Measuring the DOM's acceptance

Thursday 7 march
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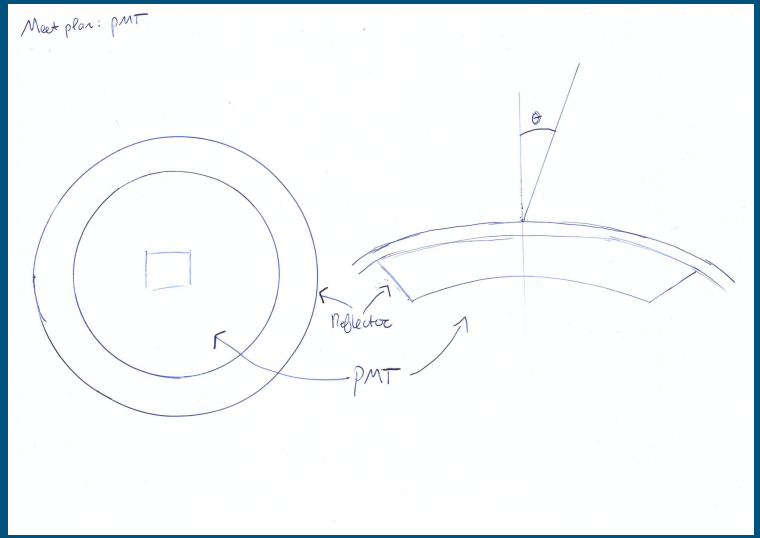
Research questions

- What is the influence of the position of where a photon hits the DOM on the signal?
- What is the influence of the angle of a photon that hits the DOM on the signal?

Extra topics could be:

- K-40 in the glass
- Suggestions?



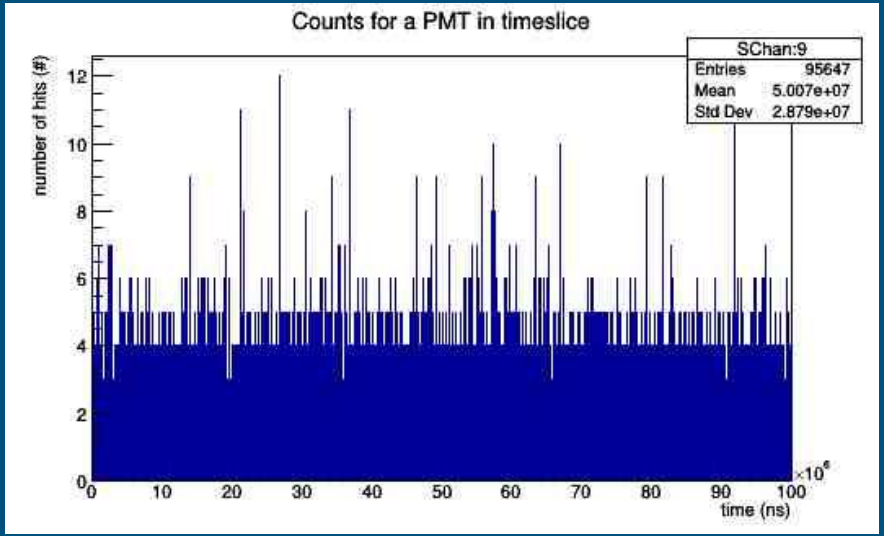
How do we quantify the DOM's signal? I

DOM registers:

- Time of a hit (t)
- Time-over-threshold (Tot)

Excite the DOM with a pulsed laser with ± single photons

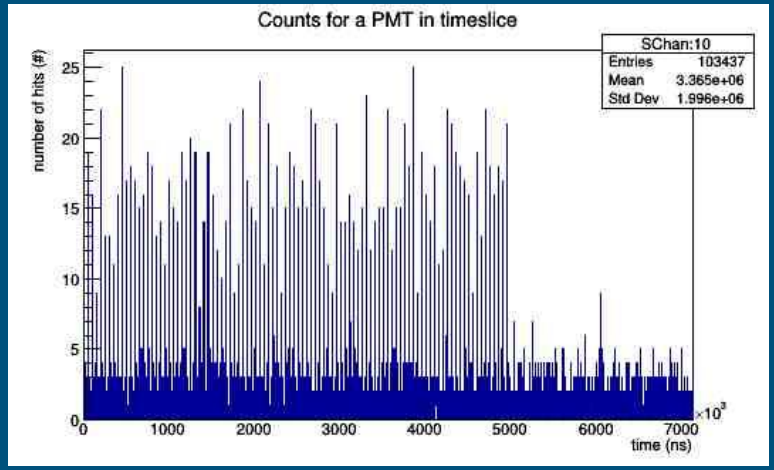
How can we find our signal?



