Wavefront sensors and adaptive optics for optical metrology, laser and microscopy

OPTICAL METROLOGY

HIGH-POWER LASERS

BIO-IMAGING

X-EUV

IMAGINE OPTIC PRESENTS

Optical metrology for AR/VR and Freeform applications

EPIC European Photonics Industry Consortium

Phabulous

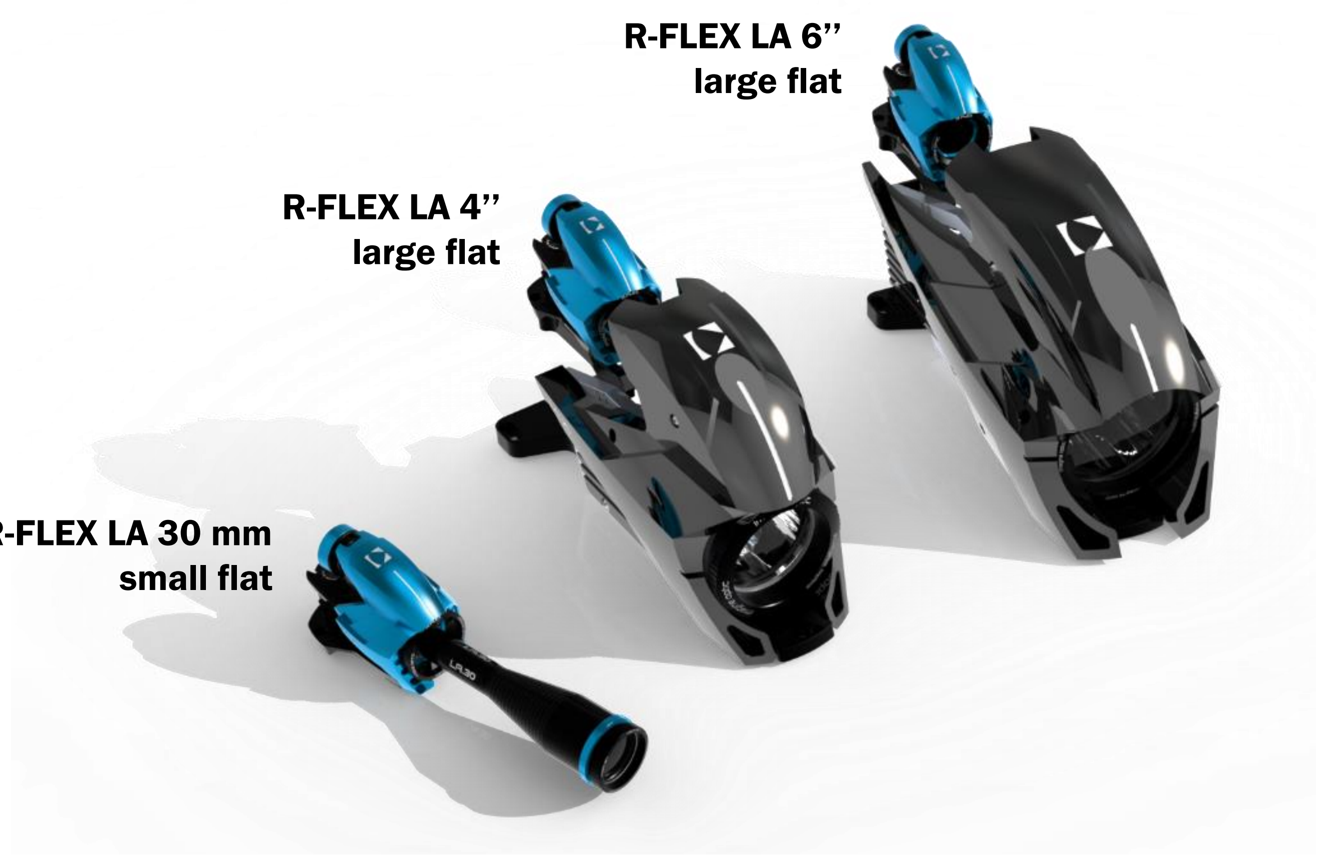
Company · Key figures

- Founded in **1996**, development and manufacturing of **wavefront sensing** & **adaptive optics**
- **55** employees, **5 M€** revenue
- 35+ patents granted
- > **1500 sensors** worldwide…
- > **200 Adaptive optics** systems with Mirao52e for ophthalmology and microscopy and
  > **70 adaptive optics** systems with ILAO & ILAO Star for high-power lasers in > 10 countries

