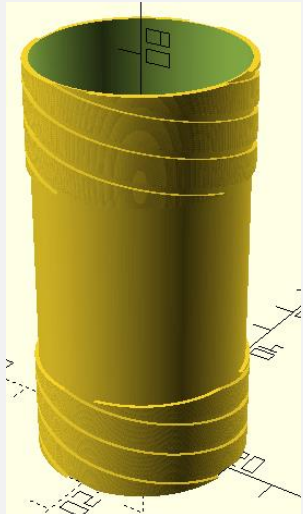


OPTICAL FIBERS BEAM TEST

IFJ Kraków
Tomasz Wojtoń

27-09-2022

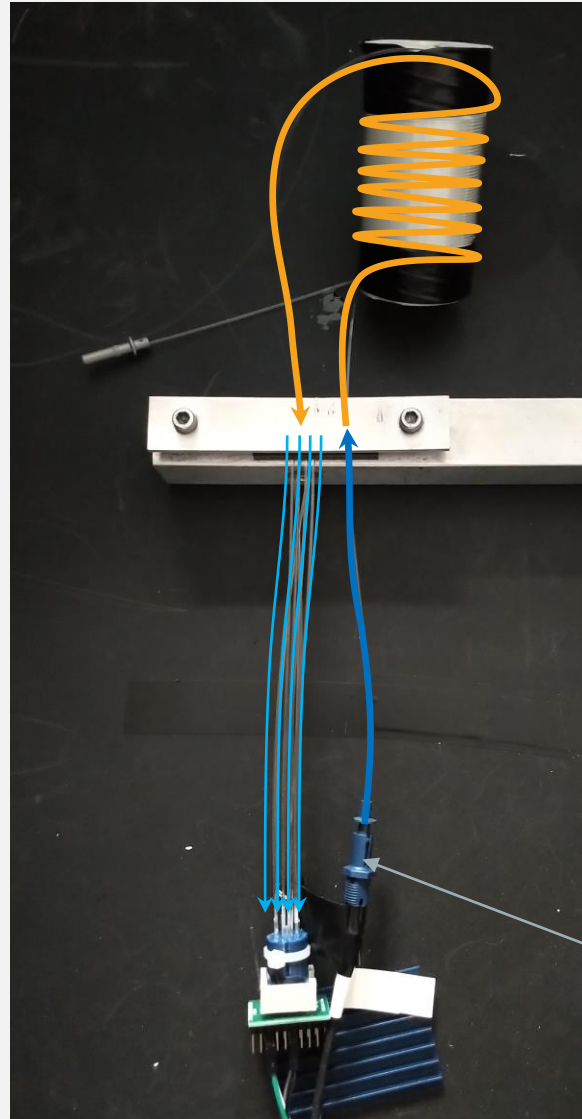
MEASUREMENT SETUP



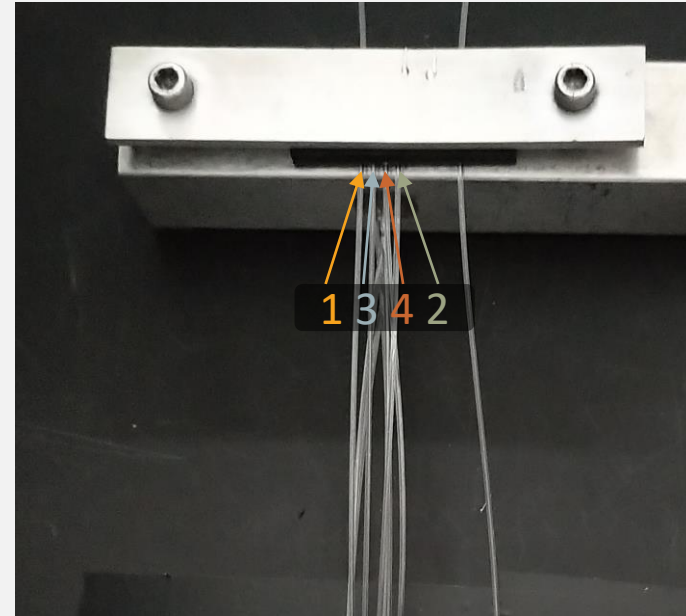
