UNIVERSITÄT
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ALBERT EINSTEIN CENTER
FOR FUNDAMENTAL PHYSICS

TPB degradation study planning

07.07.2026

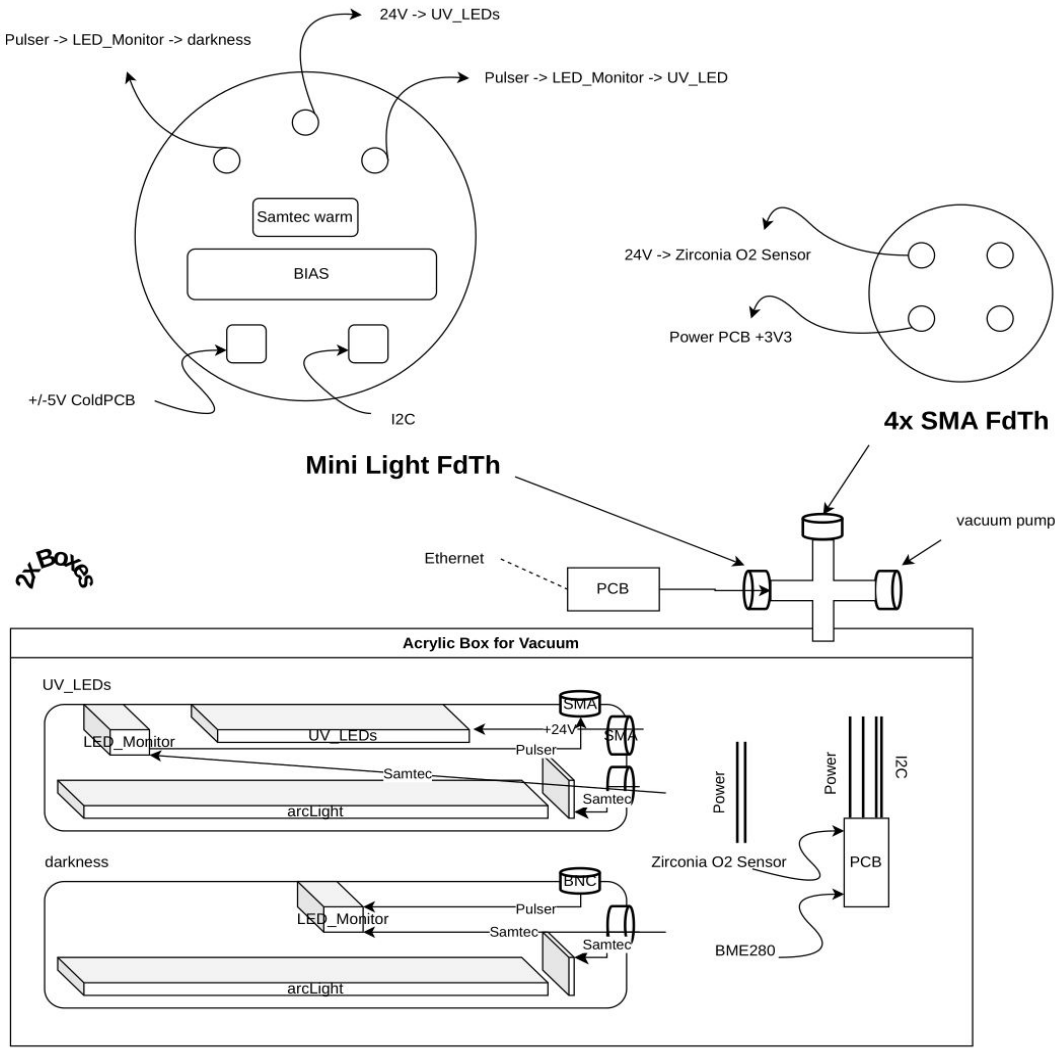
AC group meeting

Planning of TPB-deg study