How do we quantify the DOM's signal? II

We use the White Rabbit Switch (WRS):

- Time synchronization between pulsed laser and DOM
- We know when to expect our pulse!



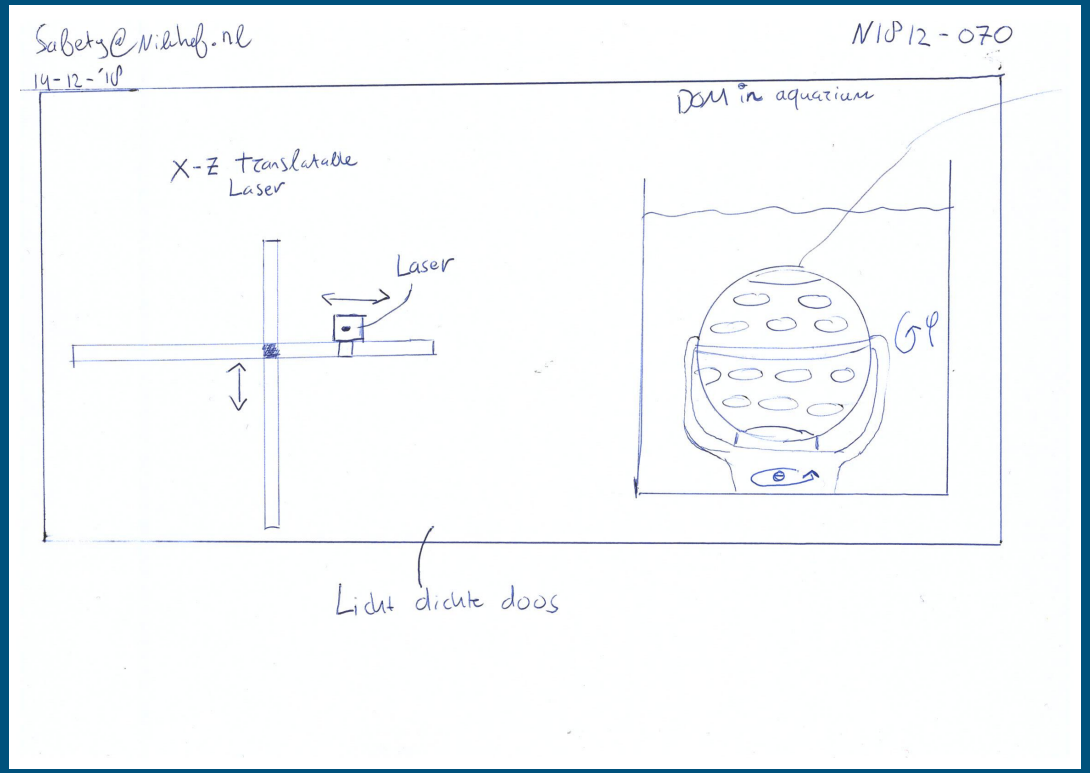
Send 100 laser pulses in a timeslice and count the number of hits in a ~ ns time window.

Experimental setup

How can we excite the DOM with our laser with varying:

- Angle of incidence
- Position on the DOM

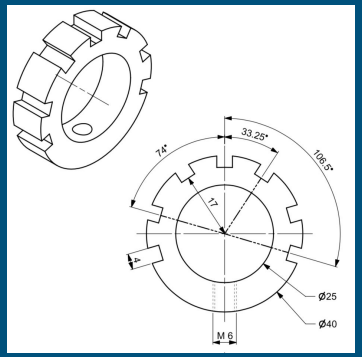
Schets van de opstelling?

