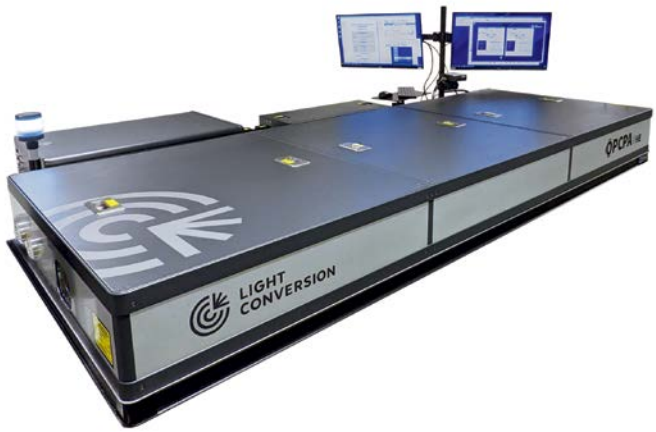
OPCPA | HE

High-Energy OPCPA Systems

FEATURES

- Multi-TW peak-power pulses at up to 1 kHz
- 800 nm, 1600 nm, or 2000 nm output
- Few-cycle pulse duration and high pre-pulse contrast
- Robust design with < 1-hour warm-up time
- Exceptional CEP and pulse energy stability
- Spectral-temporal pulse shaping options



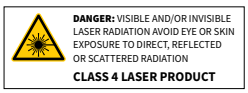
Applications like high-energy attosecond pulse generation, generation of high harmonics from solid targets, and laser electron acceleration all benefit from few-cycle pulse durations and excellent pulse contrast while requiring multi-millijoule pulse energy. Our most powerful high-energy OPCPA systems are scalable to multi-TW peak powers at kHz repetition rates while maintaining few-cycle pulse durations. Thus, they fit the most demanding requirements while providing stability and reliability unprecedented for systems of this scale.

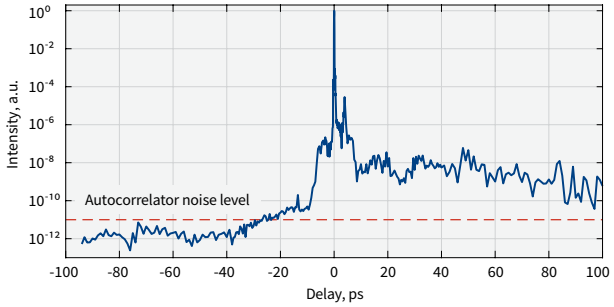
Furthermore, > 10^{12} pre-pulse contrast is obtained without complex and lossy nonlinear pulse cleaning techniques, while < 250 mrad CEP stability and < 1.5% pulse energy stability are maintained throughout a full day of operation, making it a robust and reliable multi-TW system.

SPECIFICATIONS

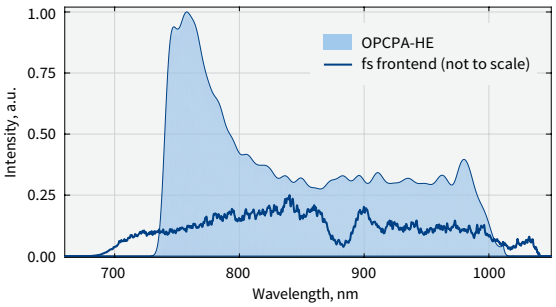
Model	OPCPA-HE		
Center wavelength	800 nm	1600 nm	2000 nm
Pump source	Picosecond Nd:YAG lasers, seeded by ORPHEUS-OPCPA		
Repetition rate	10 Hz – 1 kHz		
Maximum output pulse energy [1]	120 mJ	100 mJ	50 mJ
Pulse duration [1]	< 9 fs	< 50 fs	< 30 fs
CEP stability, 1h [1] [2]	< 250 mrad		
Long-term power stability, 8 h [1] [3]	< 1.5%		
Pulse-to-pulse energy stability, 1 min [1] [3]	< 1.5%		

[1] *Typical values. For custom inquiries, contact sales@lightcon.com.*
[2] *CEP values calculated from unaveraged, single-shot measurements.*
[3] *Expressed as as normalized root mean squared deviation (NRMSD).*

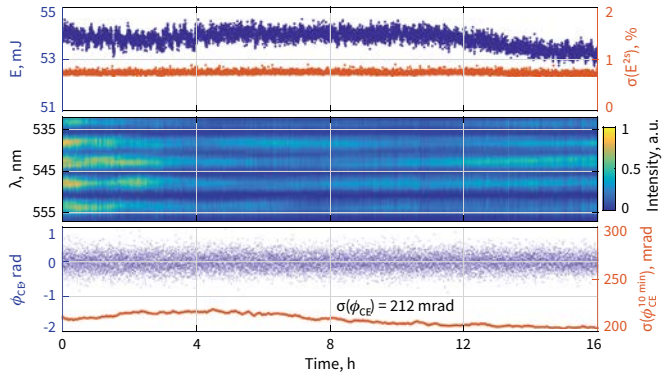




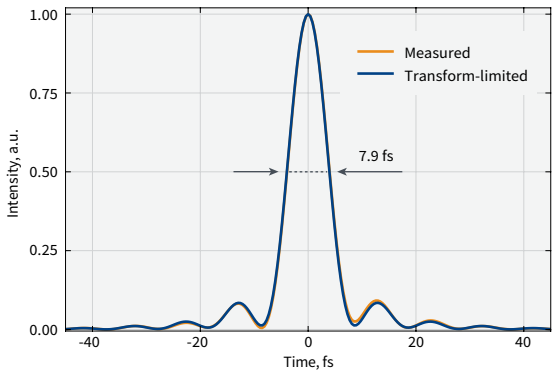
High-dynamic-range third order autocorrelation measurement of an OPCPA-HE system