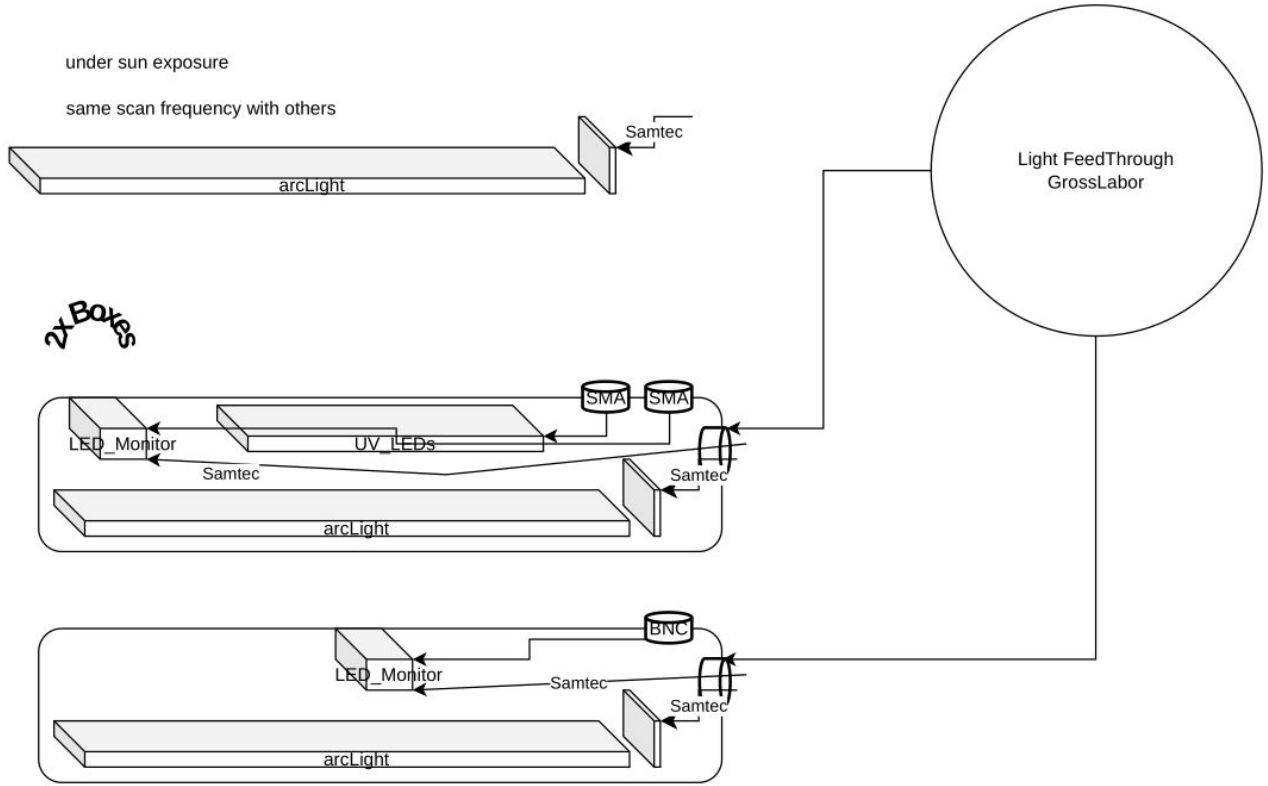
Status update

- Setup and Materials
- Upcoming tests

Setup and Materials - Controlled atmosphere



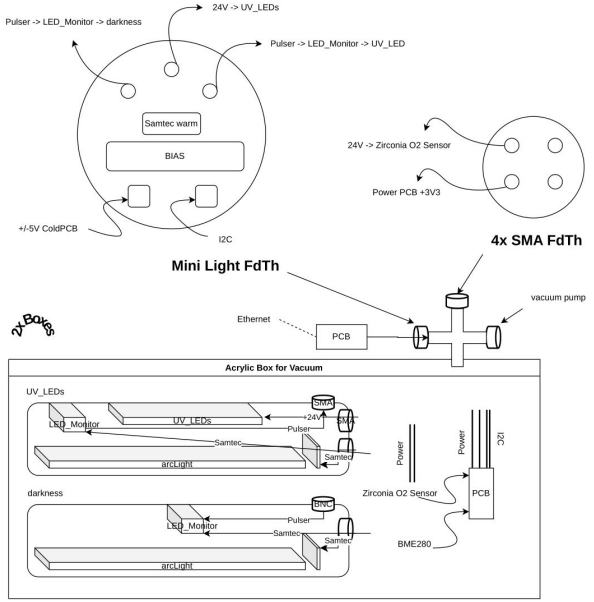
Setup and Materials - Ambient atmosphere



