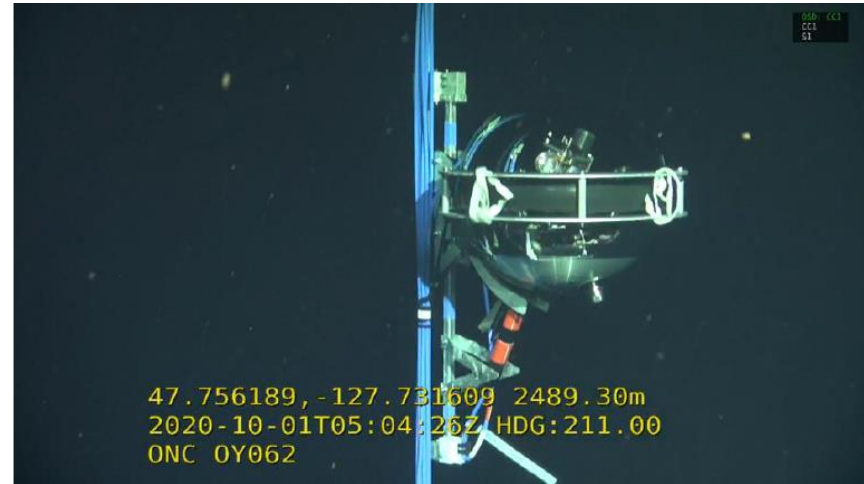# STATUS-UPDATE LiDAR

C. Fink, C. Fruck

P-ONE Virtual Collaboration Meeting

14.12.2020

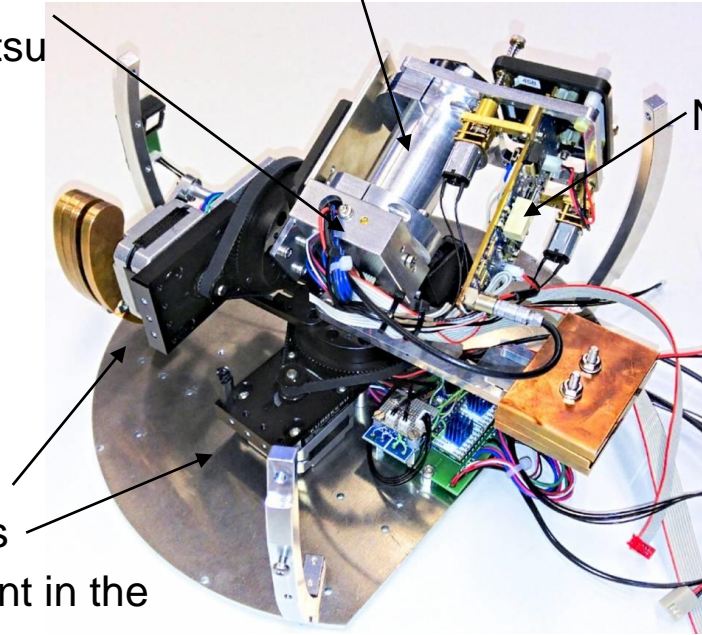# A short recap I

Focusing unit with a filter in front

Single-photon-counting
MicroPMT from Hamamatsu

Nanosecond-pulsed Laser (@ 450nm)

2-axis stepper motors
$\Rightarrow$ Move to every point in the
upper hemisphere

A short recap II

Working principle:

- Photons will eventually be scattered back to the detector

- Single-photon-counting MicroPMT detecting backscattered photons

- LiDAR001 at 168m

- LiDAR002 at 432m

- Goal: Complementary measurement of the attenuation length to STRAW

- Current best fit from STRAW at 465nm wavelength: $L_{att} = 30m$
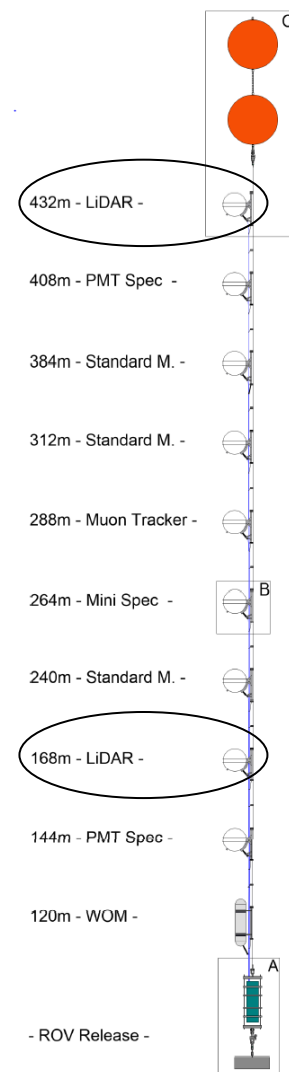
First Measurements

