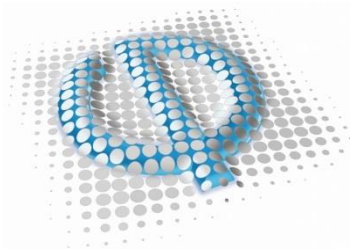


Advanced wavefront sensing solutions
for laser testing, optics metrology &
microscopy



PHASICS
The phase control company

- About PHASICS
- Product range
- Technology principle and advantages
- Solutions for laser testing
- Solutions for optics metrology
- Solutions for microscopy

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- **2003:** creation - Spin-off from **LULI laboratory** (Ecole Polytechnique - CNRS)
- Patent technology developed by **ONERA** (French National Aerospace lab)
- HQ in France - Saint Aubin (Paris area): 200m² clean room for production and calibration
- Office in the USA – Boulder – CO
- **Strong R&D** to introduce new features
- ISO 9001 Certification



◆ Customer
φ Office
φ Distributors

More than **1500** systems delivered

Worldwide presence :
90 % export turnover

French & US offices, distributors in China, Japan, Korea...


OUR CORE COMPETENCY

WAVEFRONT

ACQUISITION & ANALYSIS

Innovative patented wavefront sensing technology

« 4-Wave Lateral Shearing Interferometry »



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Wavefront measures how the light deforms when propagating through the specimen of interest. It enables characterizing:

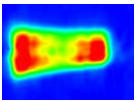
LASER



Laser Beam testing
Phase, beam profile, M², Waist, Reileigh length Zernike...

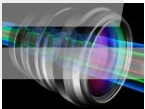


Adaptive Optics
Focal spot correction, Beam shaping

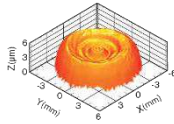


Gas/Plasma density measurement

OPTICS



Lens Quality Control
MTF & aberrations
Off axis & broadband

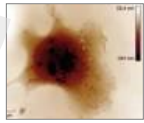


Surface testing
3D surface quality, Radius of curvature

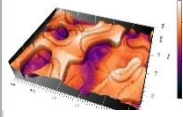


Intraocular lens ISO standard control
Toric, aspheric, bifocal

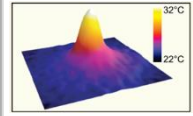
MICROSCOPY



Life Science
Label-free imaging



Material inspection
Metasurface, Wave guide RI measurement



Thermal imaging

All products are **based on our patented technology**

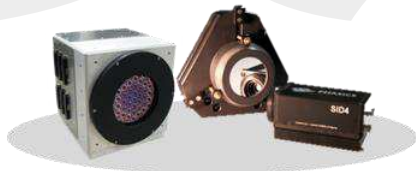
► High resolution wavefront sensors

SID4
From
Deep UV
to Far IR



Customized hardware and software for each application:

LASER



OASys

Wavefront sensor +
deformable mirror

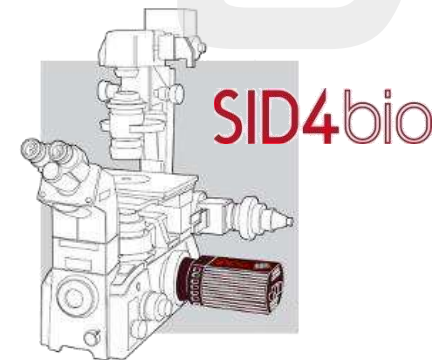
OPTICS METROLOGY



Kaleo

OEM solution & integrated bench

BIOLOGY

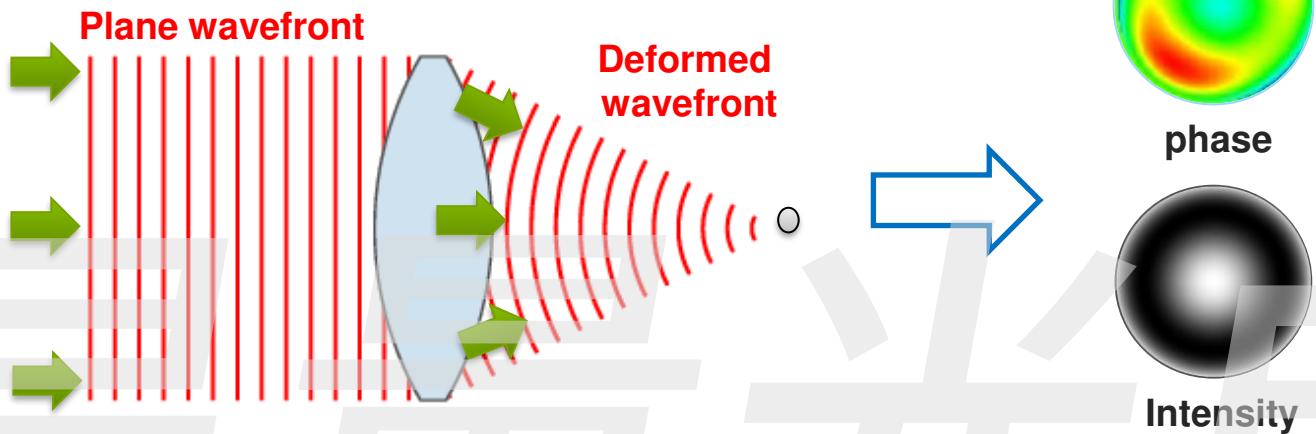


SID4bio

Plug & play camera

Wavefront Sensor Technology

Wavefront represents how the light propagates:
WAVEFRONT DEFORMATION → INFORMATION

