



Fiber experiments in preparation for the Mobile Telescope -or- The importance of shovels for cutting-edge research

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Fiber-transport for interferometry

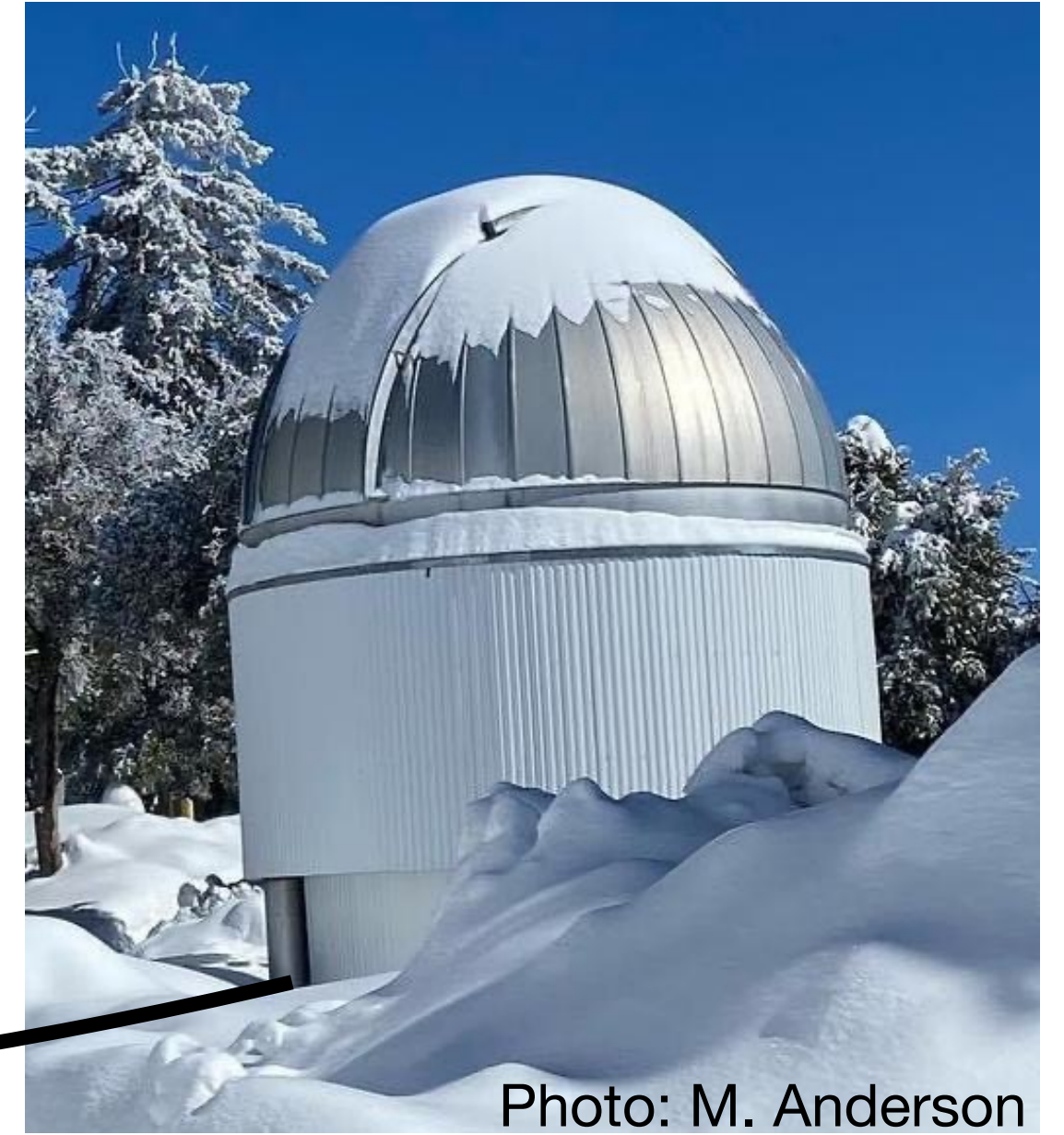
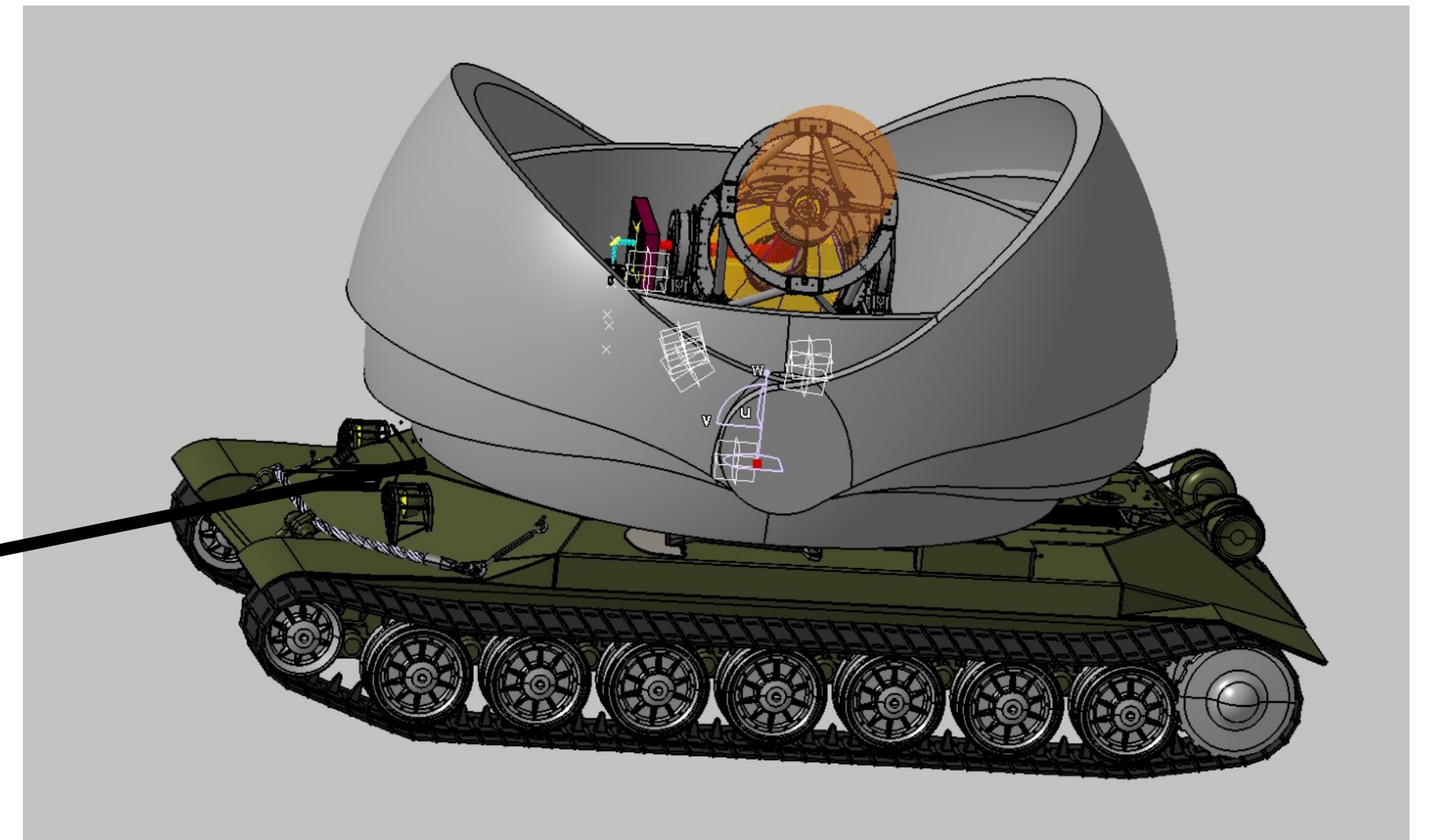
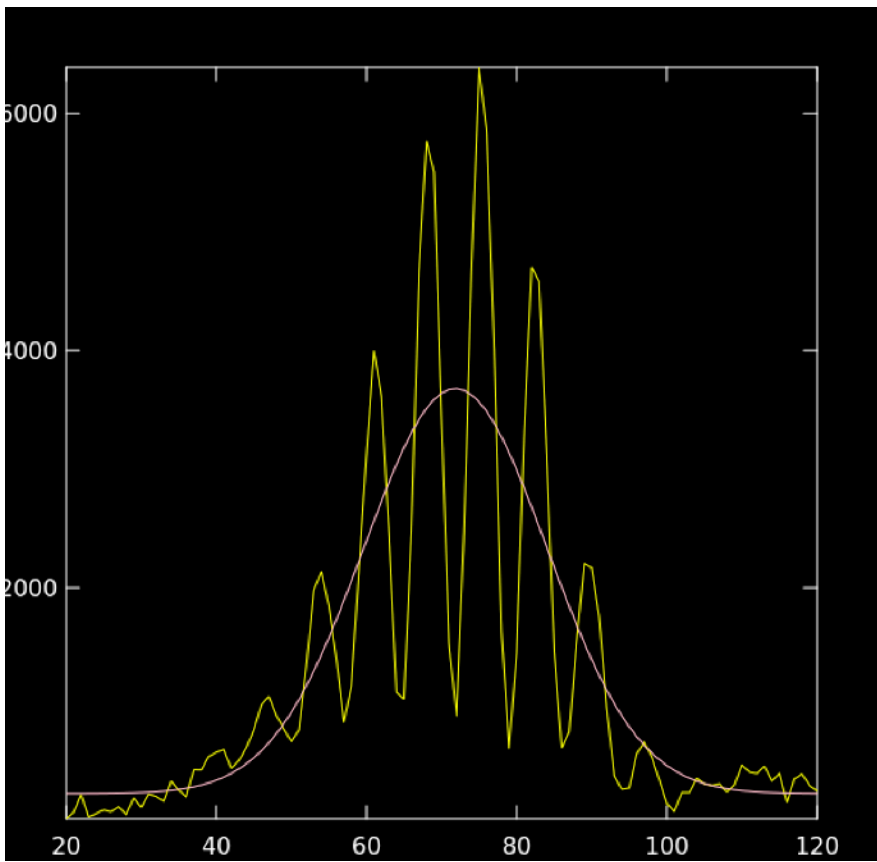
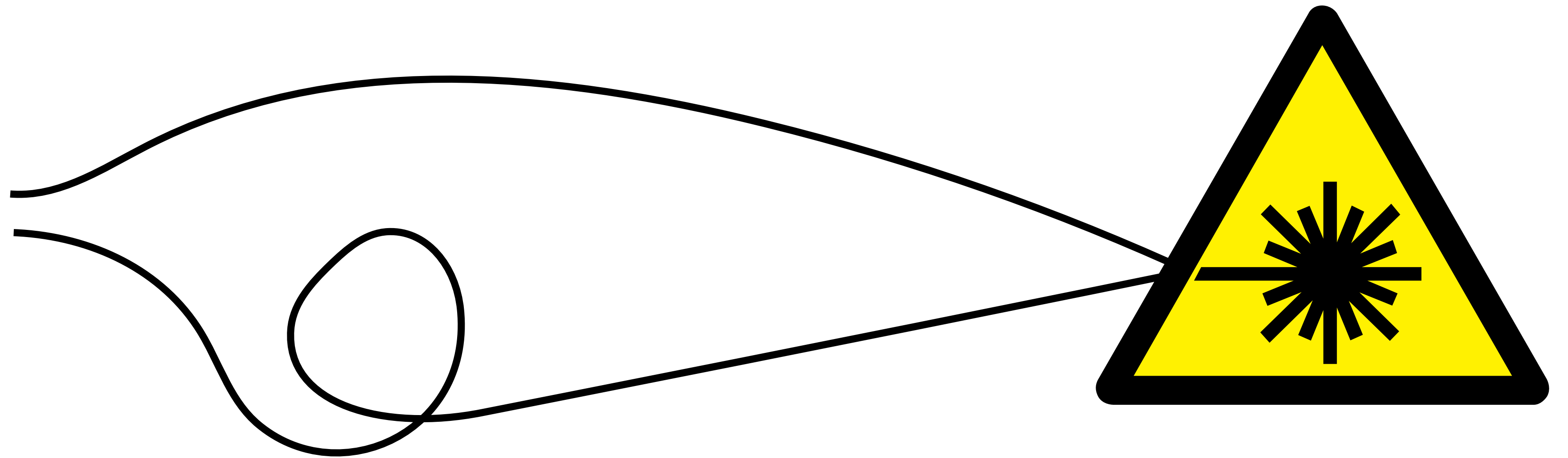