scad 3d model



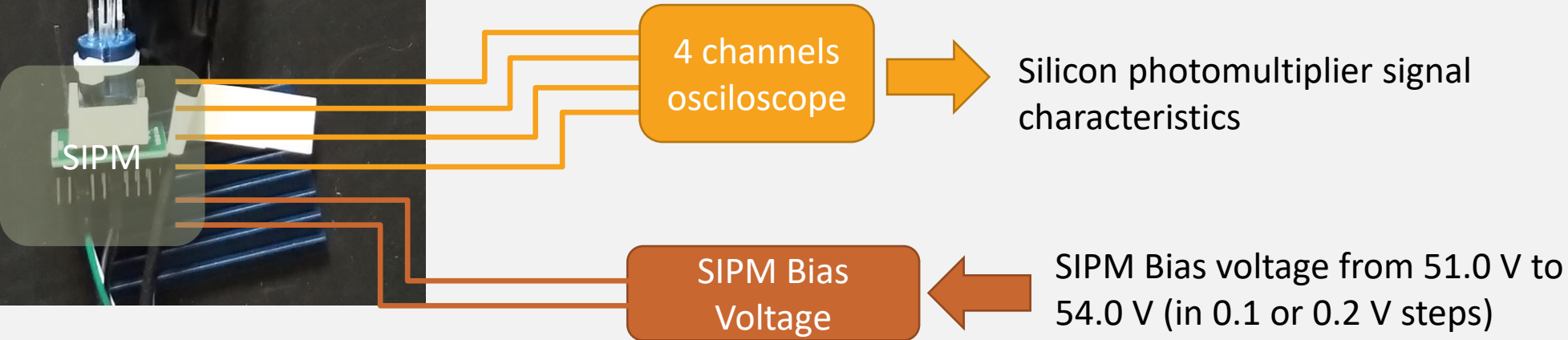
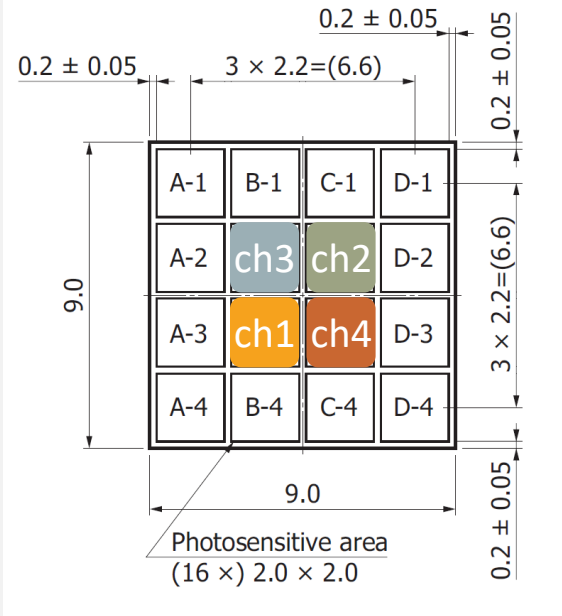
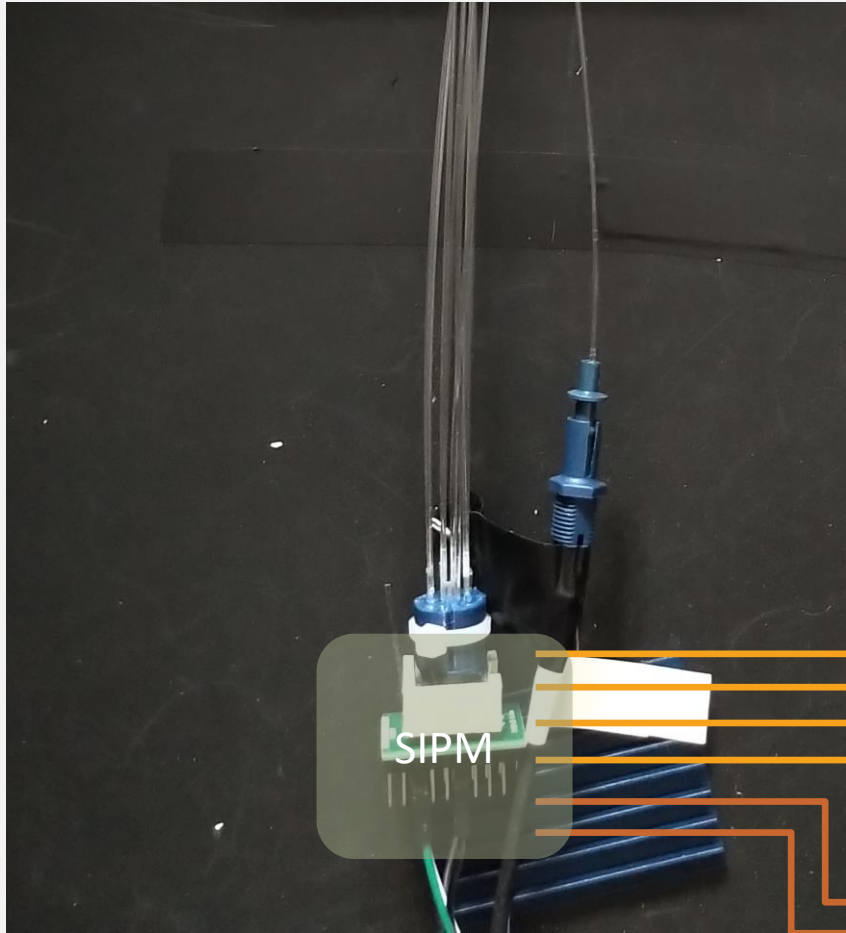
Kuraray clear fiber
test barrel



