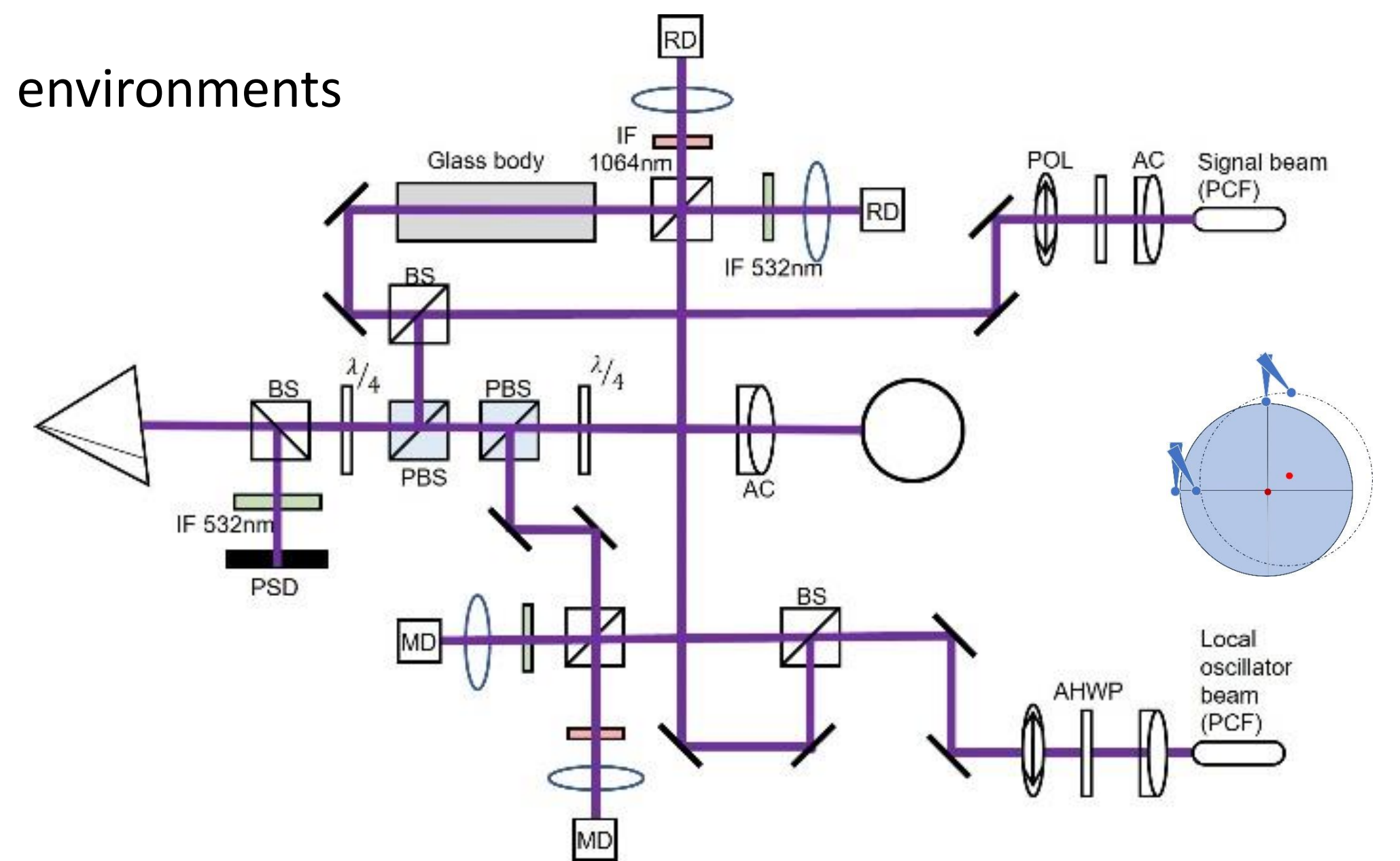
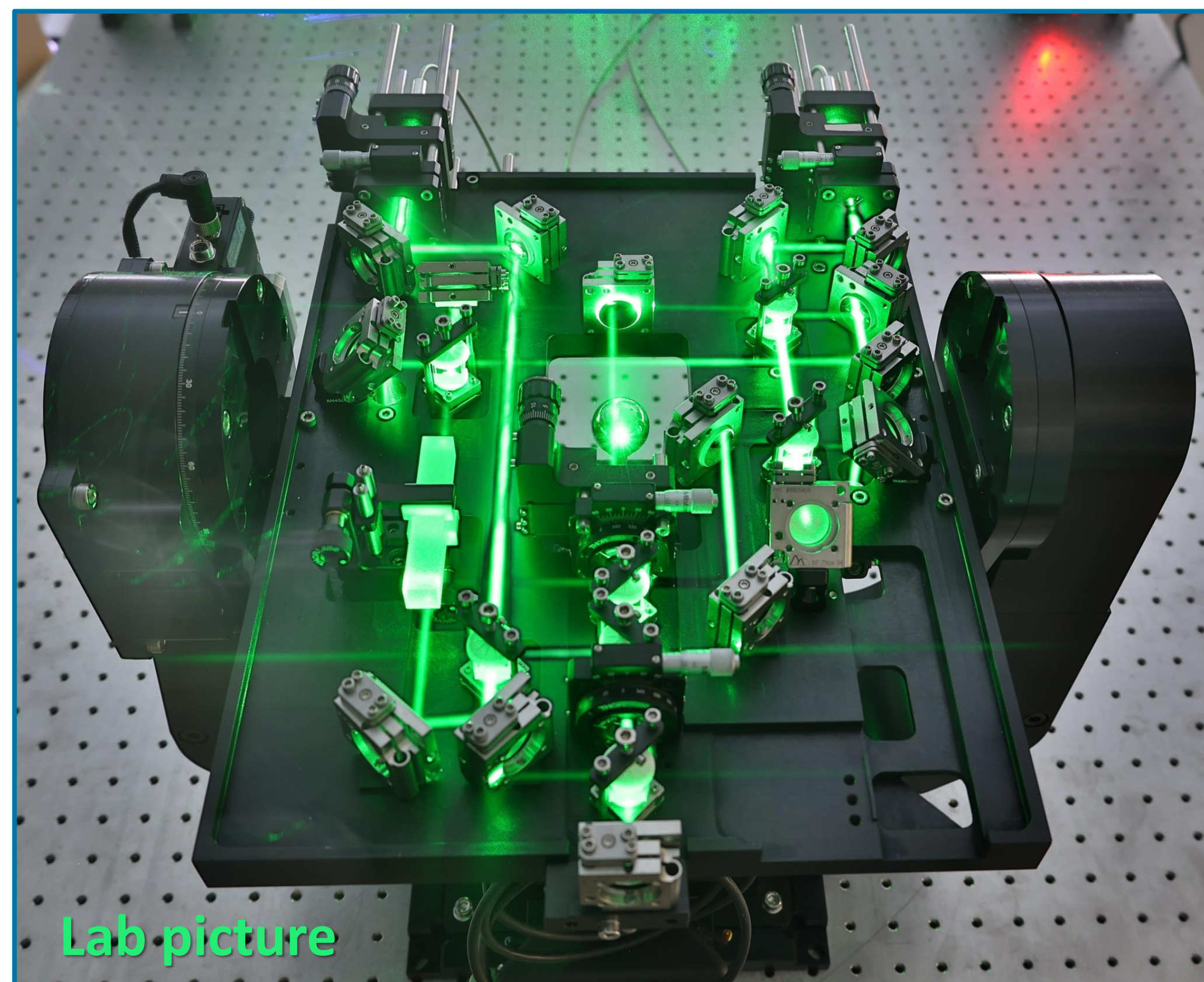
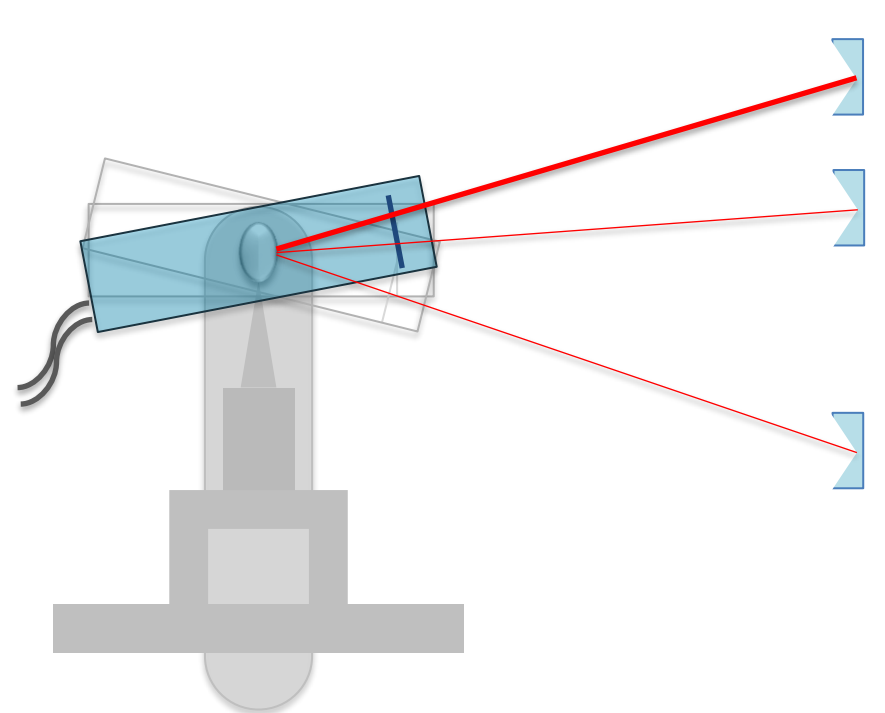


Two colour 3D Lasermeter for large volume calibrations

H. Yan¹, P. Köchert¹, P. Knigge¹, J. Blohm¹, E. K. Rafeld¹, M. Franke¹, T. Meyer¹, G. Prellinger¹, D. Heißelmann¹, M. Wiśniewski², F. Pollinger¹

LABORATORY PROTOTYPE OF 3D LASERMETER

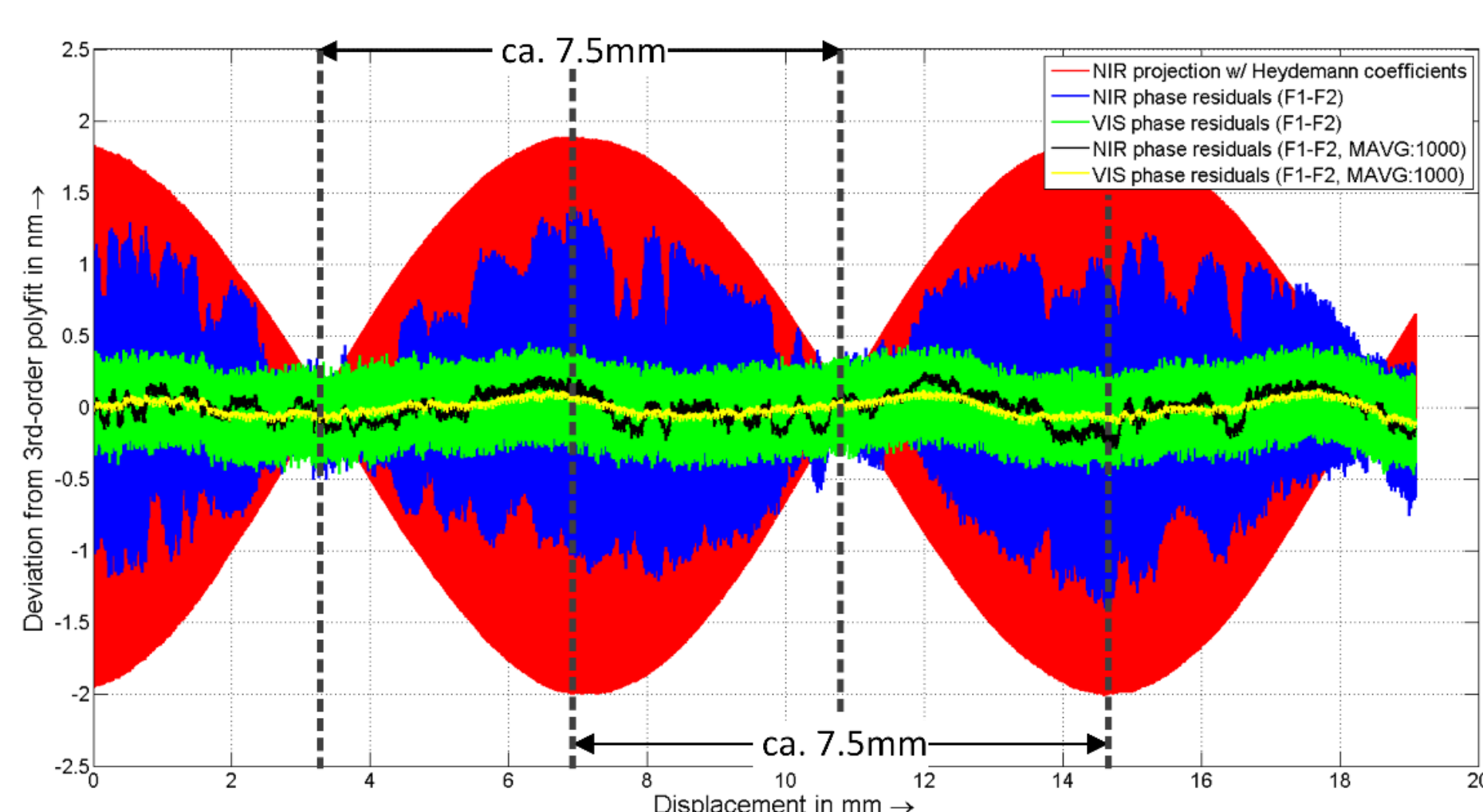
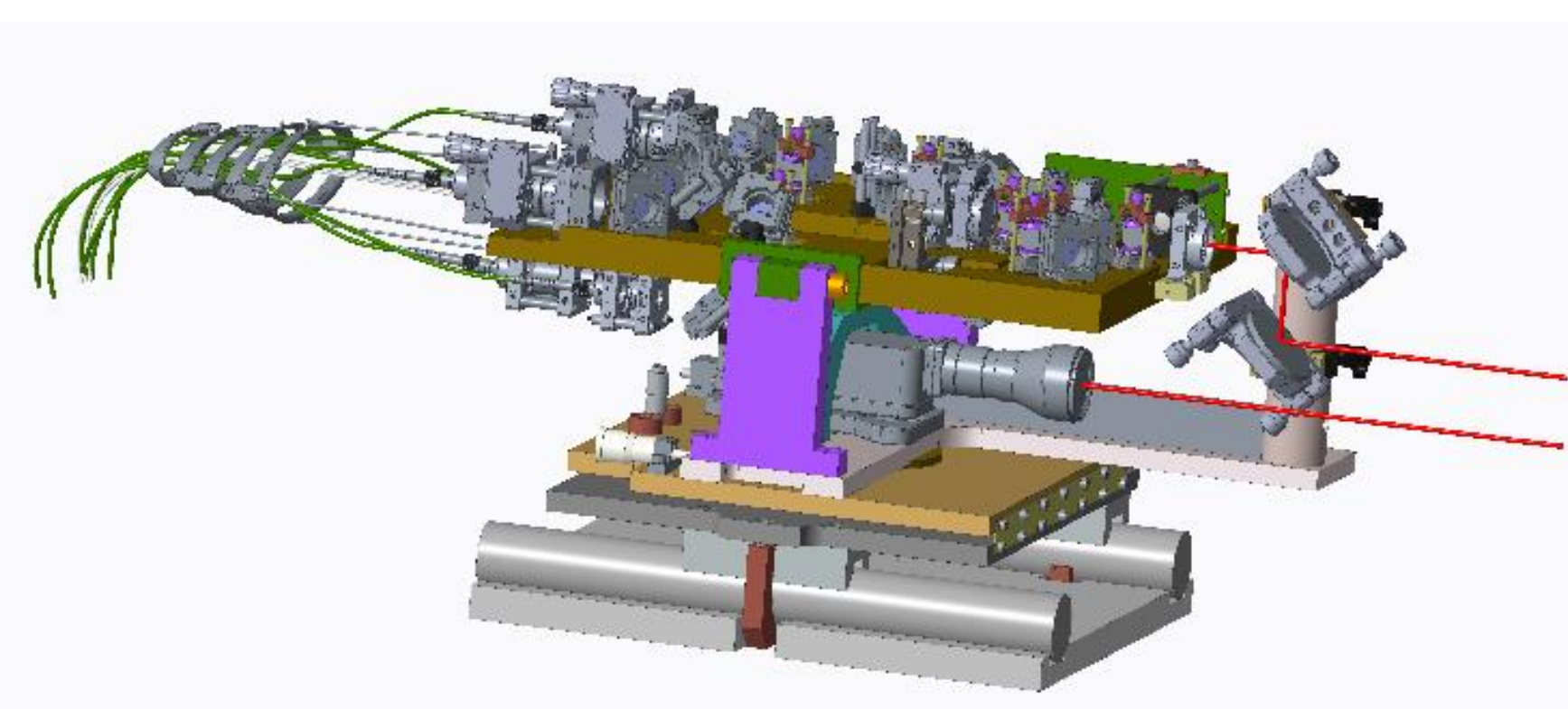
