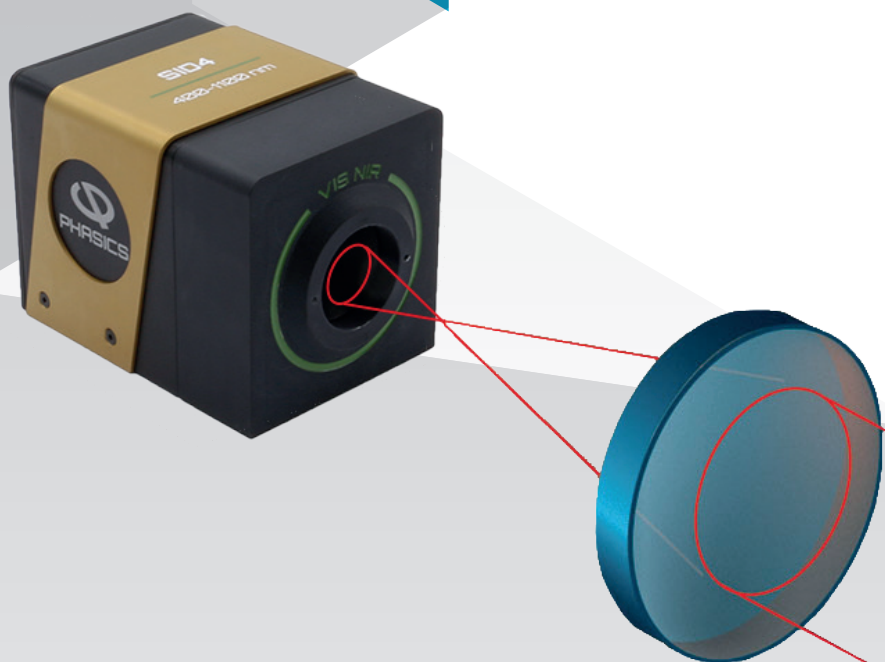
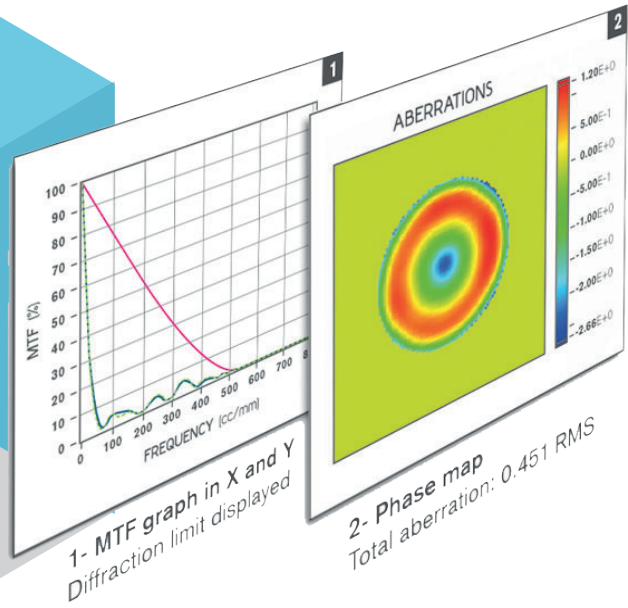


# Kaleo products

metrology of lenses  
and complex optical  
systems

**PHASICS**  
the phase control company





# Simple measurement, advanced results

PHASICS offers the most innovative solutions for **quality control of lenses and complex optical systems in R&D and production**. Relying on a unique wave front technology called quadriwave lateral shearing interferometry, PHASICS solutions provide **fast and complete characterization** of your optics.

## IN A SINGLE ACQUISITION...

### ... GET THE MTF

- Along any direction
- For any pupil size
- On and off-axis
- Up to cut-off frequency
- With various focusing methods

### ... AND WAVEFRONT QUALITY

- EFL, F#, NA
- Aberrations: Zernike, Seidel
- Real-time filtering of phase map (Zernike, Kernel...)
- Through focus MTF
- Comparison to design
- Chromatic aberrations

## → DIRECT MEASUREMENT

Measuring diverging and converging beams **with no relay lens**, PHASICS sensors enable a compact and **direct set-up**:

- Simple alignment
- Same set-up to cover your full optics range
- Characterization in working conditions
- Easy measurement interpretation

## → HIGH RESOLUTION

The unrivalled high resolution of PHASICS sensors ensure **reliability**, by enabling robust calculations and small defects detection.

