QUICK GUIDE TO THE CATALOGUE

ABOUT THIS CATALOGUE

This catalogue provides an overview of Imagine Optic’s lines of products and services as well as general information on each of them.

It is an interactive catalogue with links to more detailed content:

- Underlined text will take you to another page of this catalogue;
- Full Specification Sheet buttons will draw a PDF from our website;
- Buy Online buttons will take you to the Software and Accessories pages in our Webstore.

ABOUT IMAGINE OPTIC

Imagine Optic is a company comprising over 60 people and specializing in wavefront expertise. It has a strong engineering and R&D culture and a 25-year track record in providing ultra-precise wavefront sensors and adaptive optics solutions.

Our clients are leading tech corporations and public research institutions in a wide range of sectors, including astronomy, air & space, eyewear, ultra-intense lasers, microscopy, transportation and many more. They are as wide and varied as the uses and applications of optics and photonics.

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THE BIG LIFT

SHACK-HARTMANN SENSING, WITH A LIFT

Coming this spring is a very special gift for Imagine Optic’s 25th birthday: the HASO gets a 16-fold phase-point resolution enhancement by combining Shack-Hartmann technology with a phase retrieval algorithm applied at microlens scale.

Developed from the designs of our HASO4 Broadband and HASO4 126 VIS, the HASO LIFT 272 and LIFT 680 will perform on par with their counterparts in every aspect, and they will also be able to reach 272 x 200 and 680 x 504 phase-point resolution, respectively.

Applications that will benefit from these new sensors range from complex optical systems to freeforms and metasurfaces, but not only these; the sensors’ versatility means that many optical scientists and engineers will be able to take advantage of their superb accuracy.

A NEW SPECIES OF WAVEFRONT SENSORS

Just a few months after the debut of the “Swiss Army Knife of Optics” in the visible and SWIR wavelengths, another series of truly versatile tools demonstrates Imagine Optic’s commitment to providing the optical scientist or engineer with cutting-edge yet user-friendly instruments.

On top of combining a high-resolution mode with all the benefits that make Shack-Hartmann one of the most relied-upon technologies in optical metrology, our HASO LIFT series embeds a fully revamped Waveview4, including the absolute tilt measurement SpotTracker technology and numerous other options.

All our other HASO4 wavefront sensors will be available with a LIFT option in the coming months.

Wavefronts measured from the same phase-hologram sent to an SLM
HASO LIFT 272
The only 400 - 800 nm High-Resolution Alignment-Free Wavefront Sensor

The HASO LIFT 272 is the HR version (x16 resolution) of our most versatile wavefront sensor. It features a 272x200 phase-points resolution as well as the new SpotTracker technology, providing absolute wavefront and tilt information and eliminating alignment requirement.

**BEST FOR VERSATILITY**
- A great choice for lab or industrial applications
- Successfully used in the most demanding applications in optical metrology, microscopy and laser diagnostics
- Optimize the alignment of complex systems
- On and off-axis 3D MTF

**SOFTWARE**
- WAVEVIEW metrology software with 150 functions included + Extensions for PSF, MTF and Strehl ratio + Optional SDK for interfacing with any custom system
- WAVETUNE Adaptive Optics software + Extensions for AO applications + Optional SDK for interfacing with any custom system
- Windows10 compatible

**ABSOLUTE ACCURACY (RMS)**
<table>
<thead>
<tr>
<th>λ/100</th>
<th>λ/200</th>
</tr>
</thead>
</table>

**REPEATABILITY (RMS)**
| 272 x 200 |
| 5.2 x 7.0 |

**PHASE-POINTS RESOLUTION**
| 272 x 200 |

**PUPIL SIZE (mm²)**
| 5.2 x 7.0 |

**MAX. FRAME RATE (Hz)**
| 20 |

**WAVELENGTH (nm)**
| 400 - 800 |

**INTERFACE**
| USB 3.0 |

HASO LIFT 680
The only 680x504 Phase-Points Resolution Alignment-Free Wavefront Sensor

The HASO LIFT 680 combines the highest resolution in Shack-Hartman technology and a very large dynamic range. It features the new SpotTracker technology, providing absolute wavefront and tilt information and eliminating alignment requirement.

**BEST FOR CHALLENGING APPLICATIONS**
- High spatial sampling frequency
- Very large dynamic range
- Freeform optics characterization
- Aspheric optics characterization
- High spatial frequency aberrations

**SOFTWARE**
- WAVEVIEW metrology software with 150 functions included + Extensions for PSF, MTF and Strehl ratio + Optional SDK for interfacing with any custom system
- WAVETUNE Adaptive Optics software + Extensions for AO applications + Optional SDK for interfacing with any custom system
- Windows10 compatible

**ABSOLUTE ACCURACY (RMS)**
<table>
<thead>
<tr>
<th>λ/100</th>
<th>λ/200</th>
</tr>
</thead>
</table>

**REPEATABILITY (RMS)**
| 680 x 504 |
| 10.21 x 13.78 |

**PHASE-POINTS RESOLUTION**
| 680 x 504 |

**PUPIL SIZE (mm²)**
| 10.21 x 13.78 |

**MAX. FRAME RATE (Hz)**
| 30 |

**WAVELENGTH (nm)**
| 400 - 800 |

**INTERFACE**
| USB 3.0 |
HASO wavefront sensors are delivered with a certificate of calibration that features all the required specifications, such as absolute and relative accuracy, tilt, and curvature sensitivities.

