A brief report on LAPPD # 153

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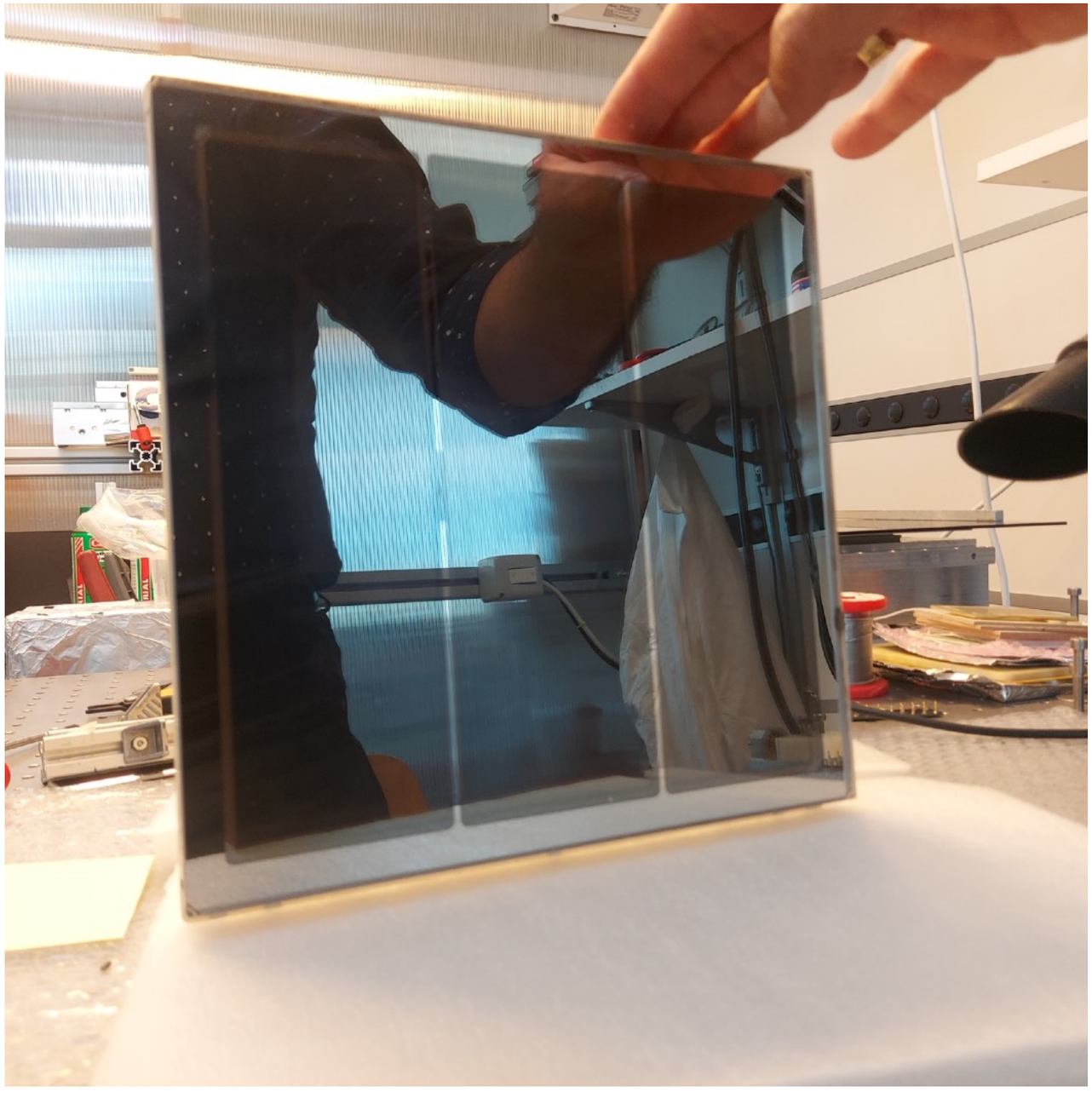
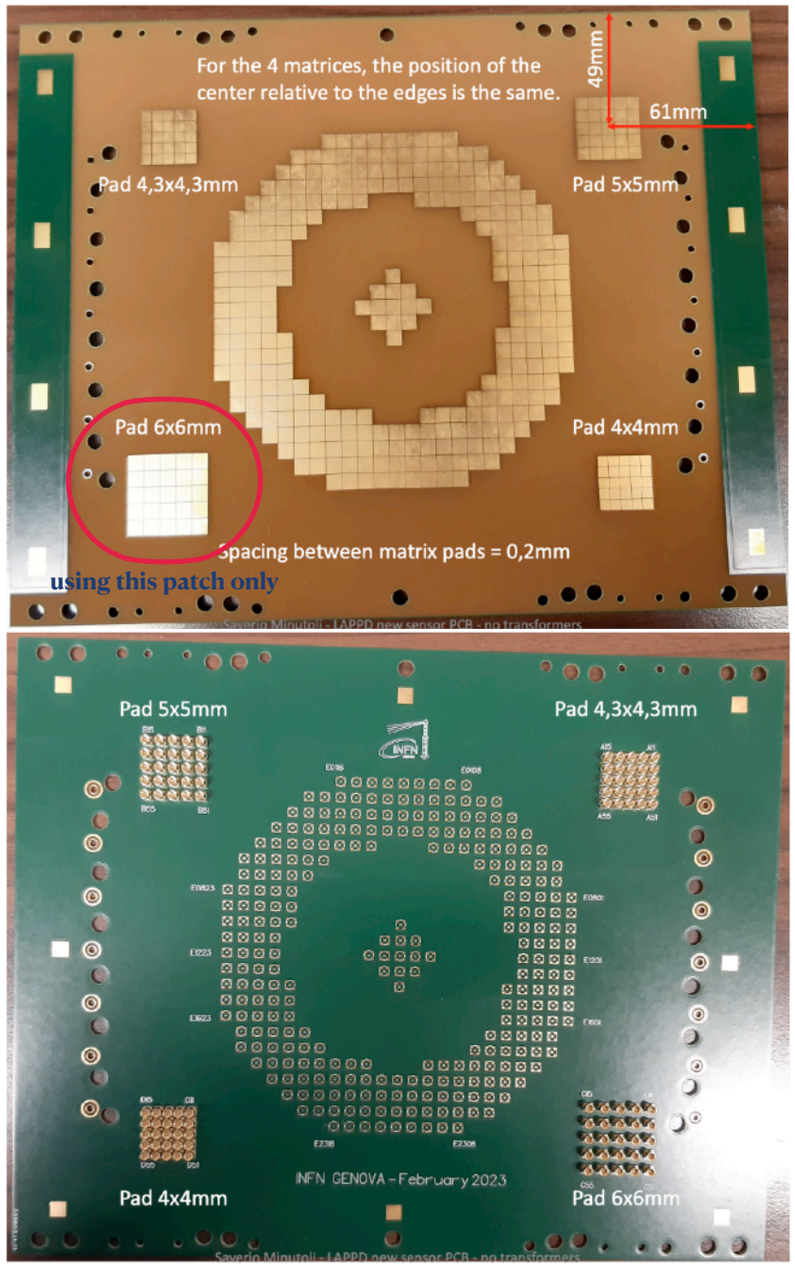
Assembling LAPPD#153