Photo: M. Anderson



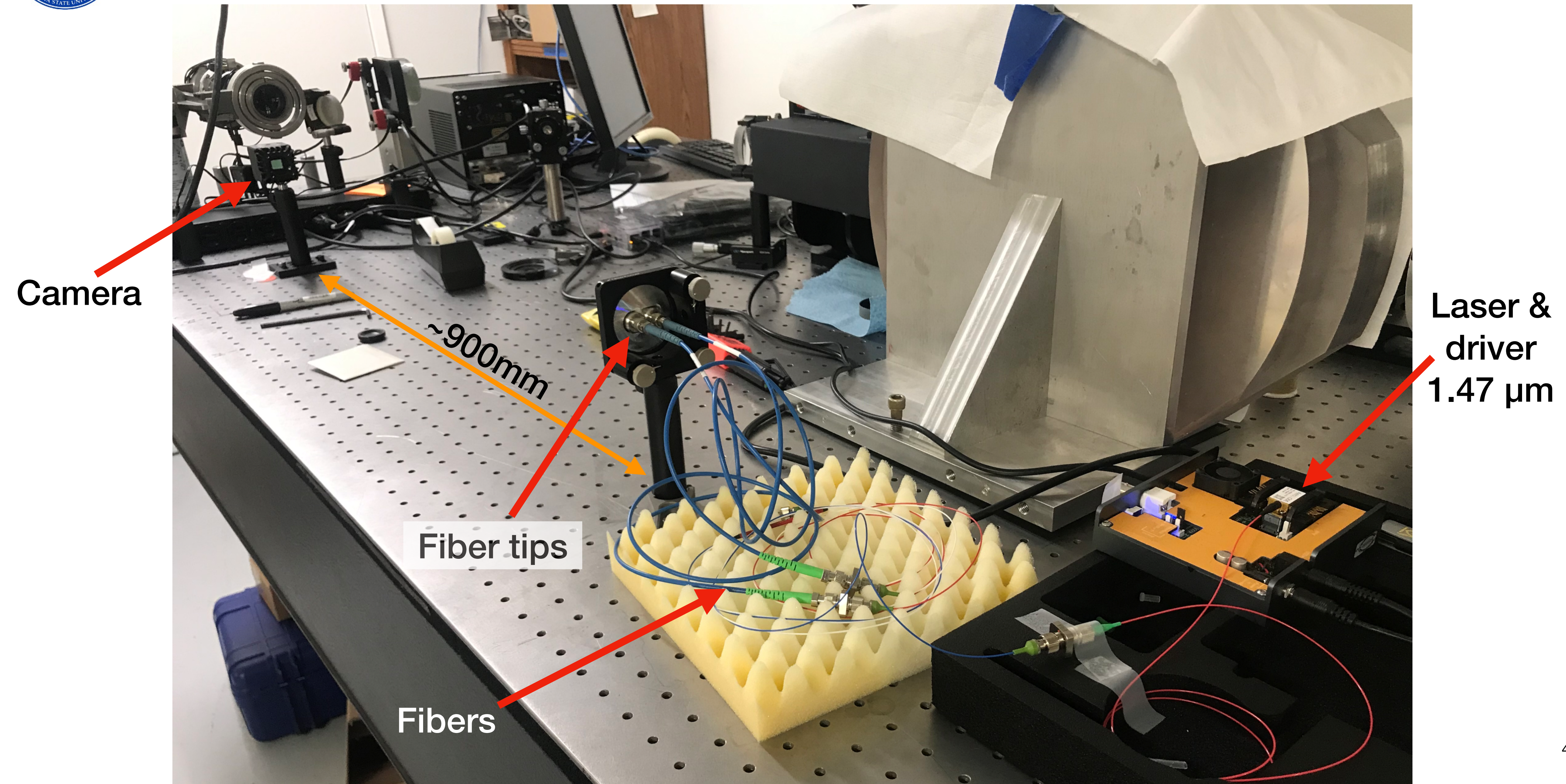


Experimental setup



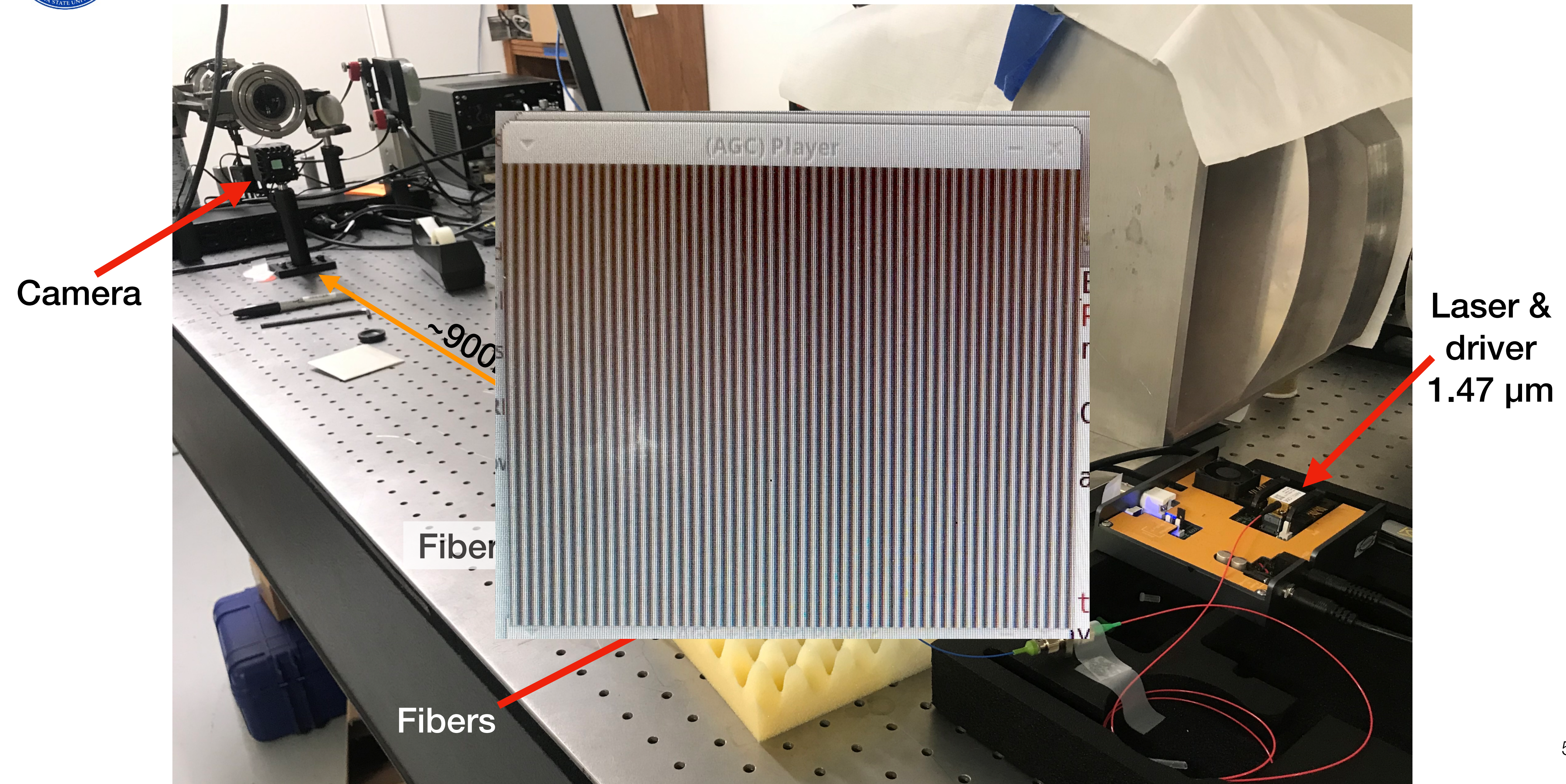


Experimental setup in real life