### 10 REASONS WHY

over 1500 HASOs are at work for scientists and industry specialists worldwide.

1. **Real-time measurement**
2. **Achromatic**
3. **Typical absolute measurement accuracy of l/100 RMS**
4. **Linearity > 99.9%**
5. **Huge dynamic range > 1000 λ**
6. **Wavefront measurement uncorrelated with beam intensity profile**
7. **Simple and robust technology**
8. **Insensitive to vibrations**
9. **Light-sensitive detector, less than 100 picouoles required**
10. **Suitable for any beam profiles, user mask not mandatory**

### PRODUCT NAME | ABSOLUTE ACCURACY (RMS) | REPEATABILITY (RMS) | MICROLENS NUMBER | PUPIL SIZE (mm²) | MAX. FRAME RATE (Hz) | WAVELENGTH (nm) | INTERFACE | SPOTTRACKER INSIDE
--- | --- | --- | --- | --- | --- | --- | --- | ---
HASO LIFT 272 | λ/100 | λ/200 | 50 x 68 | 5.2 x 7.0 | 20 | 400 - 800 | USB 3.0 | X
HASO LIFT 680 | λ/100 | λ/200 | 126 x 170 | 10.21 x 13.78 | 30 | 400 - 800 | USB 3.0 | X
HASO4 SWIR | λ/100 | λ/200 | 32 x 40 | 7.44 x 9.30 | 150 | 900 - 1700 | USB 3.0 | X
HASO4 SWIR 1550 | λ/100 | λ/200 | 32 x 40 | 3.60 x 4.5 | 99 | 1500 - 1600 | USB 3.0 | X
HASO4 Broadband | λ/100(3) | λ/200 | 50 x 68 | 5.2 x 7.0 | 20 | 350 - 1100 | USB 3.0 or GigE | X
HASO4 126 VIS | λ/100 | λ/200 | 126 x 170 | 10.21 x 13.7 | 30 | 400 - 800 | USB 3.0 | X
HASO4 FIRST | λ/100 | λ/200 | 32 x 40 | 3.6 x 4.6 | 99(5)/165(4) | 400 - 1100(6) | USB 3.0 | X
HASO4 FAST | λ/100 | λ/200 | 16 x 16 | 1.19 x 1.19 | 1000 | 400 - 900 | USB 3.0 | X
HASO EUV | λ/50 | λ/200 | 72 x 72 | 13 x 13 | 1 | 4 - 40 | USB 2.0 | X
HASO HXR | λ/10 | λ/30 | 150 x 150 | 3 x 3 | 10 | 0.05 - 0.25 (5-25keV) | USB 3.0 | X

(1) : < 6nm for wavelengths between 400 and 600 nm. The absolute accuracy may decrease slightly for wavelengths longer than 800 nm. For wavelengths above 950 nm, accuracy is ensured for source with coherence length smaller than 3 mm.
(2) : 160 Hz available in partial scan mode
(3) : Range of wavelengths for wavefront sensor calibration. The indicated absolute accuracy is valid in the calibration wavelength +/-50 nm. One or two calibration wavelengths can be chosen in the 400-1100 nm range. In case of two calibration wavelengths, the longer wavelength must not exceed two times the shorter one.

HASO wavefront sensors are delivered with a certificate of calibration that features all the required specifications, such as absolute and relative accuracy, tilt, and curvature sensitivities.
The R-FLEX2 SWIR is the second generation of our versatile optical metrology system in the 1000-1700 nm range that instantly combines our HASO4 SWIR or HASO4 SWIR 1550 wavefront sensors with a collimator and a light source.

**R-FLEX2 SWIR**

- SWIR optical characterization

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**R-FLEX LA SWIR**

30-75-100-150 mm

- The R-FLEX LA is the collimating platform that extends the capabilities of the HASO R-FLEX2 SWIR to large optics and optical surfaces. The output collimated beam size ranges from 30 to 150 mm.