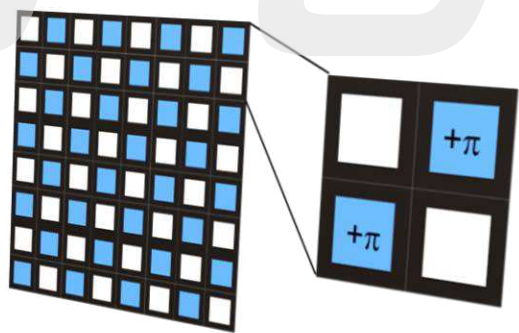


PHASICS patented technology: 4-Wave Lateral Shearing Interferometry

► Developed to overcome Shack-Hartmann sensor limitations

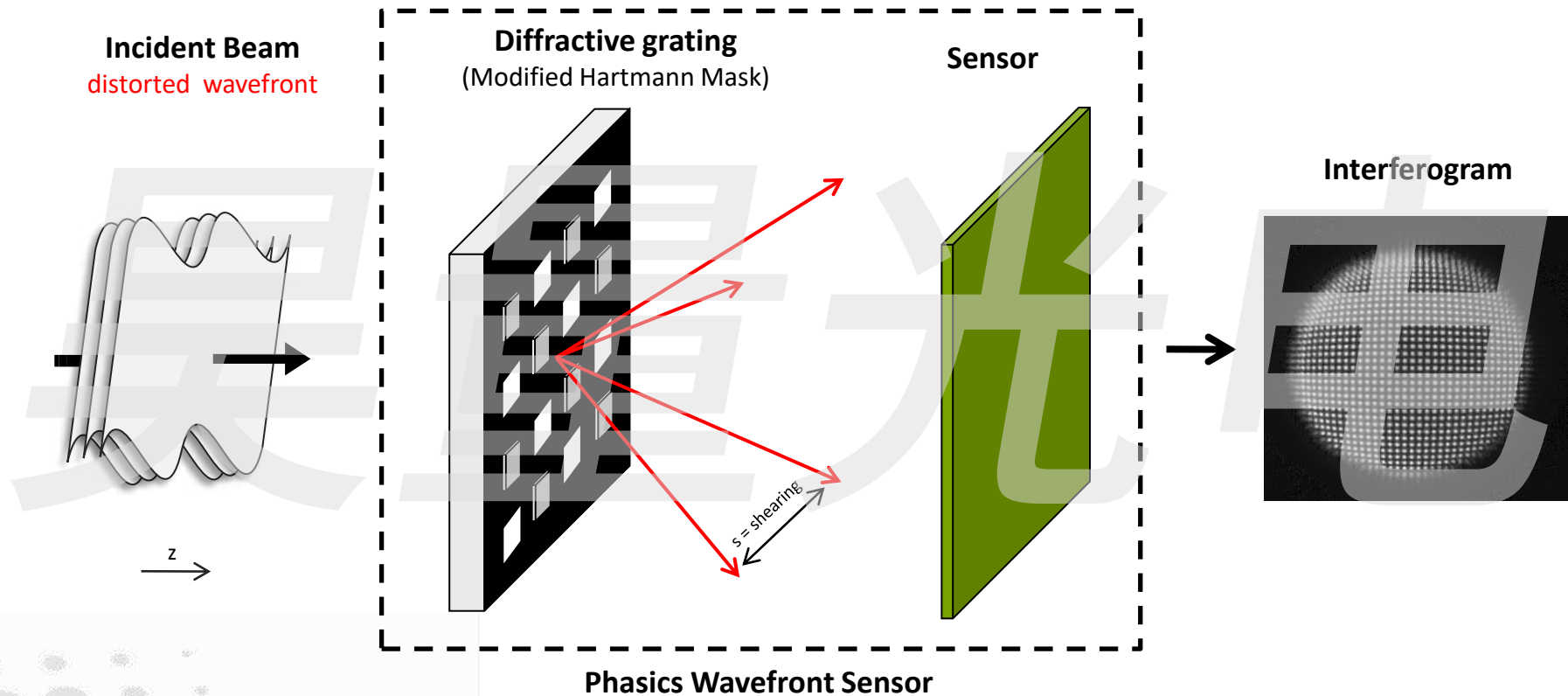