Company · Key figures

The Optical Engineer Companion™

R&D lab



R-FLEX
concave

R.FLEX LARGE APERTURE

R.FLEX2 SWIR LARGE APERTURE

Characterization of surface form
System alignment
Characterization of lasers

Any size
Any shape
Any wavelength

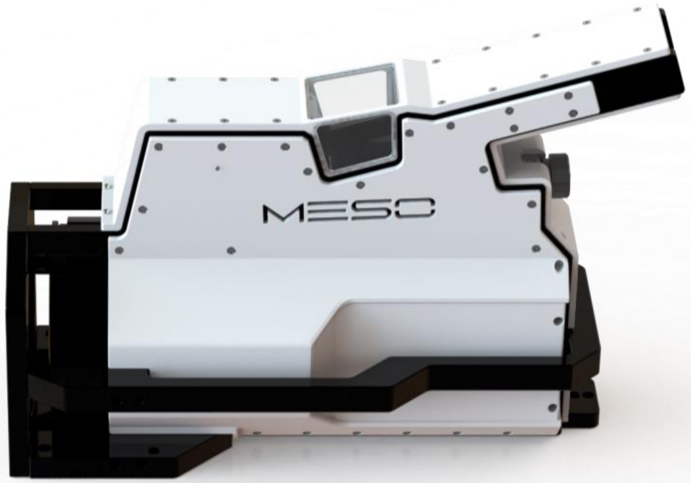
High resolution
High accuracy
Large dynamic range

Insensitive to vibrations
Light & compact
Easy to use
Cost effective

MESO

manufacturing environments

+ In situ process control
+ Thin Parallel Optics characterization
+ Transmitted wavefront quality (TWE)
+ Surface shape & flatness measurement (RWE)
+ Large optics testing
+ Wedge measurement

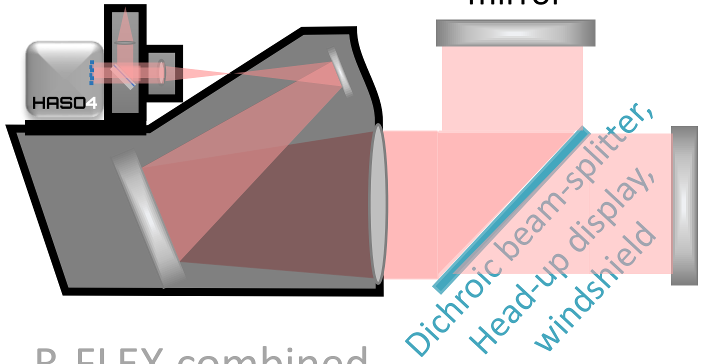


Thin Parallel Optics,
Screens,
Filters, dichroics,
Mirrors,
Beamsplitters,
Windows,
Substrates,
Crystals,
Corner cubes,
Glass wafers,
Displays,
Machined surfaces,
Prisms,
Large lenses,
Optical systems, beam expanders