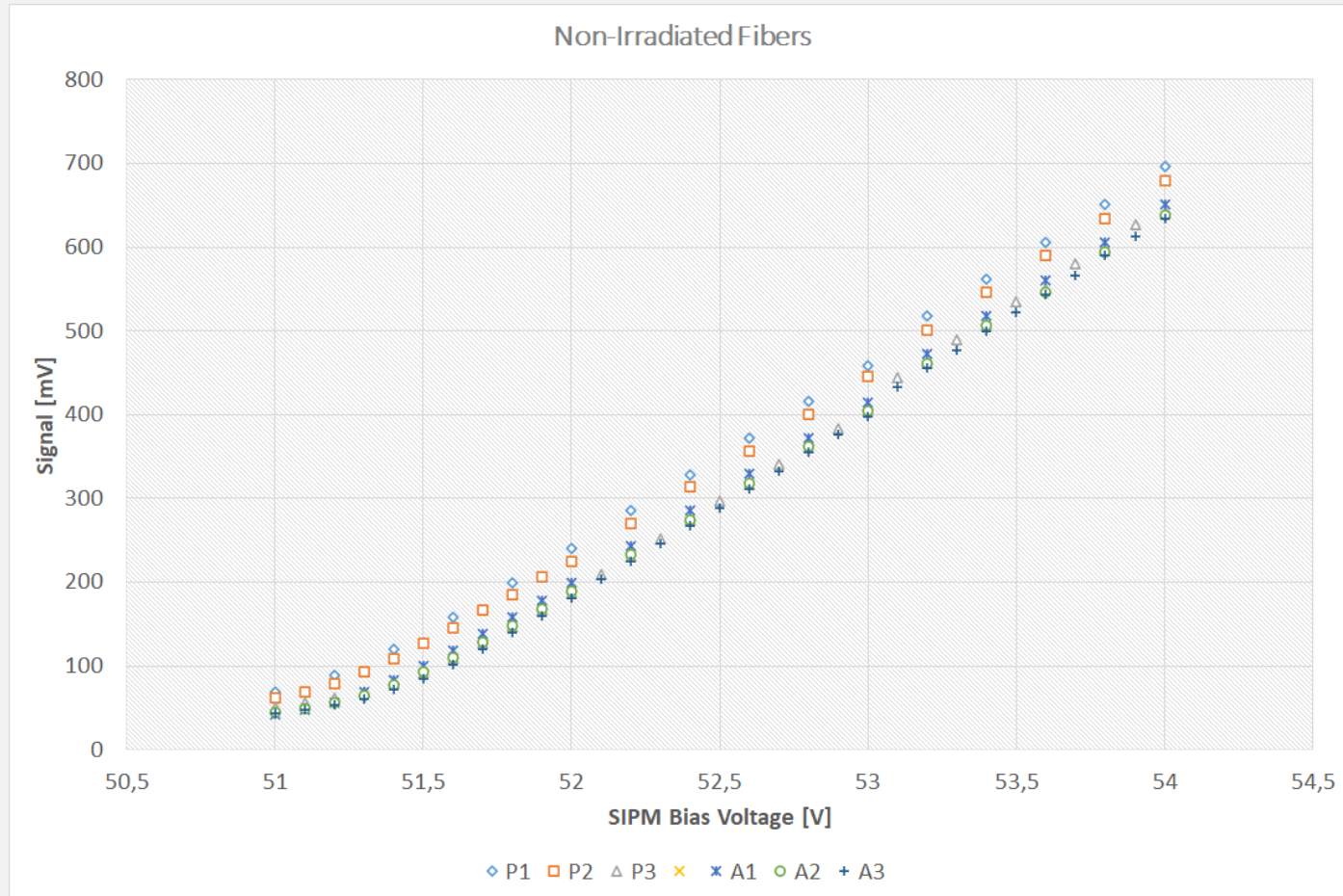
Blue LED



ELECTRONICS SETUP

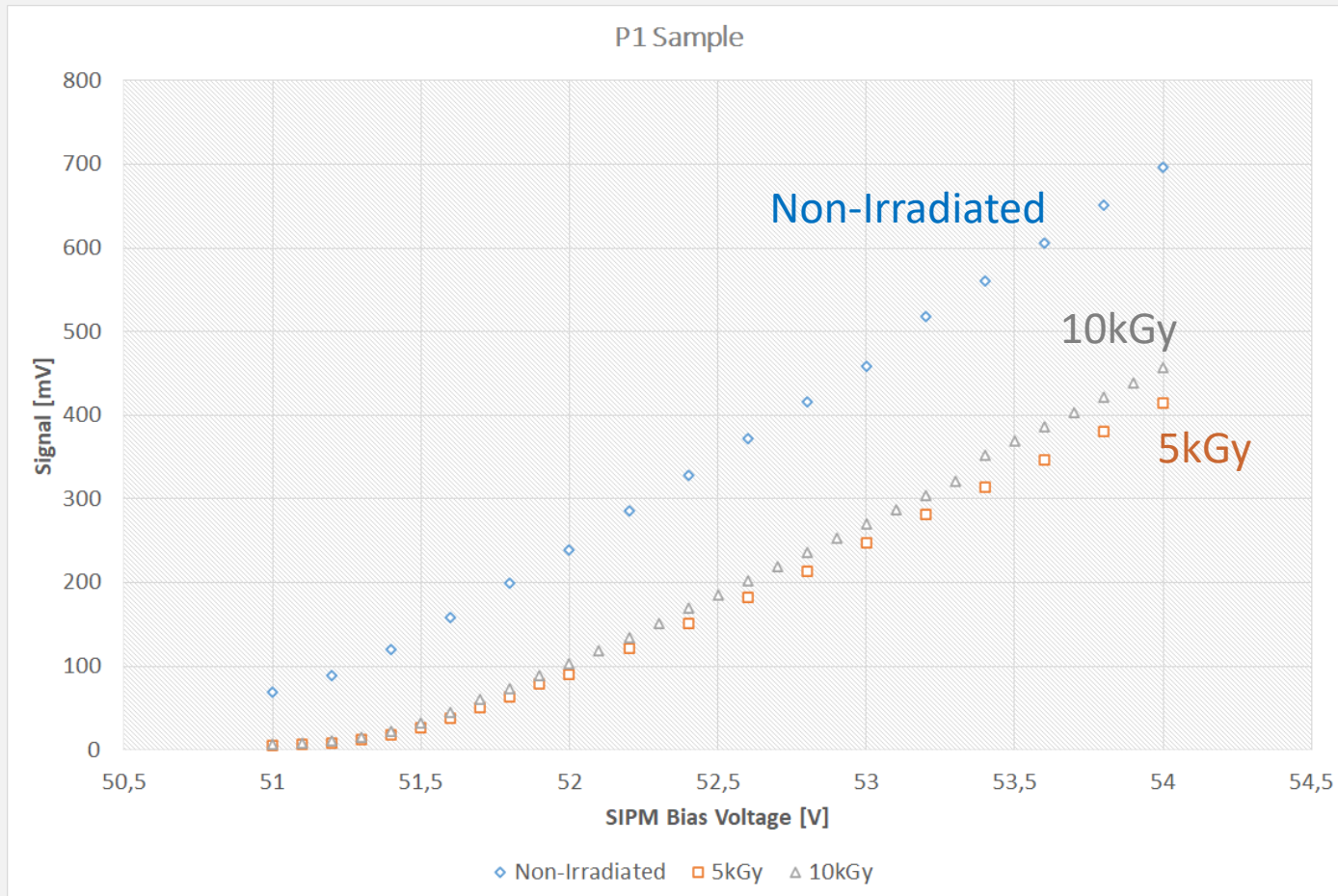


SIGNAL CHARACTERISTICS



- Signal measurements for SIPM Bias Voltage from 51 to 54V (with 0.1V / 0.2V resolution)
- Checking (non)linearity
- Non-irradiated fibers for reference