- Up to 300 x 400 measurement points
- Nanometer-level axial resolution

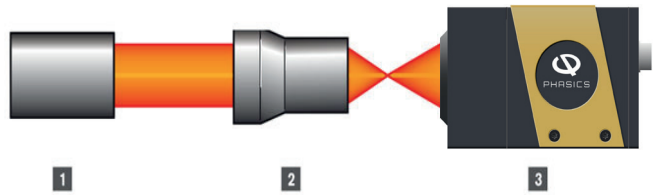
## → HIGH DYNAMIC RANGE

PHASICS sensors measure **strongly aberrated optics** to detect non-compliant **sub-assemblies** before assembly. They also measure **aspheric lenses** in transmission.

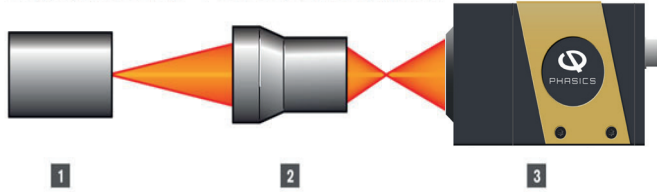
## → STABILITY

PHASICS technology does not use any reference beam, making it **unsensitive to vibrations**.

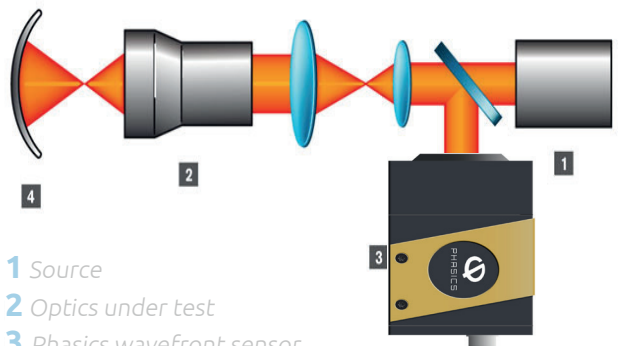
*Single pass set-up – Infinite conjugation*  
*Up to F/1 optics - Entrance pupil up to 100 mm*



*Single pass set-up – Point-to-point conjugation*



*Double-pass set-up*



- 1 Source
- 2 Optics under test
- 3 Phasics wavefront sensor
- 4 Reference sphere

# Powerful technology

## → ACHROMATICITY

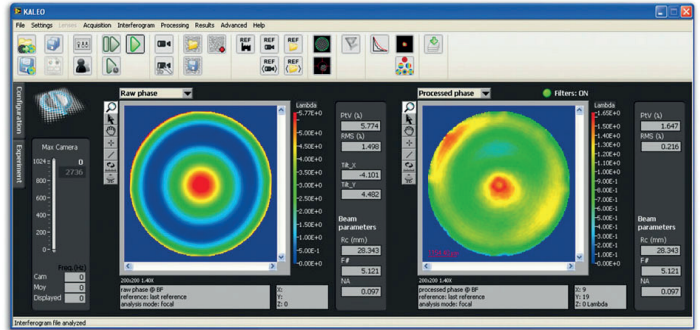
Inherently achromatic, PHASICS technology enables measurement **at any wavelength** without calibration:

- Focus shift with wavelength
- MTF comparison at various wavelengths

## → EASY AND RIGOROUS ANALYSIS

The software solution ensures **reliable** calculation and offers **flexibility**:

- Focusing methods (best or paraxial focus, MTF autofocus)
- Pupil size
- Advanced filtering options



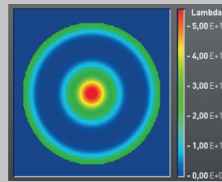
Serving the ease of use of PHASICS solution, it manages measurement from settings and acquisition to advanced calculations: Lens database - Alignment helpers - Automated reports

Direct phase measurement allows advanced analysis while **simplifying the result interpretation.**

