

ORPHEUS

Collinear Optical Parametric Amplifier



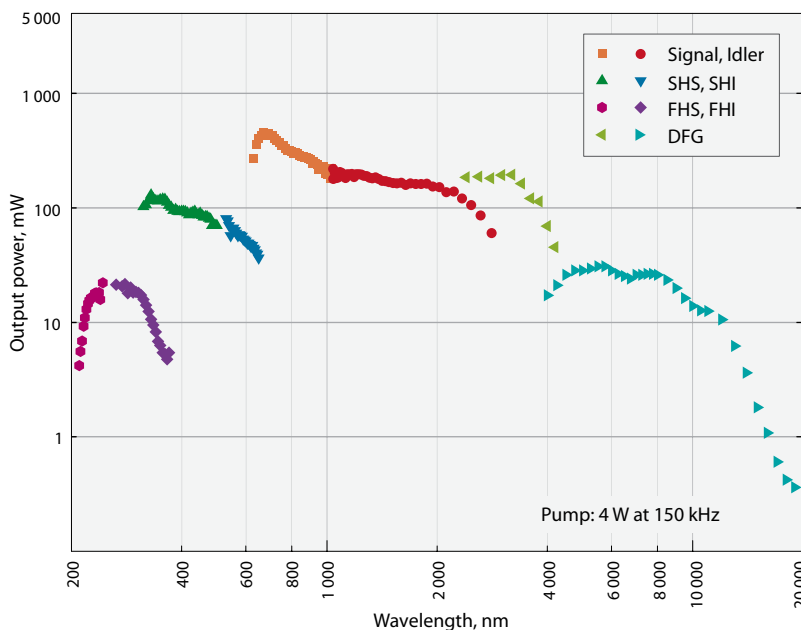
FEATURES

- Built on well known TOPAS OPA basis
- Repetition rate up to 1 MHz
- High energy conversion into parametric radiation
- Near bandwidth and diffraction limited output
- Adaptable to different pump pulse energy, wavelength and pulse duration
- Full computer control via USB port and dedicated software
- Fundamental and second harmonic of pump laser available from the same enclosure
- Compact footprint when combined with PHAROS pump laser <0.5 square meter

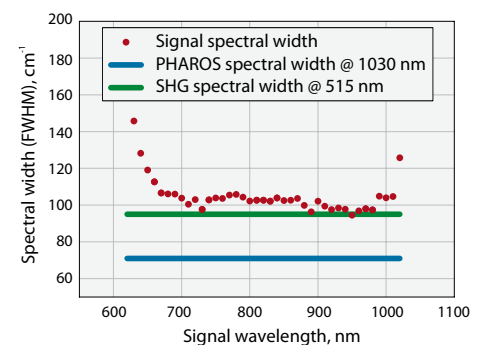
ORPHEUS is a collinear optical parametric amplifier of white-light continuum pumped by femtosecond Ytterbium based laser amplifiers. With the additional feature of being able to work at high repetition rates, ORPHEUS maintains the best properties of TOPAS series amplifiers: high output pulse stability throughout the entire tuning range, high output beam quality and full computer control via USB port as well as optional frequency mixers to extend the tuning range from UV up to mid-IR ranges. Parametric amplification is performed with the second harmonic of pump laser (515 nm). Pump beam is generated

inside of OPA unit with computer controlled angle adjustment. ORPHEUS provides tunable OPA output (630–2600 nm) with residual second harmonic (515 nm) and fundamental radiation (1030 nm) beams at the same time.

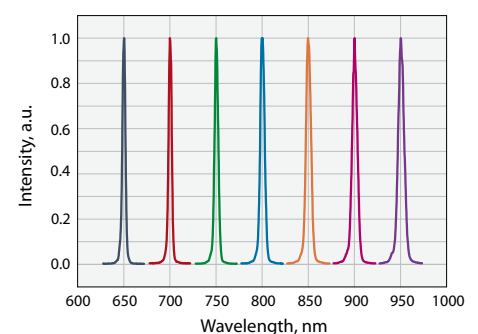
Femtosecond pulses, high power tunable output together with flexible multi-kilohertz repetition rate make the tandem of PHAROS and ORPHEUS an invaluable tool for multiphoton microscopy, micro-structuring and spectroscopy applications. Several ORPHEUS can be pumped by single PHAROS laser providing independent beam wavelength tuning.