<p><u>1900</u> Hartmann Mask</p>  <p>Holes</p>	<p><u>1970</u> Shack Hartmann Mask</p>  <p>Micro lenses array</p>
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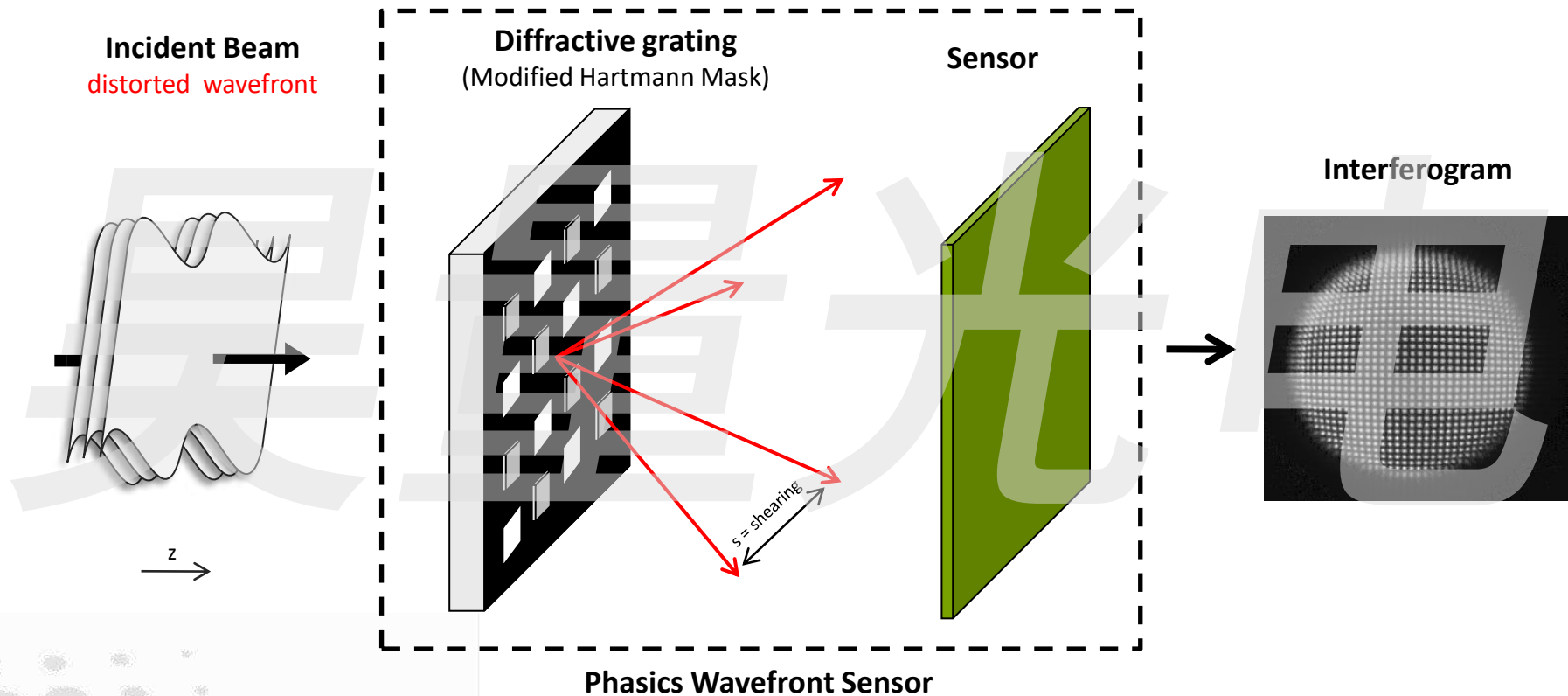
2000
Modified Hartmann Mask



