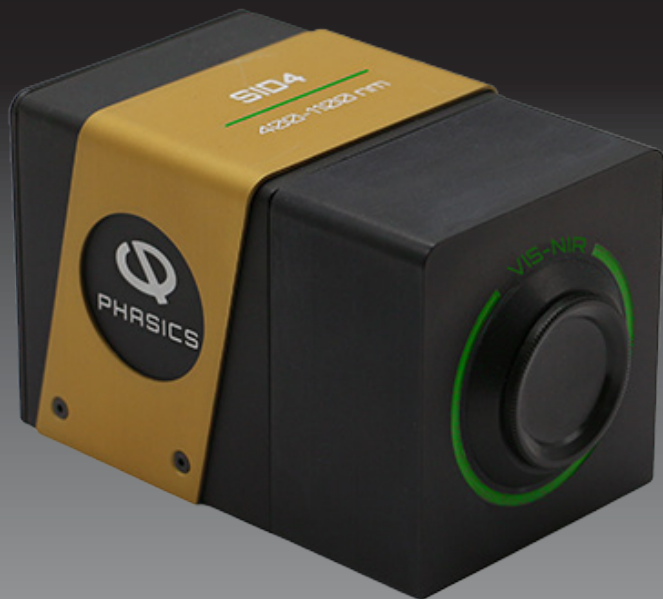


SID4 for metrology & high energy physics

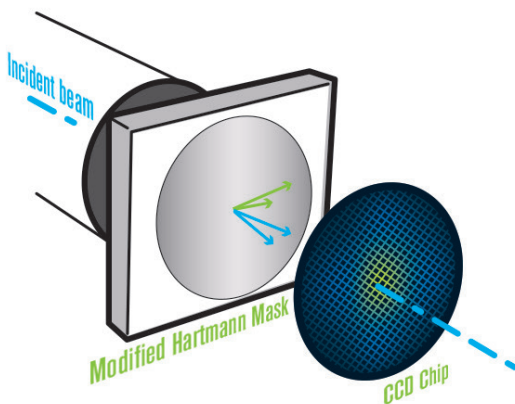




"ONE SINGLE VERSATILE WAVEFRONT SENSOR..."

PHASICS wavefront sensors stand out for both their unrivalled high resolution and their ease of use. As they cover beam testing, adaptive optics and plasma characterization, PHASICS instruments offer full versatility to engineers and researchers in high power laser facilities (Petawatt, Terawatt...).

EXCLUSIVE TECHNOLOGY: 4-WAVE LATERAL SHEARING INTERFEROMETRY

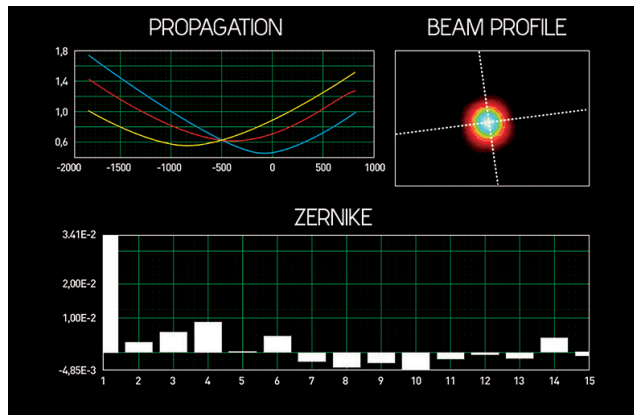


PHASICS technology was introduced to overcome the Shack-Hartmann sensor limitations, especially resolution. This ultra-high resolution enables accurate wavefront measurement for robust calculations of beam parameters.

- 1 High resolution**
 - Up to 120 000 measurement points
 - High repeatability
 - Robust calculations
- 2 High dynamic range**
 - Measurement of strong aberrations
- 3 Direct measurement of diverging beam**
 - Easy set-up & alignment
 - High NA with no relay lens
 - The after last parabola wavefront measurement
- 4 Self referenced**
 - Compact
 - Insensitive to vibration
- 5 Achromatic**
 - Compatible with broadband sources: Femtosecond laser, white light or LED
 - Cost-effective multi-wavelength solution

...TO MEET ALL YOUR CHALLENGES

I – ACCURATE BEAM CHARACTERIZATION AT ANY POINT OF THE LASER CHAIN



- High resolution of both phase & intensity for robust calculations of all laser beam parameters
- Set-up with no relay lens at any point of the laser chain
- Easy parabola and optics alignment

Aberrations: Zernike, Legendre

Beam propagation: M^2 (ISO 11146), waist, Rayleigh length, divergence

PSF: Strehl ratio, encircled energy

Advanced measurements: Annular or rectangular pupils, multiple pupils, piston, tilt

