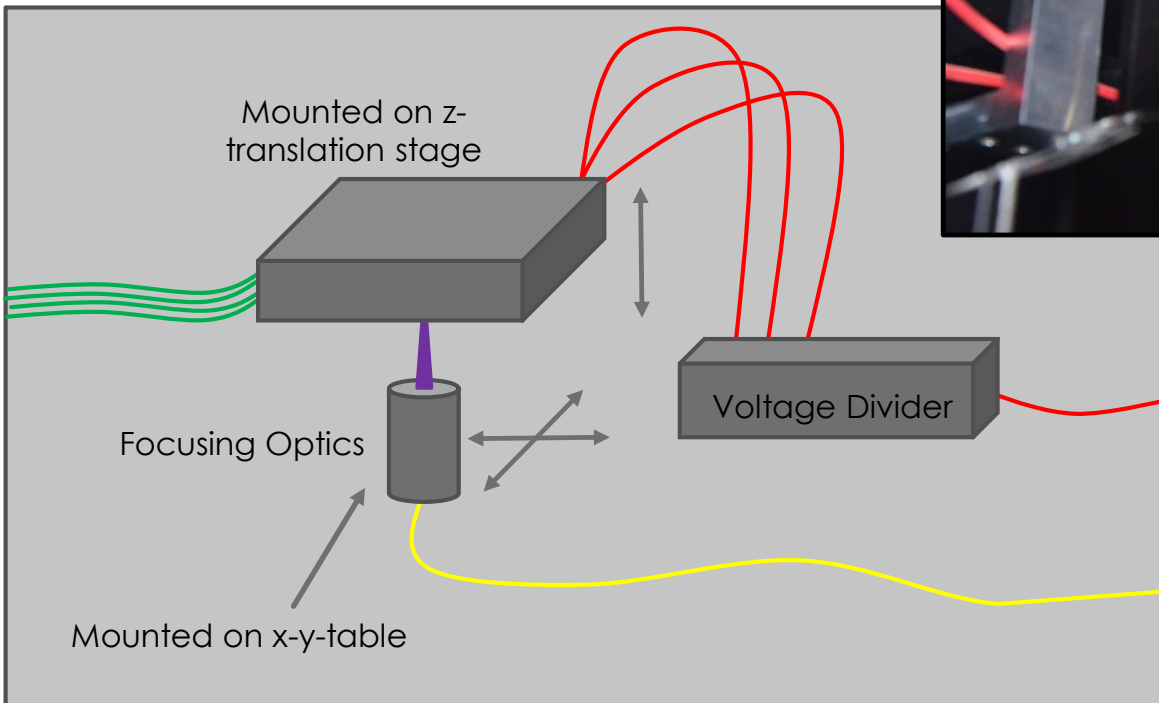
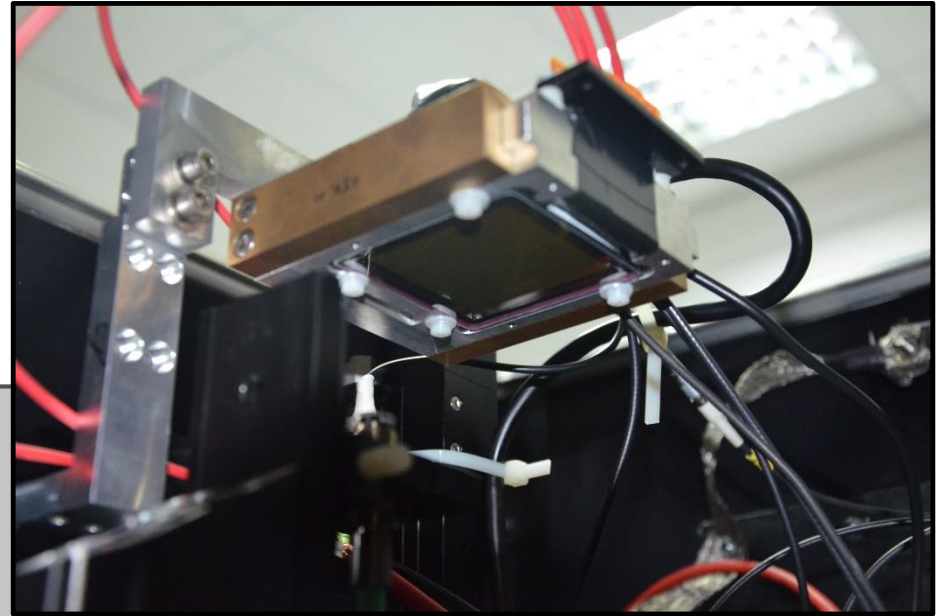
- Active area of 50.5 x 50.5 mm²
- 100 columns x 3 rows
- Electrical contact through pin array on the back side