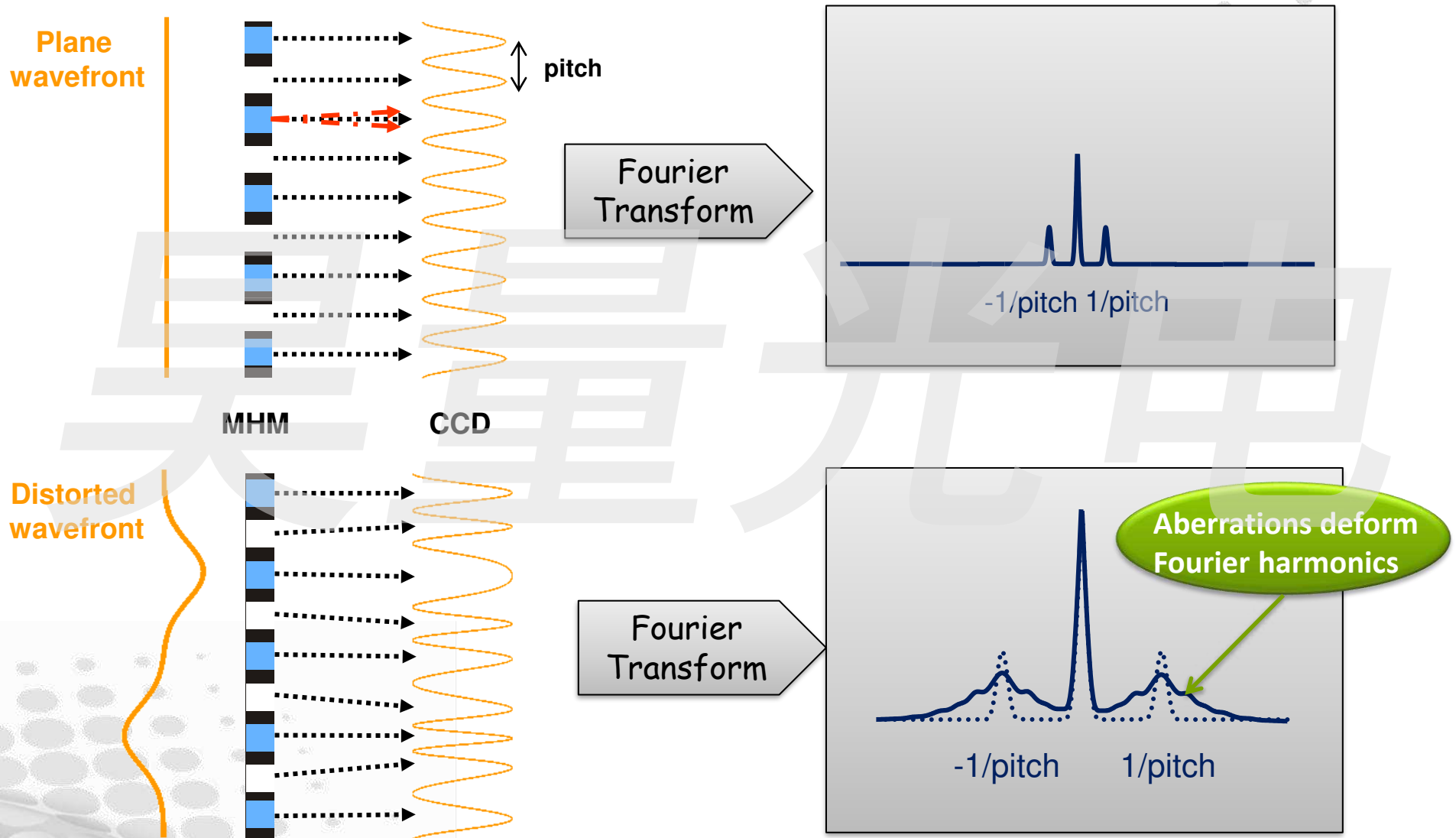
Diffractive grating
PHASICS