- **Target:** proof-of-principle 3D measurement system for 'fast' large-volume calibration in imperfectly controlled environments
- Multi-wavelength Interferometer
 - Absolute distance mode
 - Counting measurement mode
- Provisional tracking system
 - Gimbal + FPGA
 - Maxi tracking speed: 30 mm/s



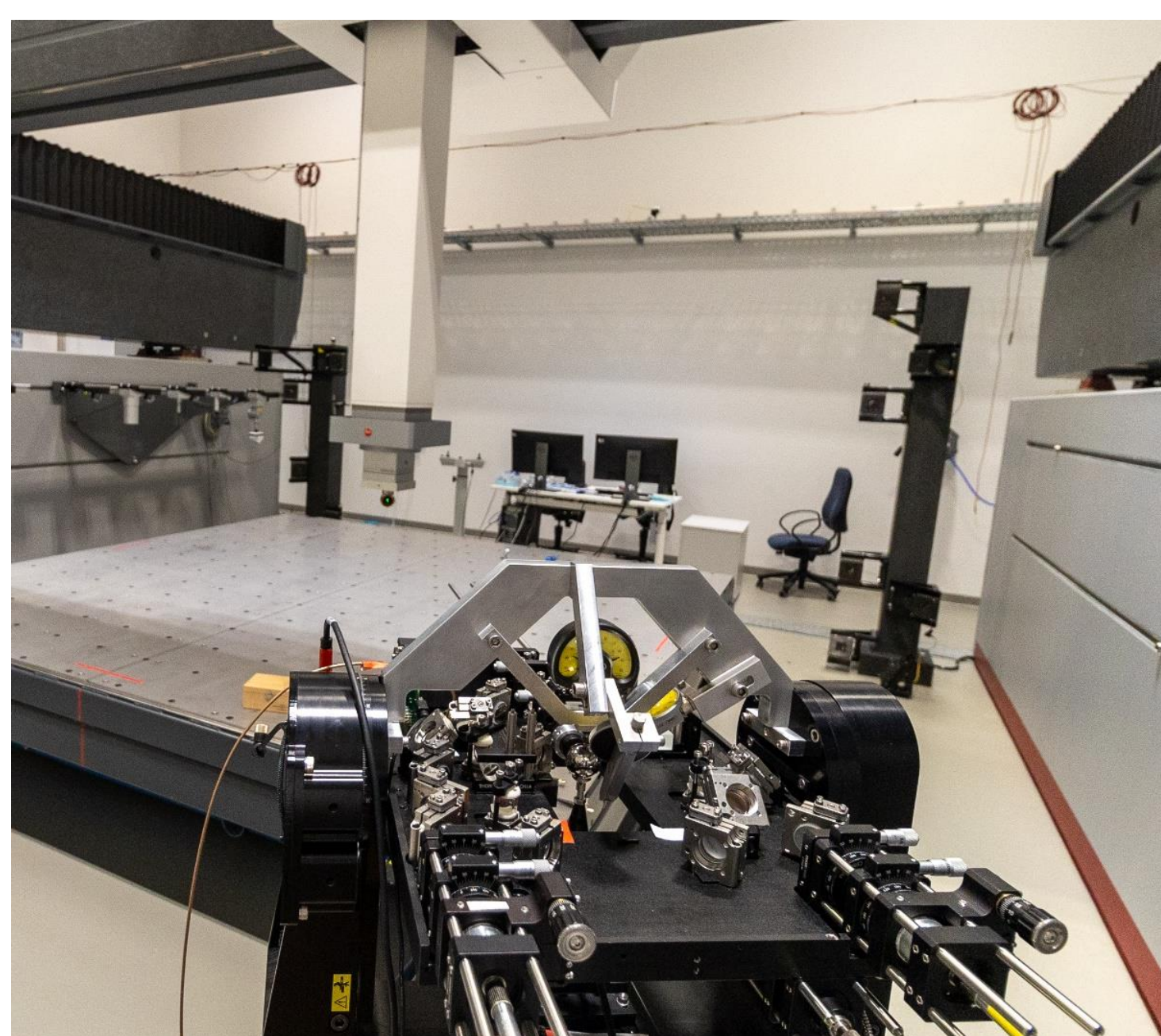
- Heterodyne interferometer principle for speed and wavelength separation
- Independently mounted fix reference sphere
- Two colour dispersive refractivity compensation