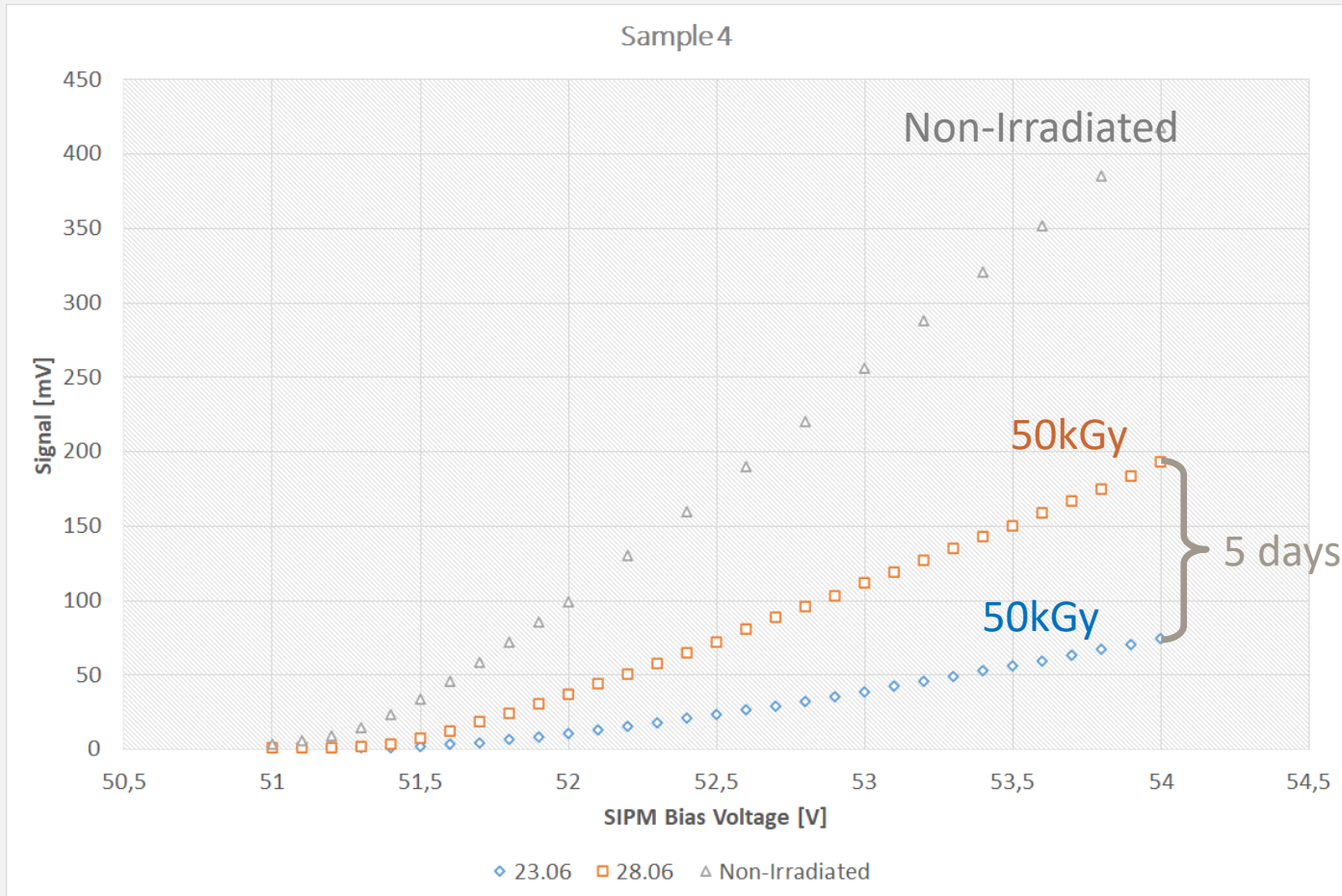
SAMPLE P1



- Higher signal after 10kGy irradiation than 5kGy, but...
- first measurement (5kGy irradiation) after 1 day;
- Second measurement (10kGy irradiation) after 4 days
- Fibers self-healing?

Cummulative irradiation	Irradiated	Measured
0	-	16.06
5 kGy	22.06	23.06
10 kGy	24.06	28.06

