Off-axis Parabolic Mirror Alignment

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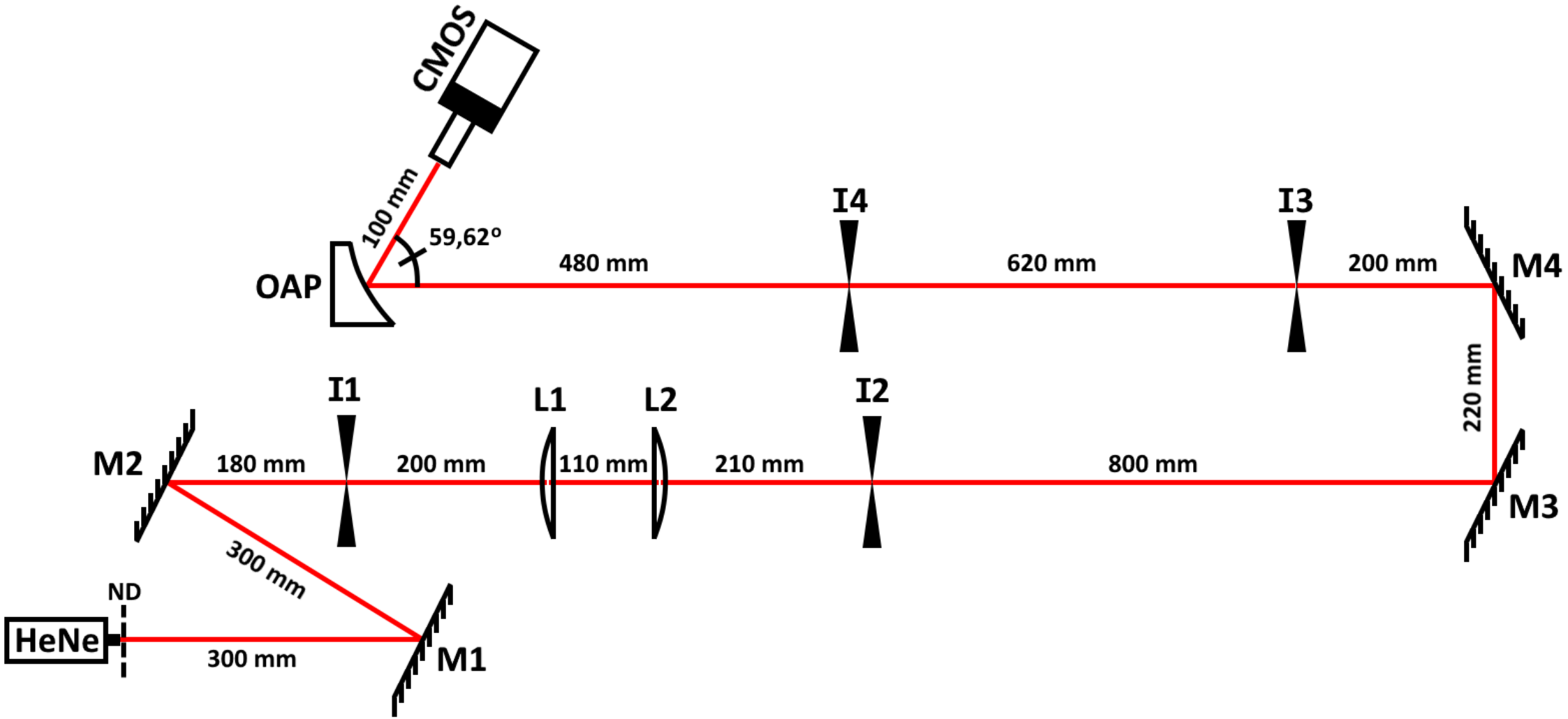
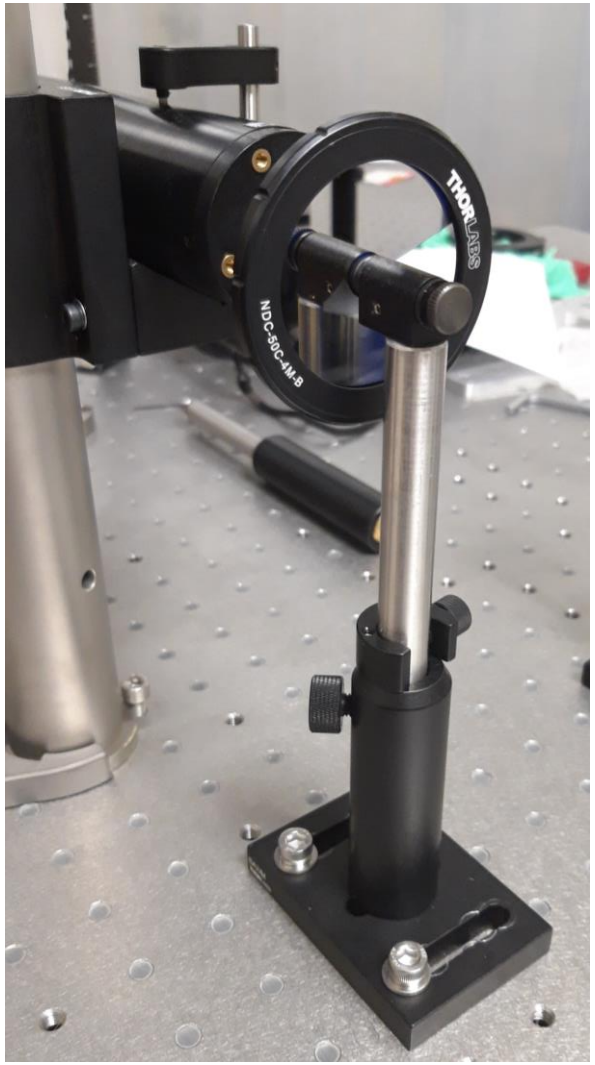
Optical setup