- Both LiDARs functional and performing measurements

- Single measurements in the scale of seconds to minutes

- Best fits from the LiDARs:

  - $L_{att,LiDAR1} = 49m$

 - $L_{att,LiDAR2} = 150m$

- Why the deviations?
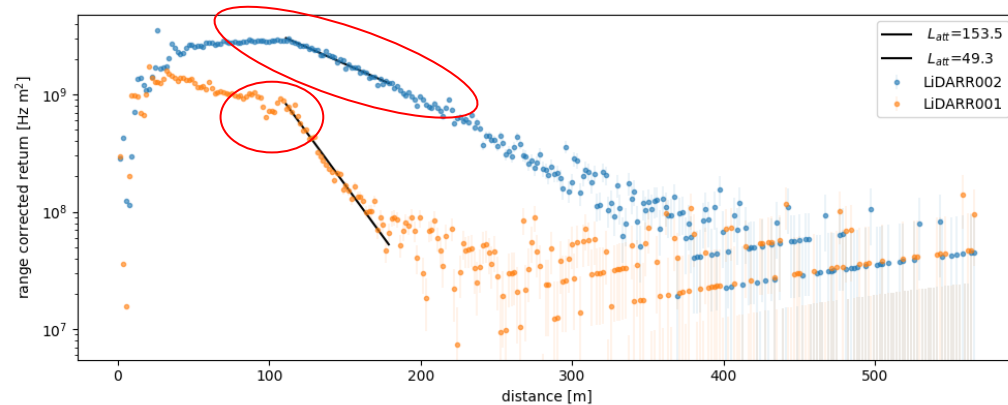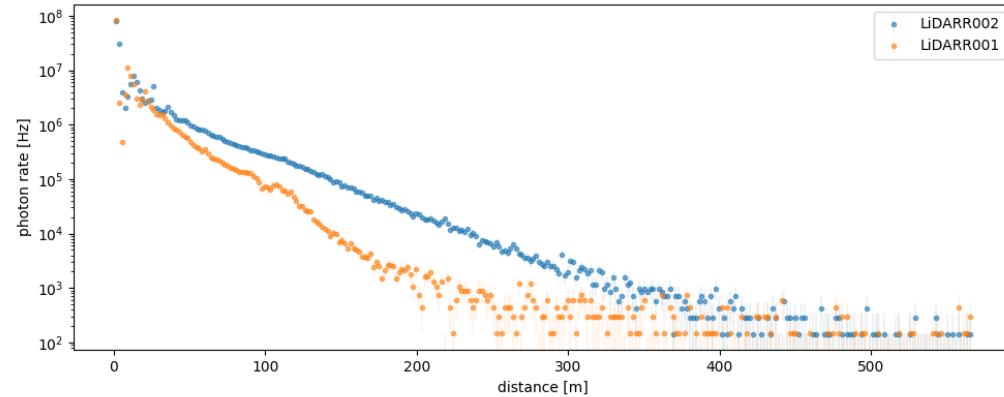
Deviations from the Simulation

