

PHAROS

High-power Femtosecond Laser System



FEATURES

- <200 fs Pulse duration
- Tunable Pulse duration
200 fs – 10 ps
- Up to 1.5 mJ Pulse energy
- Up to 15 W Average power
- 1 kHz–1 MHz Flexible repetition rate
- Includes pulse picker for pulse-on-demand operation
- Rugged, industrial grade mechanical design
- Harmonic generators (SH, TH, FH)
- Tunable OPA, NOPA, continuum generator

APPLICATIONS

- Micromachining
- Micro- and nano-structuring
- Writing of Bragg gratings and waveguides
- Multi-photon polymerization
- Nonlinear optics
- Time-resolved spectroscopy
- Biomedical applications
- Microscopy

GENERAL DESCRIPTION

PHAROS is a single-unit integrated femtosecond laser system combining millijoule pulse energies and high average power. It features market leading compact size for easy OEM integration and laboratory space saving. Most of PHAROS output parameters can be easily set via control pad or PC tuning the laser for your particular application in seconds.

OPERATION

PHAROS is built upon conventional chirped pulse amplification technique, employing the seed oscillator, regenerative amplifier and pulse stretcher/compressor modules. Kerr lens mode-locked oscillator delivers >700 mW output with sub-80 fs pulse duration. Regenerative amplifier is based on Yb:KGW lasing medium. Amplifier is non-collinearly pumped by one or two (respectively 4 W or 6-15 W PHAROS) Light Conversion proprietary design high brightness pump modules delivering up to 60 W of power. Low loss BBO Pockels cells support the operation of amplifier and optional pulse picker at repetition rates up to 200 kHz (extendable to 1 MHz). The stretcher/compressor module is based on single transmission grating exhibiting high efficiency and excellent power handling capability.

Operating parameters are adjustable from the remote control module or external PC connected via USB interface.

Tunability of laser output parameters allows PHAROS system to cover applications normally requiring different class of lasers. Tunable parameters include: pulse duration (200 fs – 10 ps), repetition rate (1 kHz to 1 MHz), pulse energy (up to 1.5 mJ) and average power (up to 15 W). Its deliverable power is abundant for a number of material processing applications, while achievable pulse durations and energies make it an attractive research tool.

PHAROS compact and robust optomechanical design includes easy to replace modules (oscillator, amplifier and stretcher/compressor) with temperature stabilized and sealed housings ensuring stable laser operation within varying environments. Those features being of critical importance for OEM and industrial users.

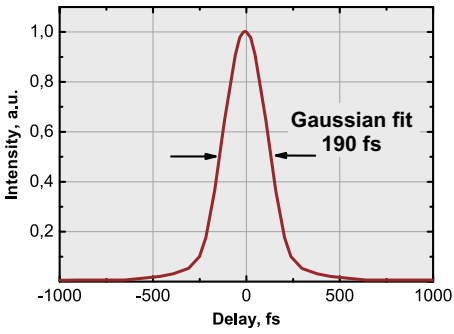
PHAROS is equipped with an extensive software package, which ensures its smooth hands-free operation as well as allows fast and easy integration into various processing devices.



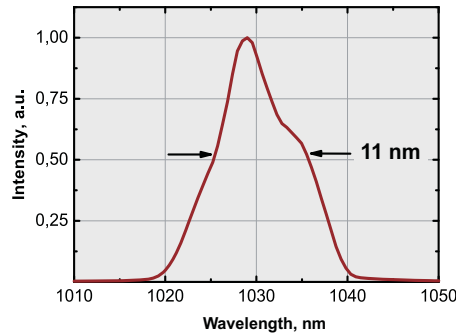
Micro image of "birefringent rose" printed with PHAROS laser in 1 × 1 mm fused silica square. Courtesy of Prof. P. Kazansky, Optoelectronics Research Centre, University of Southampton