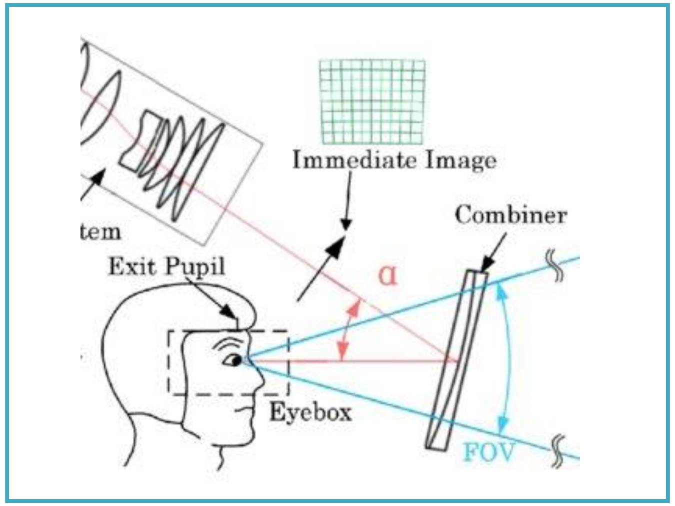
Undisturbed by reflections from sample back surface

Application 1 / 4

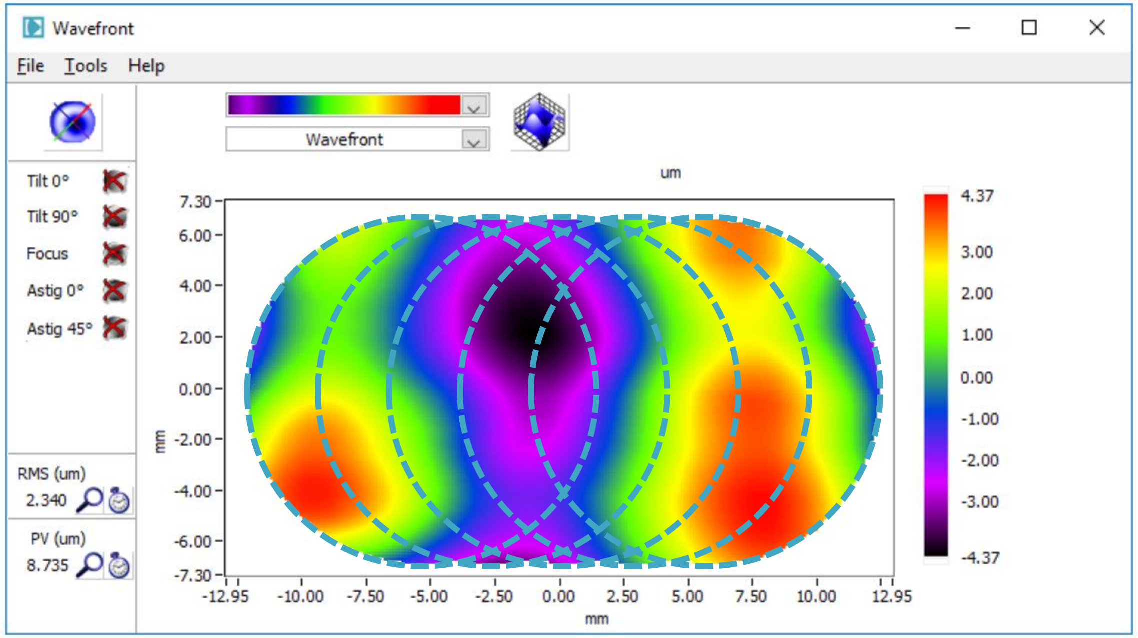
Testing of Windshield embedded with thin-film in transmission & reflection