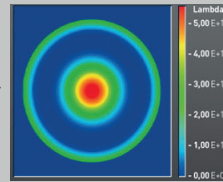
# Expert analysis software

## DESIGNPRO MODULE

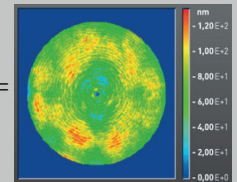
From the optical design file, this module simulates the nominal phase in the measurement plane and delivers the **residual wavefront error (WFE)**



Measured Phase  
PV=57.4λ



Simulated wavefront  
from Zemax design



Residual wavefront

Residual wavefront for a single CVX lens (PV=130mm)

## MEASURED ELEMENTS

- Single lens, component
- Complex assembly, zoom lens
- Strongly aberrated sub-assembly

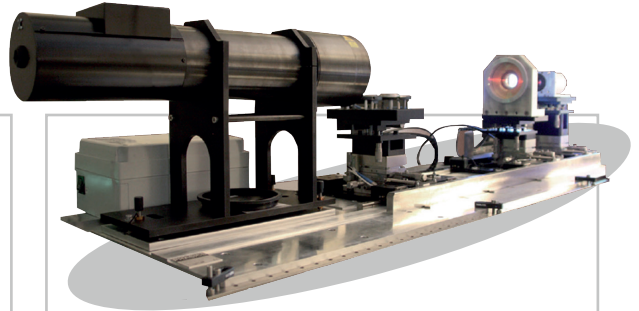
## APPLICATIONS

- New product development
- Process optimization
- Cost-effective lens alignment

# A full range of solutions for R&D and production



↑ OEM SOLUTION



↑ FULLY INTEGRATED BENCH

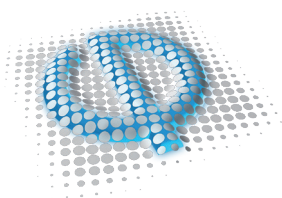
PHASICS provides OEM solutions combining wavefront sensor and software. PHASICS also designs benches fully dedicated to your needs. With a strong expertise in metrology, PHASICS works closely with your teams to analyze all your requirements (specification, throughput, budget...) and builds custom solutions mixing the right elements from

its large collection of solutions (alignment tools, choice of configuration and measurement conditions, analysis tools...) Dedicated software packages are developed on demand for easy insertion in your working environment, with special attention to safety standard compliance and ease of use for production.

## SID4 RANGE FROM UV TO IR

	Spectral range	Aperture dimension (mm <sup>2</sup> )	Spatial resolution	Phase sampling (pixels)	Phase accuracy (Absolute)	Phase resolution	Vacuum compatibility
UV	250-400 nm	7.4 x 7.4	29.6 μm	250 x 250	10 nm RMS	2 nm RMS	-
UV HR	190-400 nm	13.84 x 10.88	38.88 μm	355 x 280	10 nm RMS	1 nm RMS	-
SID4 V	400-1100 nm	4.73 x 3.55	29.6 μm	160 x 120	10 nm RMS	<2 nm RMS	> 10 <sup>-6</sup> mbar
SID4	400-1100 nm	5.02 x 3.75	27.6 μm	182 x 136	10 nm RMS	<2 nm RMS	-
SID4 HR	400-1100 nm	9.98 x 8.64	24 μm	416 x 360	20 nm RMS	<2 nm RMS	-
SID4 UHR	400-1100 nm	15.16 x 15.16	29.6 μm	512 x 512	-	<2 nm RMS	-
SWIR	0.9-1.7 μm	9.6 x 7.68	120 μm	80 x 64	15 nm RMS	<2 nm RMS	-
SWIR HR	0.9-1.7 μm	9.6 x 7.68	60 μm	160 x 128	15 nm RMS	<2 nm RMS	-
eSWIR	1.0-2.35 μm	9.6 x 7.68	120 μm	80 x 64	<40 nm RMS*	<6 nm RMS*	-
DWIR	3-5 μm & 8-14 μm	10.08 x 8.16	68 μm	160 x 120	75 nm RMS	25 nm RMS	-
LWIR	8-14 μm	16 x 12	100 μm	160 x 120	75 nm RMS	25 nm RMS	-

\* For coherent sources



# PHASICS

the phase control company

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