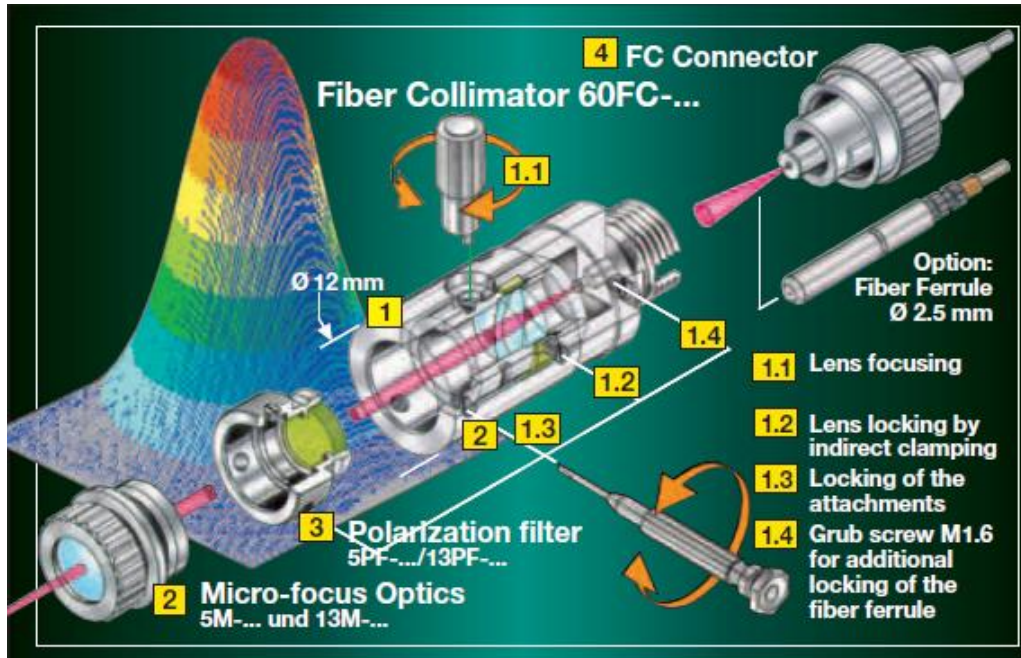
Test Setup



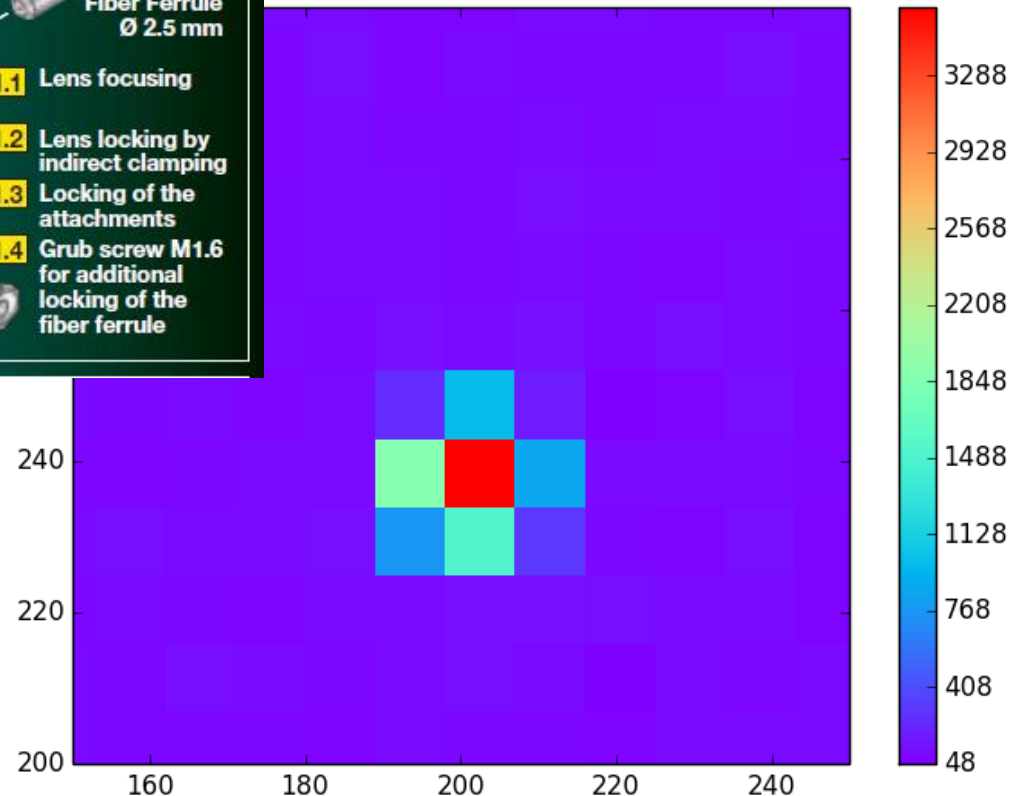
Inside the box



Focusing Optics