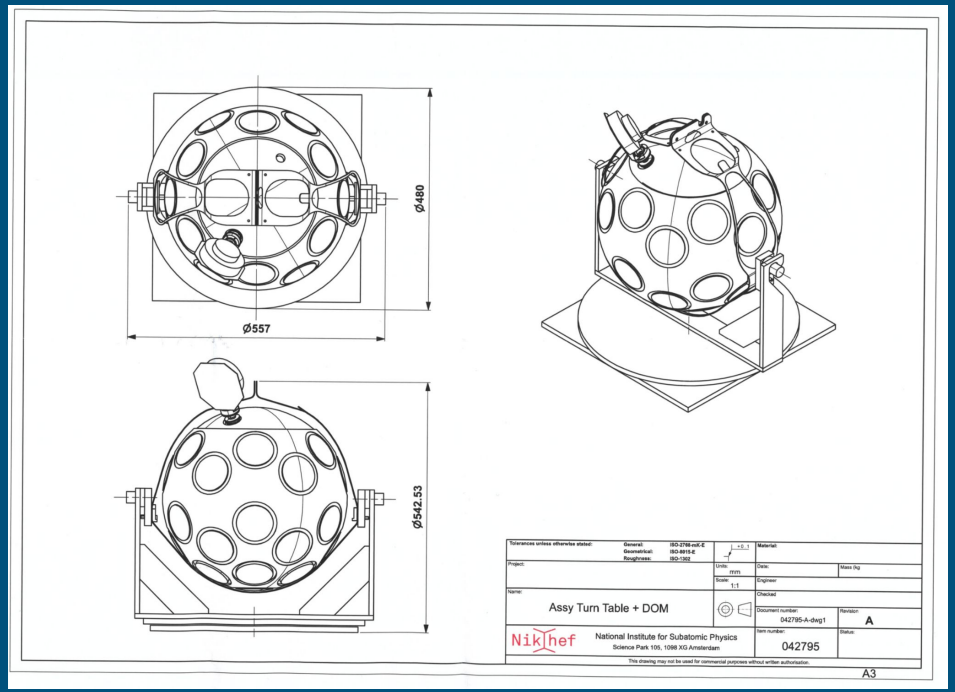


Turntable

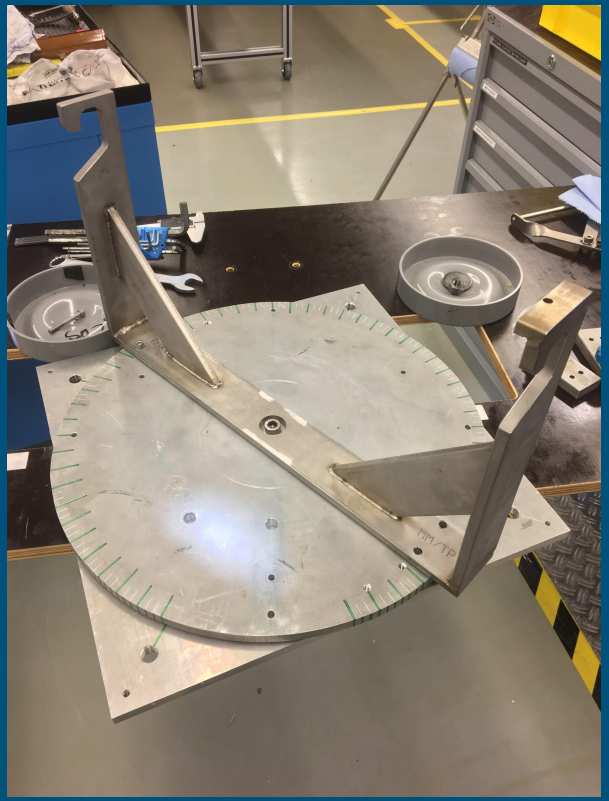
Dom should be able to twist in two dimensions

- In φ direction it can turn continuously
- In the Θ direction it can turn discreetly