Optical setup

Caption	Component	Observations
HeNe	HeNe laser (632.8 nm)	
ND	Adjustable ND filter	
M1	1-inch Ag mirror	
M2	1-inch Ag mirror	
I1	20-mm iris	Minimal aperture 1.2 mm
L1	Convex f10 lens	
I2	25-mm iris	Minimal aperture 1.4 mm
L2	Convex f100 lens	
M3	2-inch Au mirror	
M4	2-inch Ag mirror	
I3	50-mm iris	Minimal aperture 0 mm
I4	50-mm iris	Minimal aperture 0 mm
OAP	Off-axis parabolic mirror	Full offset angle 60 deg
CMOS	Camera with CMOS sensor	

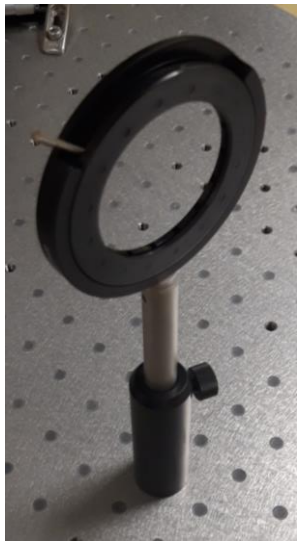
Alignment procedure – ND filter



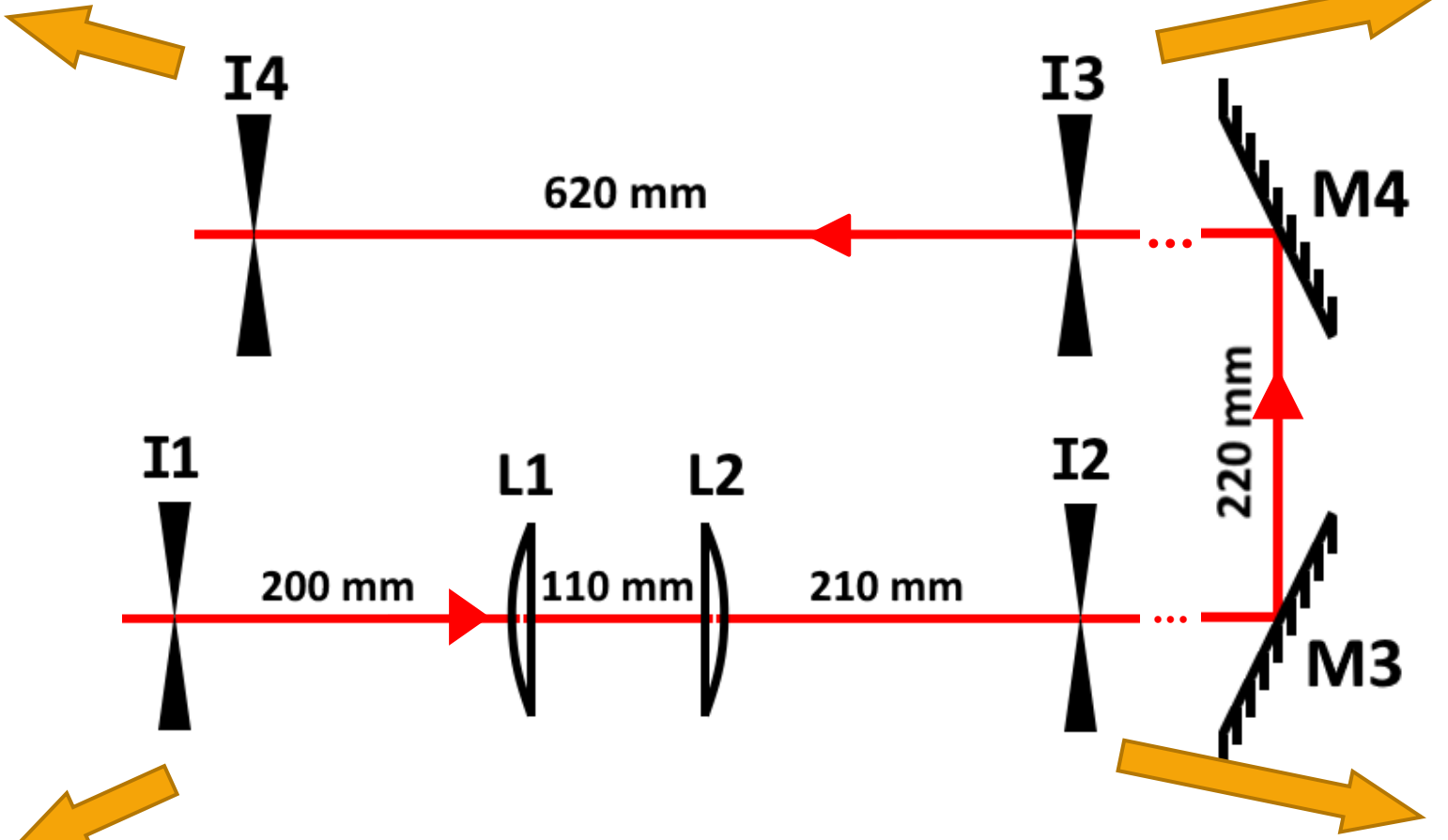
Range of adjustment

Courtesy of
https://www.thorlabs.com/thorproduct.cfm?partnumber=NDC-50C-4M-B

Alignment procedure – irises



For pointing



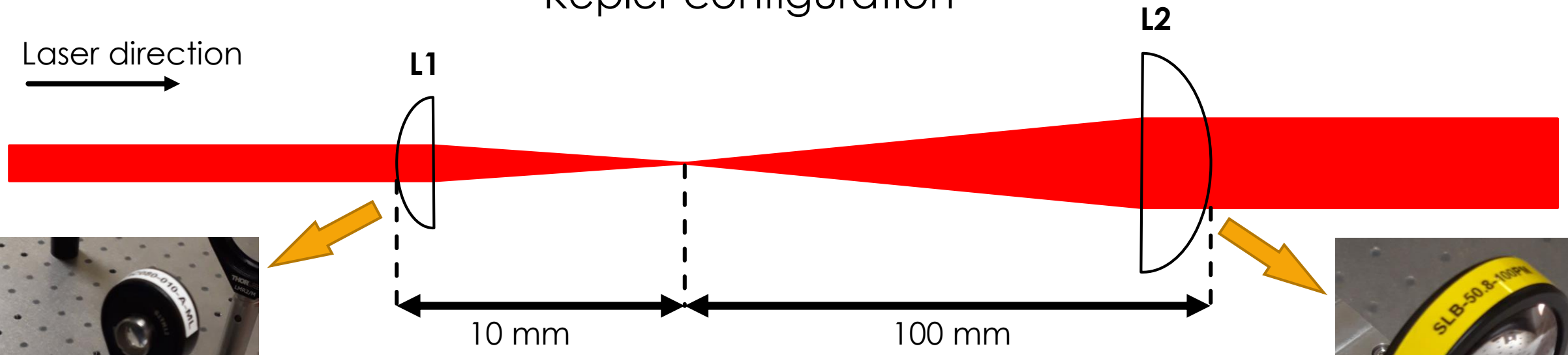
For offset

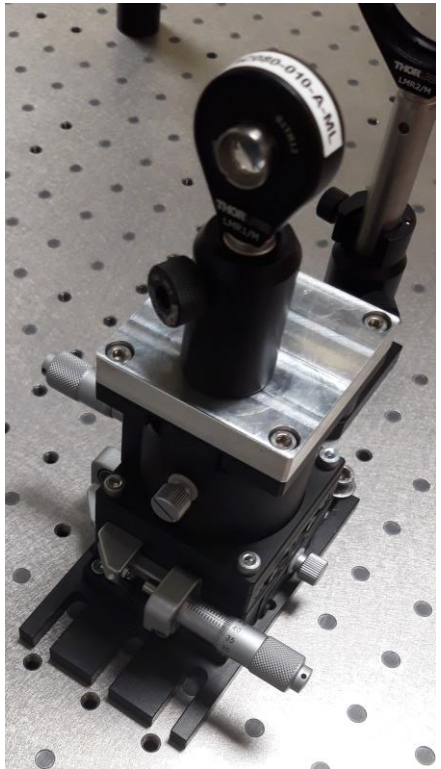
For offset

For pointing

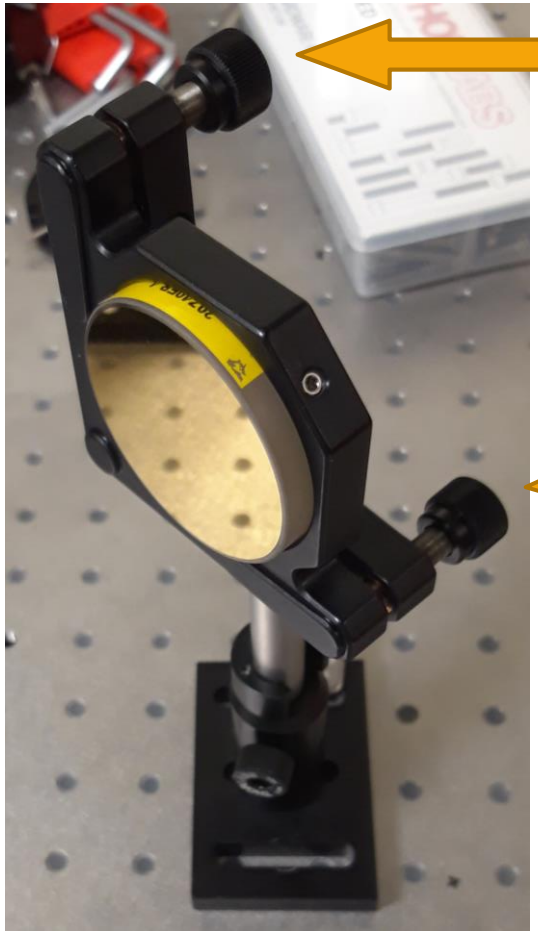