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**Popular Applications**

- Characterize optical surfaces
- Characterize chromatic aberrations
- Analyze the transmitted wavefront of optical systems with double-pass configuration
- Optimize the alignment of complex systems
- On and off-axis 3D MTF

**Plug and Click**

- Standard or Custom adaptable F# modules
- HASO4 SWIR and HASO4 SWIR 1550 compatible
- R-FLEX LA SWIR compatible
- Standard or Custom Single Mode Laser Source
- Waveview4 software

**Key Specs**

- Multiple options as per focusing objectives and collimating beam sizes
- λ/200 rms measurement accuracy in double-pass configuration
- Insensitive to vibrations and atmospheric turbulence

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**Key Features**

- Extends the capabilities of R-FLEX2 SWIR for analyzing large optics and optical surfaces such as filters, dichroic beam splitters, head-up displays, eyewear, optical windows, flat mirrors, polarization scramblers.

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**Key Specs**

- 1000 – 1700 nm wavelength
- Insensitive to vibration
- Beam 30-150 mm φ
- Up to 1280 sampling points
- Up to 150 Hz acquisition frequency

---

**Full Spec Sheet**

<table>
<thead>
<tr>
<th></th>
<th>HASO4 SWIR</th>
<th>HASO4 SWIR 1550</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement Points</td>
<td>Up to 1280</td>
<td>Up to 1280</td>
</tr>
<tr>
<td>Max acquisition freq.</td>
<td>150 Hz</td>
<td>99 Hz</td>
</tr>
</tbody>
</table>
# HASO4 SWIR

900-1700 nm Alignment-Free Wavefront Sensor

The HASO4 SWIR is based on an InGaAs camera, offering high accuracy, large dynamic range and high-speed acquisition frequency. It features the new SpotTracker technology, providing absolute wavefront and tilt information and eliminating alignment requirements.

### BEST FOR
- Optical metrology
- Adaptive optics applications such as long-range communication
- Optimizing the alignment of complex systems
- Light-source characterization

### SOFTWARE
- **WAVEVIEW** metrology software with 150 functions included
  + Extensions for PSF, MTF and Strehl ratio
  + Optional SDK for interfacing with any custom system
- **WAVETUNE** Adaptive Optics software
  + Extensions for AO applications
  + Optional SDK for interfacing with any custom system
- Windows 10 compatible

### APPLICATION NOTE

**SpotTracker inside**

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# HASO4 SWIR 1550

For Telecommunications and SWIR Lasers

The HASO4 SWIR 1550 is the ideal tool for fiber coupling and, more generally, for aligning and characterizing optical systems at 1550 nm (afocal, collimators, lenses, zoom, etc.).

### BEST FOR
- Telecommunications
- IR Lasers
- SWIR lasers
- Optical systems in the SWIR
- LiDAR application

### SOFTWARE
- **WAVEVIEW** metrology software with 150 functions included
  + Extensions for PSF, MTF and Strehl ratio
  + Optional SDK for interfacing with any custom system
- **WAVETUNE** Adaptive Optics software
  + Extensions for AO applications
  + Optional SDK for interfacing with any custom system
- Windows 10 compatible

### ABSOLUTE ACCURACY (RMS) |
**λ/100** | **λ/200** | **32 x 40** | **7.44 x 9.30** | **150** | **900 - 1700** | **USB 3.0**

### REPEATABILITY (RMS) |
**λ/100** | **λ/200** | **32 x 40** | **7.44 x 9.30** | **150** | **900 - 1700** | **USB 3.0**

### MICROLENS NUMBER |
**32 x 40**

### PUPIL SIZE (mm²) |
**7.44 x 9.30**

### MAX. FRAME RATE (Hz) |
**150**

### WAVELENGTH (nm) |
**900 - 1700**

### INTERFACE |
**USB 3.0**

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**FULL SPEC SHEET**
R-FLEX2
Visible & NIR optical characterization

R-FLEX2 is the second generation of our versatile optical metrology system that instantly combines any of our HASO4 wavefront sensors in the 400-1100 nm range with a collimator and a light source.

POPULAR APPLICATIONS
- Characterize optical surfaces
- Characterize chromatic aberrations
- Analyze the transmitted wavefront of optical systems with double-pass configuration
- Optimize the alignment of complex systems
- On and off-axis 3D MTF

PLUG AND CLICK
- Standard or Custom adaptable F# modules
- R-FLEX LA compatible
- Standard or Custom Single Mode Laser Source
- Waveview4 software

KEY SPECS
- Multiple options as per focusing objectives and collimating beam sizes
- λ/200 RMS measurement accuracy in double-pass configuration
- Insensitive to vibrations and atmospheric turbulence

FULL SPEC SHEET

HASO4 30-75-100-150 mm

R-FLEX LA

The R-FLEX LA is the collimating platform that extends the capabilities of the HASO R-FLEX2 to large optics and optical surfaces. The output collimated beam size ranges from 30 to 150 mm.

KEY FEATURES
- Extends the capabilities of R-FLEX2 for analyzing large optics and optical surfaces such as filters, dichroic beam splitters, head-up displays, eyewear, optical windows, flat mirrors, polarization scramblers.