SPECIFICATIONS

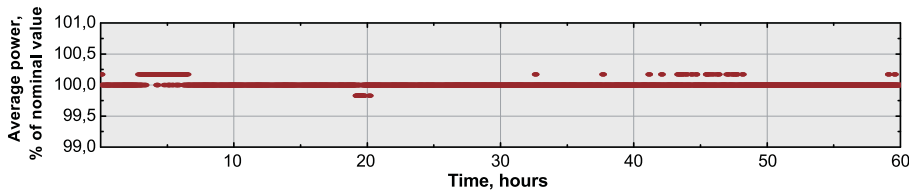
PHAROS model	PHAROS-4W	PHAROS-6W	PHAROS-10W	PHAROS-15W	PHAROS SP	PHAROS SP 1.5
Max. average power	4 W	6 W	10 W	15 W	5 W	
Pulse duration (assuming Gaussian pulse shape)	290 fs				200 fs	
Pulse duration range	290 fs – 10 ps				200 fs – 10 ps	
Max. pulse energy	> 0.2 mJ				> 1.0 mJ	> 1.5 mJ
Repetition rate	Single pulse – 200 kHz (extendable to 1 MHz)					
Centre wavelength	1028 nm ± 5 nm					
Output pulse stability	< 1.0 % rms					
Beam quality	TEM ₀₀ ; M ² < 1.2					
Beam divergence	1.1x diffraction limited (of M ² <1.2 beam)					



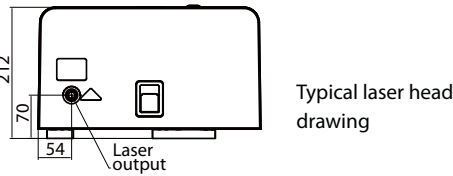
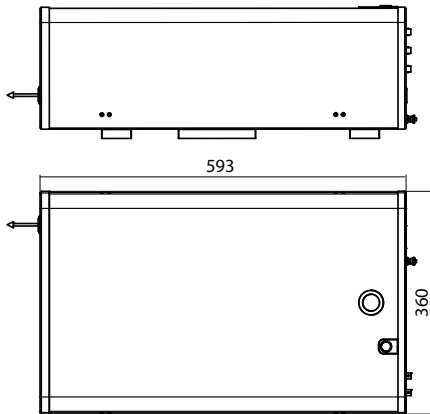
Pulse duration of PHAROS SP



Spectrum of PHAROS SP



PHAROS long term stability graph



Typical laser head drawing

PHYSICAL DIMENSIONS (mm)

Laser head	593 L x 360 W x 212 H
Power supply rack for PHAROS-4W	640 L x 520 W x 420 H
Power supply rack for other PHAROS models	640 L x 520 W x 553 H

UTILITY REQUIREMENTS

Electric	110 VAC, 50-60 Hz, 20 A or 220 VAC, 50-60 Hz, 10 A
Room temperature	15-30 °C (air conditioning recommended)
Relative humidity	20-80 % (non condensing)

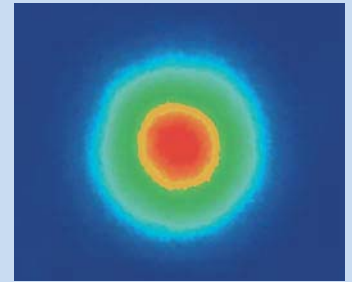
OPTIONAL ACCESSORIES

- Computer controllable pulse duration
- OPA (pumped by 2nd harmonics) and/or NOPA (pumped by 2nd and 3rd harmonics)
- Harmonics generators (2nd, 3rd and 4th)
- Continuum generator

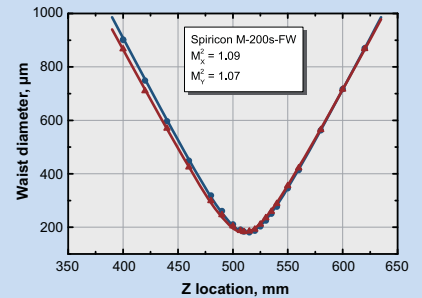


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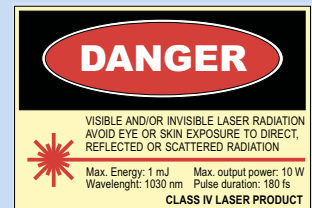
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Typical PHAROS near field beam profile at 200 kHz



Typical PHAROS M² measurement data



Specifications are subject to change without notice.



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