Alignment procedure – beam expander

Kepler configuration





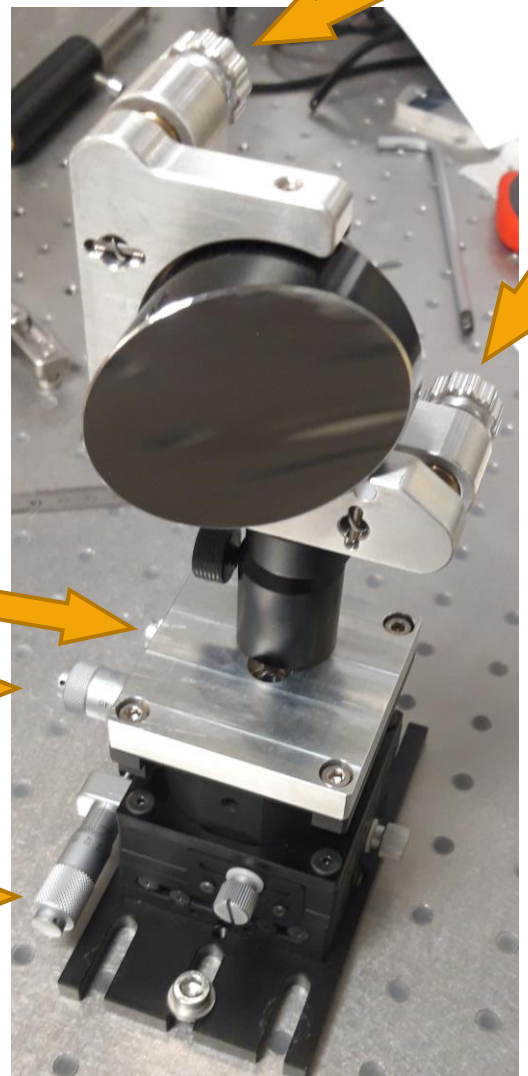
Alignment procedure – mirrors

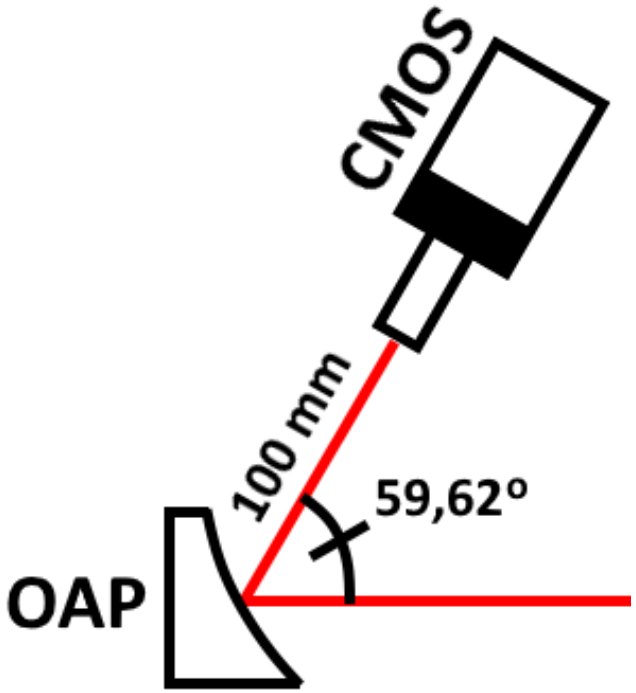


Pitch adjustment

Yaw adjustment

Alignment procedure – OAP mirror



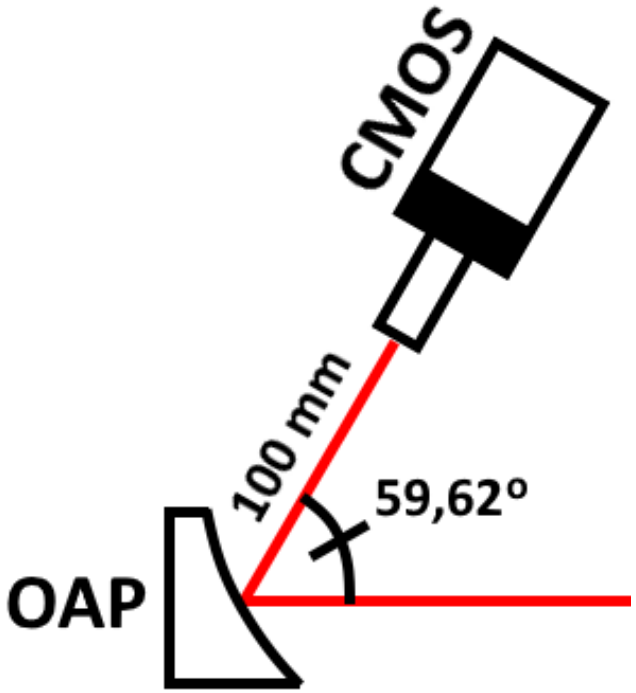


Alignment procedure – CMOS camera

Lateral adjustment

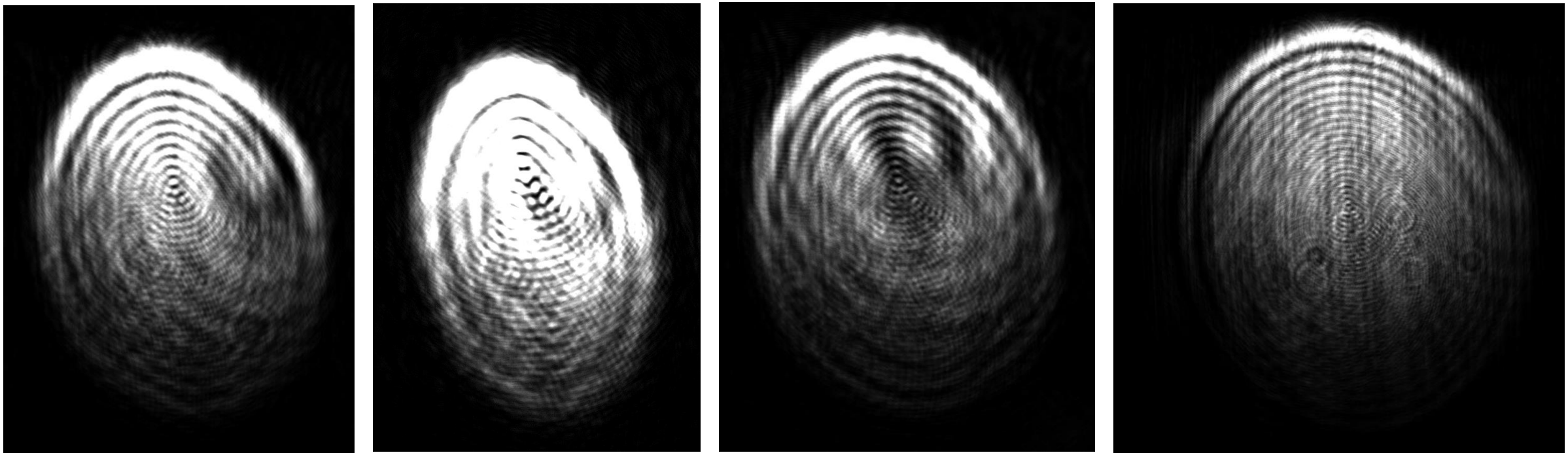
Vertical adjustment