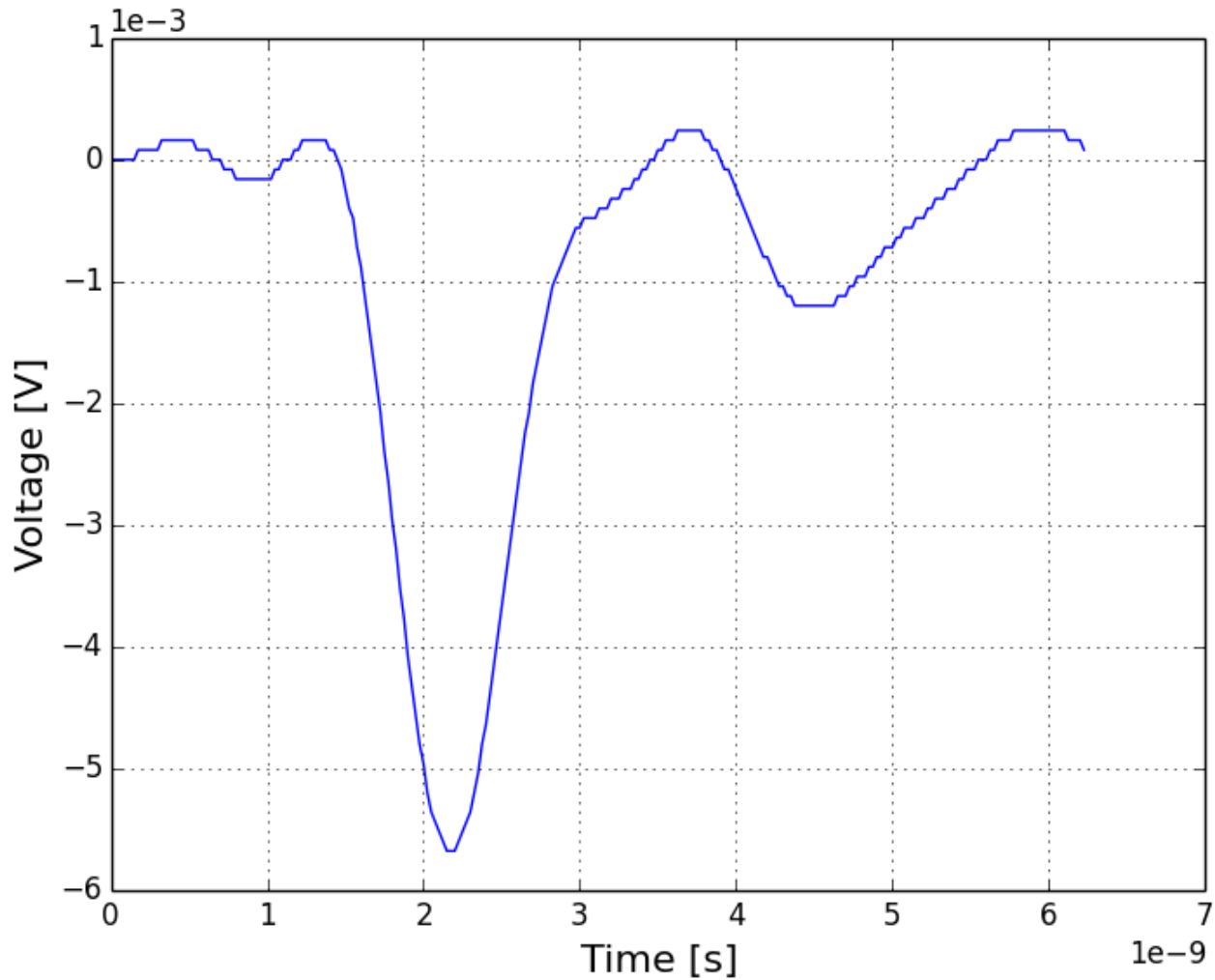


Picture taken with a CCD camera illuminated with the PiLaS and the optics. Pixel pitch is $9 \mu\text{m}$.