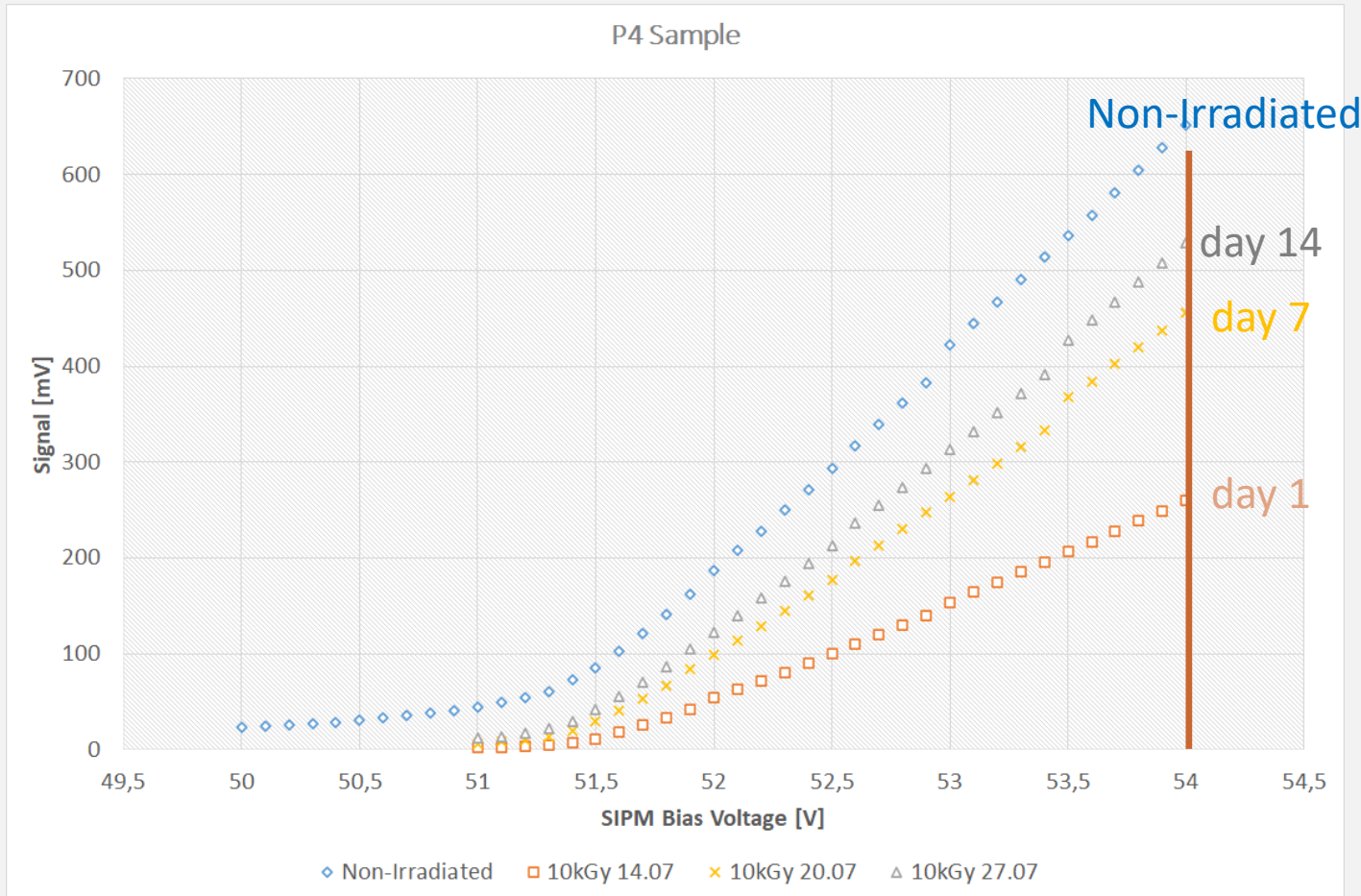
SAMPLE 4 – SELF-HEALING?



- After 5 days of fiber self-healing effect, signal was more than two times higher
- **76mV vs 186mV** (54V bias voltage)

Cummulative irradiation	Irradiated	Measured
0 kGy	-	08.06
50 kGy	22.06	23.06
50 kGy	22.06	28.06