Experimental setup in real life



Camera

Fiber

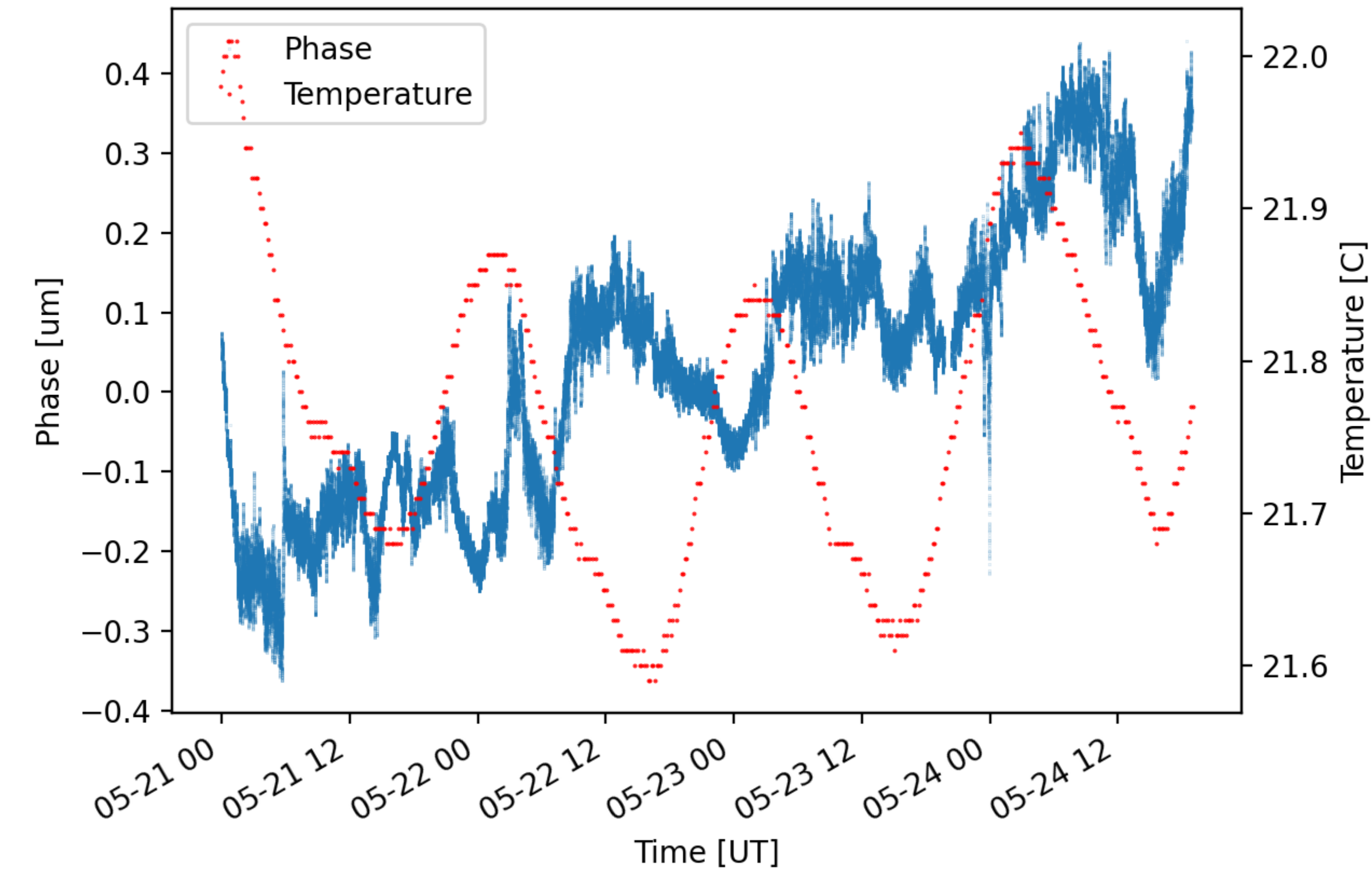
Fibers

~900

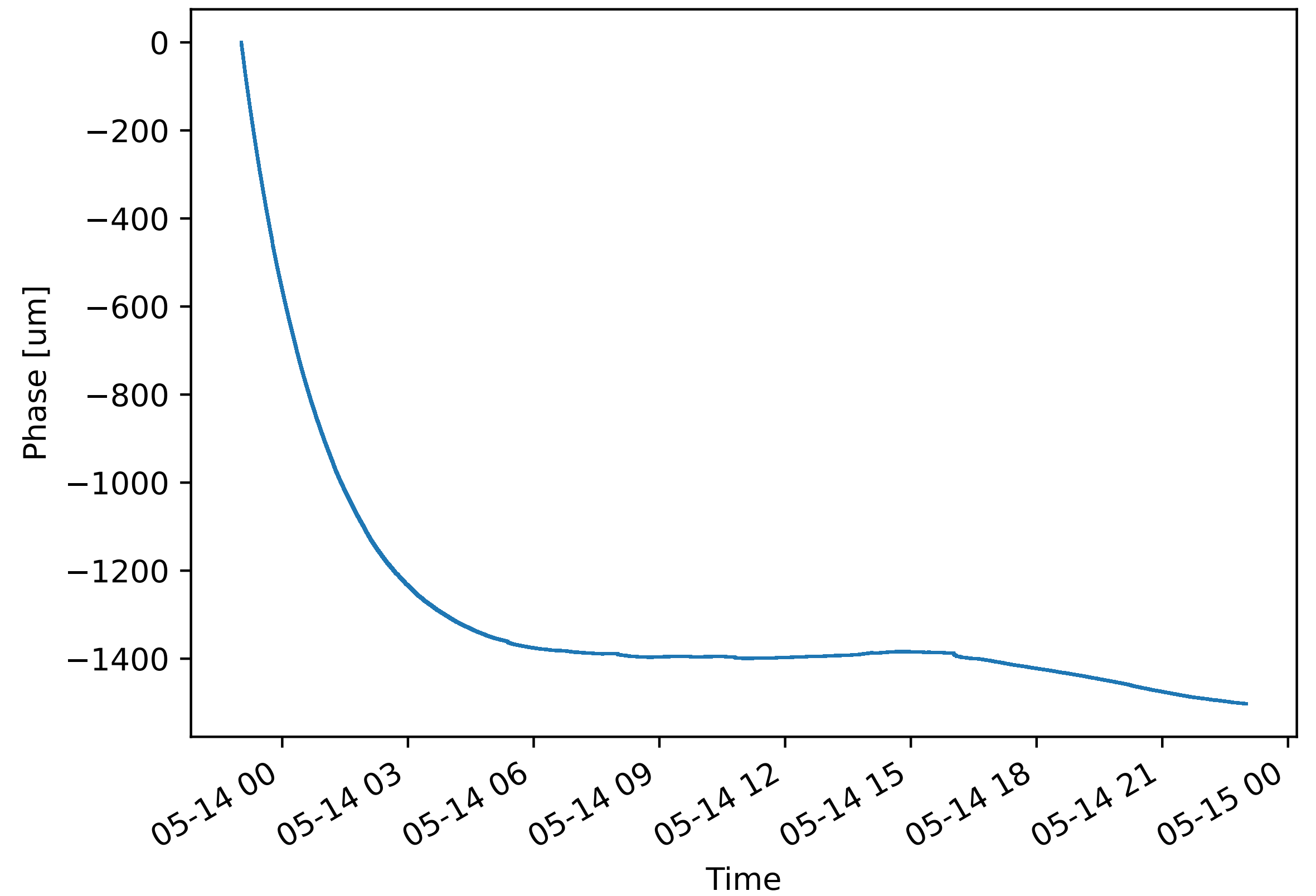