MEASUREMENT CAMPAIGN

- 1D verification on PTB and GUM 50-m geodetic baseline



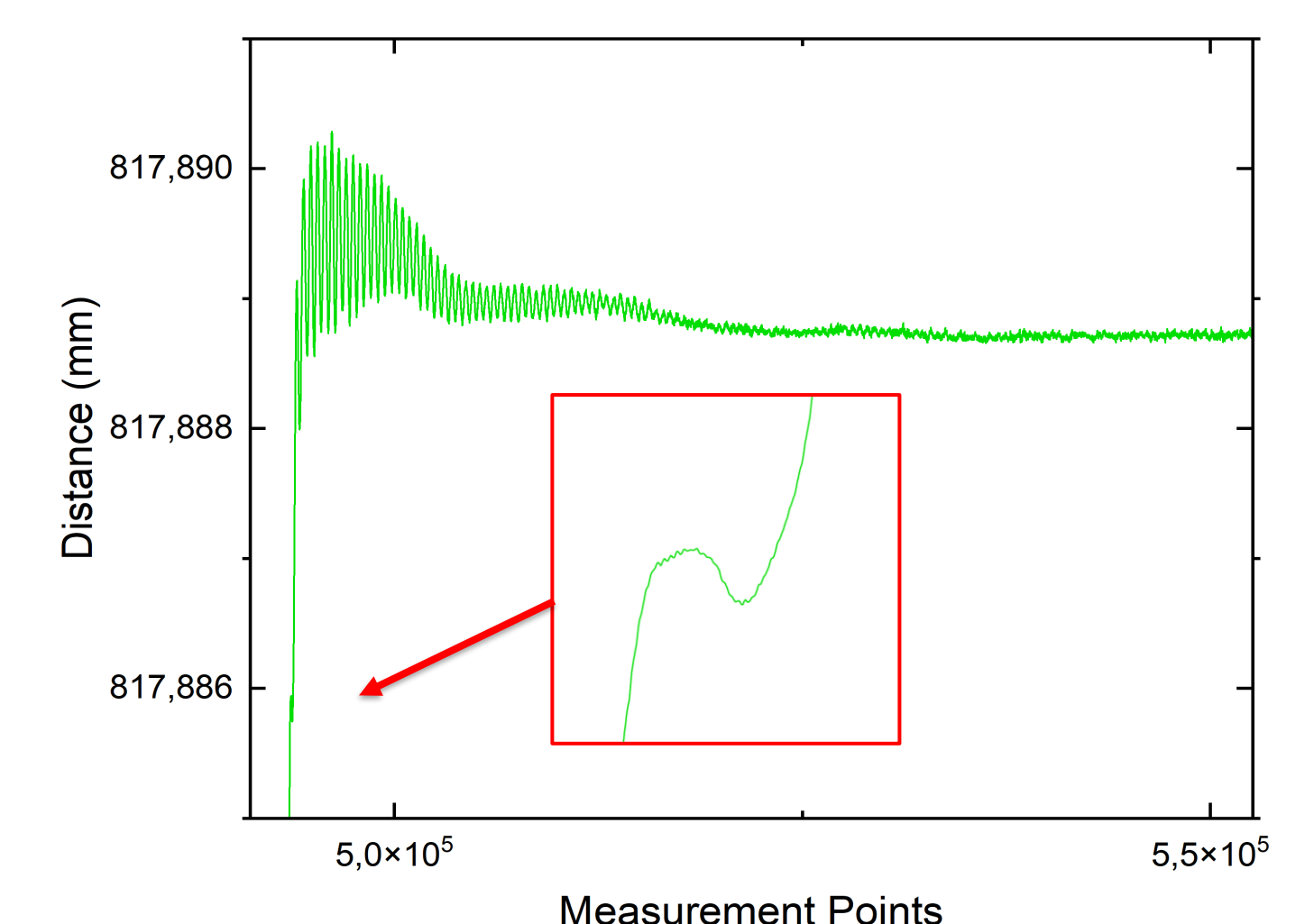
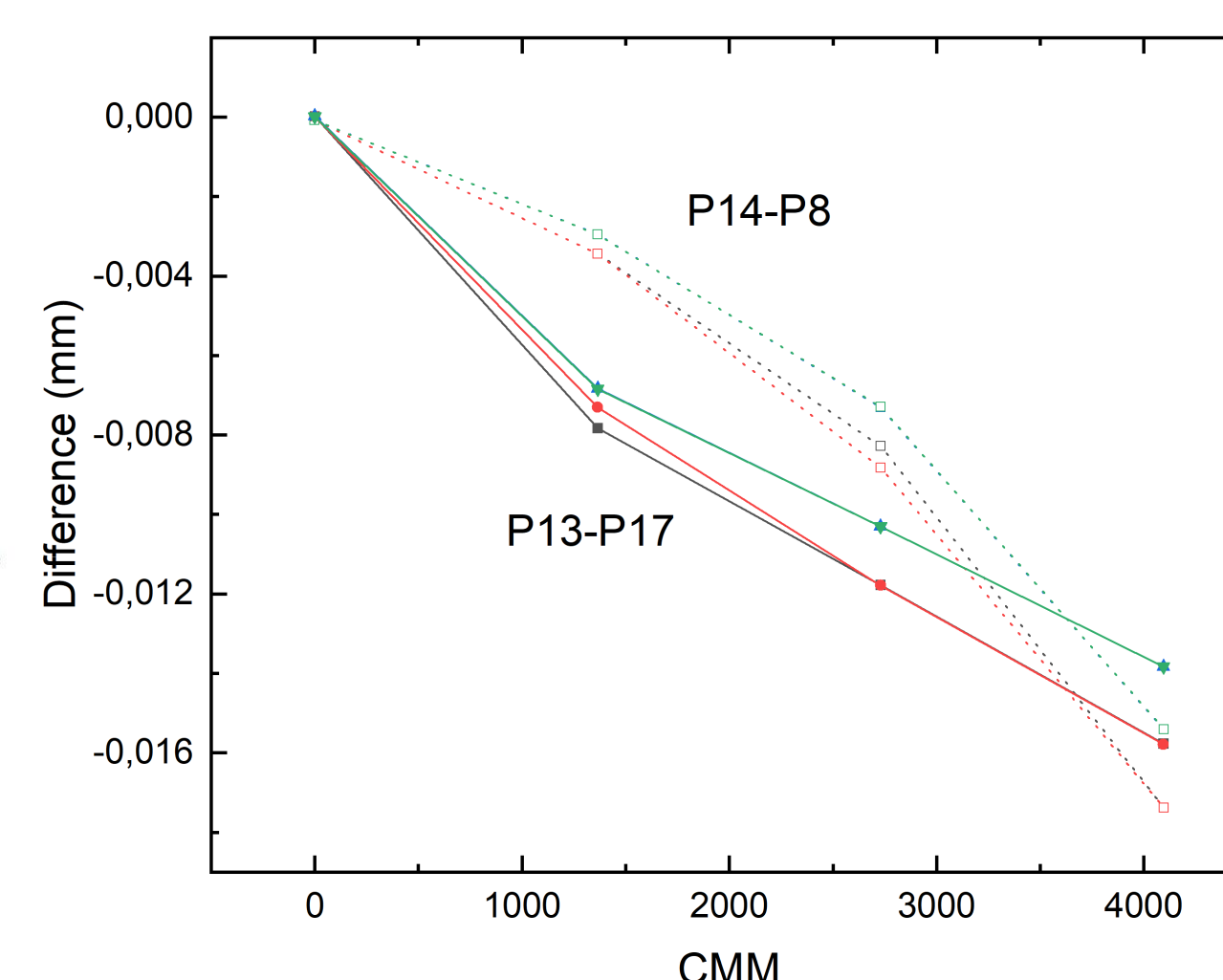
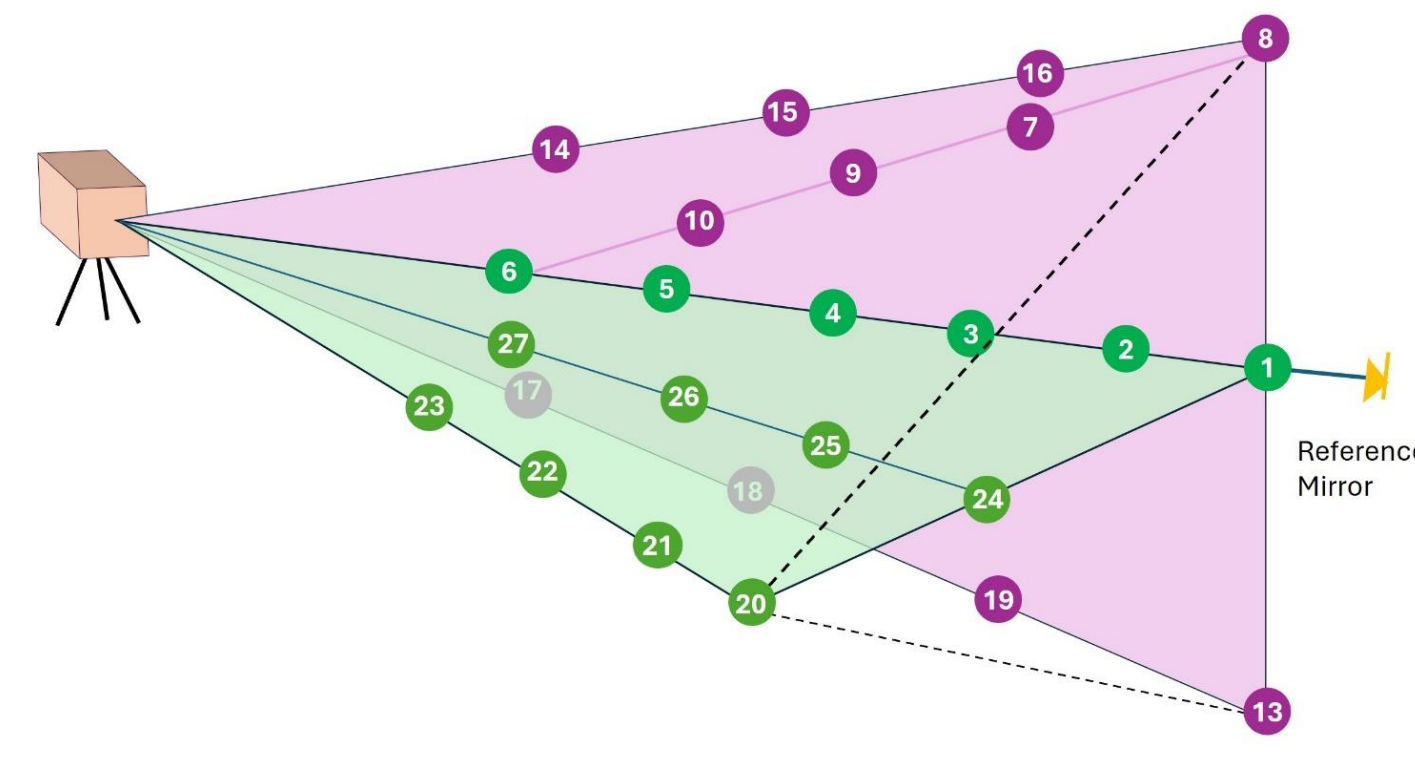
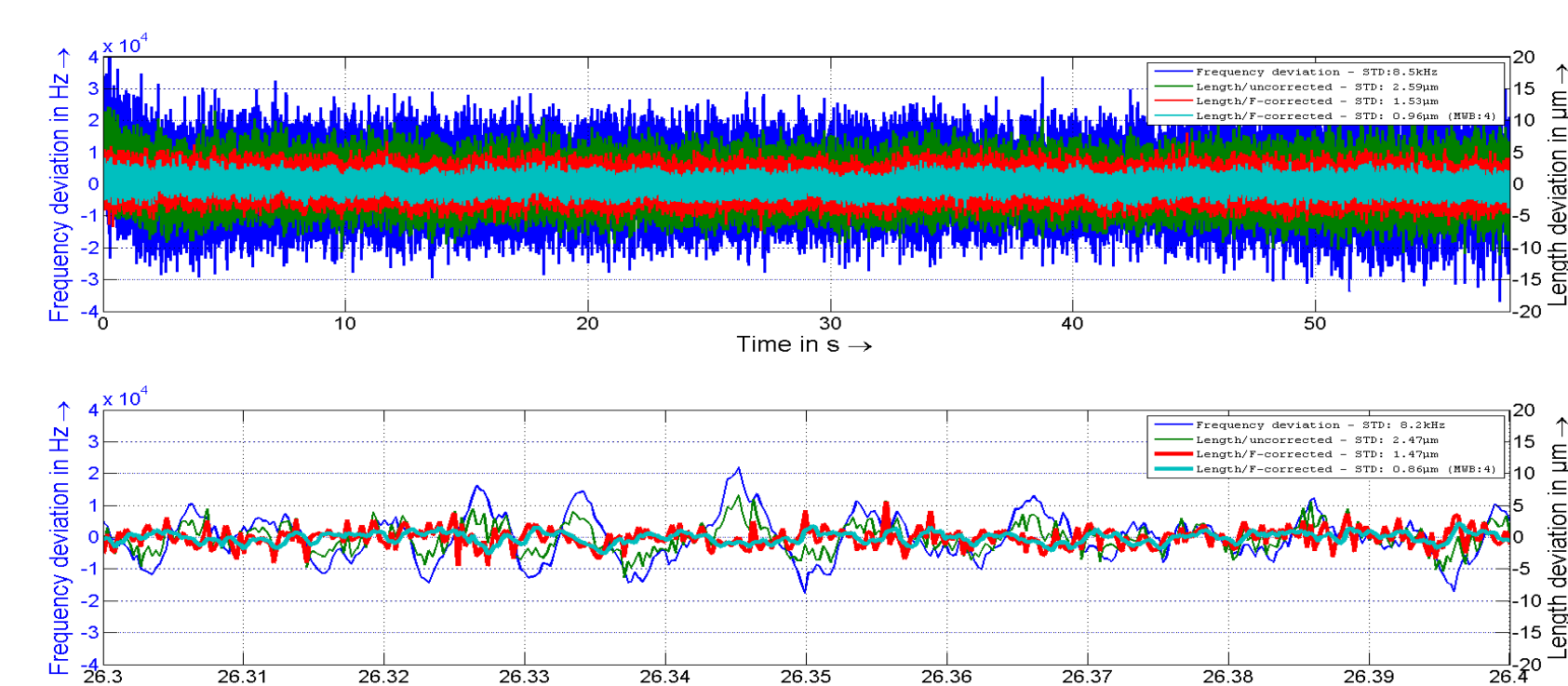