15 May 2023

- A custom made PCB from Genova for LAPPD #153

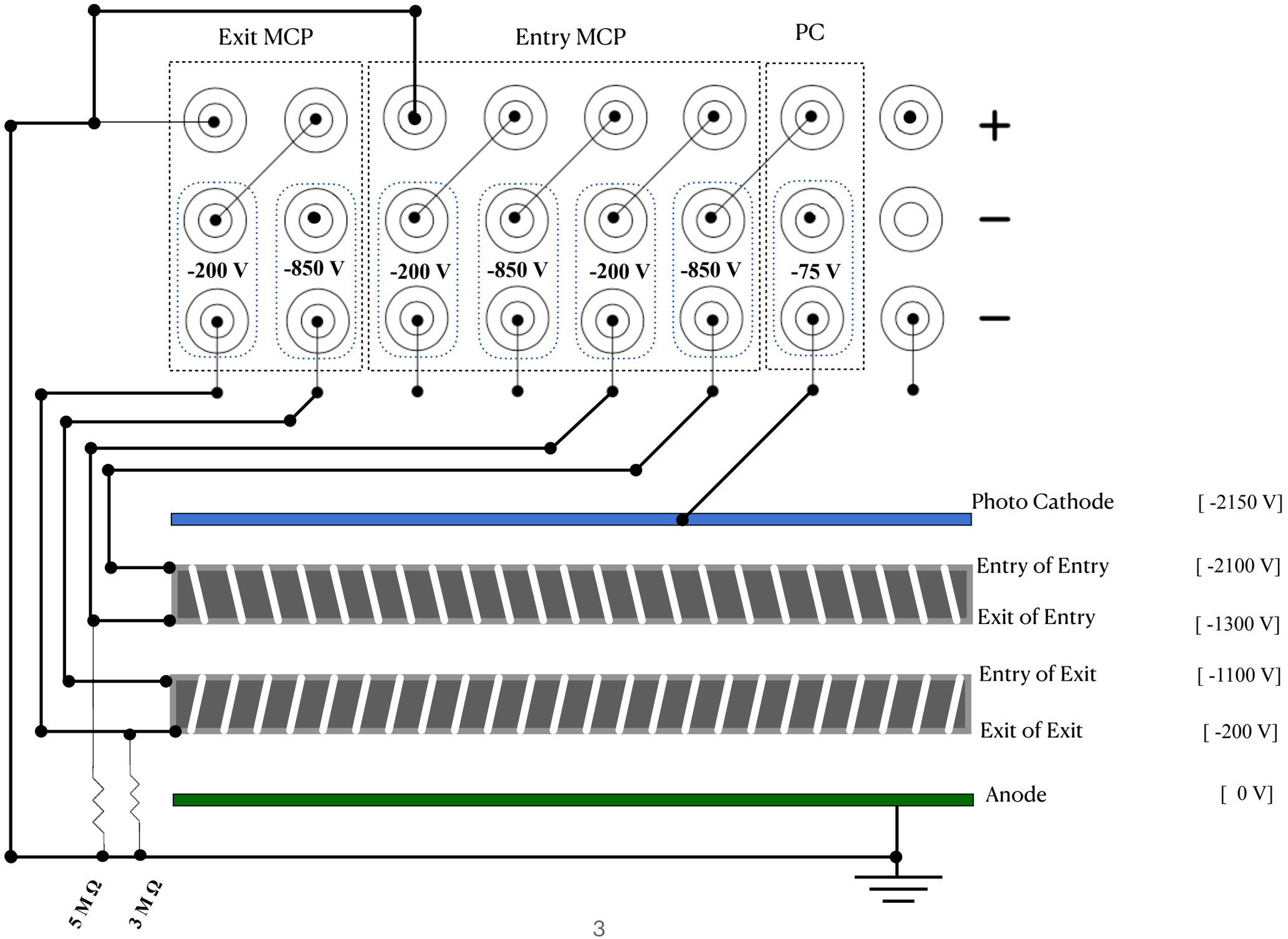


- PCB from Genova



Assembling LAPPD # 153 with the new PCB