Laser &
driver
1.47 μm



Tests in lab



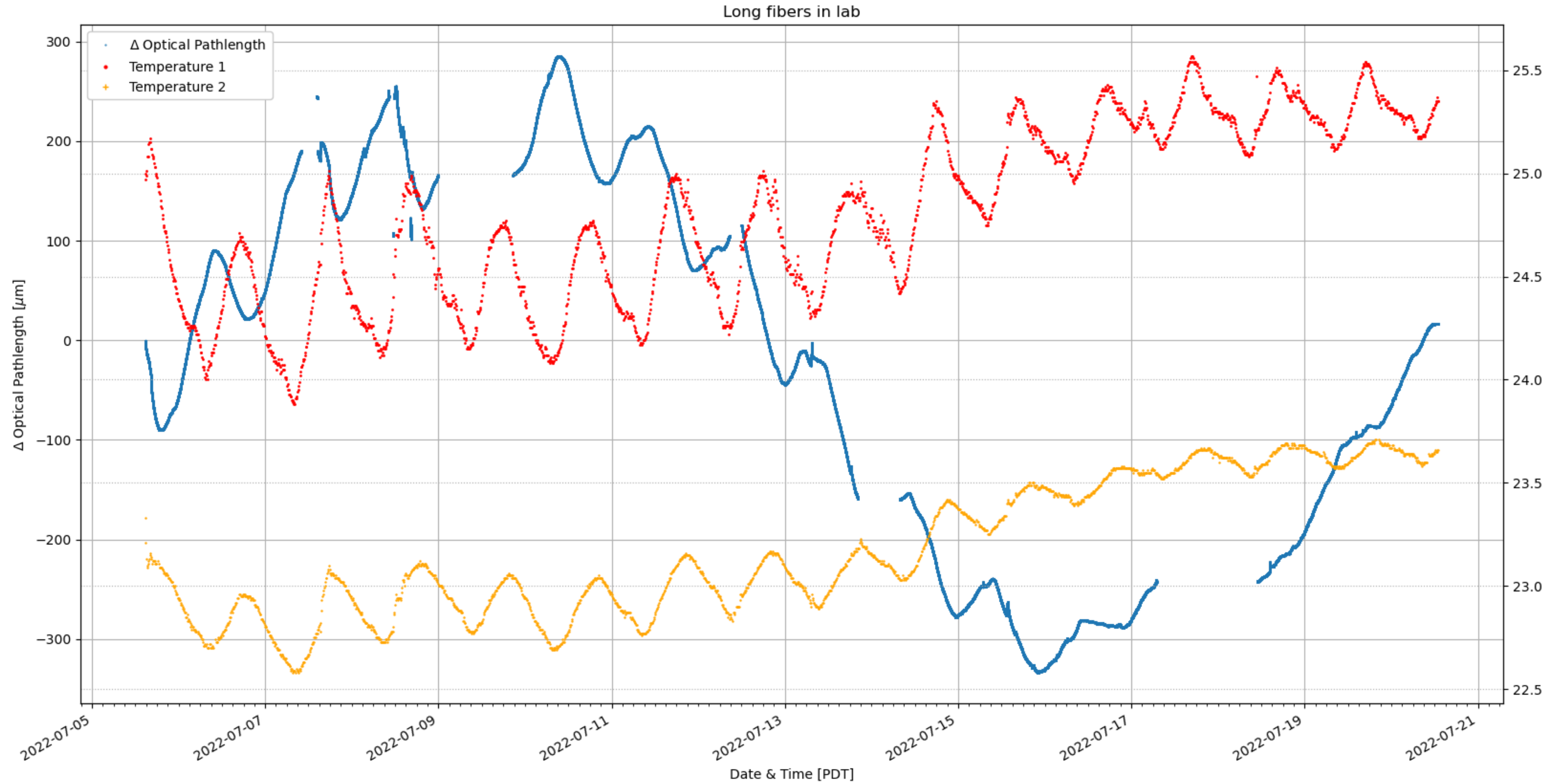
Short fibers



Long fibers
After bringing them in from storage