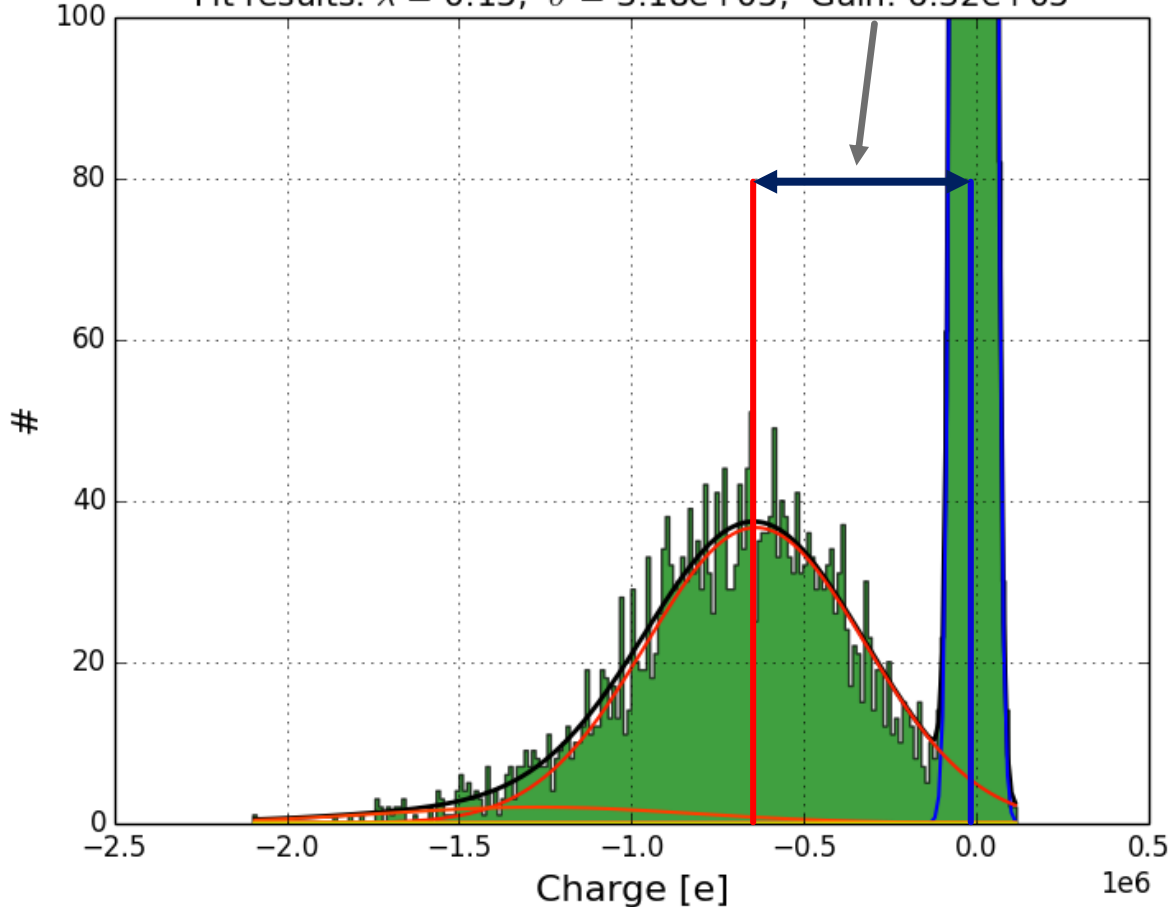
- Vendor promises $9 \mu\text{m}$ sigma at 38mm working distance (Gaussian beam profile)
- $70 \mu\text{m}$ deviation will increase the spot width by root 2 (Rayleigh length)