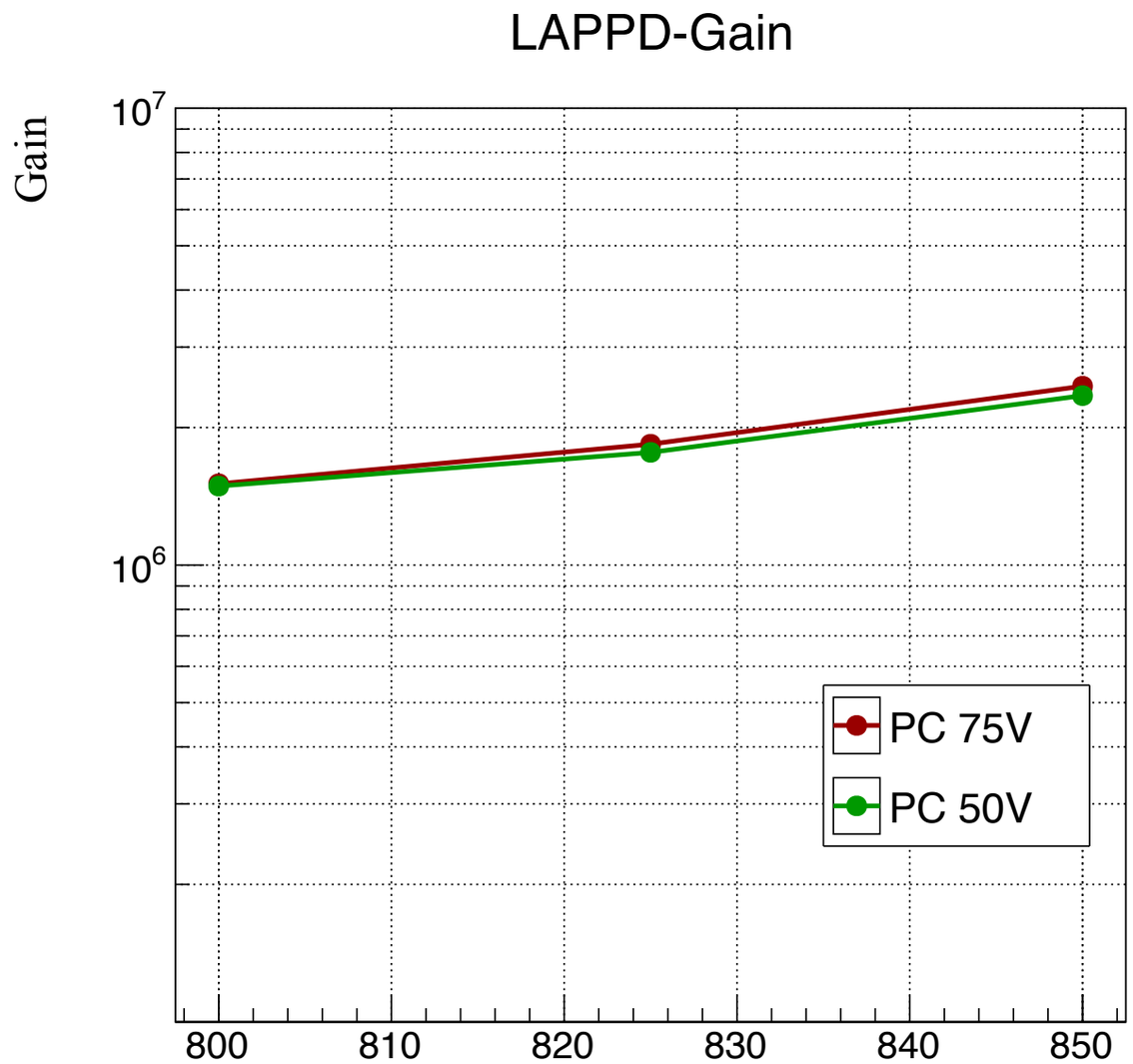
HV Scheme for LAPPD#153



HV scan for gain

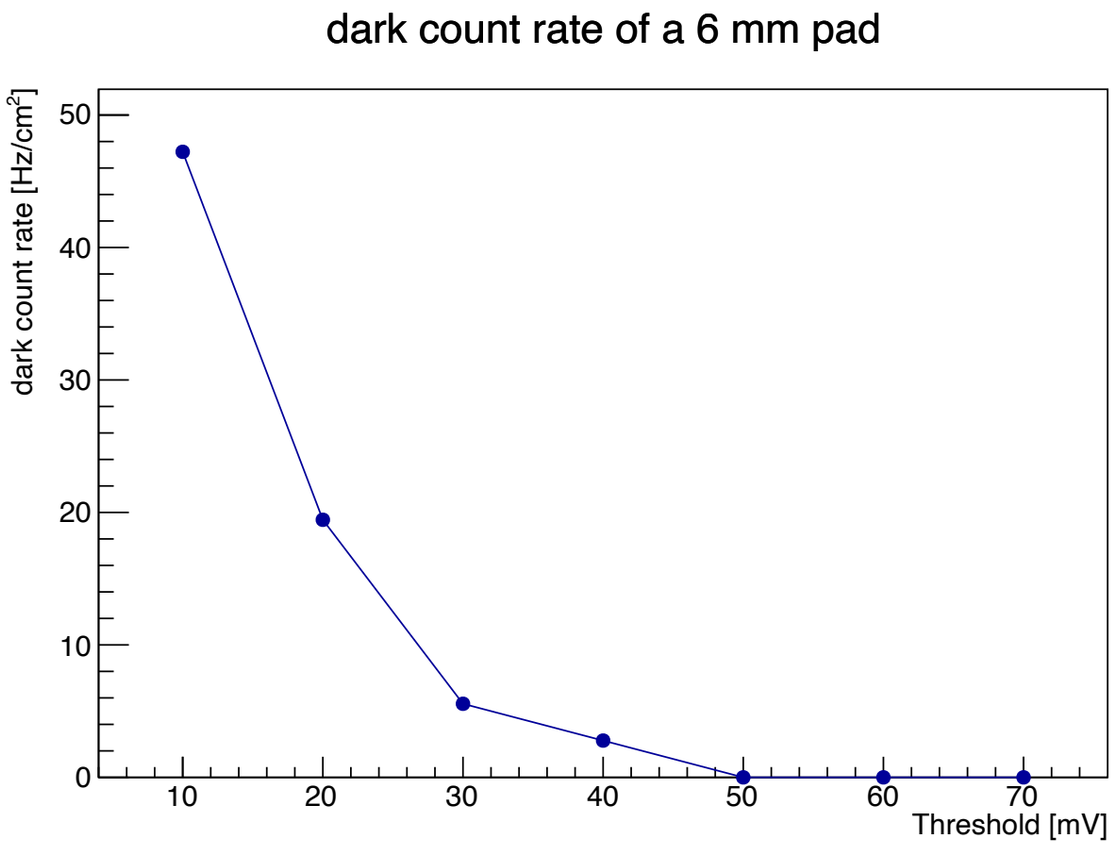