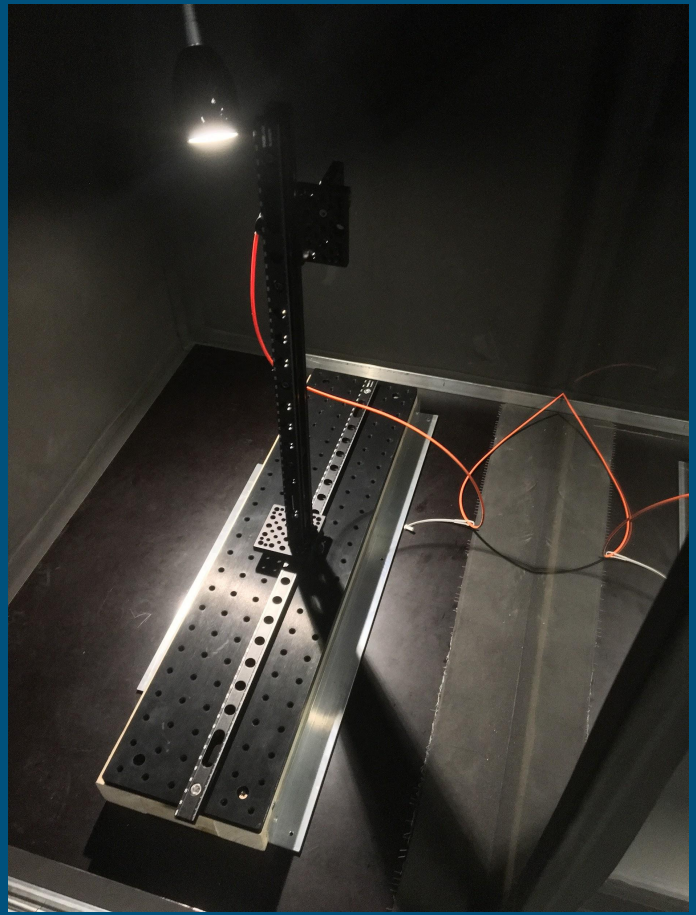
Turntable



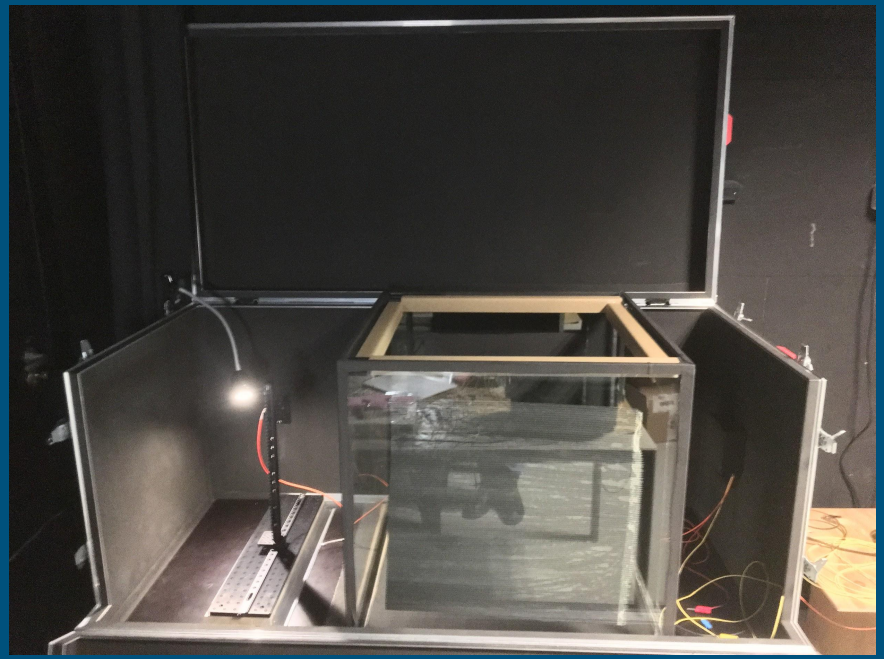
Laser setup

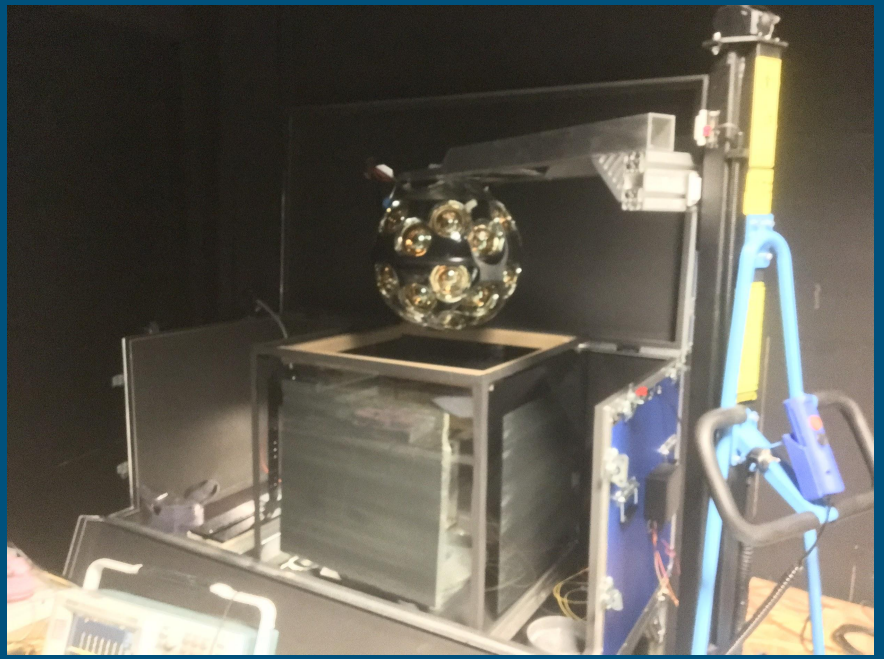
Collimator is mounted to a x-z laser rails

Manually put the laser in various positions