Pulse Shapes for Single Photons



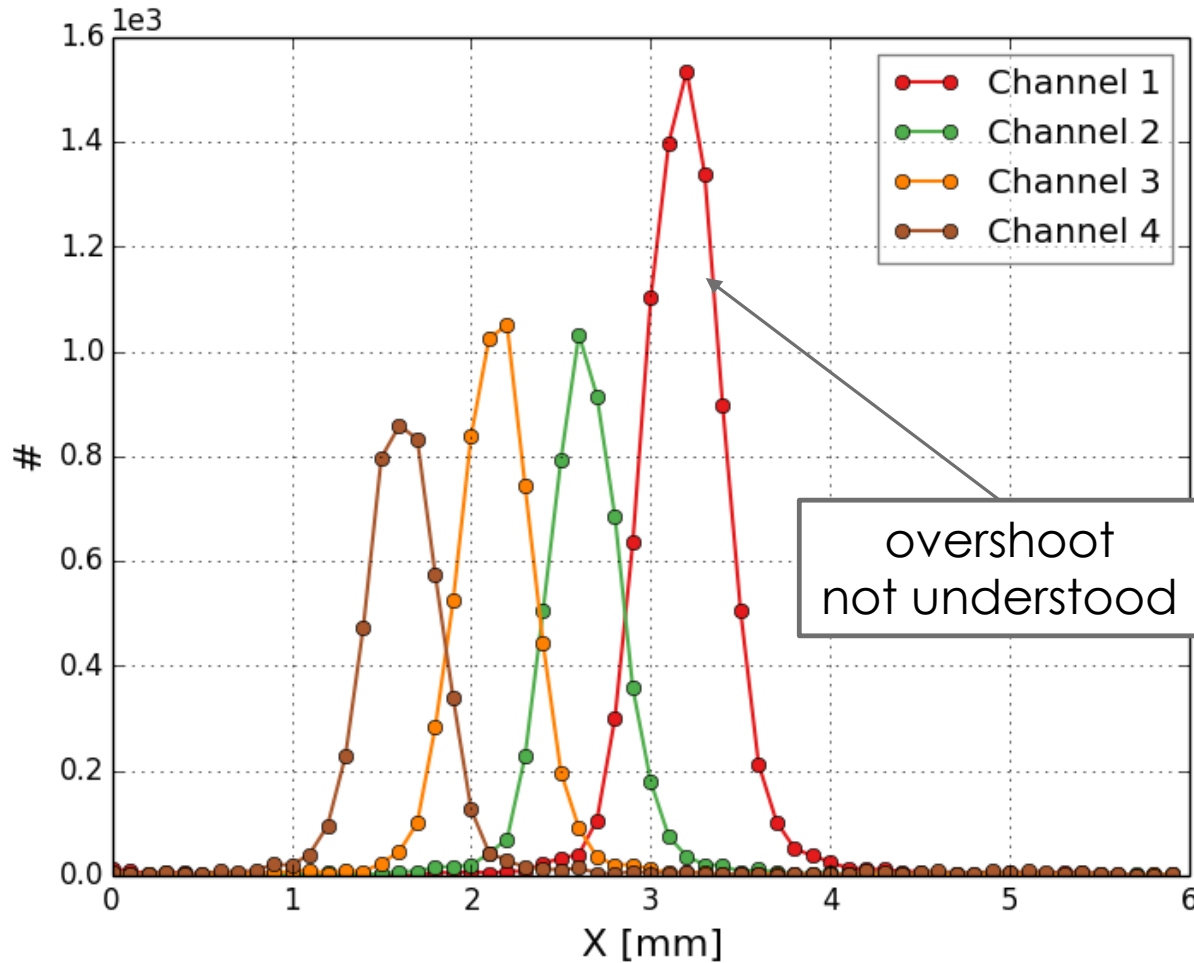
Distribution of collected charges

Fit results: $\lambda = 0.15$, $\sigma = 3.18e+05$, Gain: $6.32e+05$



- Irradiation with single photons @ 405nm (PiLas)
- Readout with scope
 - 500 MHz bandwidth
 - 50Ω load
 - Between 40 – 10 GS/s
- HV = 2455 V