Longitudinal adjustment



Results

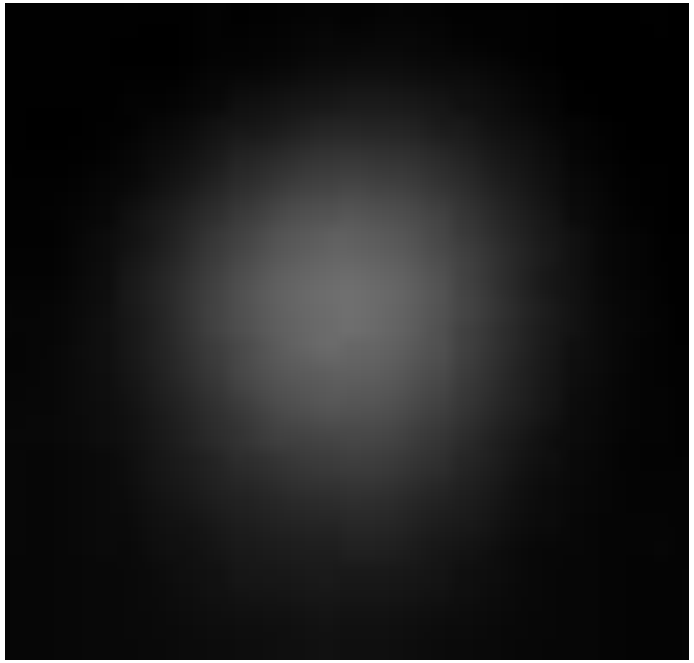
Astygmatic case (misalignment of OAP mirror w.r.t. beam)



Results

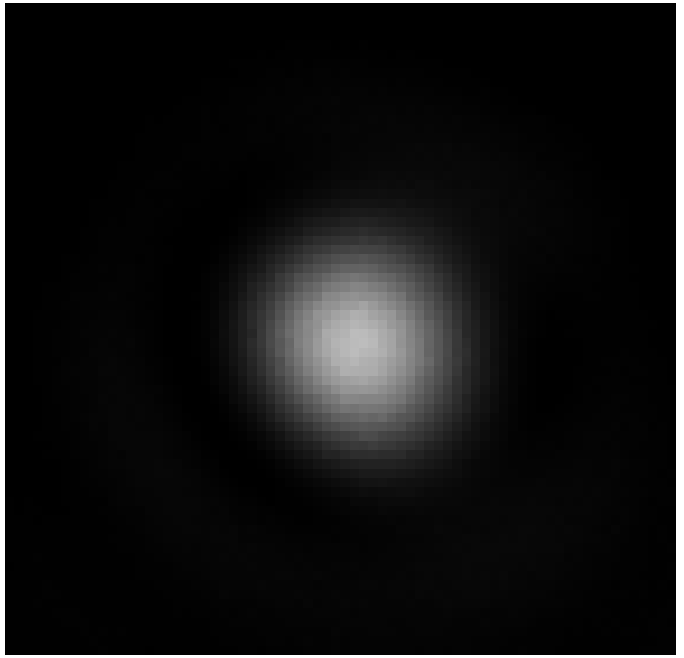
Good focus

+ 10 um



Spot size: 106.95 um x 106.95 um

0 um



Spot size: 82.8 um x 82.8 um

- 10 um

Spot size: 89.7 um x 89.7 um

Insights

- Difficult/frustrating parts:

- Getting used to optomechanics and components' sensitivities
- Collimating the beam
- Getting the „relationship" between OAP mirror and CMOS camera right

- Pleasant parts:

- Setting an uniform height of all components
- Adjusting M3 and M4
- When everything worked out in the end

Summary

- Red beam from a HeNe laser was successfully collimated using a Kepler configuration;
- OAP mirror was aligned to focus the beam onto a CMOS camera
- Various photos have been taken in all stages of trials

Thanks for watching!