KEY SPECS
- 400 – 1100 nm wavelength
- Insensitive to vibration
- Beam 30-150 mm φ
- Up to 21,000 sampling points
- Up to 1 kHz acquisition frequency

FULL SPEC SHEET

<table>
<thead>
<tr>
<th>Measurement Points</th>
<th>HASO4 BROADBAND</th>
<th>HASO4 128 VIS</th>
<th>HASO4 FAST</th>
<th>HASO4 FIRST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Frequency</td>
<td>30 Hz</td>
<td>30 Hz</td>
<td>1000 Hz</td>
<td>99 Hz</td>
</tr>
</tbody>
</table>
The HASO4 BroadBand is our most versatile wavefront sensor. This newly released second edition features the new SpotTracker technology. Providing absolute wavefront and tilt information and eliminating alignment requirements.

**BEST FOR VERSATILITY**
- A great choice for lab or industrial applications
- Successfully used in the most demanding of applications in optical metrology, microscopy and laser diagnostics.
- Optimize the alignment of complex systems
- On and off-axis 3D MTF

**SOFTWARE**
- **WAVEVIEW** metrology software with 150 functions included
  + Extensions for PSF, MTF and Strehl ratio
  + Optional SDK for interfacing with any custom system
- **WAVETUNE** Adaptive Optics software
  + Extensions for AO applications
  + Optional SDK for interfacing with any custom system
- Windows10 compatible

**FULL SPEC SHEET**

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The HASO4 126 VIS is the perfect wavefront sensor for applications that require high sampling density or a very large dynamic range. It features the new SpotTracker system, providing absolute wavefront and tilt information and eliminating alignment requirement.

**BEST FOR CHALLENGING APPLICATIONS**
- High spatial sampling frequency
- Very large dynamic range
- Freeform optics characterization
- Parabolic mirrors characterization
- High spatial frequency aberrations

**SOFTWARE**
- **WAVEVIEW** metrology software with 150 functions included
  + Extensions for PSF, MTF and Strehl ratio
  + Optional SDK for interfacing with any custom system
- **WAVETUNE** Adaptive Optics software
  + Extensions for AO applications
  + Optional SDK for interfacing with any custom system
- Windows10 compatible

---

**ABSOLUTE ACCURACY (RMS)** | **REPEATABILITY (RMS)** | **MICROLENS NUMBER** | **PUPIL SIZE (mm²)** | **MAX. FRAME RATE (Hz)** | **WAVELENGTH (nm)** | **INTERFACE**
---|---|---|---|---|---|---
λ/100 | λ/200 | 50 x 68 | 5.2 x 7.0 | 20 | 350 - 1100 (2) | USB 3.0 or GigE

---

**ABSOLUTE ACCURACY (RMS)** | **REPEATABILITY (RMS)** | **MICROLENS NUMBER** | **PUPIL SIZE (mm²)** | **MAX. FRAME RATE (Hz)** | **WAVELENGTH (nm)** | **INTERFACE**
---|---|---|---|---|---|---
λ/100 | λ/200 | 126 x 170 | 10.21 x 13.78 | 30 | 400 - 800 | USB 3.0
**HASO4 FIRST**

Quality Wavefront Sensing in the 400-1100 nm Spectrum

The HASO4 First is based on a camera on par with the best industrial standards in terms of reliability, and it offers high wavefront measurement performance, factory calibration and advanced software capabilities.

**BEST FOR**
- Adaptive Optics applications for microscopy or UHIL
- OEM applications in optical metrology and beam diagnostics
- AO for high-power laser optimization

**SOFTWARE**
- **WAVEVIEW** metrology software with 150 functions included
  - Extensions for PSF, MTF and Strehl ratio
  - Optional SDK for interfacing with any custom system
- **WAVETUNE** Adaptive Optics software
  - Extensions for AO applications
  - Optional SDK for interfacing with any custom system
- Windows10 compatible

**FULL SPEC SHEET**

<table>
<thead>
<tr>
<th>ABSOLUTE ACCURACY (RMS)</th>
<th>REPEATABILITY (RMS)</th>
<th>MICROLENS NUMBER</th>
<th>PUPIL SIZE (mm²)</th>
<th>MAX. FRAME RATE (Hz)</th>
<th>WAVELENGTH (nm)</th>
<th>INTERFACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>λ/100</td>
<td>λ/200</td>
<td>32 x 40</td>
<td>3.6 x 4.6</td>
<td>99/165(2) (2) see page 10</td>
<td>400 - 1100(3) (3) see page 10</td>
<td>USB 3.0</td>
</tr>
</tbody>
</table>

**HASO4 FAST**

1 kHz Wavefront Sensor

The HASO4 Fast combines a state-of-the-art CMOS camera with the core signature features of HASOs: absolute measurement, unequaled accuracy, high linearity and insensitivity to vibration.