R-FLEX combined w/ LA



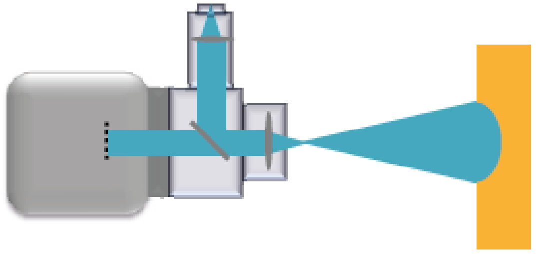
Sample diagonal ≈ 170 mm



Stitched reflected wavefront

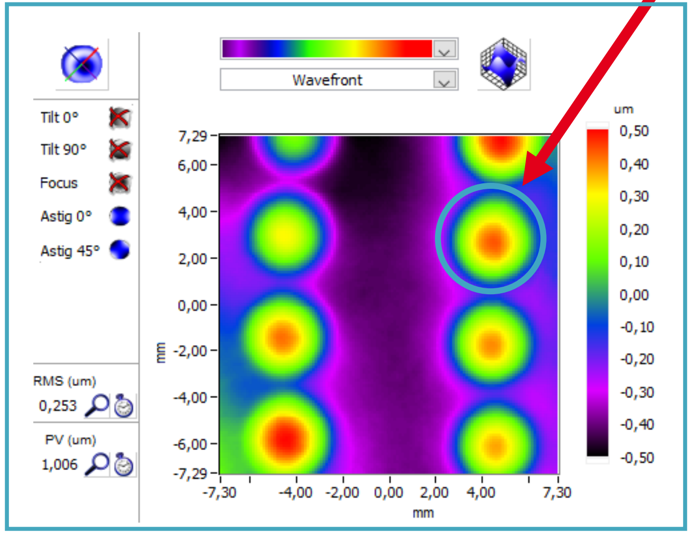
Application 2 / 4

Testing of micro-structured molds

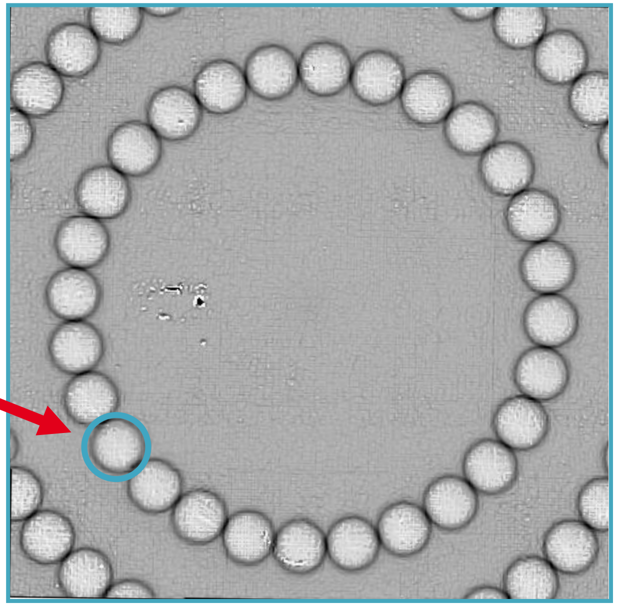


R-FLEX combined