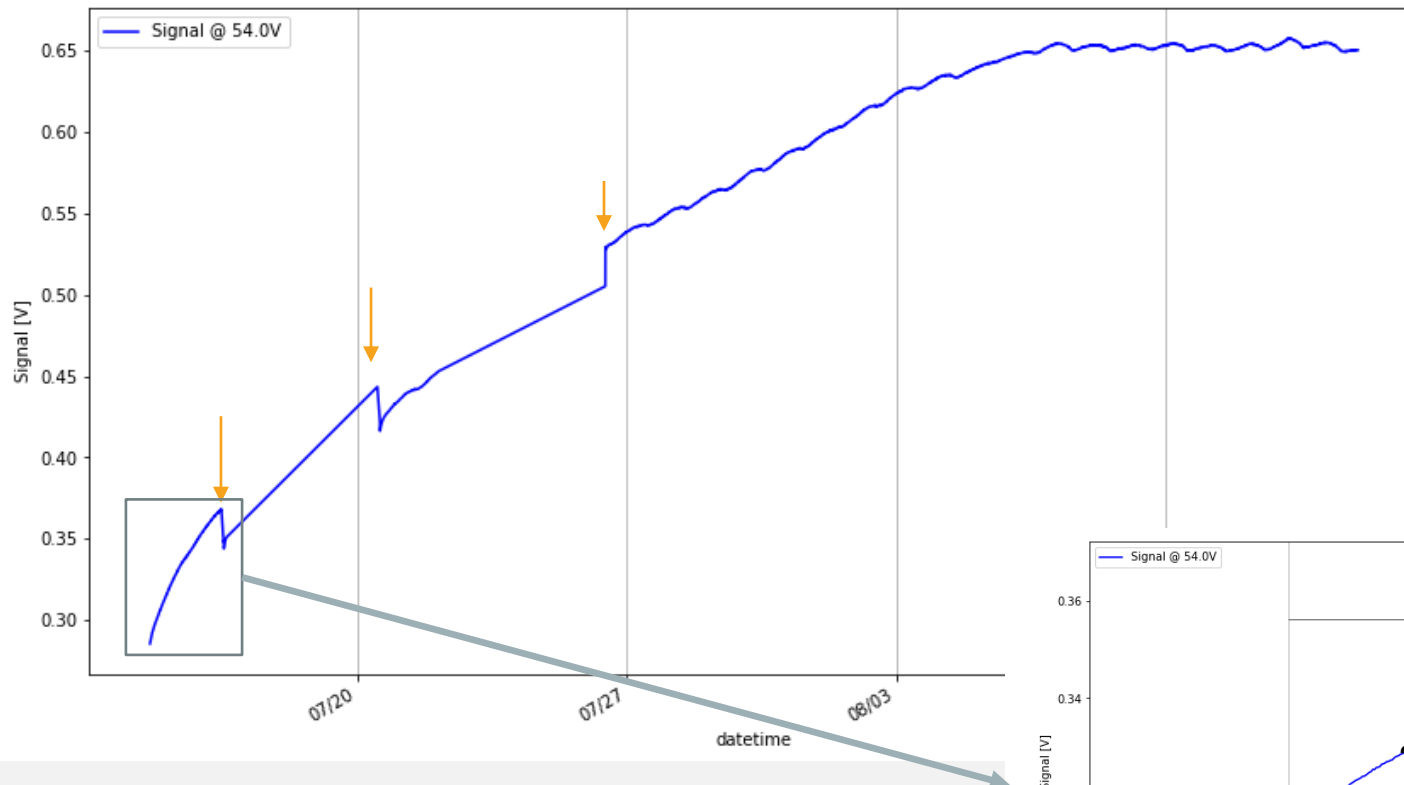
SAMPLE P4 – SELF-HEALING



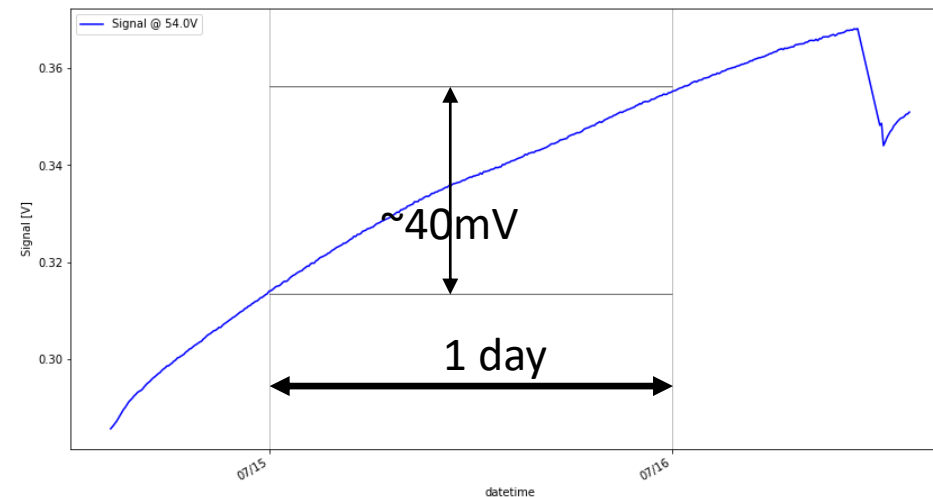
- Another irradiated sample to test self-healing effect (**10kGy**)
- For 54V SIPM bias voltage:
 - Day 1 after irradiation: **260mV**
 - Day 7 after irradiation: **455mV**
 - Day 14 after irradiation: **530mV**
 - Non-irradiation: **650mV**