**BEST FOR**
- Loops compensating for atmospheric turbulence
- Laser beam optimization
- Freespace communications

**SOFTWARE**
- **WAVEVIEW** metrology software with 150 functions included
  - Extensions for PSF, MTF and Strehl ratio
  - Optional SDK for interfacing with any custom system
- **WAVETUNE** Adaptive Optics software
  - Extensions for AO applications
  - Optional SDK for interfacing with any custom system
- Windows10 compatible

**FULL SPEC SHEET**

<table>
<thead>
<tr>
<th>ABSOLUTE ACCURACY (RMS)</th>
<th>REPEATABILITY (RMS)</th>
<th>MICROLENS NUMBER</th>
<th>PUPIL SIZE (mm²)</th>
<th>MAX. FRAME RATE (Hz)</th>
<th>WAVELENGTH (nm)</th>
<th>INTERFACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>λ/30</td>
<td>λ/200</td>
<td>16 x 16</td>
<td>1.19 x 1.19</td>
<td>1000</td>
<td>400 - 900</td>
<td>USB 3.0</td>
</tr>
</tbody>
</table>

**Adaptive Optics**
- **HASO4 FIRST**
  - Camera on par with the best industrial standards
  - High wavefront measurement performance
  - Factory calibration
  - Advanced software capabilities
- **HASO4 FAST**
  - State-of-the-art CMOS camera
  - Absolute measurement
  - Unequaled accuracy
  - High linearity
  - Insensitivity to vibration

**Microscopy**
- **HASO4 FIRST**
  - Reliable camera
  - High wavefront sensing
  - Software with 150 functions
- **HASO4 FAST**
  - Advanced software
  - Wavefront optimization

**Beam Diagnostics**
- **HASO4 FIRST**
  - High accuracy
  - Software with PSF, MTF, and Strehl ratio
  - Interfacing SDK
- **HASO4 FAST**
  - Software for AO applications
  - Interfacing SDK

**Optics**
- **HASO4 FIRST**
  - High reliability
  - Software for AO
  - Windows10 compatibility
- **HASO4 FAST**
  - Software for AO
  - Windows10 compatibility

**Software**
- **WAVEVIEW**
  - 150 functions
  - Extensions for PSF, MTF, and Strehl ratio
  - Interfacing SDK
- **WAVETUNE**
  - Adaptive Optics software
  - Extensions for AO applications
  - Interfacing SDK

**Windows Compatibility**
- **HASO4 FIRST**
  - Windows10 compatible
- **HASO4 FAST**
  - Windows10 compatible
HASO EUV
HHG, synchrotron, EUV-FEL, new generation lithography

The HASO EUV offers unsurpassed quality, precision and ease of use for ultra-short wavelength beam characterization, adjustment and alignment.

**BEST FOR**
- HHG, synchrotron and EUV-FEL beam alignment and characterization
- Mirror alignment in beamlines, Bender optimization
- Stability characterization
- Schwarzschild telescope alignment and characterization
- Zoneplate characterization
- Plasma science

**SOFTWARE**
- **WAVEVIEW** metrology software with 150 functions included
  - Extensions for PSF, MTF and Strehl ratio
  - Optional SDK for interfacing with any custom system
- **WAVETUNE** Adaptive Optics software
  - Extensions for AO applications
  - Optional SDK for interfacing with any custom system
- Windows10 compatible

**FULL SPEC SHEET**

<table>
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<tr>
<th></th>
<th>ABSOLUTE ACCURACY (RMS)</th>
<th>REPEATABILITY (RMS)</th>
<th>MICROHOLES NUMBER</th>
<th>PUPIL SIZE (mm²)</th>
<th>MAX. FRAME RATE (Hz)</th>
<th>WAVELENGTH (nm)</th>
<th>INTERFACE</th>
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<tbody>
<tr>
<td>HASO EUV</td>
<td>λ/50</td>
<td>λ/200</td>
<td>72 x 72</td>
<td>13 x 13</td>
<td>1</td>
<td>4 - 40 (30 - 300 eV)</td>
<td>USB 2.0</td>
</tr>
</tbody>
</table>

HASO HXR
Broadband Hard X-Ray Wavefront Sensor

The HASO HXR offers live, single-shot wavefront measurement with high resolution, dynamic range and accuracy for beamline characterization and alignment. A perfect tool for synchrotron or X-FEL beamline scientists.