w/ focusing module

≈1mm diameter



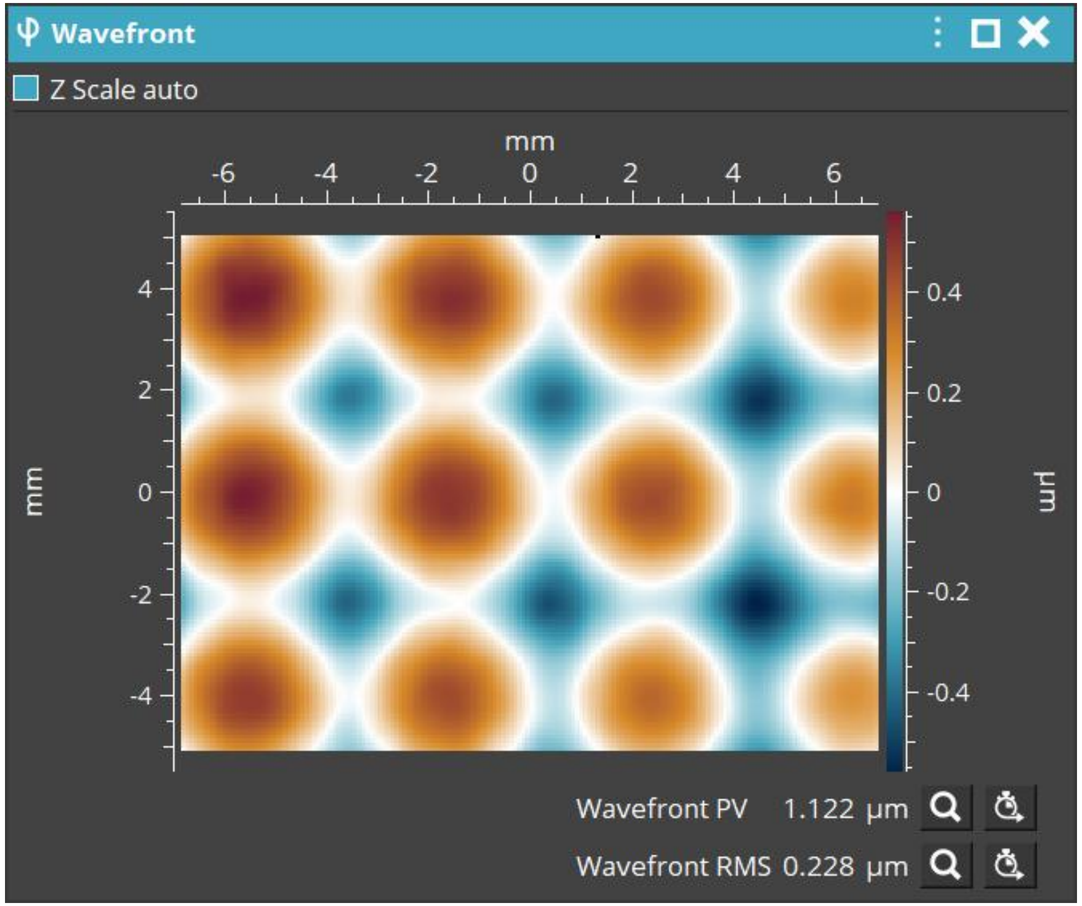
Small area measurement

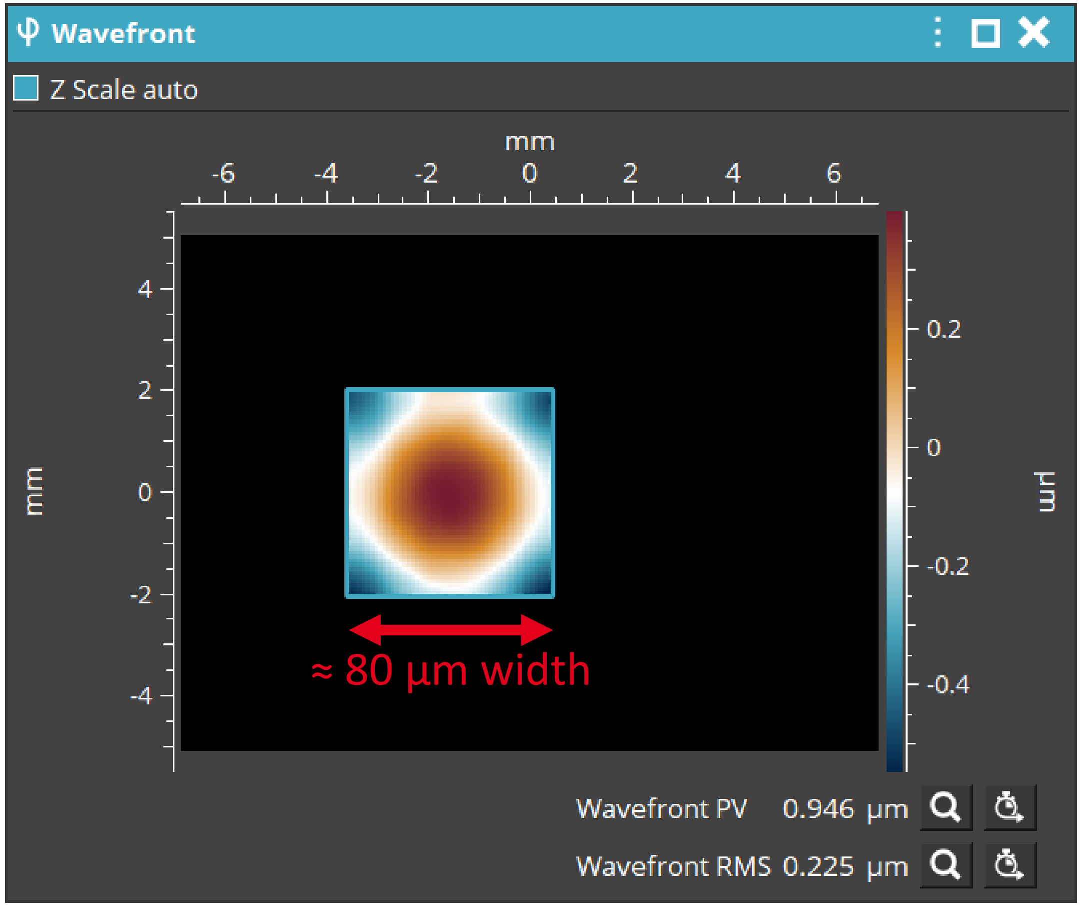


Stitched optical power map

Application 3 / 4

Control of micro-optics (µL) in transmission

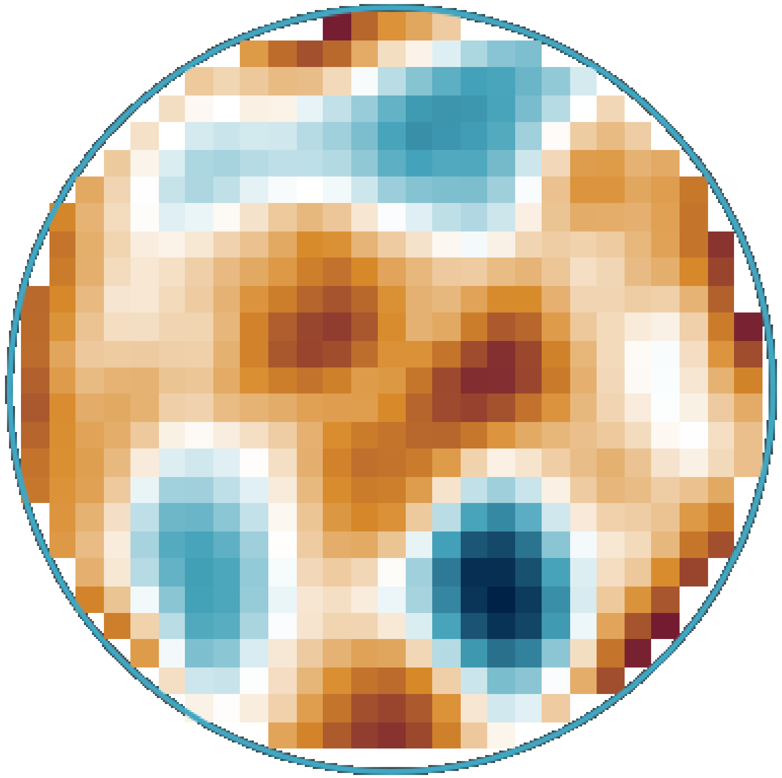