Setup so far





Dry measurement

First results without water

- DOM fixed
- Laser scans horizontally and vertically

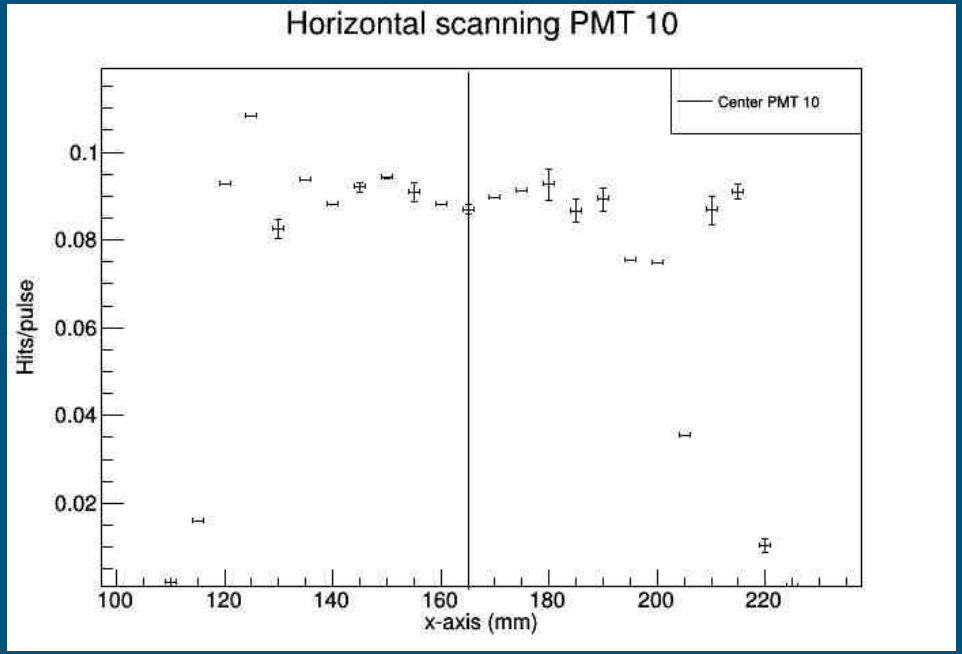
Count the amount of hits and compare it with the number of laser pulses sent