Tests in lab 2

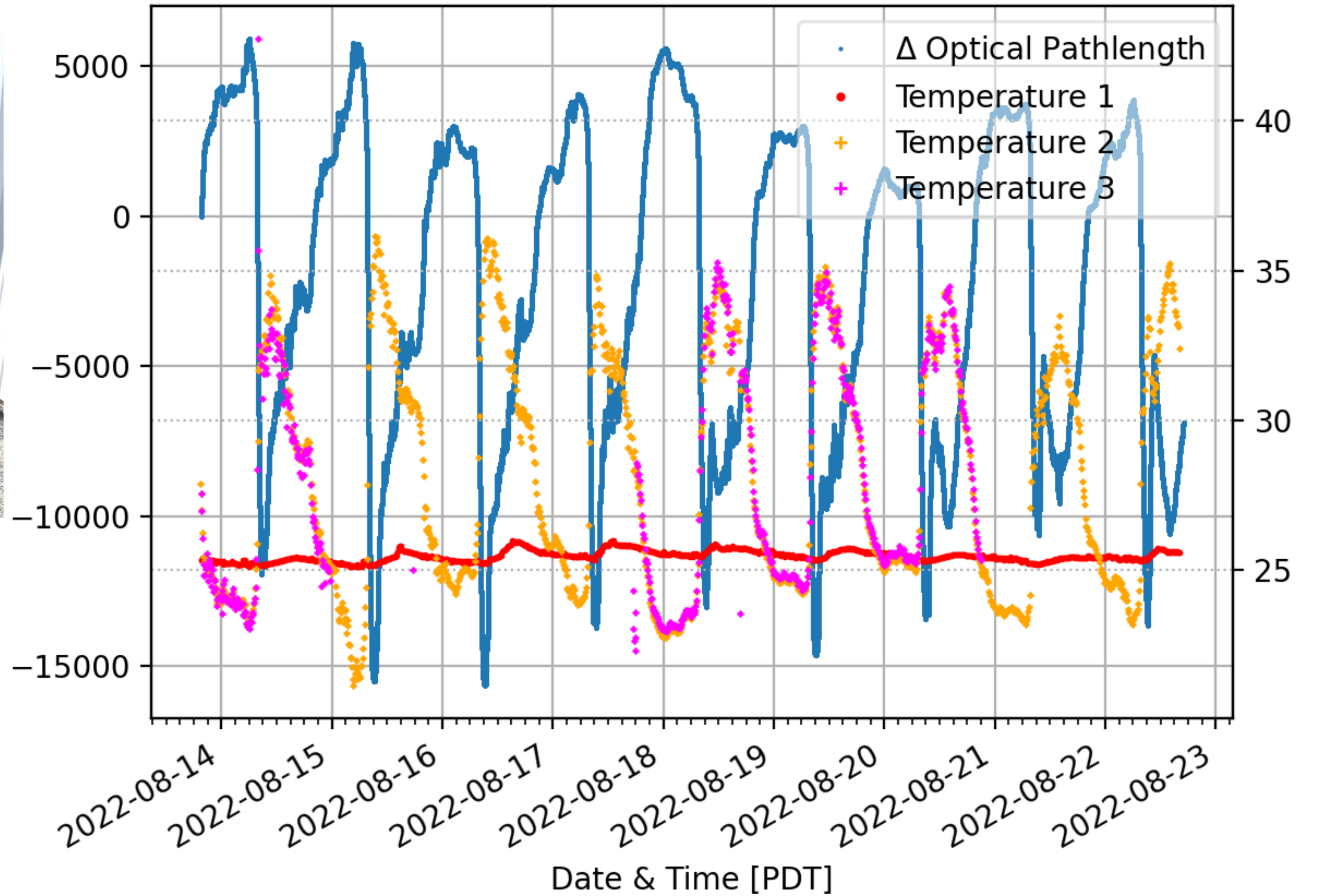


$\sim 0.5^{\circ}\text{C}$ daily change in temperature
 $\sim 130 \mu\text{m}$ length differential

