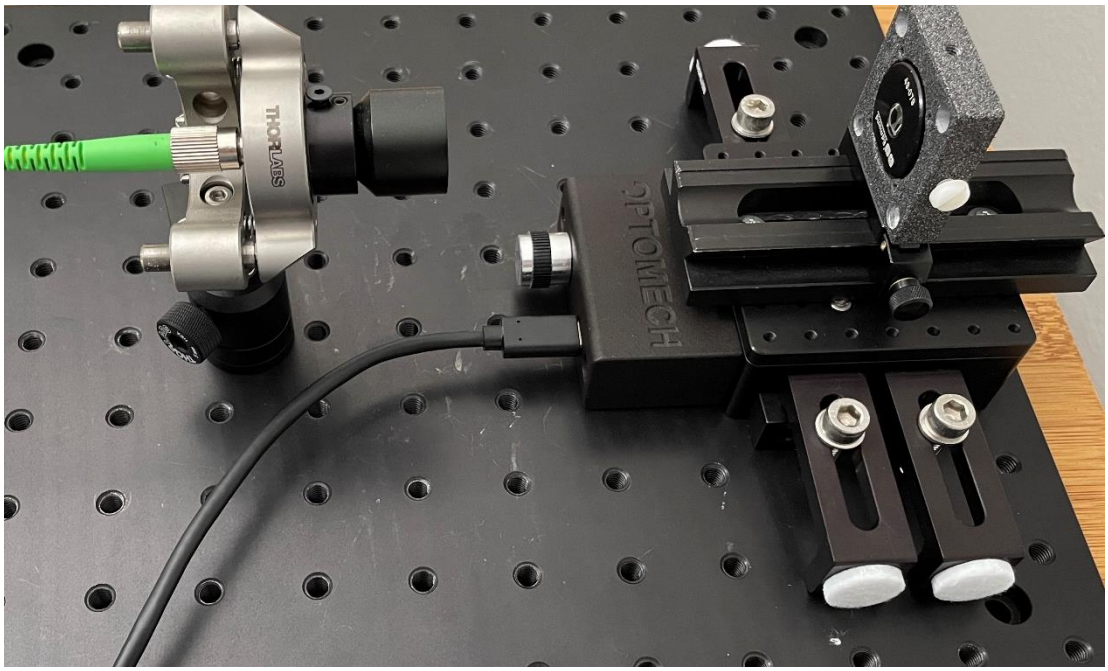
Extraordinary accuracy possible with our linear table !

The linear stage was attached to an optical bench. A corner cube retroreflector was mounted on the moving part of the bench. An interferometric displacement sensor (Attocube IDS3010) was mounted on the optical bench at a distance of approximately 100 mm from the reflector. The optical A-axis of the interferometer was approximately aligned with the motion axis of the stage. The visualization shows you the setup as well as the sequence of position measurements (see figure).



Inclusion of possible sources of error:

- Refractive index of the air:

Air movement, temperature, humidity and pressure changes lead to measurement errors of the interferometer. Ambient compensation was not connected. The influence of this type of error is estimated at 0.1 µm.

