SHACK-HARTMANN SENSOR
WAVEFRONT AND BEAM CHARACTERIZATION

The Shack-Hartmann wavefront sensor provides accurate characterization and precision adjustment of laser beams and optics. Using a microlens array, the input beam is split into a large number of partial rays. Position and intensity of the foci are monitored with a camera, allowing for wavefront and beam profile reconstruction from a single measurement.

Thus, real-time evaluation of beam parameters such as diameter, divergence and M^2 is possible, as well as the prediction of the propagation behavior. Furthermore, a Zernike analysis accomplishes the precise characterization of optical elements.

FEATURES

▲ Wide spectral range EUV-NIR
▲ White light capability
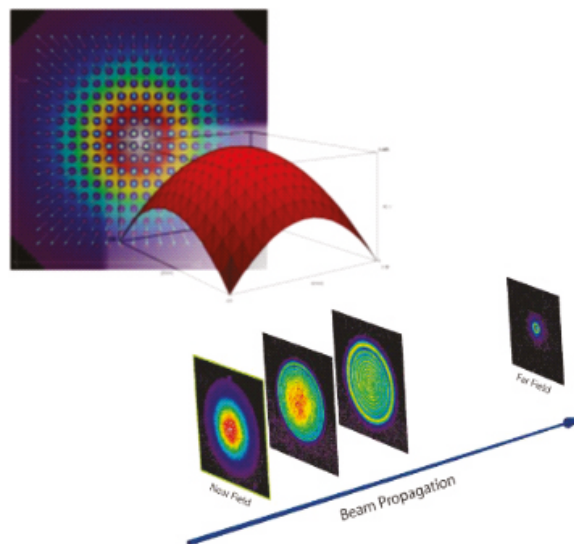▲ Many combinations of cameras and micro lens arrays
▲ Customization

APPLICATIONS

▲ ISO beam characterization
▲ Beam propagation/M^2 in real time
▲ Optics characterization
▲ Photothermal absorption measurements

SOFTWARE

▲ Fast measurement and evaluation
▲ Intuitive graphics, diagrams and data views
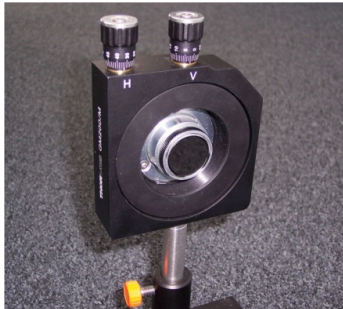▲ Macro language for measurement automation

With a single shot, the intensity and phase distribution of a laser beam is accurately measured. It qualifies the prediction of beam propagation behavior as well as M^2 determination.

Beam profiles can be computed for any location along the beam path, by Fresnel-Kirchhoff integration. The propagated profiles show an excellent agreement with directly measured camera data. This is of particular interest in case of very small foci and for measuring variations of laser sources and optics over time.

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STANDARD SENSOR

▲ ISO laser diagnostics
▲ Optics fine-adjustment
▲ Wavefront correction

MEASURING SOLUTIONS

▲ Optical material testing
▲ Thermal lensing
▲ Sub nm resolution

UV/EUV/X-RAY SENSOR

▲ Large area sensors
▲ Hartmann plate for λ<100nm
▲ Customized solutions
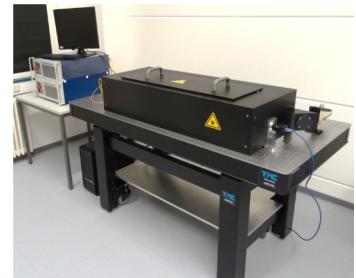
SPECIFICATIONS

Model [1]	Standard Sensor	UV/EUV/X-Ray Sensor
Active area	8.8 x 6.6 mm^2	16 x 16 to 28 x 24 mm^2
Spectral range	300 - 1100 nm	<1 nm - 1100 nm
Frame rate	2 - 12 fps	0.5 -2 fps
Wavefront resolution (abs)	up to λ/50 to λ/100 (rms) @ 633 nm	
Wavefront resolution (rel) [2]	up to λ/1000 @ 633 nm	
Dynamic range	10 mrad	
Trigger	yes	
Interface	USB or Ethernet	

1) Typical values. Other cameras and micro lens arrays as well as customized solutions are available. Please contact us for more details.
2) Depending on optical setup. Customized version with up to λ/10000 @ 633 nm possible.