Tests with outside fibbers



96m of fiber outside



~12°C daily change in temperature
~18 mm length differential

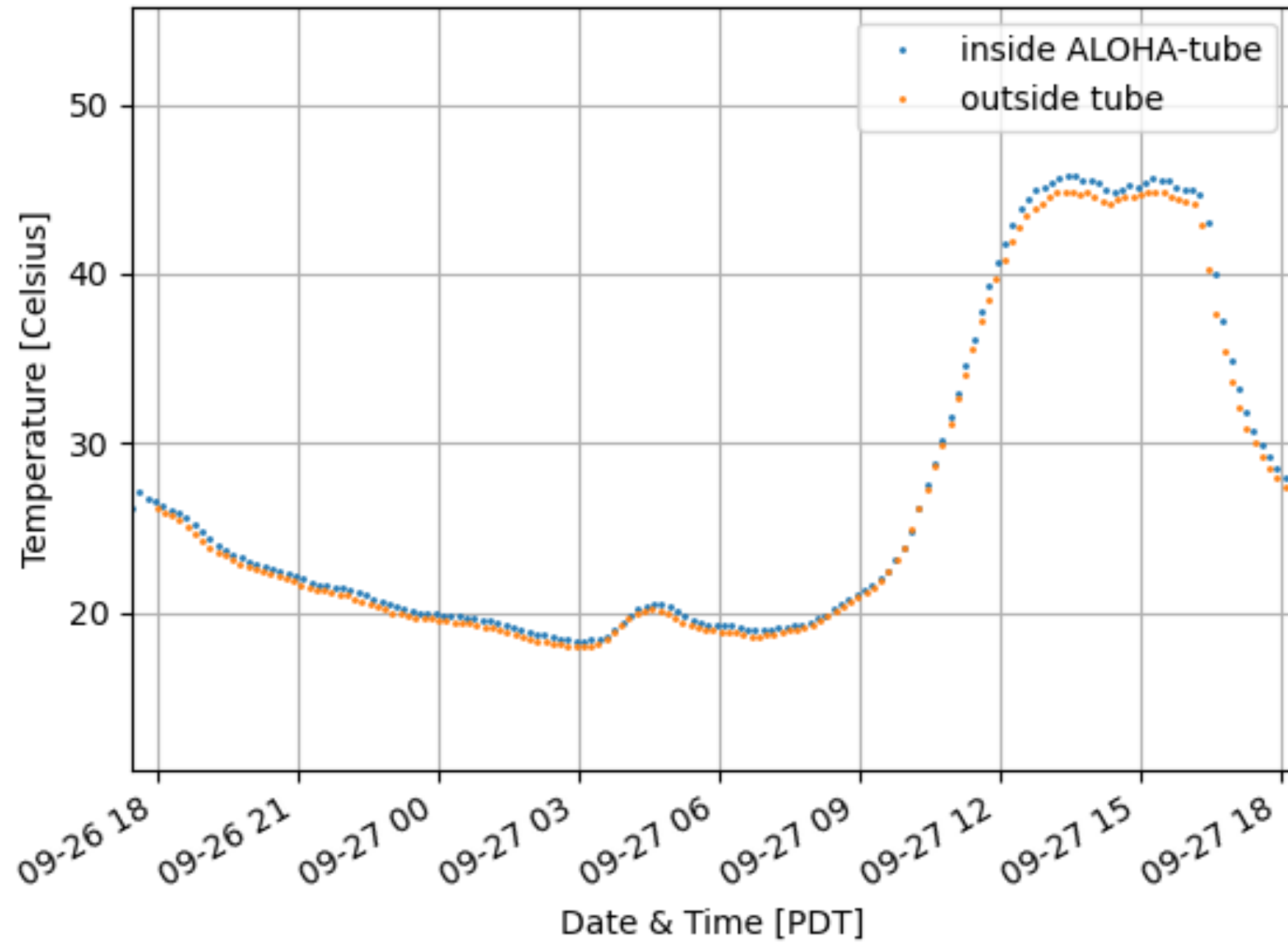


Tests on temperatures in the ground

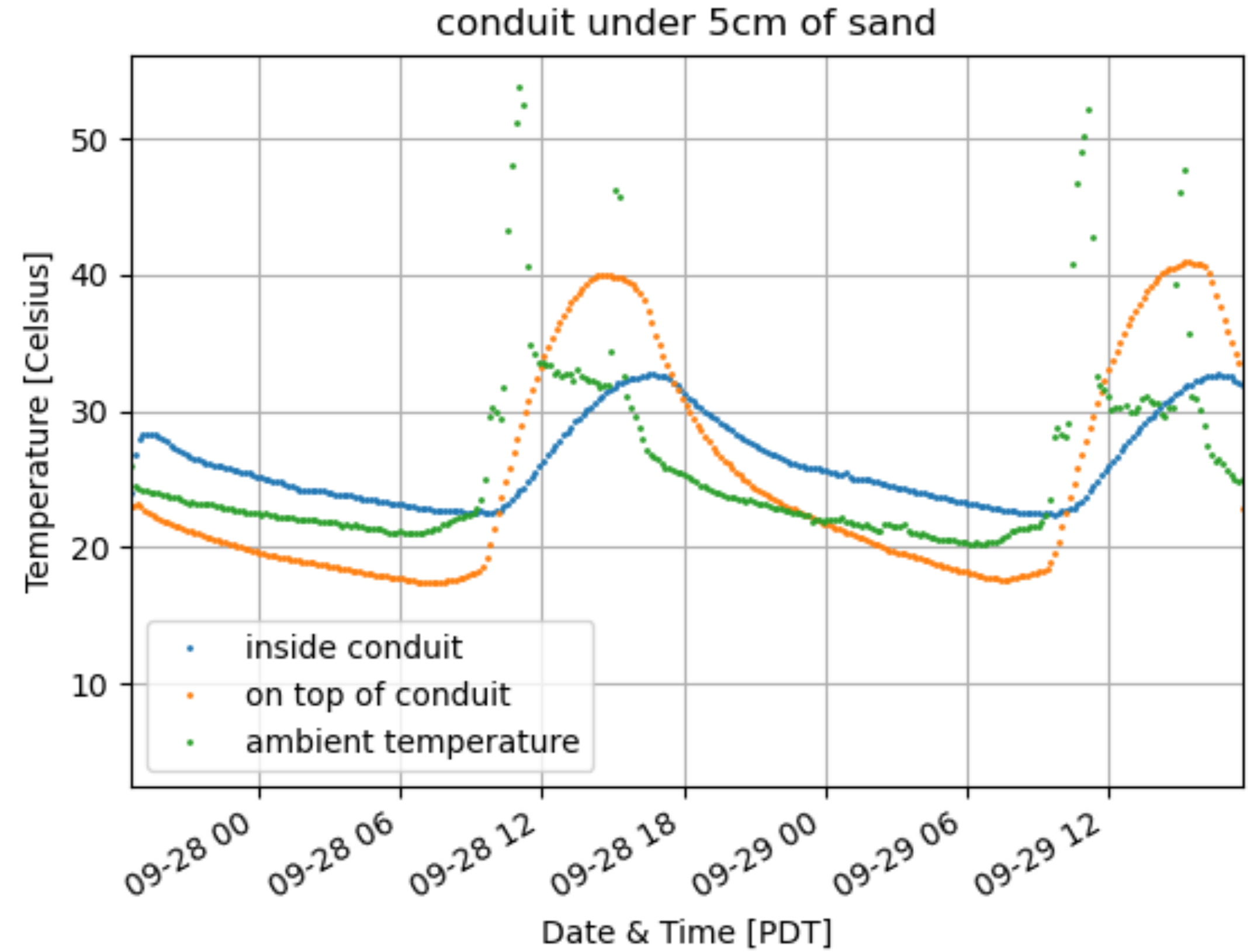




Tests on temperatures in the ground



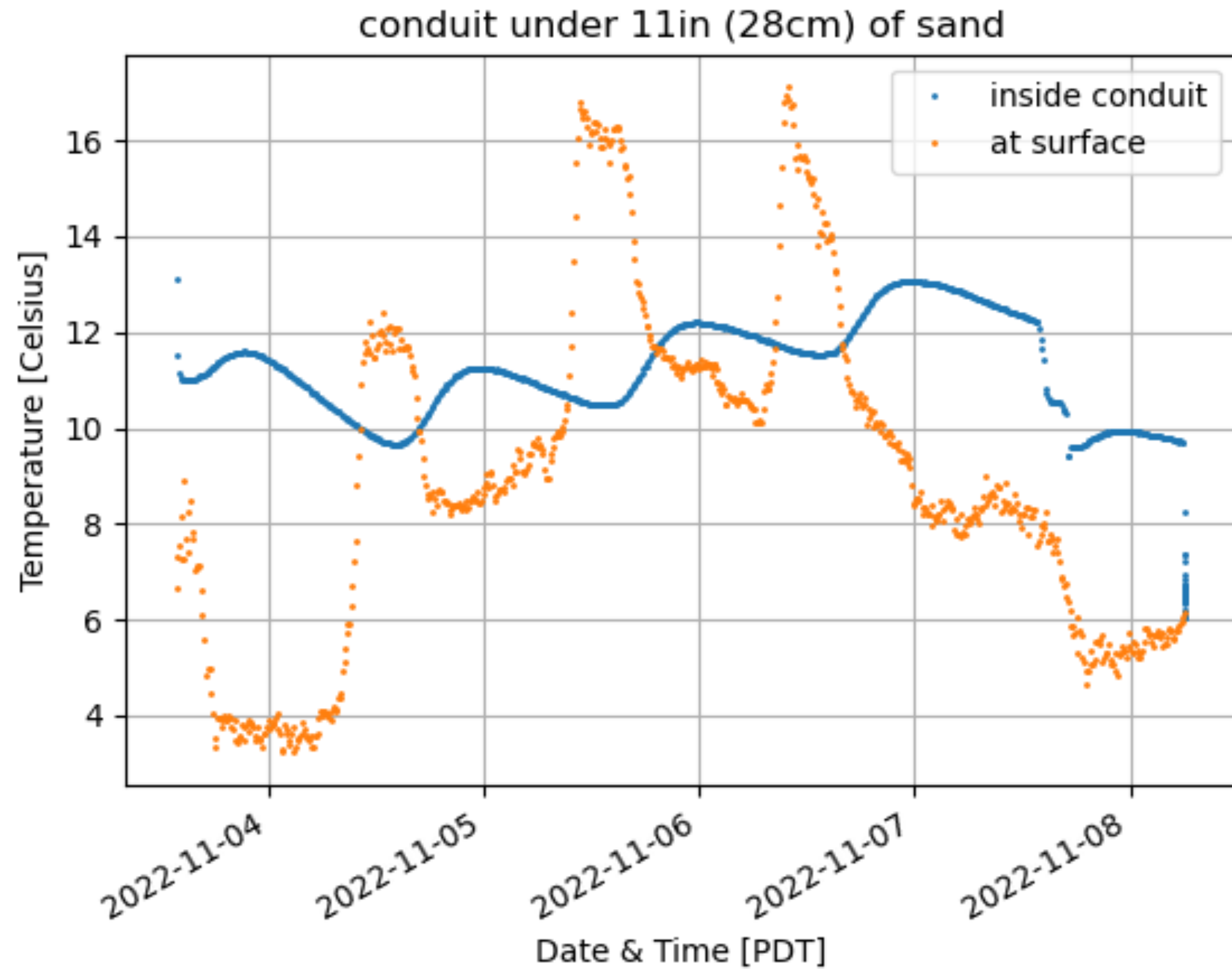
ALOHA-fibers: tube above ground
25°C daily variation



Conduit under 5 cm of sand:
~10°C daily variation (blue line)



Tests on temperatures in the ground



Above ground:	25°C
Conduit 5 cm deep:	10°C
Conduit 15 cm deep:	5°C
Conduit 28 cm deep:	2°C

Conduit under 28 cm of sand:
~2°C daily variation (blue line)

Conclusions

- Optical length variations with temperature are larger than expected
- Fibers above ground is not an option
- Digging deeper is better
Acceptable ~11 in / 28 cm / 9 atto-parsec