**BEST FOR**
- Source characterization
- Real-time alignment of optical systems, e.g. KB, toroidal, etc.
- Phase imaging of biological material, nanoparticles, archeological artifacts
- Precise driving of X-Ray active optics

**SOFTWARE**
- **WAVEVIEW** metrology software with 150 functions included
  - Extensions for PSF, MTF and Strehl ratio
  - Optional SDK for interfacing with any custom system
- **WAVETUNE** Adaptive Optics software
  - Extensions for AO applications
  - Optional SDK for interfacing with any custom system
- Windows10 compatible

**FULL SPEC SHEET**

<table>
<thead>
<tr>
<th></th>
<th>ABSOLUTE ACCURACY (RMS)</th>
<th>REPEATABILITY (RMS)</th>
<th>MICROLENS NUMBER</th>
<th>PUPIL SIZE (mm²)</th>
<th>MAX. FRAME RATE (Hz)</th>
<th>WAVELENGTH (nm)</th>
<th>INTERFACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HASO HXR</td>
<td>λ/10</td>
<td>λ/30</td>
<td>150 x 150</td>
<td>3 x 3</td>
<td>10</td>
<td>0.05 - 0.25 (5 - 25 keV)</td>
<td>USB 3.0</td>
</tr>
</tbody>
</table>
As the latest version of our acclaimed optical metrology software for HASO wavefront sensors and the HASO R-FLEX2 metrology system, it features our new SpotTracker technology. It provides absolute wavefront and tilt information, eliminating alignment requirements.

**KEY SPECS**
- Zonal and modal wavefront reconstruction; Real-time wavefront and intensity map
- Full-pupil wavefront reconstruction even with random obstructions
- Tilt and focus monitoring
- Zero latency

**SpotTracker**: Auto-detect & auto-correct angle deviation

**OPTIMIZED INTERFACE**
- 1-click access to main functions
- Same-type actions in same location
- Context-based menus
- Multi-instance panel display to easily compare wavefronts
- Custom dashboards

**PSF (Point Spread Function) & STREHL RATIO EXTENSION**
The PSF is calculated by combining the phase and intensity measurements on the sensor’s surface. The PSF module also provides the Strehl ratio, avoiding any need for a beam profiler.

**MTF (MODULATION TRANSFER FUNCTION) EXTENSION**
MTF is calculated for all directions at the same time. The MTF module also lets you compare your measurements to those of a perfect system.

Make the most of your HASO wavefront sensor with the PSF & Strehl Ratio or MTF extensions. Use our Software Development Kit to integrate our wavefront sensors into external and proprietary applications.

**WAVEKIT SDK / METROLOGY EDITION**
- Modal Wavefront Analysis + Intensity Analysis
- Integrate using either C/C++, PYTHON or Labview SDK
- Several hundred available functions
- Dozens of examples

Order Waveview4 or update/upgrade older Waveview versions from our webstore.

Order Waveview Extensions and our SDK Wavekit Metrology Edition from our webstore.
WaveKit SDK / FULL EDITION

WaveKit is intended for optical metrology scientists with programming skills who wish to develop their own application based on or integrating Imagine Optic systems.

The SDK user should be familiar with at least one of the API language (C / C++ / Python / Labview), and have a basic mastering of software development principles and practice.

IN THE BOX
- 2 m-long fiber patch cable
- 12V power adapter
- USB 2.0 interface for remote control

SMLS Laser Diodes
Reliable Optical Metrology Sources

Our single-mode fibered laser light sources provide a stable output for optical metrology applications. The compact, multi-function laser driver box is an ideal source for our HASO R-FLEX2 metrology system.

WAVEKIT SDK / FULL EDITION

WaveView Features
- Data acquisition (local or distant)
- Wavefront slopes computation
- Wavefront slopes processing

WaveTune Features
- Data acquisition (local or distant)
- Wavefront slopes computation
- Wavefront slopes processing
- Wavefront corrector control
- Adaptive optics loop

Options
- PSF
- MTF

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<th>METROLOGY</th>
<th>AO</th>
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<tr>
<td>WaveView Features</td>
<td>x</td>
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<td>x</td>
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<tr>
<td>Wavefront slopes computation</td>
<td>x</td>
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<td>Wavefront slopes processing</td>
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<tr>
<td>WaveTune Features</td>
<td></td>
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</tr>
<tr>
<td>Data acquisition (local or distant)</td>
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<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Wavefront slopes computation</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Wavefront slopes processing</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Wavefront corrector control</td>
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<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Adaptive optics loop</td>
<td>x</td>
<td>x</td>
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</tr>
</tbody>
</table>

Options
- PSF
- MTF

WAVELIGHT MAX. OUTPUTPOWER LASER CLASS

<table>
<thead>
<tr>
<th>WAVELENGTH</th>
<th>MAX. OUTPUTPOWER</th>
<th>LASER CLASS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMLS 520-S</td>
<td>520 nm</td>
<td>4.5 mW</td>
</tr>
<tr>
<td>SMLS 635-S</td>
<td>635 nm</td>
<td>4.5 mW</td>
</tr>
<tr>
<td>SMLS 785-S</td>
<td>785 nm</td>
<td>4.5 mW</td>
</tr>
<tr>
<td>SMLS 1064-S</td>
<td>1064 nm</td>
<td>4.5 mW</td>
</tr>
<tr>
<td>SMLS 1550-S</td>
<td>1550 nm</td>
<td>4.5 mW</td>
</tr>
</tbody>
</table>

R-FLEX2 compatible

R-FLEX2 SWIR compatible

Custom wavelengths SMLS are also available.