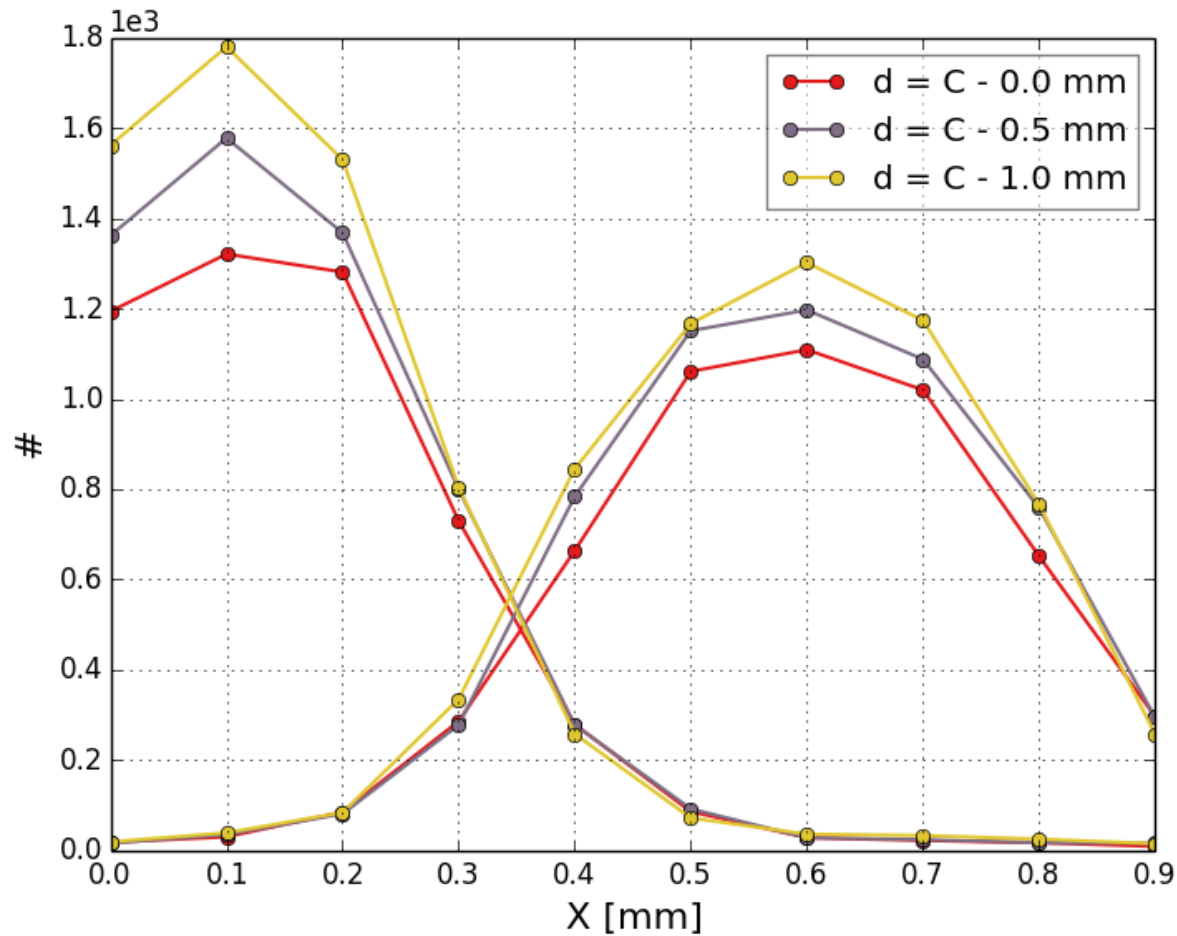
Scanning four neighbouring anodes



Threshold measurement:
 $V_{\min} = 5 \text{ mV}$

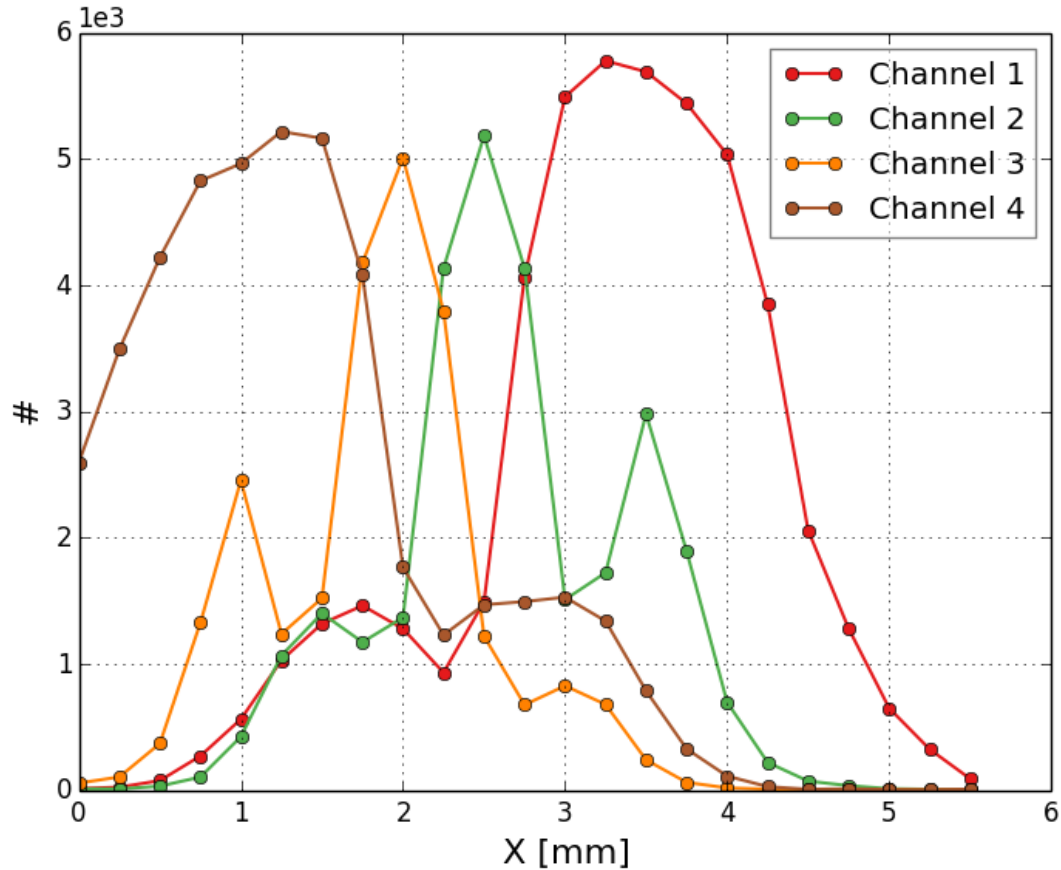
overshoot
not understood

Optimization of the Working Distance

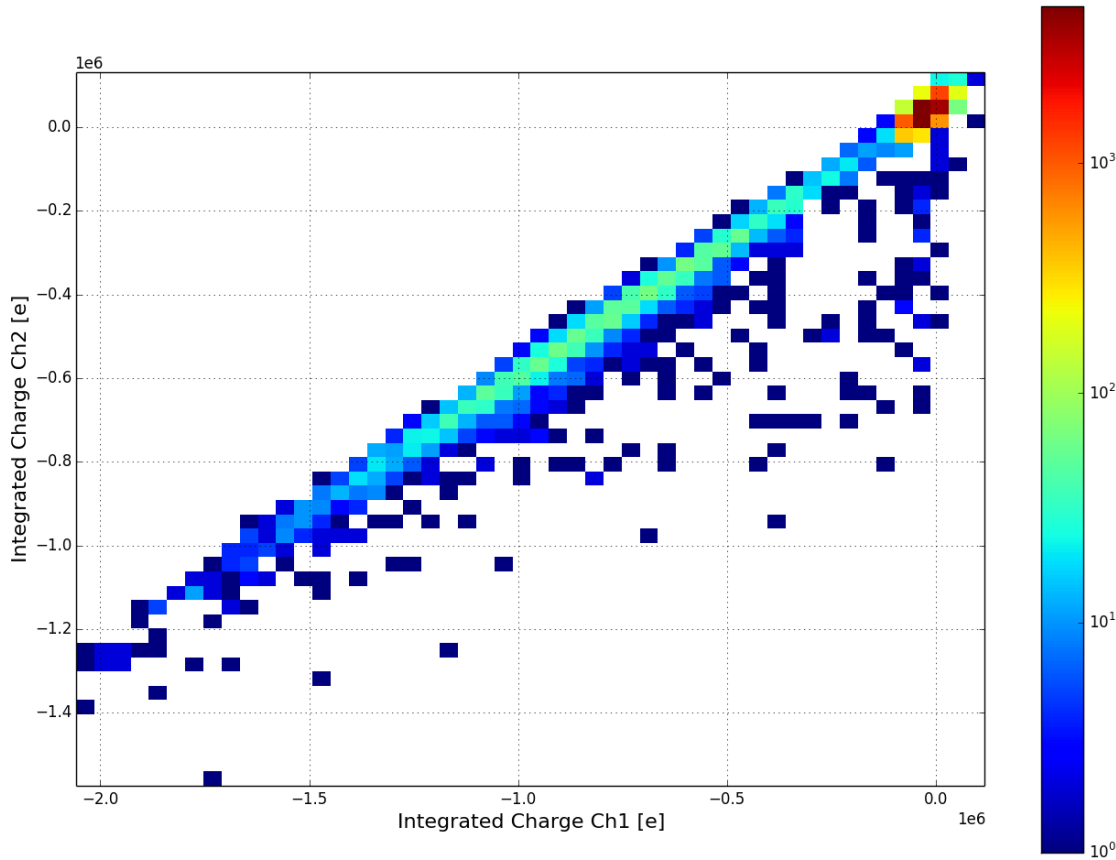