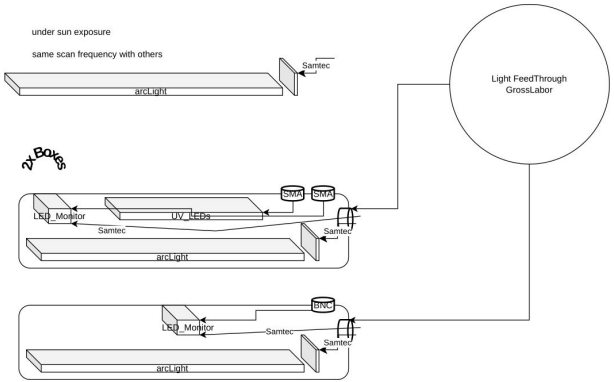
Summary

- Darkboxes built
- Both FdTh and mounts for VC available
- Have 8 SEMTEC cables
- Need to check SMA Cable inventory

Controlled Atmosphere



Ambient Atmosphere



Tests to be done

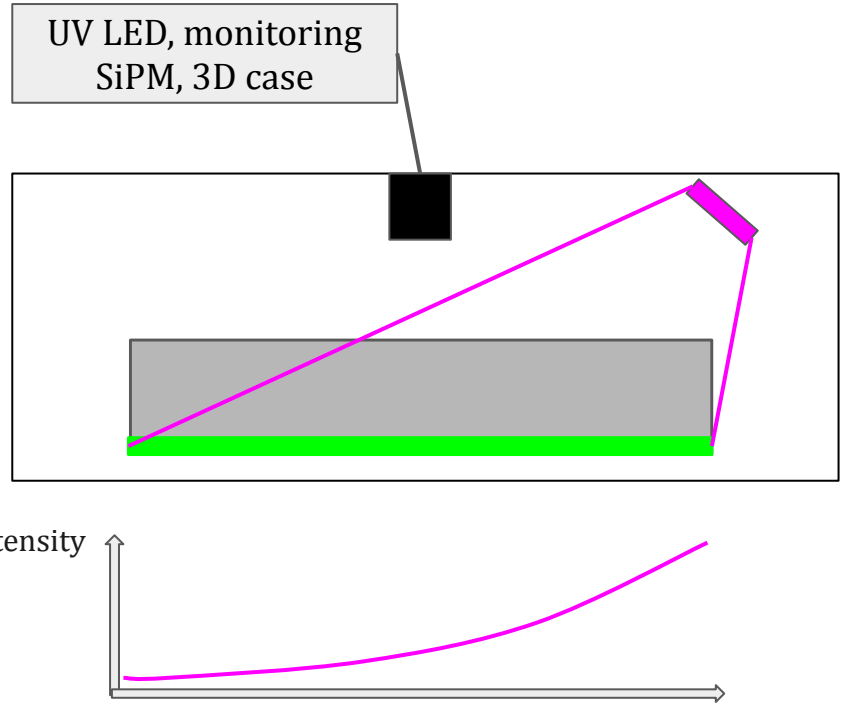
Where to put setup?

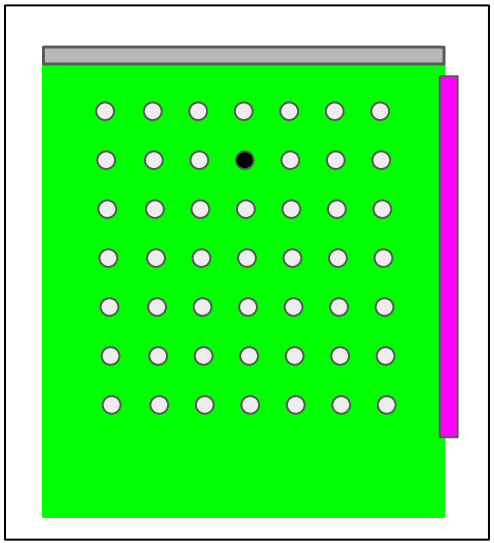
- I would suggest GL, since we need a read-out for the SiPM’s, GAr, and access to a Pulser
- Can keep the Ambient Boxes on a Trolley