with CAEN V1742 / RDS4

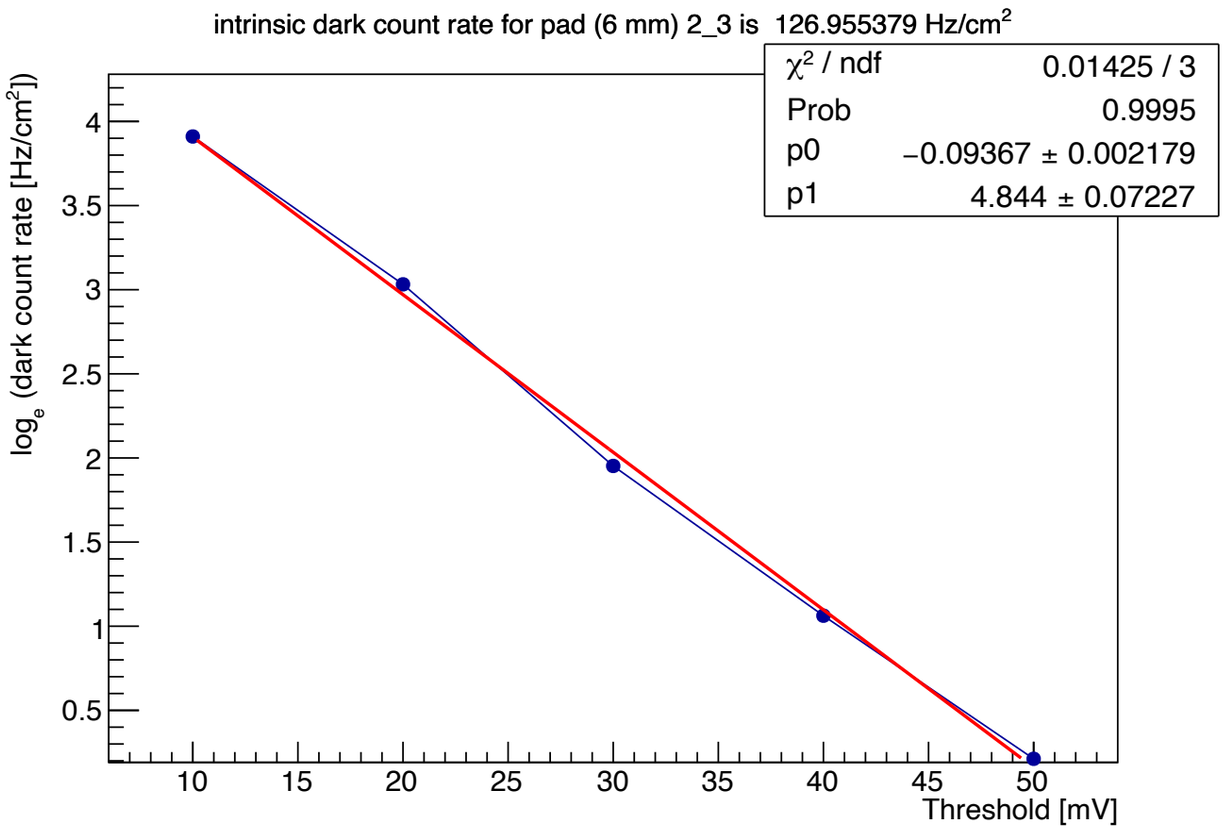
- LASER from PicoQuant
- at 405 nm
- Single Photo Electron mode (97% empty)