Application 4 / 4

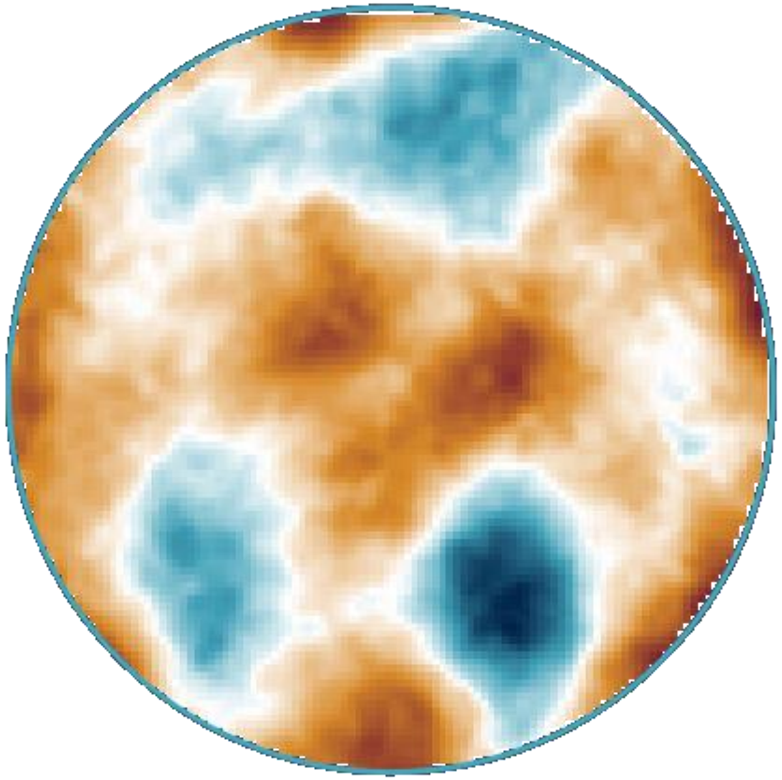
Characterization of freeform phase plate in transmission

HASO SWIR
(at 1550nm)



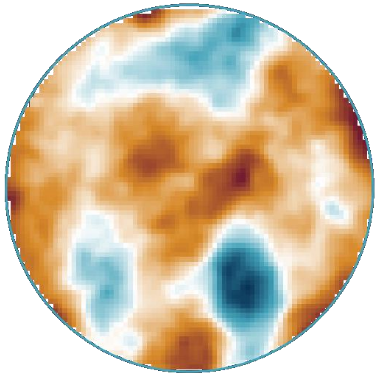
Resolution = 28 x 28
PV = 2.350µm,
RMS = 0.444µm
20 mm diameter sample

HASO LIFT SWIR
(at 1550nm)