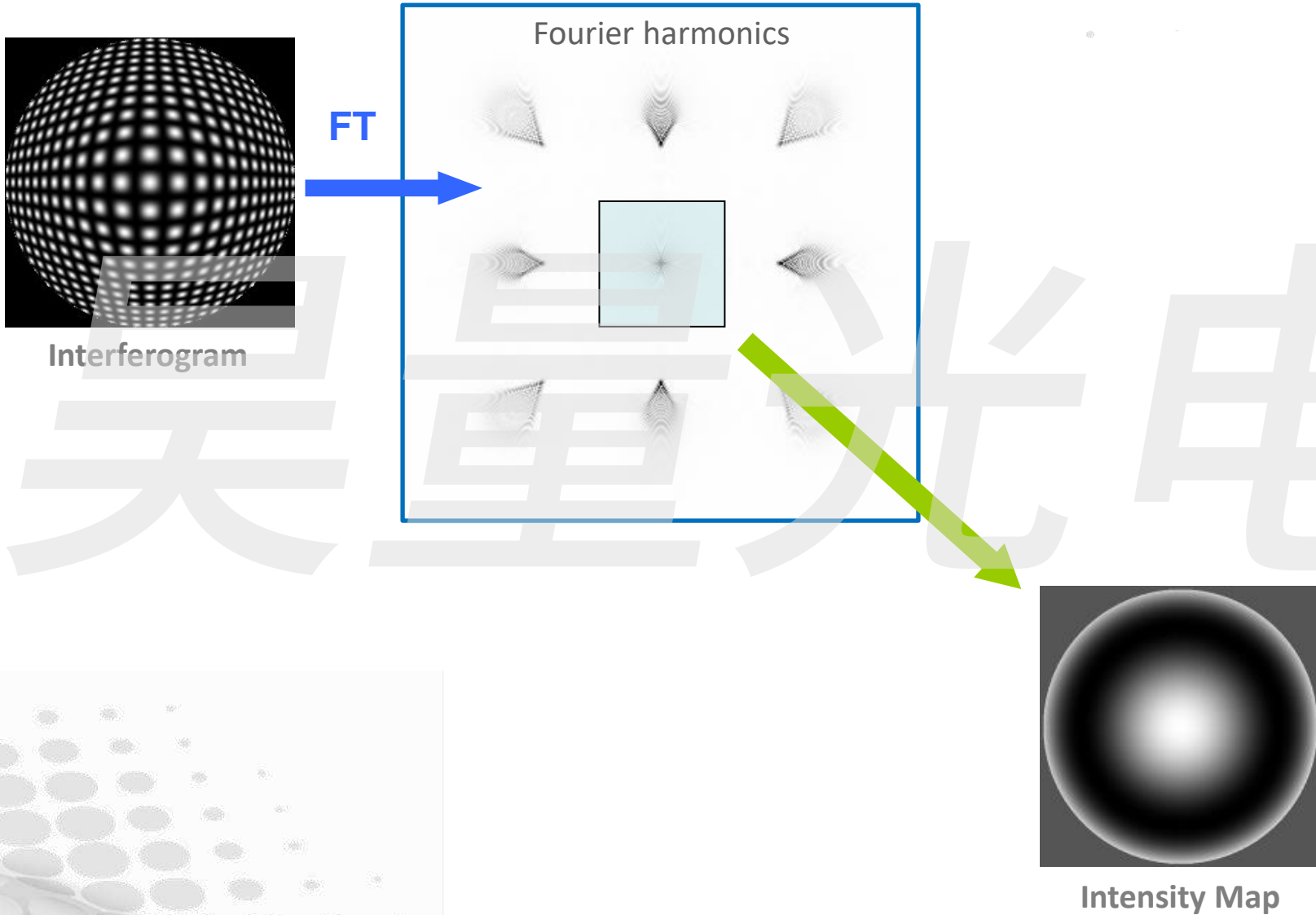
► Improves it and opens the path to new applications