Typical tuning curve of ORPHEUS



Typical output pulse spectral width



Typical spectra of signal wave

SPECIFICATIONS *

	ORPHEUS OPA
Required pump laser	PHAROS, PHAROS-SP or CARBIDE laser
Tuning range	630 – 1020 nm (signal) and 1040 – 2600 nm (idler)
Integrated second harmonic (515 nm) generation efficiency	>40 %
Conversion efficiency at peak of tuning curve, signal and idler combined	>12 %, when pump energy is 20 – 1000 μJ >6 %, when pump energy is 8 – 20 μJ
Pulse energy stability	2 % rms @ 700 – 960 nm and 1100 – 2000 nm
Pulse bandwidth	80 – 120 cm ⁻¹ @ 700 – 960 nm, pumped by PHAROS 120 – 220 cm ⁻¹ @ 700 – 960 nm, pumped by PHAROS-SP
Pulse duration	150 – 230 fs, pumped by PHAROS 120 – 190 fs, pumped by PHAROS-SP
Time-bandwidth product	< 1.0
Integrated mini spectrometer **	Wavelength range: 650 – 1050 nm, resolution: ~1.5 nm

* Conversion efficiency specified as the percentage of input power to ORPHEUS.

** ORPHEUS-HP only.

OUTPUT OF OPTIONAL UV-VIS CONVERTER

	SH of Signal	SH of Idler	FH of Signal	FH of Idler
Tuning range	315 – 510 nm	520 – 630 nm	210 – 255 nm	260 – 315 nm
Conversion efficiency *	>4 % at peak @ 20 – 1000 μJ >2 % at peak @ 8 – 20 μJ		>0.8 % at peak @ 20 – 1000 μJ >0.4 % at peak @ 8 – 20 μJ	

* Conversion efficiency specified as the percentage of input power to ORPHEUS.

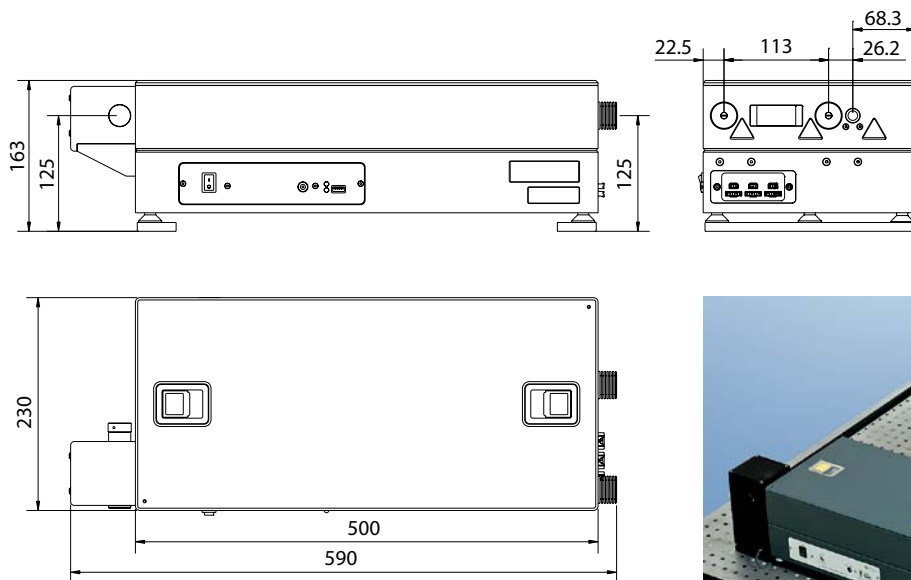
OUTPUT OF OPTIONAL DEEP-UV CONVERTER *

	DUV	FHG
Tuning range	190 – 215 nm	258 nm
Pulse energy conversion efficiency at 20 – 1000 μJ	> 0.3 % @ 200 nm	> 5.0 %
Pulse energy conversion efficiency at 8 – 20 μJ	Not available	

* ORPHEUS-HP only.

OUTPUT OF OPTIONAL MID-IR CONVERTER

	DFG1	DFG2
Tuning range	2200 – 5000 nm	5000 – 16000 nm
Pulse energy conversion efficiency at 20 – 1000 μJ	>3.0 % @ 3000 nm	>0.2 % @ 10000 nm
Pulse energy conversion efficiency at 8 – 20 μJ	>1.5 % @ 3000 nm	>0.1 % @ 10000 nm



ORPHEUS drawings



Compact layout of PHAROS pump laser in tandem with ORPHEUS on 0.5 square meter