Resolution = 112 x 112
PV = 2.552µm,
RMS = 0.452µm

HASO4 126
(at 1064nm)



PV = 2.589µm,
RMS = 0.460µm

Conclusion

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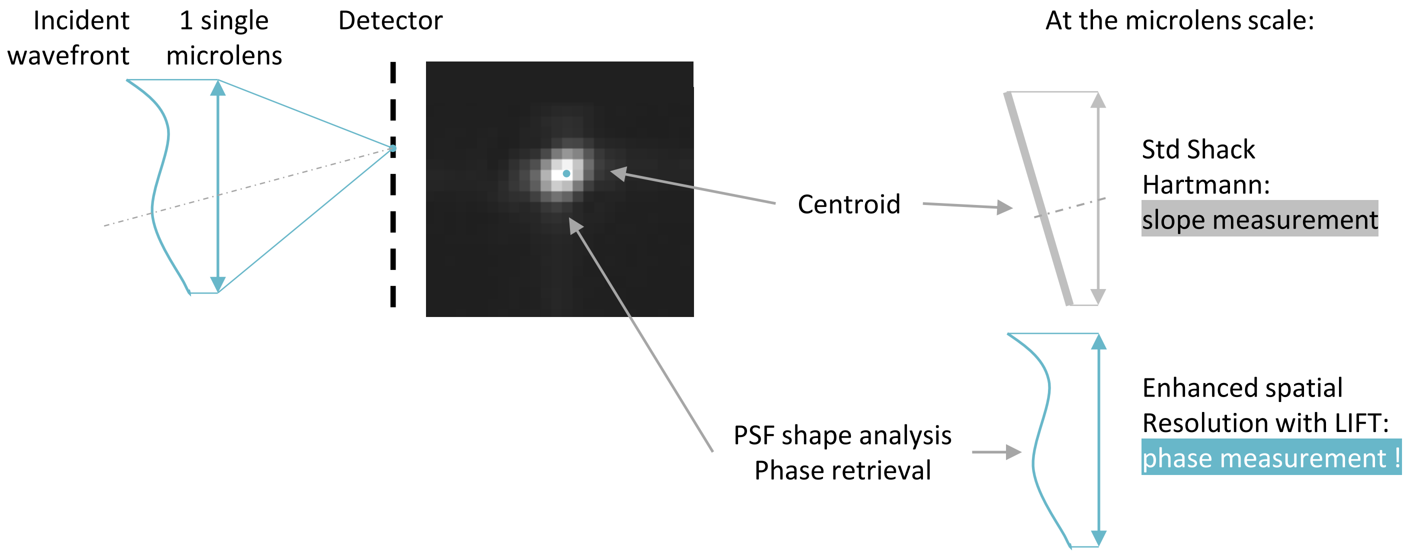
Pleased to provide more information
Happy to perform tests on your samples