BUY ONLINE
Order any of these SMLS Laser Diodes from our webstore.
CUSTOM METROLOGY

We understand that every component or system to be wavefront characterized is a project on its own. We have the resources and the expertise to provide you with solutions tailored to your needs. Whether we’re talking about a simple one-off lens/beam testing or an automatized machine on the production floor, we will analyze your situation and provide you with a technical solution that meets your exact requirements.

Our wavefront sensors, solutions, and expertise have been an integral part of several prestigious scientific projects and have won the trust of numerous companies operating in semi-conductors, consumer electronics, defense and space industries.

Our areas of expertise include several engineering specializations: optical metrology, opto-mechanical design, automatization and software.

EXAMPLES OF CUSTOM METROLOGY SYSTEMS

1. High-throughput automatic lens characterization systems.

2. Wafer characterization in reflection.


4. Fully automatic system for variable liquid lens characterization.
ADAPTIVE OPTICS

Adaptive Optics for Ultra-High Intensity Lasers p.17 & 18
Microscopy & BIO imaging p.19 & 20
ILAO Star is the first stepper-motor deformable mirror dedicated to ultra-intense lasers that can perform wavefront correction during full-power operation. Its customizable design will perfectly fit any laser characteristics.

**KEY FEATURES**
- Mirror shape maintained even without electrical power
- Excellent optical quality with active flat better than 10 nm RMS and minimal print-through effect
- Perfectly adapted to a beam diameter from 20 mm to 500 mm
- Dielectric, metallic, or hybrid coating available
- Compatible with WaveTune software and every HASO wavefront sensors
- Optional SDK in C/C++, Python, Labview

**BEST FOR**
- Correcting aberrations in full power mode
- Focal spot correction
- Wavefront precompensation
- Particles acceleration
- High harmonics generation

**KEY SPECS**
- Optical quality enabling Strehl Ratio > 0.9
- Close-loop processing frequency ≥ 10Hz
- Very low hysteresis (<0.5%)
- Very high Correction capability
- No backlash compensation needed
- Completely customized to laser’s parameters
- Easy maintenance for actuator or substrate replacement
- Any angle of incidence ≤ 45°

**EXAMPLES**

<table>
<thead>
<tr>
<th>EXAMPLES</th>
<th>ANGLE OF INCIDENCE</th>
<th>CORRECTION BEAM SIZE</th>
<th>NUMBER OF ACTUATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ILAO Star 50</td>
<td>&lt;10°</td>
<td>Circular, Φ 22 mm</td>
<td>19</td>
</tr>
<tr>
<td>ILAO Star 100</td>
<td>5°</td>
<td>Circular, Φ 30 mm</td>
<td>37</td>
</tr>
<tr>
<td>ILAO Star 200</td>
<td>45°</td>
<td>Elliptical, Φ 80 x 110 mm</td>
<td>37</td>
</tr>
<tr>
<td>ILAO Star 400</td>
<td>45°</td>
<td>Rectangular, 140mm x 200 mm</td>
<td>52</td>
</tr>
</tbody>
</table>

Full Spec Sheet

**FOCAL SPOT DIAGNOSTIC**

The first in-vacuum system dedicated to both wavefront measurement and focal spot optimization for Ultra High Intensity Lasers

**BEST FOR**
- Fully designed for high-vacuum environment
- Both wavefront and focal spot measurement
- Can be coupled with DM for focal spot optimization with PharAO.

**KEY FEATURES**
- High-vacuum compatibility: up to 10⁻⁶ mbar
- Low outgassing
- Can accommodate very large beams >200 mm
- Large range of specific coatings for short pulses
ADAPTIVE OPTICS FOR ULTRA-HIGH INTENSITY LASERS

WAVETUNE
Perfect loop control for imperfect wavefronts

WaveTune is a unique application that seamlessly combines wavefront measurement and correction features with extensive instrument diagnostics. It is perfectly adapted to our HASO wavefront sensors, ILAO Star, and mirAO deformable, and to a wide range of active components from other manufacturers.

RECOMMENDED APPLICATIONS
- Free-space communication
- Astronomy
- Microscopy
- Ophthalmology
- Ultra-intense lasers

KEY FEATURES
- Wavefront analyzer hardware control including integration time, trigger mode, averaging
- Wavefront measurement
- Target wavefront formation - set tilt, curve and high-frequency aberrations; open- and closed-loop wavefront correction
- Unique security feature for UHIL allowing safe closed loop at full power

COMPATIBLE WAVEFRONT CORRECTORS
A wide range of SLMs are compatible – please contact us for more details.

