

ORPHEUS

Collinear Optical Parametric Amplifier



as well as optional frequency mixers to extend the tuning range from UV up to mid-IR ranges. It can also operate at wide range of repetition rates from 1 kHz up to 1 MHz.

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. Fresh or residual fundamental and second harmonic radiation (1030 nm and 515 nm respectively) are accessible from dedicated output ports. ORPHEUS provides tunable OPA output (630-2600 nm) with residual second harmonic and fundamental radiation 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.

FEATURES

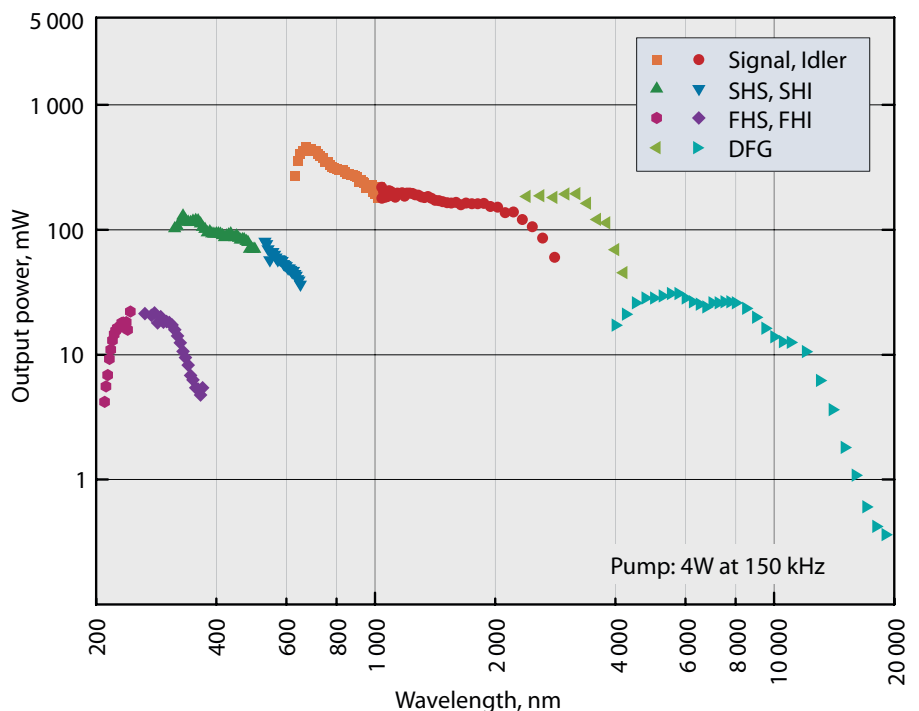
- Built on well known TOPAS OPA basis
- Repetition rate up to 1 MHz
- High energy conversion into parametric radiation
- Near bandwidth and diffraction limited output
- Adaptable to different pump pulse energy, repetition rate and pulse duration
- Full computer control via USB port and dedicated software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

APPLICATIONS

- Spectroscopy
- Multi-photon confocal microscopy
- Nonlinear optics
- Micro structuring

GENERAL DESCRIPTION

ORPHEUS is a collinear optical parametric amplifier of white-light continuum pumped by PHAROS laser. ORPHEUS maintains the best features of TOPAS series amplifiers: high output stability throughout the entire tuning range, high output pulse and beam quality, full computer control via USB port