Things to test

- Install LED-Monitoring in Darkboxes, cable everything, make first measurements to see if it’s dark enough.
- Setup Vacuum Chamber, test the Sensors (T, rel. hum., P, O2)
- Test sensors in vacuum chamber (do they survive if we pull vacuum?)
- When Sensors work, quantify the GAr flow to keep low O2 and humidity levels
- Sensor calibration

Monitoring-LED measurements vs full scan frequency





○ Scan positions in 3D scanner

● Fixed scan position in darkbox

Backup & Previous Slides

Overview TPB degradation study

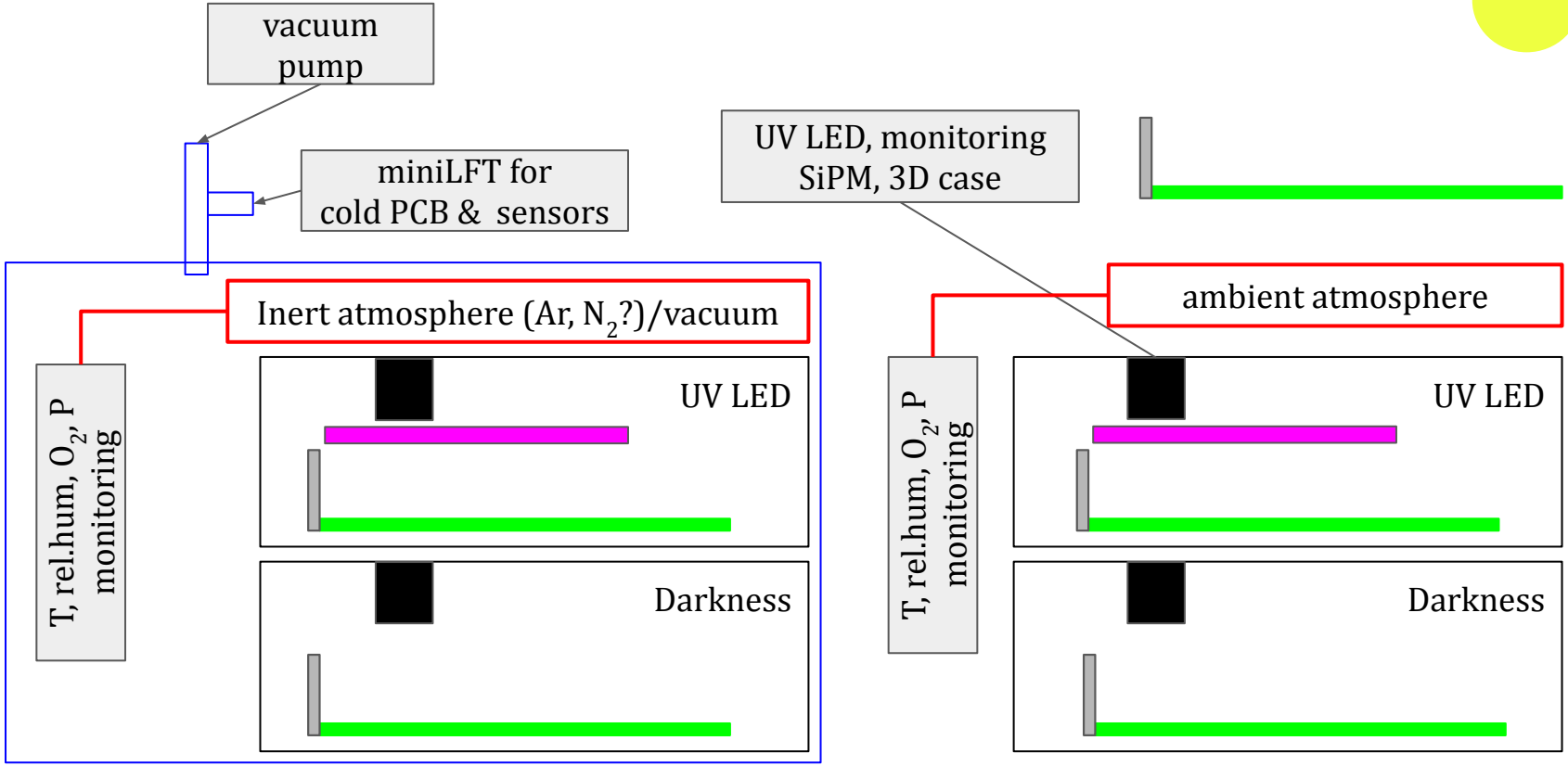
Setup

- Produce 5 ACL's with similar performance (scanner)
- 2x ACL in inert-gas/Argon atmosphere
  - 1 ACL in darkness
  - 1 ACL irradiated with UV
- 2x ACL in ambient atmosphere
  - 1 ACL in darkness
  - 1 ACL irradiated with UV
- 1x ACL in ambient atmosphere, exposed to sunlight