- The gain of the LAPPD at: 75/850/200/850/200 ~= 2.5 * 10^6 [INCOM -> almost 4 * 10^6]
- **It took a very long time (weeks) to reach 75/850/200/850/200**
- Now we are at: 100/850/200/850/200 with a gain ~= 3 * 10^6 [INCOM -> almost 5 * 10^6]
- We would like to reach: 50 on the PC with 875 on the MCPs

Dark Rate of LAPPD #153





- Set voltage: 100/850/200/850/200
- We record dark pulses on the oscilloscope for 10 min
- Count the number of pulses with different heights for a pad

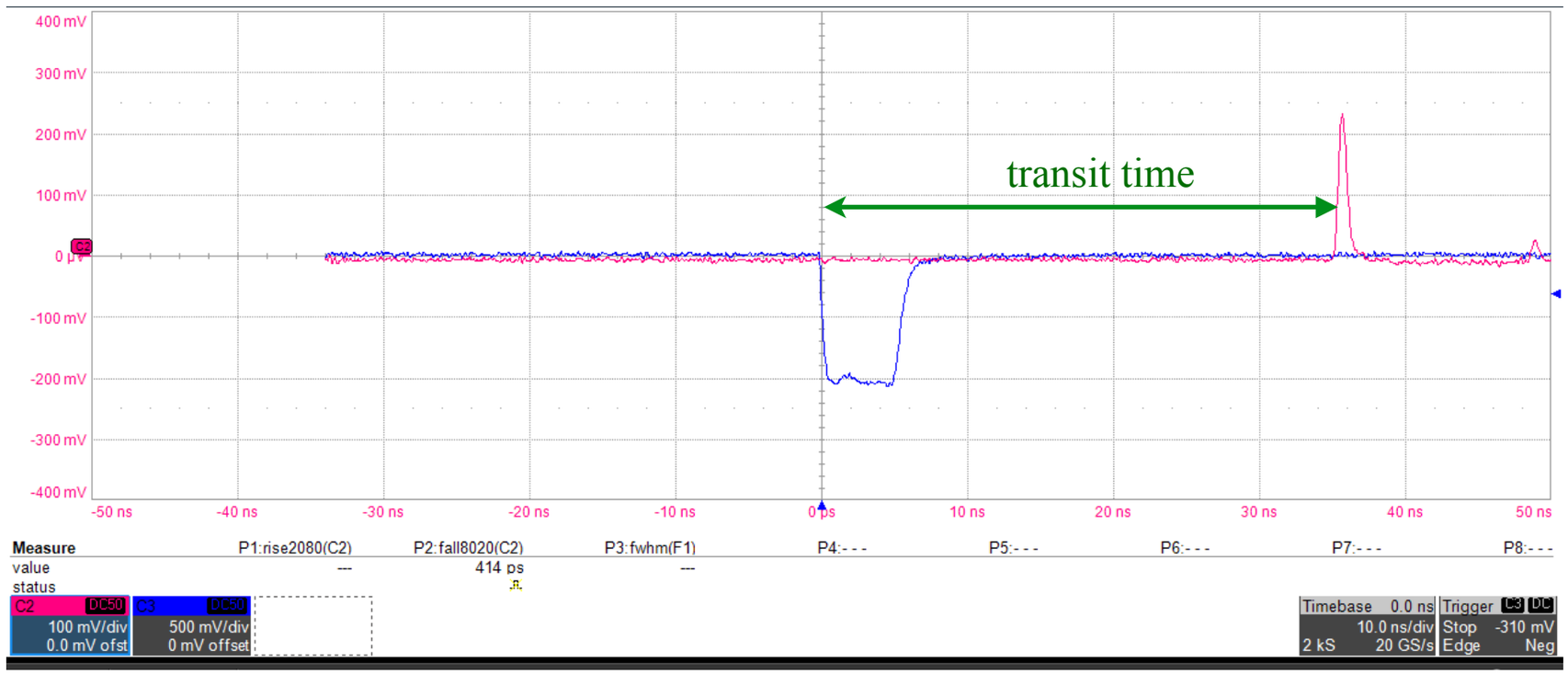
- A linear fit in the $\log_e$ scale is done.
- The intercept is taken for the intrinsic dark count rate
- The intrinsic dark count rate ~= 130 Hz/cm^2 at room temperature