Cummulative irradiation	Irradiated	Measured
0 kGy	-	10.07
10 kGy	13.07	14.07
10 kGy	13.07	20.07
10 kGy	13.07	27.07

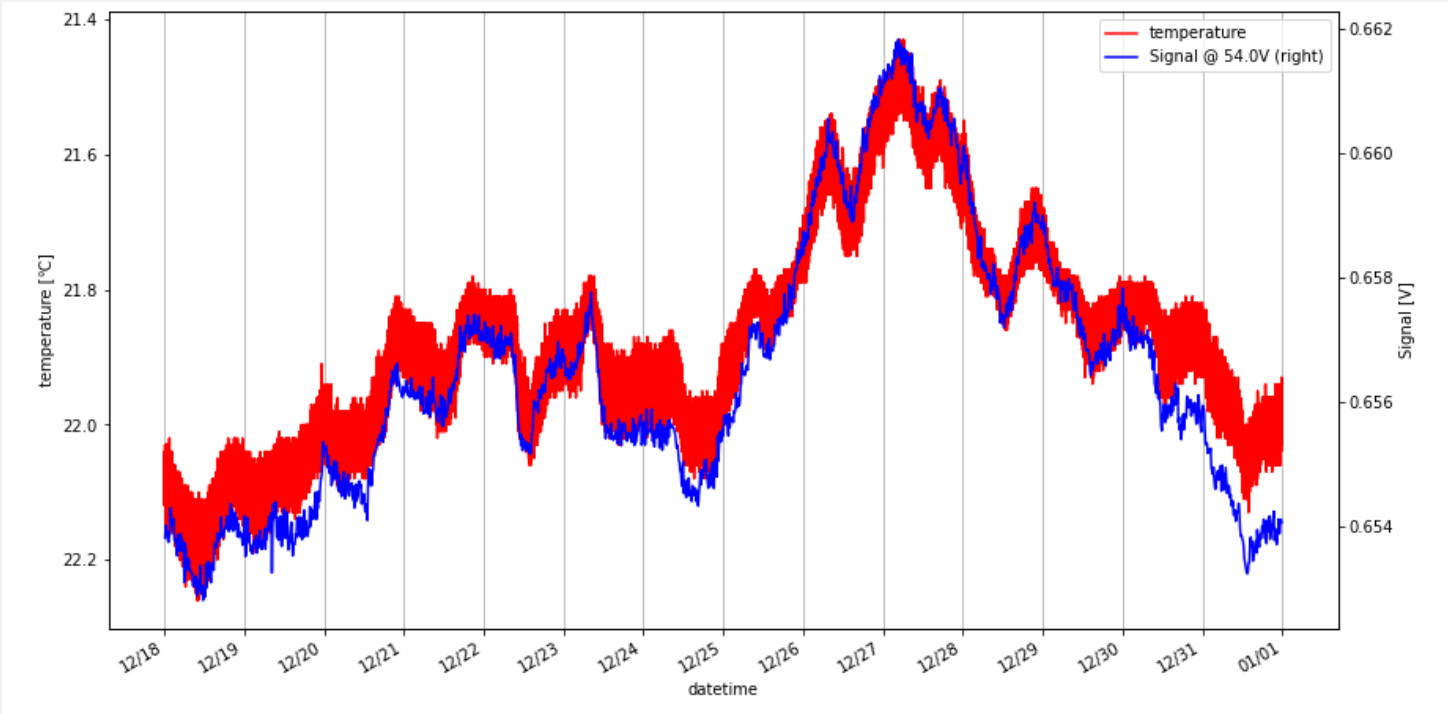
SAMPLE P4 – SELF-HEALING CONTINUOUS MEASUREMENT



- Setup for automated measurements (with 10 minutes time resolution)
- One measurement takes ~ 2.5 m (auto scan from 51 to 54V)
- Measurement from 14.07 to 14.08 – one month (with breaks for test another fibers)
- Breaks (arrows) – signal changes after change fiber (to measure another one)



TEMPERATURE FLUCTUATIONS



- Temperature measurement in the box to observe correlation of signal to temperature
- $\sim 13\text{mV per } 1^\circ\text{C}$

LAB NEWS

- Preparing setup for automated measurements of 16 channels:
 - ATS9416 digitizer - 14 bit, 100 MS/s, 16ch
 - Continuous streaming mode
 - 3.5 GB/s throughput
- Plans to stabilize temperature in the box and then:
- Long-term measurements with stable temperature of fibers and SIPM