Sample list of tested Deformable Mirrors:
- ILAO / ILAO STAR series
- Alpao DM series
- Mirao 52 series
- BMM Mini & Multi DM
- Meadowlark
- CILAS BIM, MONO, SAM
- Hamamatsu SLM
- Thorlabs DM

BUY ONLINE

PHARAO EXTENSION
Focal spot optimization

Phase Retrieval algorithm
PhaRAO is an optional extension of WaveTune. With the help of a simple far field camera, PhaRAO enables users to control and optimize the focal spot directly in the interaction chamber.

WAVEKIT SDK AO EDITION
Fully customize open- or closed-loop Adaptive Optics set-ups

KEY FEATURES
- Modal Wavefront Analysis + Intensity Analysis
- Wavefront Correction Diagnosis + Influence Matrix Analysis + AO Control System
- Integrate using either C/C++, Python or Labview SDK
- Several hundred available functions
- Tens of examples

FULL SPEC SHEET

FREE SAMPLES
Mirao 52e deformable mirror offers an exceptionally large stroke and high optical quality combined with low power consumption. It incorporates 52 electromagnetic actuators and provides an exceptional 50 μm PV deformation amplitude.

BEST FOR
- Bio-imaging
- Ophthalmology
- Microscopy
- Beam shaping

KEY SPECS
- ±50 µm stroke (tilt p/v)
- 15 mm pupil with 52 actuators
- Exceptional surface quality (<10 nm rms active flat)
- Very low hysteresis (<2%)
- Near perfect linearity (>95%)
- Compatible with open-loop control
- USB2 connectivity

SOFTWARE
- WAVEVIEW metrology software with 150 functions included
  - Extensions for PSF, MTF and Strehl ratio
  - Optional SDK for interfacing with any custom system

- WAVETUNE Adaptive Optics software
  - Extensions for AO applications
  - Optional SDK for interfacing with any custom system

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- Ultra-high temporal stability

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  - Extensions for AO applications
  - Optional SDK for interfacing with any custom system

Windows10 compatible
MICROSCOPY & BIO-IMAGING

MICAO 3DSR
High Resolution 3D for SMLM

MicAO 3DSR is the first plug & click adaptive optics device dedicated to 3D single molecule localization microscopy techniques. By correcting aberrations, MicAO 3DSR restores near-diffraction-limited resolution and axial symmetry of the PSF. As a result, the number of detected photons is increased, which in turn improves the localization precision in all three dimensions.

BEST FOR
- Photoactivation localization microscopy (PALM)
- Stochastic optical reconstruction microscopy (STORM)
- Single particle tracking (SPT)

KEY FEATURES
- Corrects aberrations and restores diffraction-limited PSF
- Delivers best 2D and 3D localization precision for PALM/STORM imaging
- Doubles the amount of detected photons and improve localization precision
- High temporal stability of the correction

PLUG-AND-CLICK
- MicAO 3DSR has been developed for easy implementation on any inverted-frame microscope. The device is simply inserted between the microscope side port and the imaging camera, and it functions as an image relay, also allowing for the use of additional modules such as dual color view devices and microscope port splitters.

SOFTWARE
- MicAO 3DSR is delivered with user-friendly software which contains all the necessary tools for detection and correction of aberrations in biological samples.

AO KIT BIO
Build any AO system for microscopy

AOKit Bio is a set of adaptive optics components, composed of a wavefront sensor, HASO4 First or HASO4 SWIR, a deformable mirror or phase modulator and WaveTune adaptive optics software.

RECOMMENDED FOR
- Wide field
- Confocal
- Multiphoton
- Light sheet
- STED and SIM microscopy, as well as FCS or optical tweezers

KEY FEATURES
- HASO4 First or HASO4 SWIR
- MicAO soft
- Wavekit SDK
- MirAO 52e / 52es or any compatible DM or phase modulator

FULL SPEC SHEET
ALL OUR HARDWARE EQUIPMENT COMES WITH THE NECESSARY SOFTWARE AND RELEVANT DOCUMENTATION, AS WELL AS COMPLIMENTARY SERVICES:

- **Installation assistance** by our technicians and engineers.
- **Training on both software and hardware.**
- **Support** through our Zendesk-powered interface featuring FAQs, troubleshooting and other useful resources, as well as a customer login and assistance system with a >90% satisfaction rating.

IMAGINE OPTIC ALSO PROVIDES ON-DEMAND SERVICES:

- Recalibration of HASO wavefront sensors.
- Equipment rental.
- Characterization of optical components.
- Full customization of optical metrology and adaptive optics benches and systems (see Custom Metrology for a few references).

FEEL FREE TO REACH OUT TO US WITH ANY QUESTIONS OR SPECIFIC REQUESTS AT CONTACT@IMAGINE-OPTIC.COM
3 GREAT WAYS TO ACCESS INFORMATION AND RESOURCES OR ORDER ONLINE
FROM YOUR DESKTOP OR MOBILE PHONE

Finally, connect to our Youtube Channel to watch (and rewatch) our Imagine Webinars and Imagine Microscopy series.
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