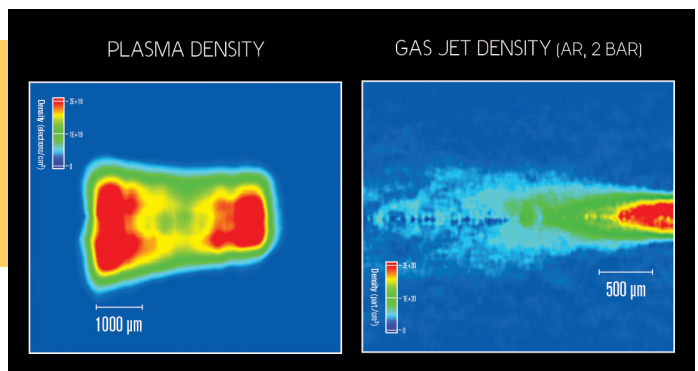
Beam profile: Energy distribution, intensity centroid

II – GAS & PLASMA DENSITY HIGH SENSITIVITY & REPEATABLE MEASUREMENT

- High sensitivity (8x lower noise than Mach-Zender interferometer)
- Accurate at low gas pressure
- Repeatable shot-to-shot measurements to compare homogeneity (nozzle selection, laser pulse illumination...)

Easy & cost-effective set-up

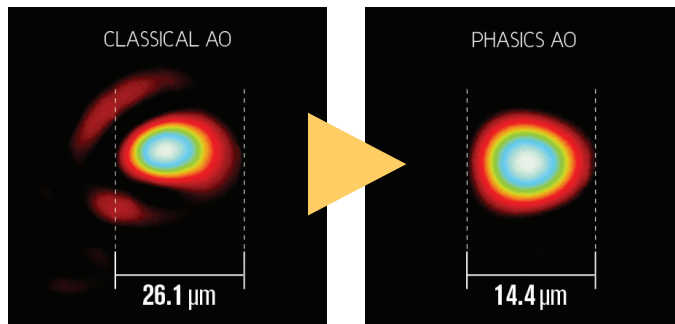
- No reference arm
- Any probe source : fs-laser, LED, halogen...



IN LASER EXPERIMENTS"

III - ADVANCED ADAPTIVE OPTICS WITH ANY DEFORMABLE MIRROR

- Telescope aberrations removal
- 3D dynamic pointing



Correction after the last parabola without any additional device to achieve the best possible focal spot.



IV - OPTICS ALIGNMENT & TESTING EASY DOUBLE PASS MEASUREMENT WITH R-CUBE INTEGRATED ILLUMINATION ADD-ON



- Large mirror testing
- Telescope aberrations removal
- Lens test and alignment
- Diagnostics beamline calibration

HIGH RESOLUTION WAVEFRONT SENSORS

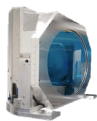
SID4 RANGE FROM UV TO IR



	Spectral range	Aperture dimension (mm ²)	Spatial resolution	Phase sampling (pixels)	Phase accuracy (absolute)	Phase resolution	Vacuum compatibility
SID4 UV	190-400 nm	7.8 x 7.8	26 µm	300 x 300	15 nm RMS	2 nm RMS	-
SID4 UV HR	190-400 nm	13.3 x 13.3	26 µm	512 x 512	20 nm RMS	2 nm RMS	-
SID4 HR V	400-1100 nm	9.98 x 8.64	24 µm	416 x 360	20 nm RMS	2 nm RMS	10 ⁻⁶ 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	15.29 x 15.29	27.6 µm	554 x 554	-	5 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	1.2-2.2 µm	9.6 x 7.6	120 µm	80 x 64	<40 nm RMS*	<6 nm RMS*	-
eSWIR HR	1.2-2.2 µm	9.5 x 7.6	120 µm	159 x 127	<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	-

* For coherent sources

WITH ANY DEFORMABLE MIRROR



	High Power Laser			Imaging correction	Imaging correction & beam shaping
Technology	Piezo electric (small diameter)	Piezo electric (large diameter)	Mechanical of the latest generation (stepper motor)	Membrane	SLM
Number of actuators	up to 36	up to 150	up to 60	up to 80	1080 x 1920
Diameter	15-25 mm	300-400 mm	22-500 mm	10-30 mm	7-16 mm
Damage threshold	Very high (on-demand coating)			High	Medium
Loop speed	5-10 Hz	5-10 Hz	1 Hz	5-10 Hz	5-10 Hz



DEDICATED SOFTWARE PACKAGES

- **SID4 density module** for plasma diagnosis
- **OASys module** for adaptive optics
- **SID4** for beam analysis



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