

SINGLE-SHOT MULTISPECTRAL WAVEFRONT SENSOR FOR LASER BEAM CHARACTERIZATION AND QUANTITATIVE PHASE BIO-IMAGING

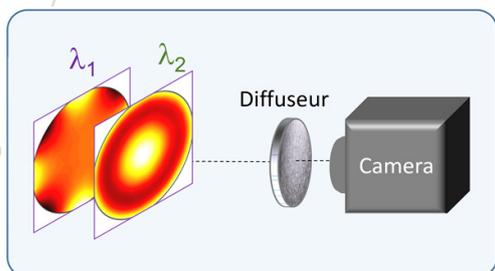
This innovative system allows simultaneous wavefront shapes measurement at different wavelengths in a single acquisition step, of the broadband or multi-line light beam.

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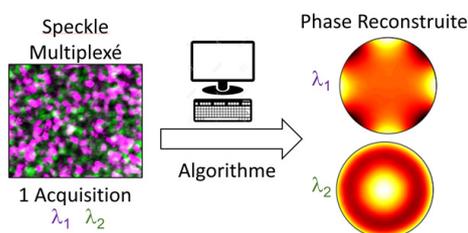
L'AVENIR EST FAIT D'AUDACE

PRESENTATION

All existing Wavefront sensors (WFS) can only measure several wavefronts by sequential image acquisition. Sequential multi-spectral WFS has several drawbacks: it is difficult to implement, expensive, and incompatible with single-pulse laser characterization. This innovative system now allows simultaneous wavefront shapes measurement at different wavelengths using the multi-spectral (broadband or multi-line) light beam. It relies on the recent development of a wavefront analyzer (DiPSI) based on the use of a simple diffuser that obviates all these drawbacks by performing spectral measurements simultaneously. This aspect is advantageous for a variety of applications such as optical metrology, laser metrology, quantitative phase imaging and ophthalmology.



Multi-spectral wavefront analyzer - Wavefront sensor (WFS)
Spatio-temporal wavefront analyzer - DiPSI
Quantitative Phase Imaging (QPI) - Ultra-short pulse laser



APPLICATIONS

- Spatio-temporal characterization of ultra-short pulse laser
- Single-shot 3D tomographic imaging for flow cytometry
- Optical metrology, freeform optic, metasurfaces
- Optical aberration measurements
- Ophthalmology
- Nanoparticle characterization

DEVELOPMENT PHASE

- ✓ TRL 4 for the characterization of pulsed laser
- ✓ TR2-3 for QPI

INTELLECTUAL PROPERTY

Patent application filed in March 2019

CONTACT

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COMPETITIVE ADVANTAGES

- Based on DiPSI solution (Diffuser Phase Sensing and Imaging): simple, modular, broadband, high-sensitivity and high spatial resolution WFS
- Easy to implement, modular and low cost by avoiding the use of many filters
- Performs spatial and/or spectral measurements simultaneously, which facilitate its application to quickly evolving systems

PUBLICATIONS

Pascal Berto, Hervé Rigneault, and Marc Guillon, «Wavefront sensing with a thin diffuser», Opt. Lett. 42, 5117-5120 (2017). DOI: 10.1364/OL.42.005117