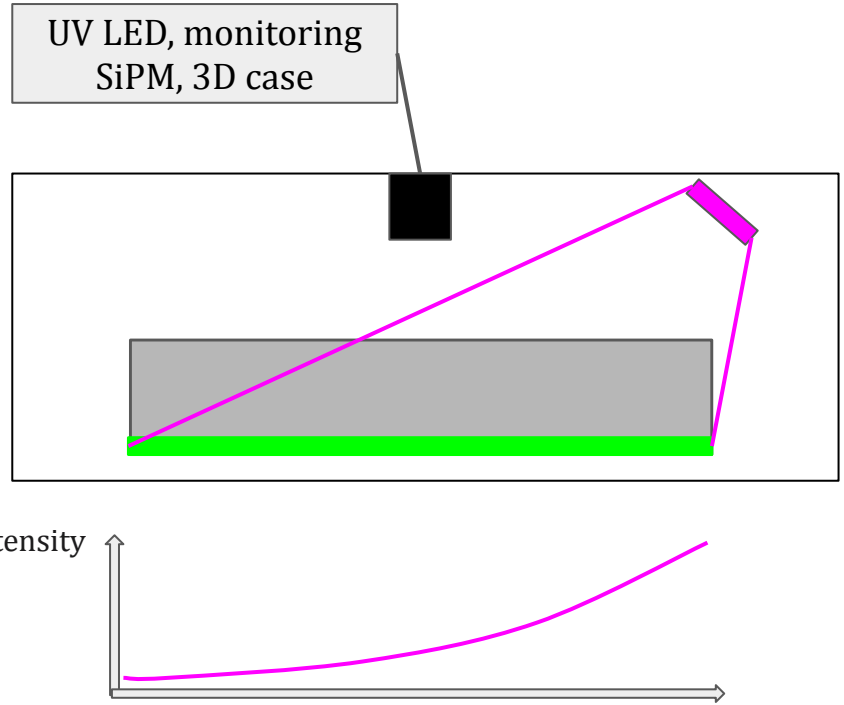
Measurements

- Monitor humidity, pressure, temperature, oxygen and make a comparison between degradation
- After degradation: Check if TPB performance can be regenerated (e.g. liquid argon bath)
- Implications for packing, transporting, storing etc.

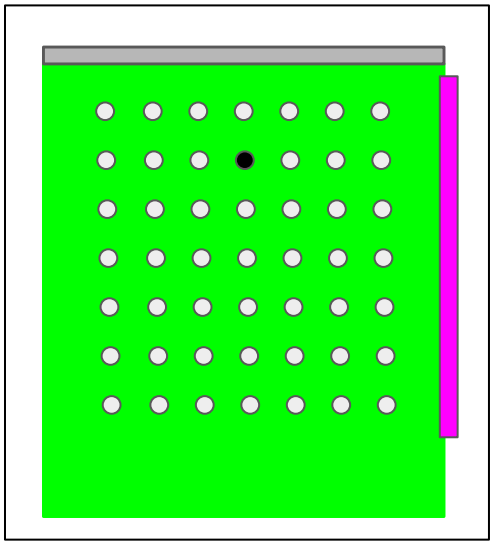
Overview setup



Setup in darkboxes



- Scan positions in 3D scanner
- Fixed scan position in darkbox



The time of scanning the ACL in the 3D scanner should be kept as little as possible, because they should stay in their respective environments. Therefore not a full ACL scan is foreseen, but only a point-like grid (see above). The fixed position with the pulsed LED and monitoring SiPM allows to measure more frequently, but with less resolution