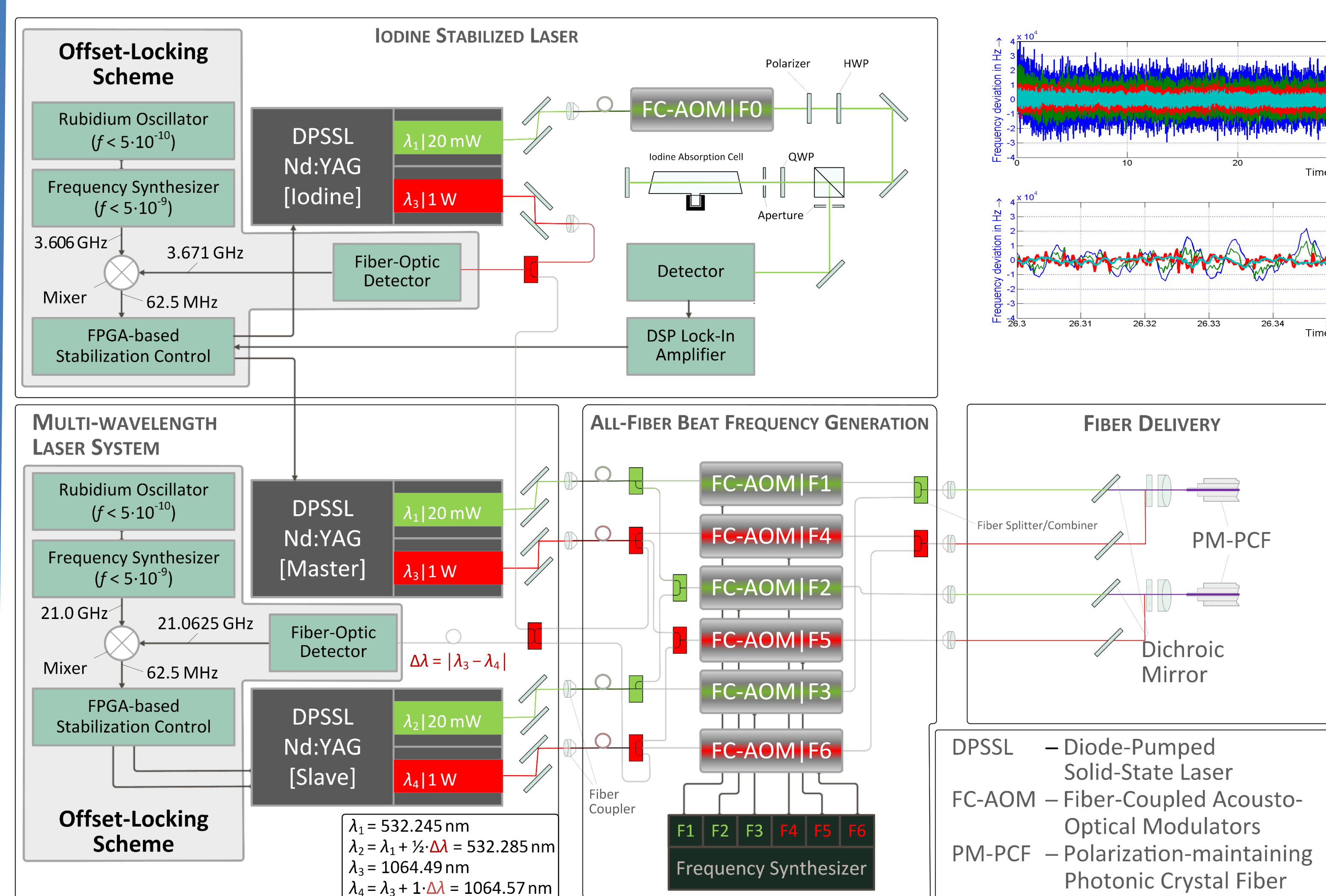
- VIS: ADI MU ~ 5 μm
- NIT: remnant nonlinear error



- 3D measurement on CMM in PTB
 - Absolute and incremental mode
 - Comparison with CMM

OPTICAL SOURCE PLATFORM

- Nd:YAG based multi-wavelength laser system
 - OPLL for synthetic wavelength generation
 - Fibre-coupled AOMs for beat note generation
 - 532/1064-nm superposition by photonic crystal fibres (PCF)
- Iodine stabilized laser system with frequency deviation compensation
 - 40% reduce of standard deviation



- Absolute distance: approx. 5.9 m
- Measurement along lines in space
- Spatial resolution example: deviations between CMM and 3D lasermeter (preliminary)
- Transient resolution example: CMM reaching position