Typical tuning curve of ORPHEUS

SPECIFICATIONS

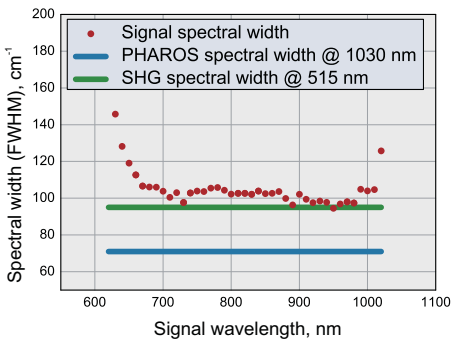
| | ORPHEUS OPA |
|------------------------------------|---|
| Tuning range | 630-1020 nm signal and 1040-2600 nm idler |
| Pulse energy conversion efficiency | >14 % at peak, signal with idler combined, at 1-200 kHz >8 % at peak, signal with idler combined, at 500 kHz >5 % at peak, signal with idler combined, at 1 MHz |
| Pulse energy stability | <2 % rms @ 700-960 and 1100-2000 nm |
| Pulse bandwidth | 80-120 cm ⁻¹ @ 700-960 nm, pumped by PHAROS 4-10W 120-220 cm ⁻¹ @ 700-960 nm, pumped by PHAROS SP |
| Pulse duration | 120-300 fs depending on the wavelength and pump pulse width |
| Time-bandwidth product | < 1.0 |
| Integrated SHG | 515 nm, conversion efficiency >40 % |

Requirements for the pump laser (typically PHAROS femtosecond laser): wavelength 1030 nm, Repetition rate 1 kHz – 1 MHz, Pump pulse energy 6 μJ – 1 mJ, Pulse duration (FWHM) 180-290 fs.

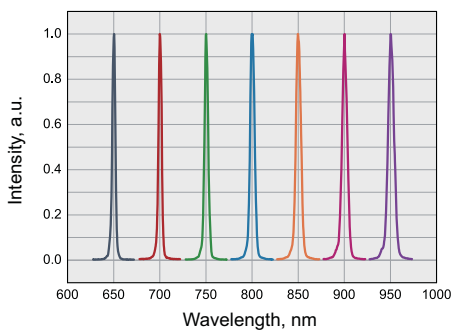
OUTPUT OF LYRA – OPTIONAL TUNING RANGE EXTENSION UNIT

| | SH of signal | SH of idler | FH of signal | FH of idler | DFG1 | DFG2 |
|------------------------------------|-------------------------|-------------|-------------------------|-------------|----------------|-------------------|
| Tuning range | 315-510 nm | 520-630 nm | 210-255 nm | 260-315 nm | 2200-4200 nm | 4000-16000 nm |
| Pulse energy conversion efficiency | >30 % at peak @ 100 kHz | | >20 % at peak @ 100 kHz | | >3%* @ 3000 nm | >0.2%* @ 10000 nm |

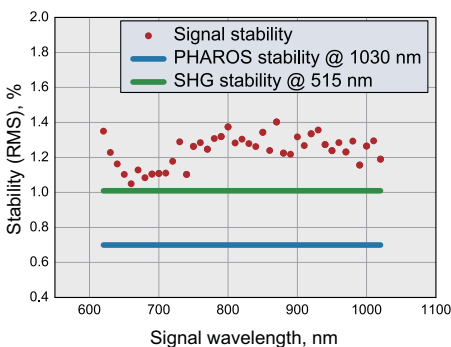
* calculated as percentage of input power to ORPHEUS.



Typical output pulse spectral width



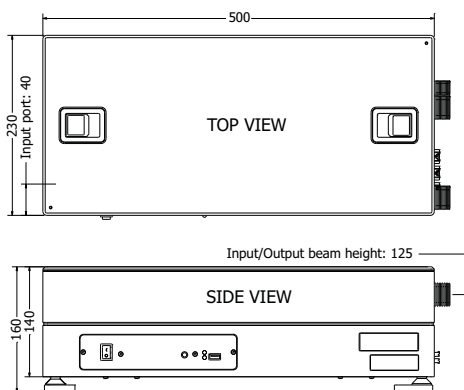
Typical spectra of signal wave



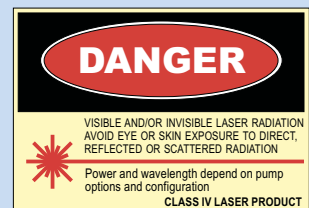
Stability of ORPHEUS output pulse



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



ORPHEUS drawings



Specifications are subject to change without notice.

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