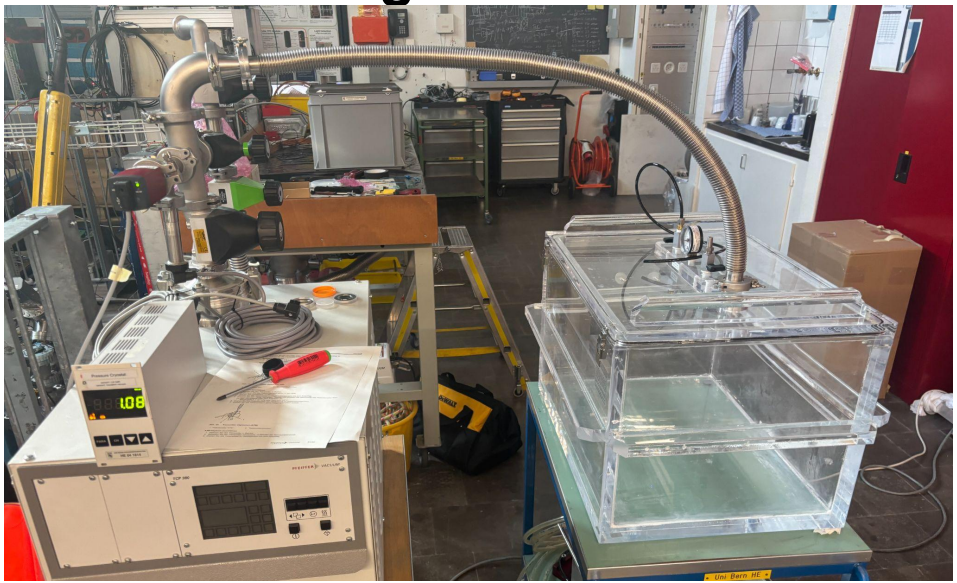
Overview task list

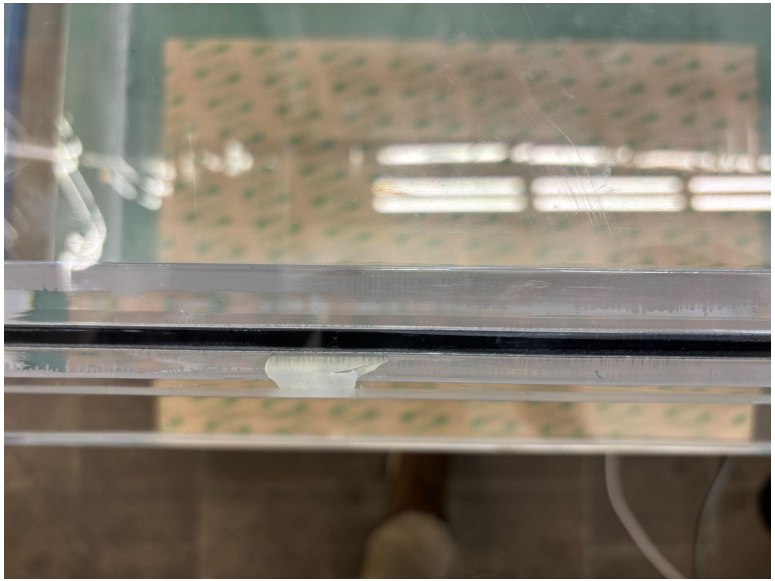
1. EvapChamber leak & flow tests/feedthrough
2. Dark boxes & Scanner LED’s
3. Sensors (Production/calibration/Influx/Grafana)
4. Glue tests & ACL production