Optimum is not reached, yet

If you don't ground the neighbouring anodes ...



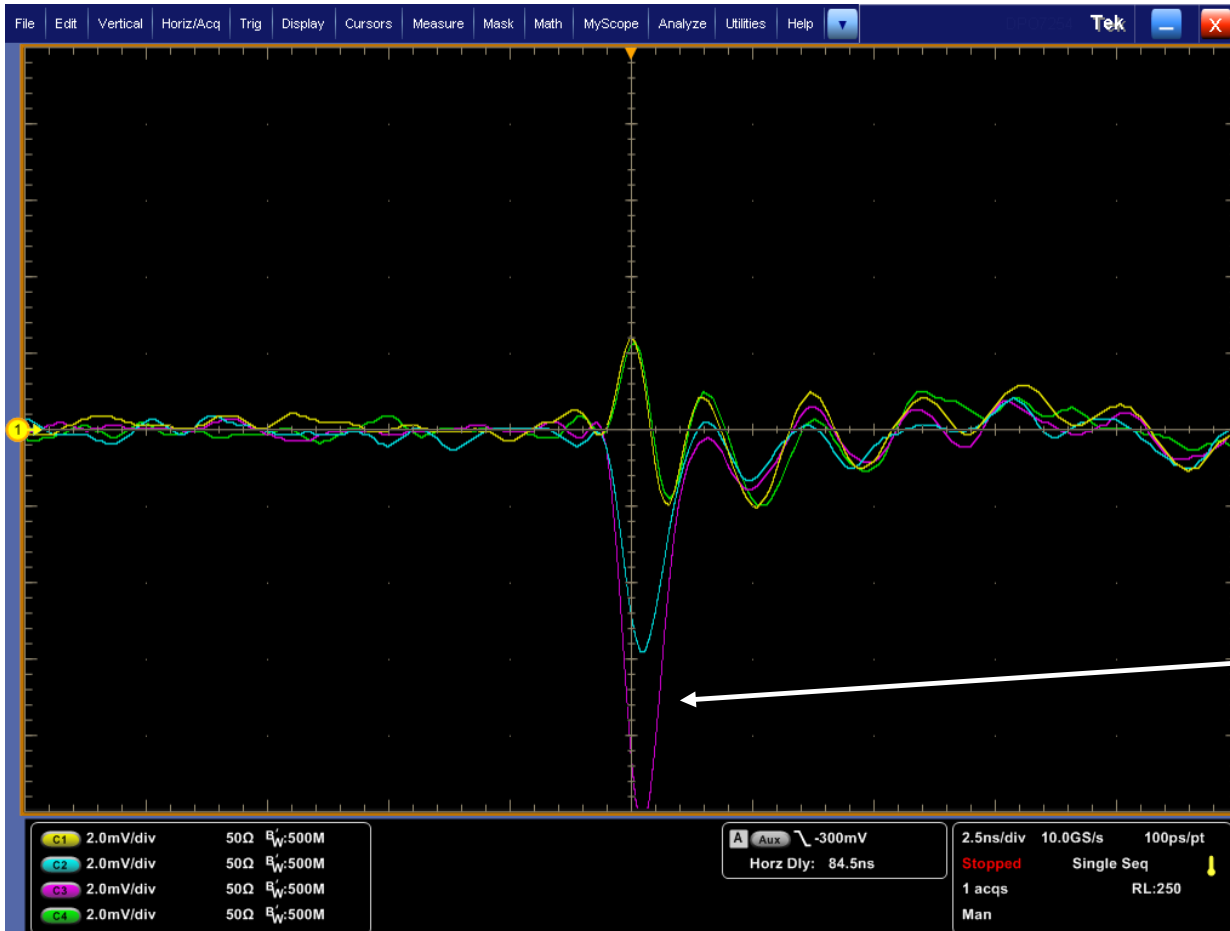
If you don't ground the neighbouring anodes ...



How much is charge sharing
and how much is cross-talk?

Will be analyzed!