Dry measurements I

Horizontal PMT scan

- DOM is fixed with a PMT 10 in front of the laser
- Laser moves horizontally

Y-axis: How many hits are seen compared to the number of laser pulses sent

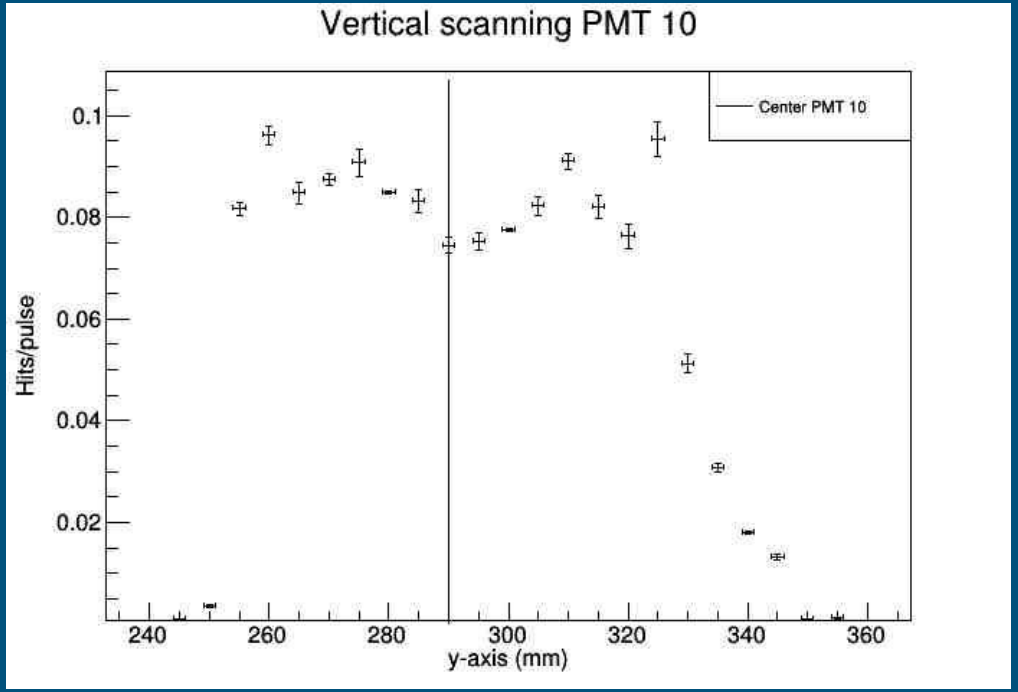


Dry measurements II

Vertical PMT scan

- DOM is fixed
- Laser moves vertically

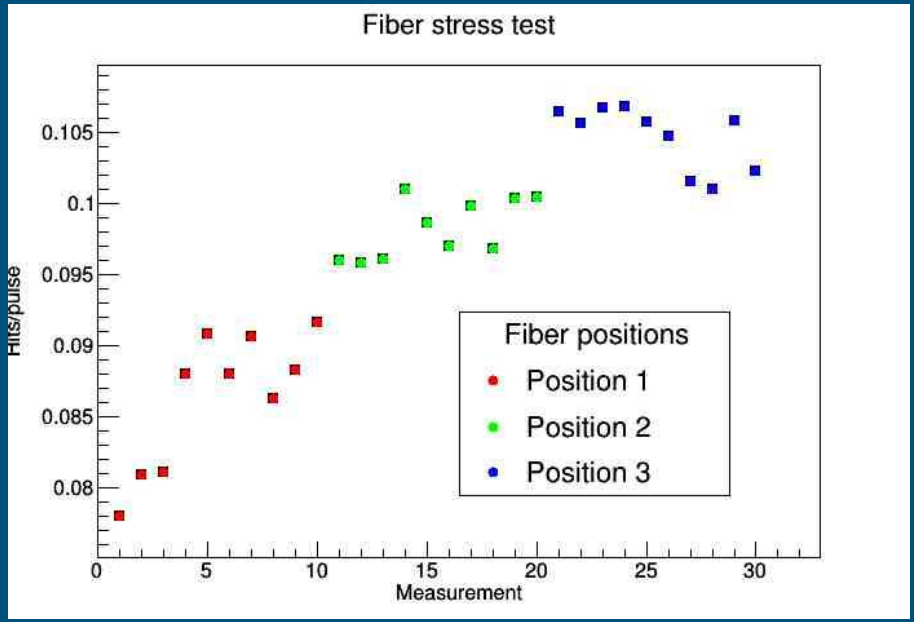
Less symmetry; maybe due to the tape?



Dry measurements III

Laser fiber stress test

- Consecutive measurements with a fixed DOM and laser
- Several knots tied into the laser fiber



We expected less efficiency with more obstruction in fiber, but we see the opposite

What’s next?

- Prepare a DOM for the water
  - Mount improvised BOB to DOM
  - Which DOM?
- Fill the aquarium and collect data!