- Signal independent of time and direction

- Possible Explanation for LiDAR2: afterpulses in the MicroPMT

  - Photoelectrons ionize residual gases

  - Positively charged Ions travel towards photocathode

  - Generate afterpulse upon impact
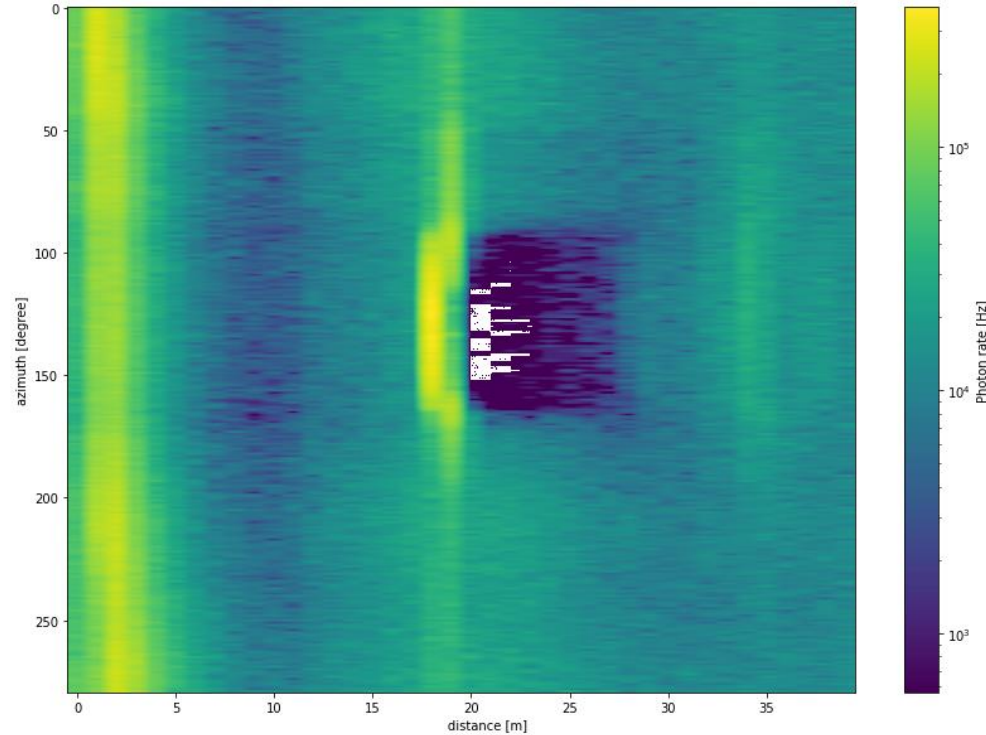
- (yet) no explanation for behaviour of LiDAR1
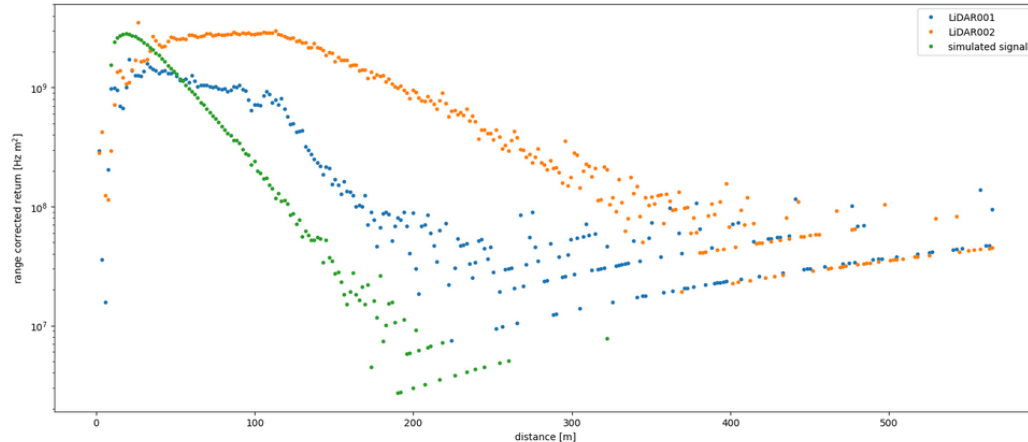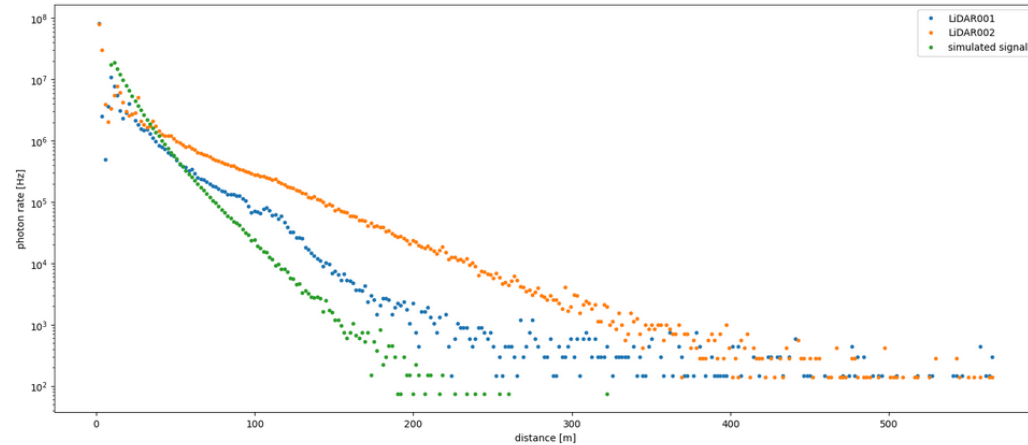
Simulating the Afterpulses

- Artificial Afterpulse signal

- Can we recreate the measured signal?

