LIGHT CONVERSION

ORPHEUS-F

new

Broad Bandwidth Optical Parametric Amplifier

FEATURES

- Combines the best features of collinear and non-collinear OPA
- Pulse duration compressible down to <40 fs
- Adaptable to different pump pulse energy, repetition rate up to 1 MHz
- Variable output bandwidth
- Full computer control via USB port and dedicated software

ORPHEUS-F is a collinear optical parametric amplifier of white-light continuum pumped by femtosecond Ytterbium based laser amplifiers. This OPA combines the short pulse durations that are produced by a non-collinear OPA and wide wavelength tuning range offered by collinear version.

Parametric amplification is performed in two stages. The first nonlinear crystal (BBO) is non-collinearly pumped with the second harmonic of pump laser at 515 nm and seeded with a white light continuum, producing broad bandwidth tunable output in 650 nm – 900 nm wavelength range. The second nonlinear crystal (type 1 BBO/LBO) is again pumped by the SH of pump, but in a collinear configuration. The output of the second stage is a Signal wave tunable in the range of 650 nm – 900 nm, and corresponding Idler at 1200 nm – 2500 nm. Both beams exhibit a broad spectrum, with typical bandwidth reaching 300 – 600 cm^{-1} at some wavelengths. The Signal beam can be easily compressed with a simple prism-based setup down to <60 fs in most of the tuning range, while Idler is compressed in bulk material down to 40 fs – 90 fs depending on wavelength.

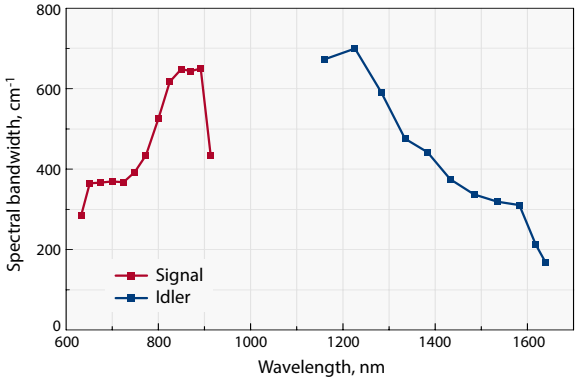
Before amplification white light continuum pulse can be dispersed by inserting different amount of glass in the beam path. This makes it possible to limit the output bandwidth to some extent (up to 2 – 3 times) without losing any output power. By comparison, standard ORPHEUS device uses spectral narrowing to produce bandwidth-limited 200 fs – 300 fs duration pulses directly at the output, with extended Signal/Idler tuning range and options to generate ultraviolet and mid-infrared light. Our non-collinear ORPHEUS-N-2H device produces even broader bandwidths, compressible down to <20 femtoseconds, but limits the tuning range to 650 nm – 900 nm. This places the performance of ORPHEUS-F configuration in between our other solutions.

SPECIFICATIONS *

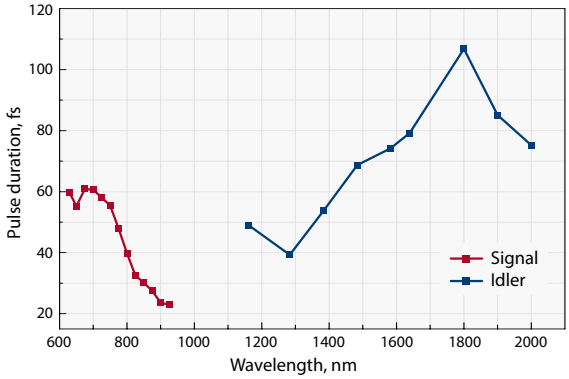
	ORPHEUS-F OPA
Required pump laser	PHAROS, PHAROS-SP or CARBIDE laser
Tuning range	650 nm – 900 nm (signal) and 1200 nm – 2500 nm (idler)
Conversion efficiency at peak of tuning curve, second stage signal and idler combined	>10 %, when pump energy is 30 µJ – 500 µJ
Pulse energy stability	<2 % rms @ 700 – 900 nm and 1200 – 2000 nm
Pulse bandwidth	200 – 600 cm^{-1} @ 650 – 900 nm 150 – 500 cm^{-1} @ 1200 – 2000 nm
Pulse duration before compression	<250 fs
After compression **	25 – 70 fs @ 650 – 900 nm 40 – 100 fs @ 1200 – 2000 nm
Compressor transmission **	50 – 70 % @ 700 – 900 nm 70 – 80 % @ 1200 – 2000 nm

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

** *Optional compressor includes two prism compressor for signal and bulk compressor for idler.*



Typical spectral bandwidth of ORPHEUS-F



Pulse duration after external compression of ORPHEUS-F

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