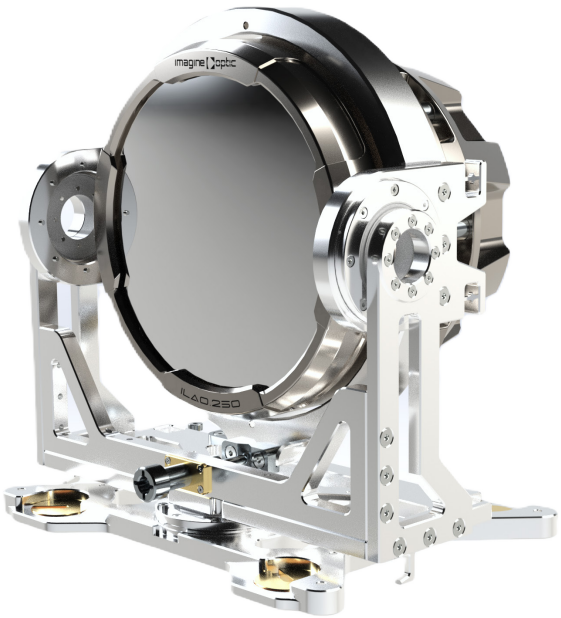
ILAO STAR

Deformable mirror
The Ultra Intense Guy

Customized to laser parameters
Ultra-linear
Ultra-stable



imagine optic

ILAO STAR

The first mechanical deformable mirror dedicated to ultra intense lasers that can perform adaptive optics correction at full power mode.

About laser correction at full power mode :
Single-movement correction, combined with WaveTune's enhanced safety functions, enables closed-loop correction of the laser in full-power mode

APPLICATIONS

ILAO STAR is the perfect deformable mirror for:
+ Focal spot correction
+ Wavefront precompensation
+ Particle acceleration
+ High harmonic generation
+ Laser fusion
+ **Aberration correction at full power mode***

FEATURES

+ Mirror shape maintained even without electrical power
+ Excellent optical quality with active flat better than 10 nm rms and minimal print-through effect
+ Compatibility with vacuum environment (optional)
+ Completely customized to laser's parameters
+ Easy maintenance with replaceable substrate and actuators
+ Unique beamline correction including focusing optics with PHARAO
+ High optical quality enabling Strehl Ratio > 0,9
+ Insensitivity to electromagnetic perturbations
+ High reliability and long lifetime : > 10 Millions moving cycles
+ Excellent reproducibility quality : diffraction limited

*See «The petawatt laser of ELI ALPS: reaching the 700 TW level at 10 Hz repetion rate», Opt. Express 31, 44160-44176 (2023)

SPECIFICATIONS**

OPTICAL SPECS

Surface quality (actively flattened)	10 nm RMS
Coating	dielectric, metallic, or hybrid
Linearity	> 95 %
Hysteresis	< 0.1 %

OPERATING SPECS

Number of actuators	19 to 52 for standard, custom available
Frequency	10 Hz for 3 µm PtV (closed loop)
Temporal stability	10 nm RMS over 13h

OPERATING SYSTEM Windows 10 or 11

MISC

Working environment	ambient or vacuum
Maintenance	Actuators maintenance consists in a simple operation exclusively from the back of the mirror. Reflecting substrate is replaceable in case of laser induced damage.

ILAO STAR PRODUCT RANGE

Product name	Number of actuators	Beam size	Dynamic range
ILAO STAR 50	19	16-25 mm	>20 µm
ILAO STAR 100	19-37	25-50 mm	>20 µm
ILAO STAR 150	37	50-80 mm	>50 µm
ILAO STAR 200	37-52	80-120 mm	>50 µm
ILAO STAR 250	52	120-170 mm	>50 µm

**Subject to changes without further notice

ILAO STAR CUSTOMIZATION

Imagine Optic works closely with you to customize ILAO STAR deformable mirrors in order to achieve the best possible corrections according to your laser beam characteristics.

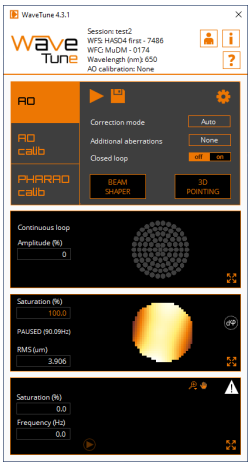
Following parameters are subject to customization:

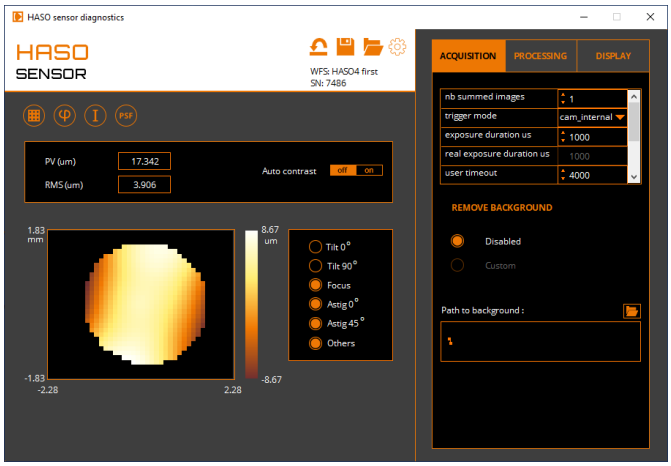
+ beam size: from 20 to 500mm
+ intensity profile: Gaussian, super-Gaussian, or top hat
+ beam shape: circular, elliptical, square, or rectangular
+ incident angle: 0°, 45°, or other
+ coating: dielectric, metallic, or hybrid
+ environment: ambient or vacuum
+ spatial frequency correction: the number of actuators is optimized to achieve the 4th, 6th, 8th or even higher order Zernike polynomials correction

SOFTWARE

WAVETUNE™
Adaptive Optics Software

WAVETUNE™ software seamlessly combines wavefront measurement and correction features with extensive instrument diagnostics. For easier correction process, tip-tilt, focus and higher-order aberrations can be managed independently from one another. It is perfectly adapted to our ILAO STAR deformable mirrors, integrating specific security functions such as the synchronization with laser (to change the mirror form only in the absence of the laser pulse).



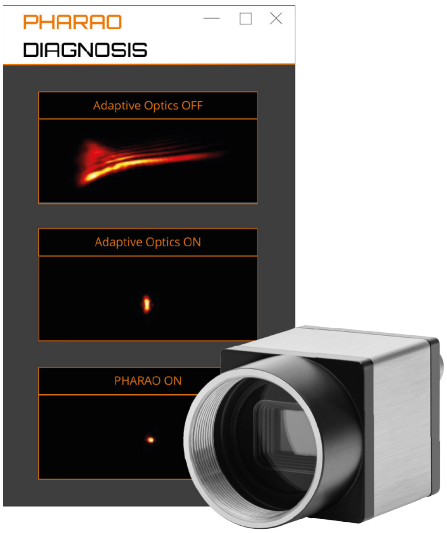


Options :

+ Optional SDK in C/C++, LabVIEW and Python

PHARAO™
Software extension

Fully correct beamline aberrations up to user focal plane thanks to PharAO. It is a unique kit featuring a Phase Retrieval algorithm combined with a camera to correct transport and focusing optics aberrations, in vacuum or ambient environment.***



***See «New adaptive optics control strategy for petawatt-class laser chains», Quantum Electronics, 47 (8) 711 - 717 (2017)

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