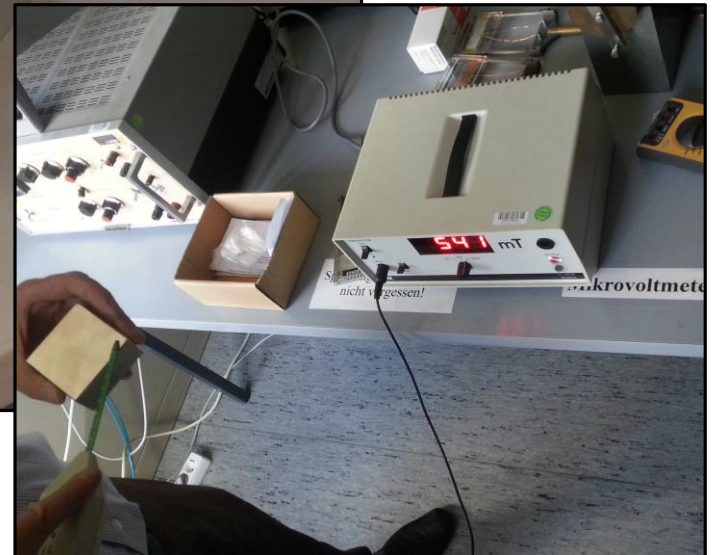
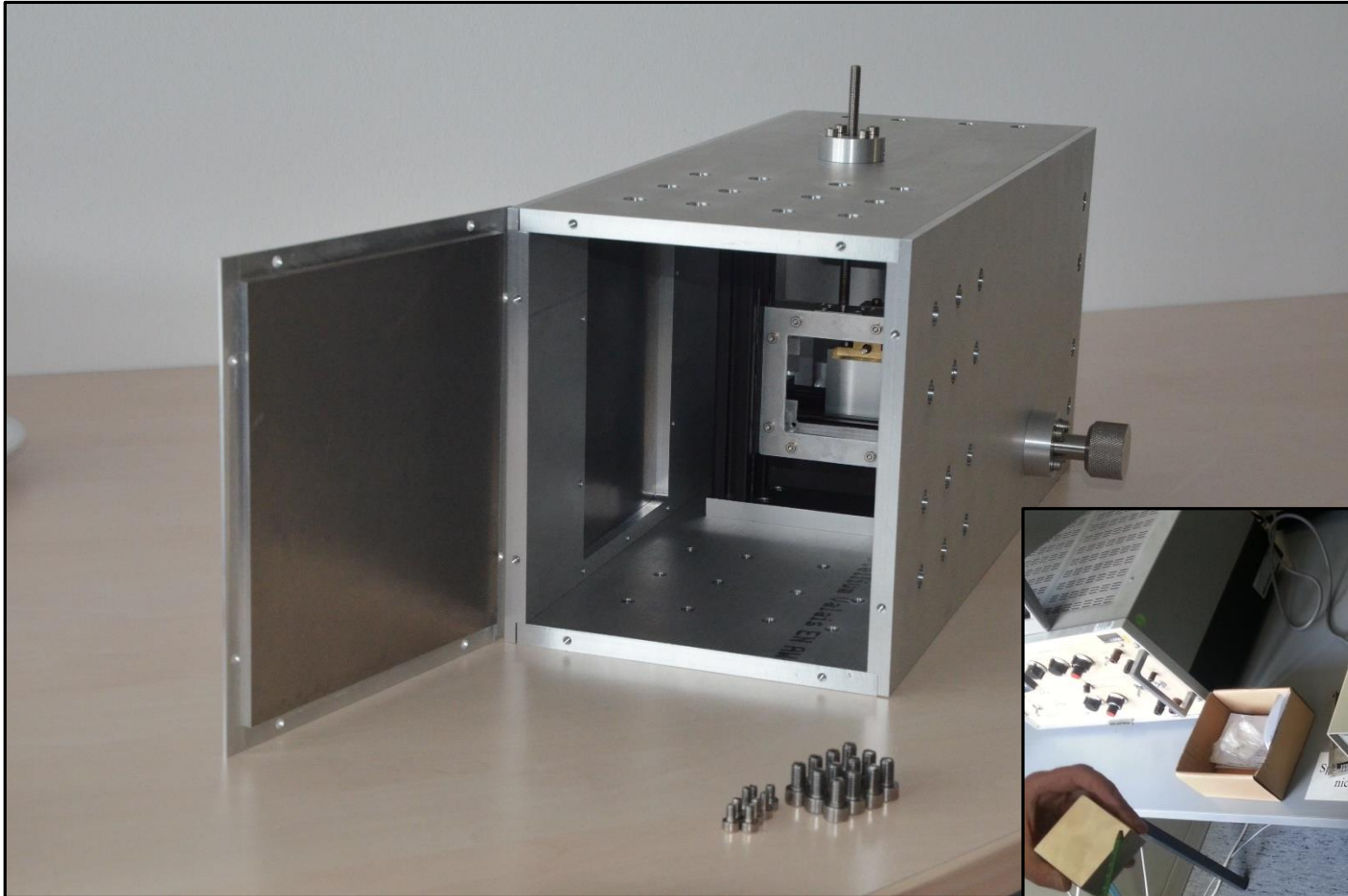
Multiple photons cause cross-talk



This does not come from the readout

About 10mV peak

Testing with magnets is on the way



Outlook

- Magnet Box
- New readouts (TOFPET, TRB3)
 - PCMAG?
 - Full ROM