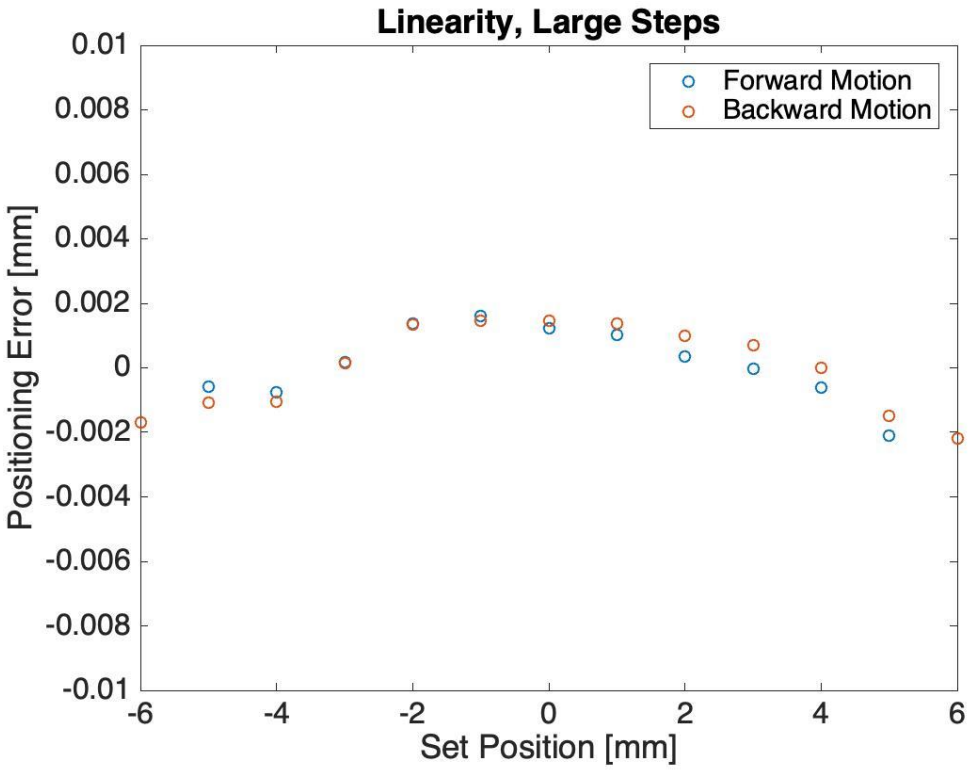
- Cosine error:

The optical axis could not be perfectly aligned with the motion axis, resulting in a cosine error (or gain error). For the created diagrams, this error was corrected in post-processing with a linear detrend.

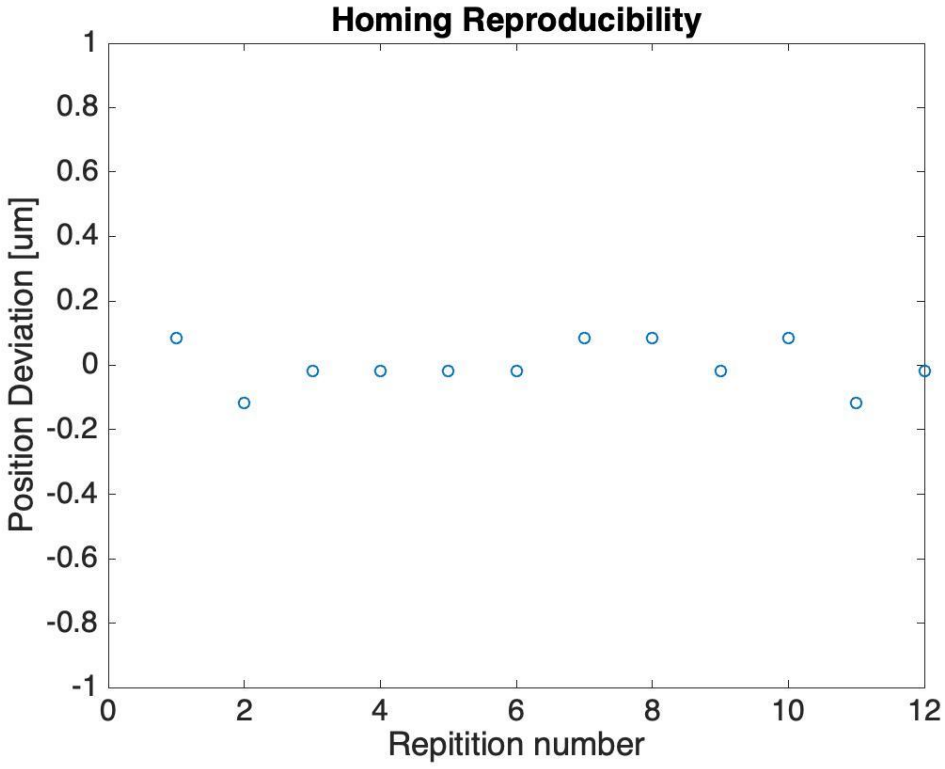
Results of the measurements:

- Linearity -> better than 2 µm over the total range !

- Hysteresis -> smaller than 1 µm !



- Reproducibility -> better than 0.2 µm !



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