Support information

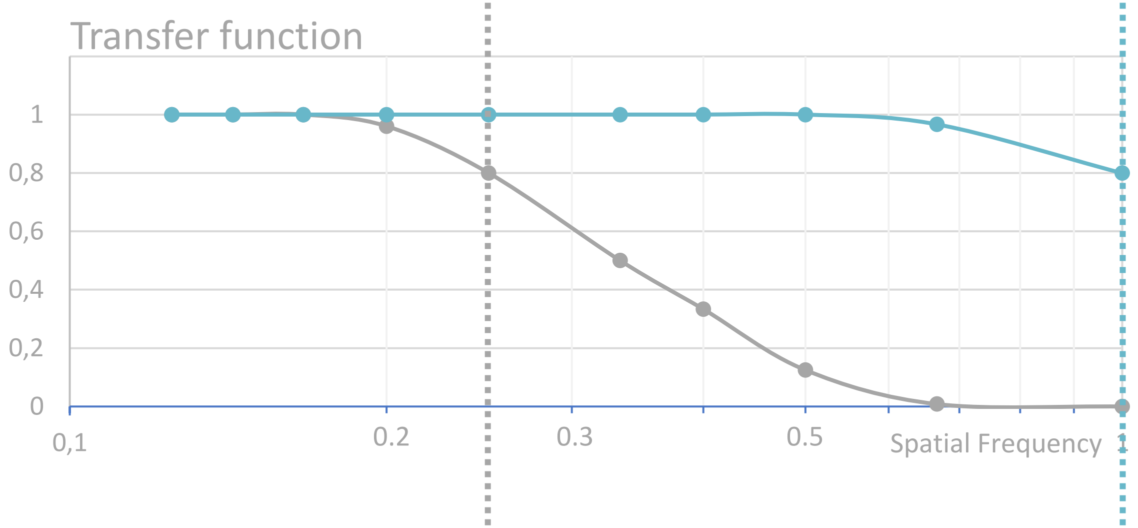
HASO LIFT


Incident
wavefront
1 single
microlens
Detector
At the microlens scale:
Centroid
Std Shack
Hartmann:
slope measurement
PSF shape analysis
Phase retrieval
Enhanced spatial
Resolution with LIFT:
phase measurement !

HASO LIFT

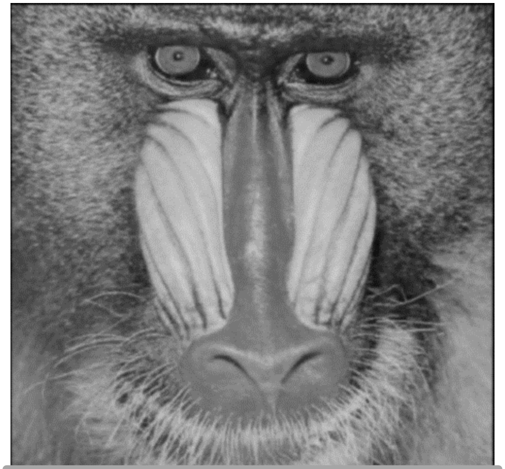
Sensor resolution: x16

Resolution improvement: x4



Twice Shannon frequency for standard HASO

Twice Shannon frequency for enhanced resolution LIFT sensor



Hi Res phase pattern

standard Shack Hartmann sensor corresponding measured phase

LIFT sensor corresponding measured phase