Evap chamber - tasks

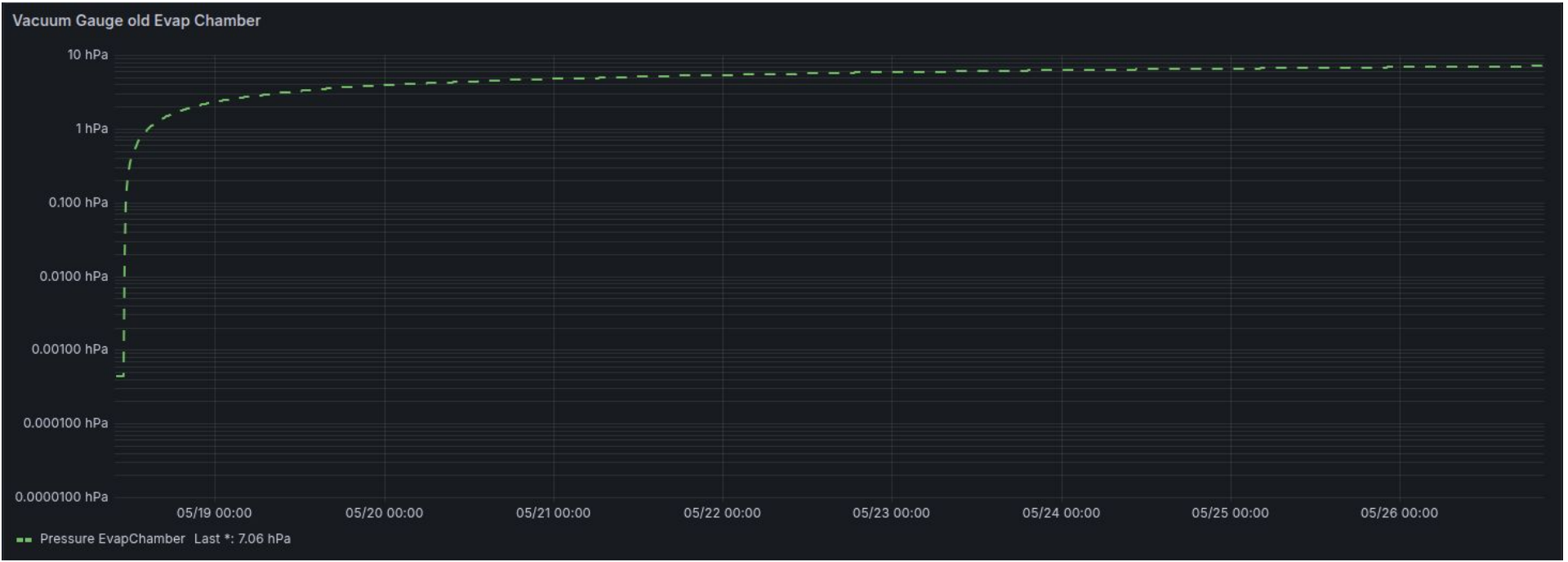
- Leak-checking
  - Found two leaks with Helium leak checker
- Feedthrough for miniLFT
  - Ongoing with Lori, meeting him this week.
- miniLFT (same as at the scanner)
  - Populated by Alex - ready to be tested
- Constant flushing - Measure Argon gas-flow to keep humidity/oxygen low
  - Need LAr
  - Need miniLFT installed
  - Need sensor v2 (Alex working on it)

Leak-checking





Leak tests - after 1 week still at ~10^1-10^2 mbar



Grafana: Dashboards -> TPB degradation study -> Evap Chamber leak tests

Dark boxes

- Materials ordered
  - Waiting for delivery to build boxes
- Test LED-strips
  - 1 UV LED strip & heat sink here, materials at Alex - test the strip (darkbox in GL?)
- Scanner LED’s
  - 4 PCBs are being populated by Alex (Monitoring SiPM, UV LED’s)
  - Silas is 3D printing the cases
  - Need to be tested afterwards

Sensors

- Sensors production
  - Setup for sensors in EvapChamber slightly different PCB, Alex working on this (Arduino inside EvapChamber)
- Sensor calibration
  - Sensors (T, humidity, pressure, oxygen) show different values, need to calibrate (in arduino-code)
- Sensor Influx & Grafana implementation
  - Arduino has IP adress
  - Pushes to influx
  - Displayed in Grafana

Glue tests & ACL production (a sticky situation…)

- Materials
  - new “post-it” glue arrived, have dichroic mirror and TPB
  - Test-glue that was sent from IBZ is not the exact same (seems to be a bit less strong)
- Coating chamber
  - Had some issues with the contact between cooling and alu plate, fixed with some metal clamps
- New glue
  - Can be removed from alu plate, dichroic mirror can be removed
  - Sequence: clean alu plate -> apply glue -> apply mirror -> cut mirror to alu plate size -> wash mirror -> put in chamber
  - **Issue**: During washing, water was able to enter underneath the dichroic mirror
    Coating really bad, when water was underneath, needs to be addressed!

Glue tests