Transit Time Spread of LAPPD #153

Using a fast oscilloscope

- Bandwidth 2.5 GH
- Max sampling rate = 20 GS/s

- LASER 405 nm,
- 21 ps (sigma),
- LASER spot is <500 µm
- Amplifier (2 GHz, 20 dB)

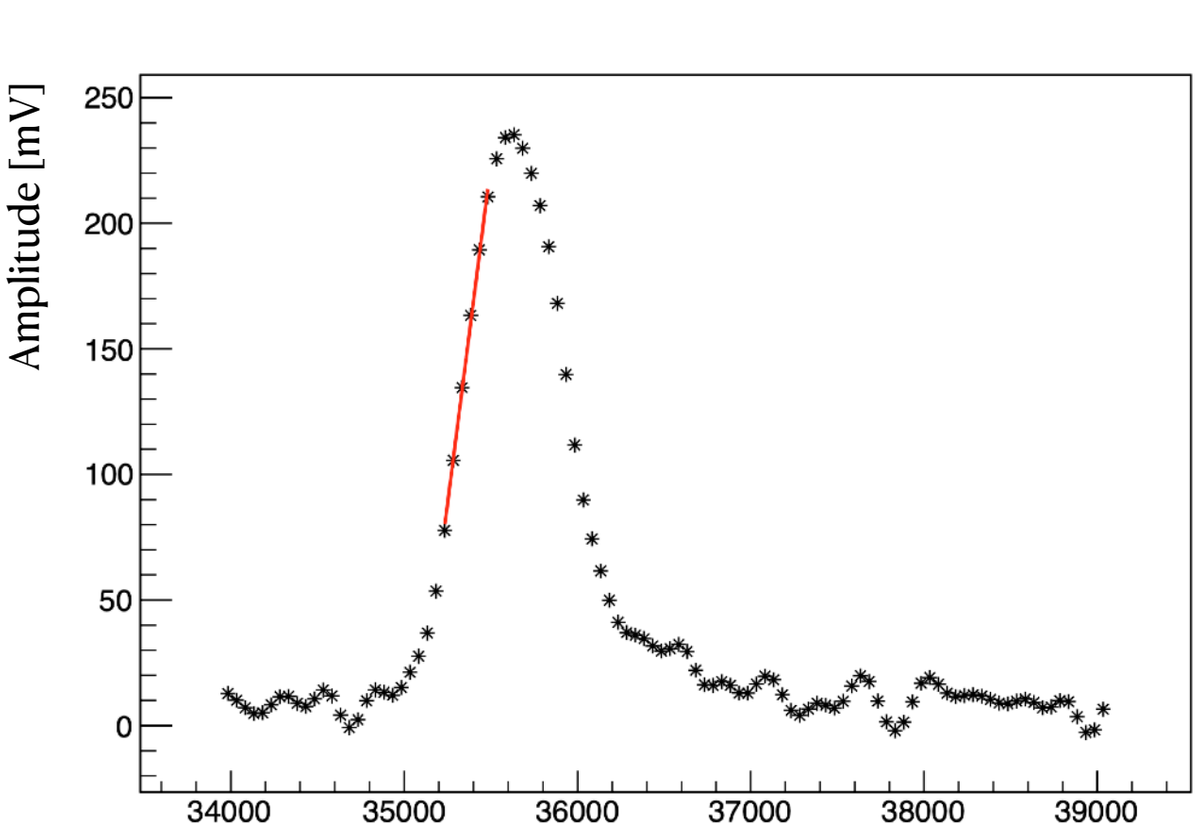


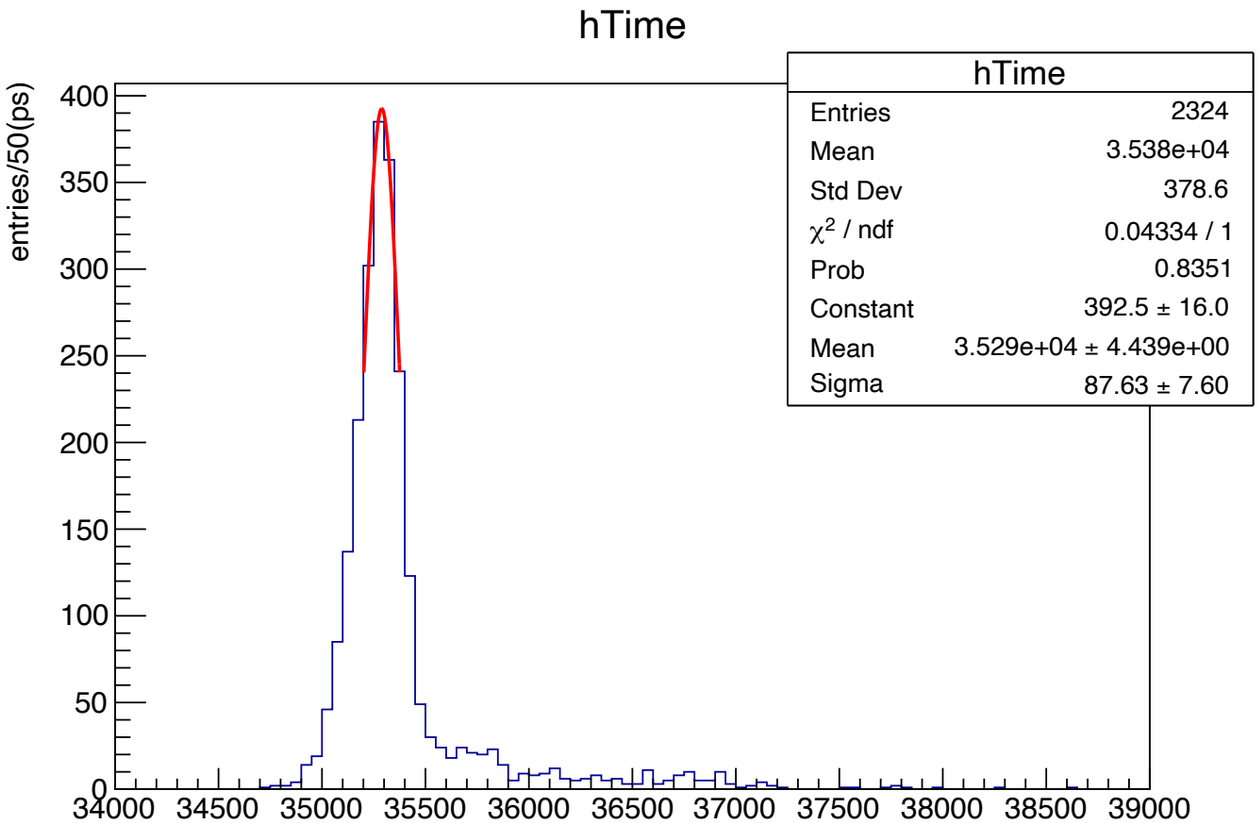
- LAPPD # 153
- Working voltage: 100/850/200/850/200

- The oscilloscope triggered on the **Sync Out of the LASER**
- LAPPD signal goes to another channel (50 ps sample width)

- The spread on the arrival time of the signal (at 50%) is calculated

Arrival time of the signal





- The ‘sample window’ records data for 5 (34-39) ns.
- Photon events are selected above a threshold, within 5 ns time window.
- Single PhotoElectron are assured: 97-99% empty triggers.
- After the peak selection, the leading edge (25-85%) of the signal is fitted with a linear function.
- The time at 50% amplitude (t_{50}) is calculated from the fit.
- A distribution of t_{50} is prepared for 100K events.
- The sigma/FWHM gives the TTS. We fit it with a single Gaussian within FWHM rage.
- At HV 100/850/200/850/200, TTS = 88 ps (sigma)

Transit Time Spread with PC voltage

fitted with a single Gaussian within FWHM