

ORPHEUS-ONE

Collinear Mid-IR Optical Parametric Amplifier



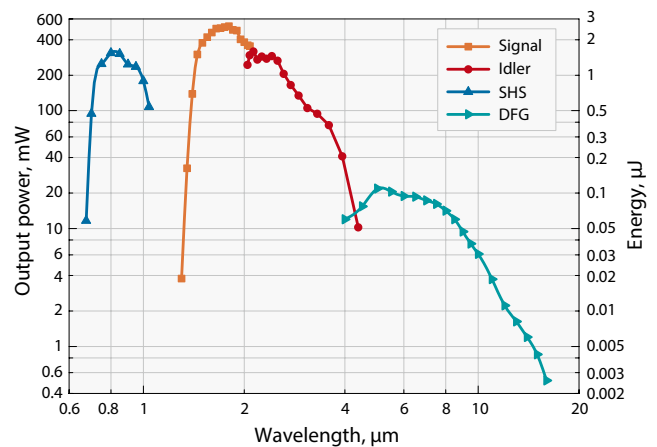
FEATURES

- Signal and idler tuning from 1350 nm to 4500 nm
- Tuning range extendable to 16000 nm
- Twice the output in mid-IR compared to standard ORPHEUS
- Built on well-known TOPAS OPA basis
- Repetition rate up to 1 MHz
- Adaptable to different pump pulse energy and pulse duration
- Full computer control via USB port and dedicated software

ORPHEUS-ONE is a collinear optical parametric amplifier of white-light continuum pumped by femtosecond Ytterbium based laser amplifiers and focused on mid infrared wavelengths generation in two stages.

In comparison to standard ORPHEUS + DFG configuration, the ORPHEUS-ONE provides higher conversion efficiency into the infrared range. Furthermore, ORPHEUS-ONE integrates the two stages into a single housing, which minimizes the footprint of the system and increases the long term stability.

The extended range 4500 – 16000 nm is accessed by mixing the signal and idler of the second stage in a mid-IR crystal. The scheme used in ORPHEUS-ONE can generate $>150 \text{ cm}^{-1}$ when OPA is configured for broad-bandwidth amplification.



Typical tuning curve of ORPHEUS-ONE.
Pump: Pharos-6W, 200 kHz, 260 fs

SPECIFICATIONS ¹⁾

	ORPHEUS-ONE OPA
Required pump laser	PHAROS, PHAROS-SP or CARBIDE laser
Tuning range	1350 nm – 2060 nm (signal) and 2060 nm – 4500 nm (idler)
Integrated second harmonic (515 nm) generation efficiency	~10 – 25 %, this beam is not accessible without special modification
Conversion efficiency at peak of tuning curve, second stage signal and idler combined	$>14 \%$, when pump energy is $30 \mu\text{J} - 400 \mu\text{J}$ ²⁾
Pulse energy stability	$<2 \%$ rms @ 1450 – 4000 nm
Pulse bandwidth	$100 - 250 \text{ cm}^{-1}$ @ 1450 – 2000 nm
Pulse duration	200 – 250 fs, pumped by PHAROS 120 – 190 fs, pumped by PHAROS-SP
Time-bandwidth product	< 1.0 @ 1450 – 2000 nm

¹⁾ Conversion efficiency specified as the percentage of input power to ORPHEUS-ONE.

²⁾ High energy version ORPHEUS-ONE-HE available for pump energies up to 2 mJ.

OUTPUT OF OPTIONAL MID-IR CONVERTER

	DFG2
Tuning range	4500 – 16000 nm
Pulse energy conversion efficiency	$>0.3 \%$ @ 10000 nm
Pulse bandwidth	$100 - 160 \text{ cm}^{-1}$ @ 5000 – 10000 nm
Pulse energy stability	$<3 \%$ rms @ 5000 nm $<4 \%$ rms @ 10000 nm
Pulse duration	$<300 \text{ fs}$ @ 5000 – 10000 nm