- Good agreement in the region of interest

- Not suitable for subtracting from measured data
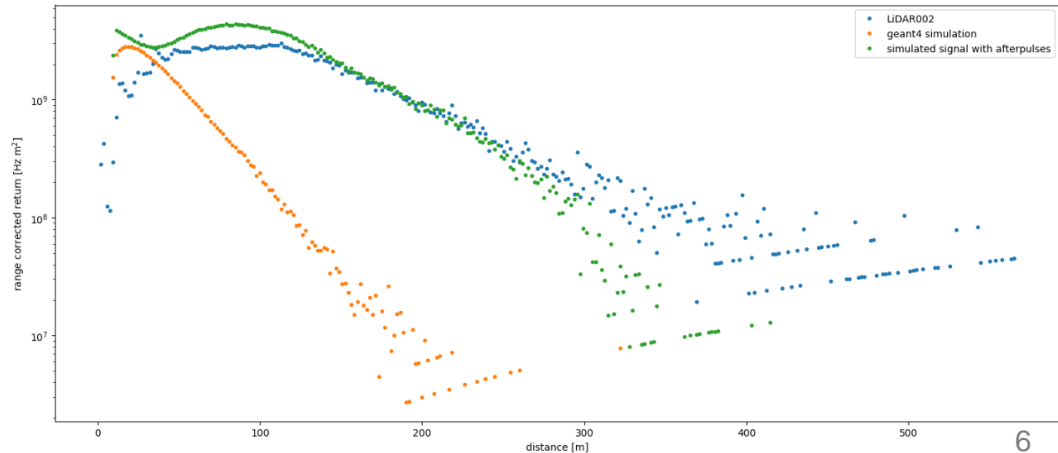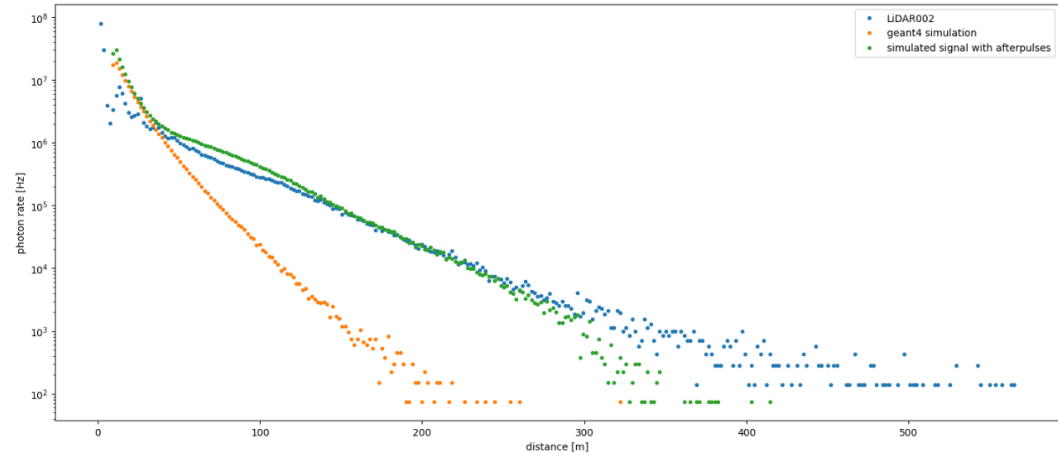
Hitting the buoy

- Scan in order to hit the buoy

- Inclination of 0.5°

- 1ms integration time per scanned degree

- Signal measured after the buoy: Afterpulses + Stray light + dark counts

What's next?

- Measure the real afterpulse signal for LiDAR2

- Subtract it from measured signal for pure LiDAR signal

- Get explanation for behavior of LiDAR1

Thank you for your attention!