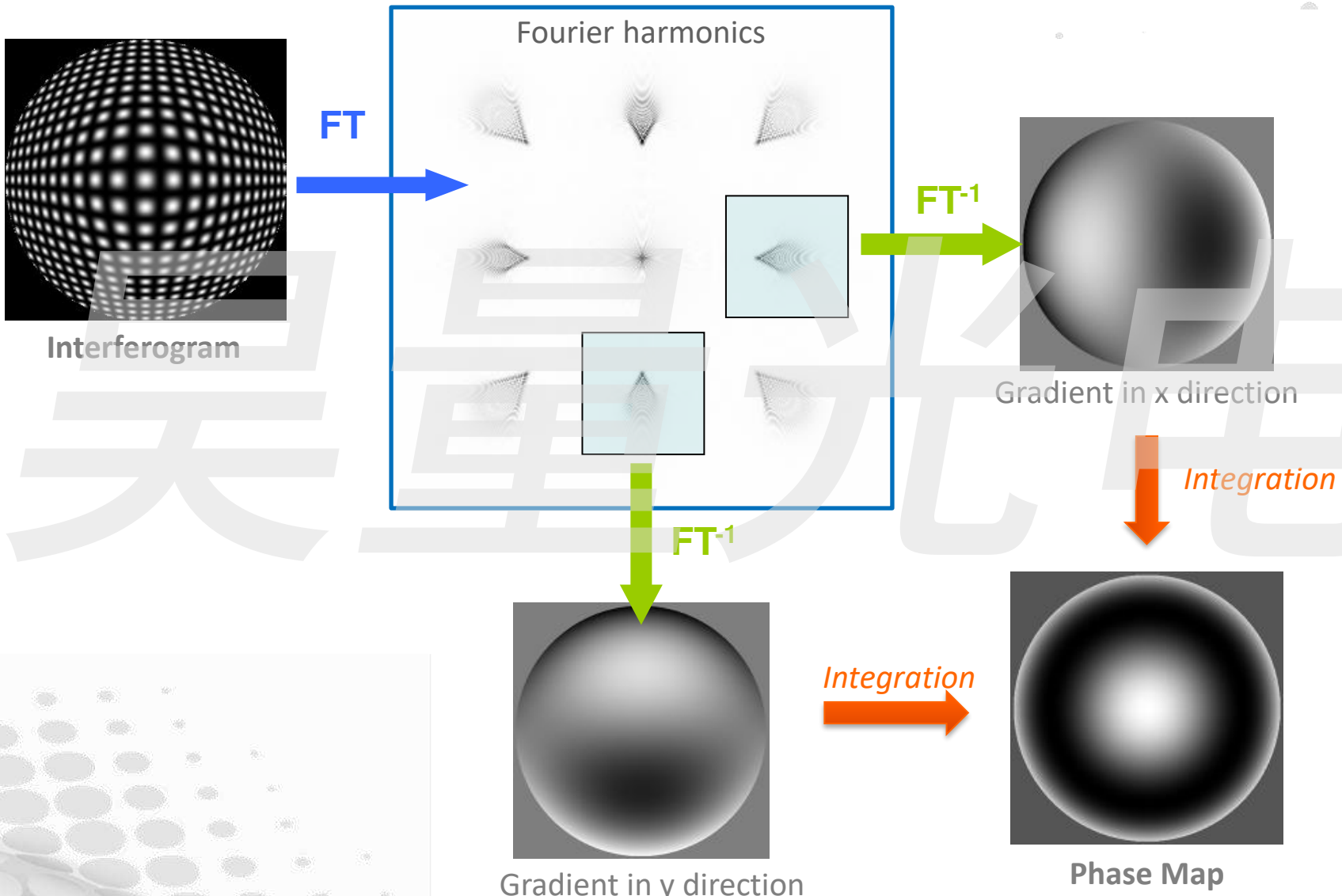


Analysis with Fourier Transform



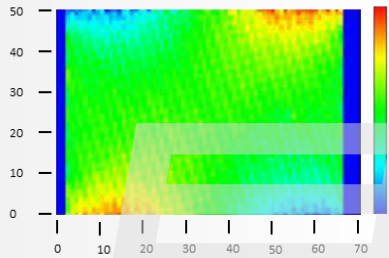


Analysis with Fourier Transform



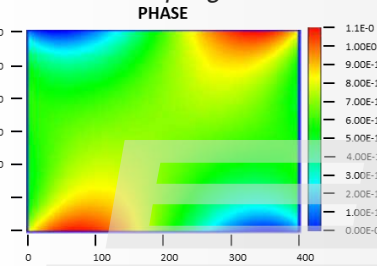
High resolution

Shack Hartmann:



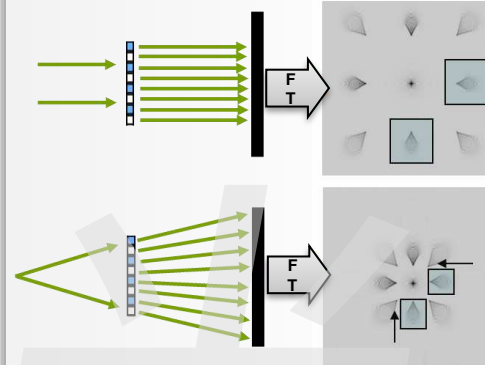
Phasics:

16 times sampling resolution



- High Phase Sampling up to 850 x 720
- Reduced uncertainties & noise
- Enhanced accuracy and repeatability
- High order Zernike projection

Large dynamic range

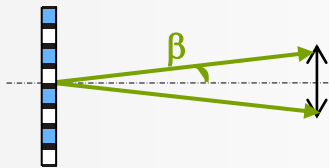


- Handles high NA divergent beam up to 0.7
- Flexible to measure focal system after its focal spot
- Large aberrations measurement up to 500 μm PV (defocus)

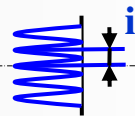


Achromaticity

Diffractive optic



Interferometry



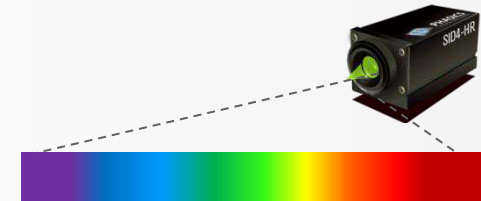
- Interferogram is not wavelength dependent
- The technology itself is achromatic

Achromatic three-wave (or more) lateral shearing interferometer

Jérôme Primot, L. Sogno

November 1995 Journal of the Optical Society of America A 12(12):2679-2685

Operating within all the wavelength range of the detector without calibration



Large range of applications areas

From lithography in UV to security defense in IR