OPCPA-HE output spectrum



OPCPA-HE pulse energy, f-2f interferogram and CEP stability measured over 16 h



Temporal profile of OPCPA-HE output pulses measured with a self-referenced spectral interferometry device

ORPHEUS | OPCPA

Compact, Few-cycle, CEP-stable OPCPA Systems

FEATURES

- Few cycle pulses in a compact footprint
- 800 nm, 1600 nm, 2000 nm, or 3000 nm output
- High repetition rate, up to MHz
- Industrial-grade pump, up to 320 W, 8 mJ
- Exceptional power and pulse energy stability
- CEP stabilization option

Benefiting from the industrial-grade stability and reliability of the PHAROS and CARBIDE lasers, ORPHEUS-OPCPA delivers few-cycle, CEP-stable pulses in a package as compact as our standard parametric amplifiers. All of the ORPHEUS OPCPA models use the same base architecture to produce CEP-stable, few-cycle pulses in one of the four center wavelengths: 800 nm, 1600 nm, 2000 nm, and 3000 nm. ORPHEUS-OPCPA is available with a pulse compressor or without, thus, intended as seed sources, delivering background-free pulses with near-single-cycle bandwidths, excellent spectral phase coherence, and CEP stability.

Using synchronized industrial-grade CARBIDE or PHAROS lasers, pump power of up to 320 W and pump pulse energy of up to 8 mJ is accessible. The use of other pump sources for higher power, such as thin-disk or innoslab lasers, is available upon request.

SPECIFICATIONS

Model	ORPHEUS-OPCPA			
Center wavelength	800 nm	1600 nm	2000 nm	3000 nm
Pump source [1]	PHAROS / CARBIDE			
Pump power [1]	20 – 320 W			
Pump pulse energy [1]	0.2 – 8 mJ			
Repetition rate	1 kHz – 1 MHz			
Conversion efficiency [2]	> 7%	> 10%	> 9%	> 6%
Pulse duration [2]	< 10 fs	< 40 fs	< 25 fs	< 45 fs
Transform-limited pulse duration [2] [3]	< 6 fs	< 30 fs	< 15 fs	< 35 fs
CEP stability, 1h [2] [4]	< 250 mrad			
Long-term power stability, 8 h [2] [5]	< 1.5%			
Pulse-to-pulse energy stability, 1 min [2] [5]	< 1.5%			

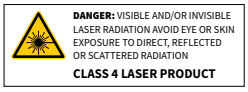
[1] *For using other pump sources, such as thin-disk or innoslab lasers, contact sales@lightcon.com.*

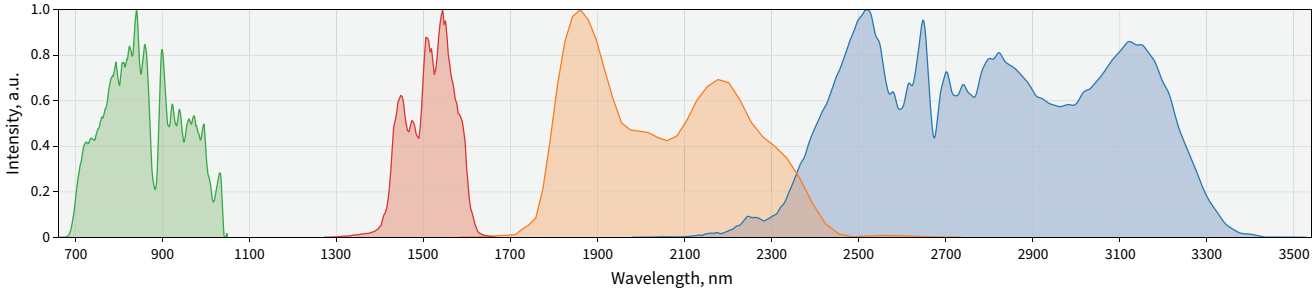
[2] *Typical values. For custom inquiries, contact sales@lightcon.com.*

[3] *Uncompressed, for seeding larger amplifiers.*

[4] *CEP values calculated from unaveraged, single-shot measurements.*

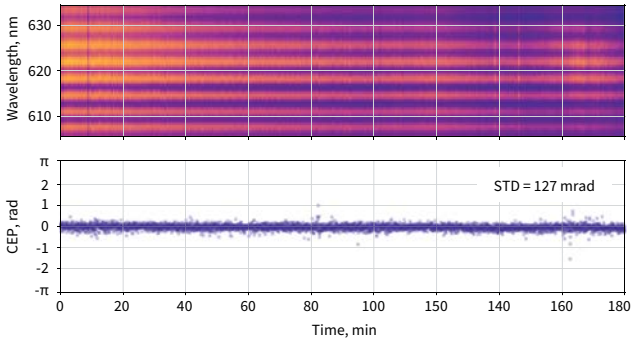
[5] *Expressed as normalized root mean squared deviation (NRMSD).*





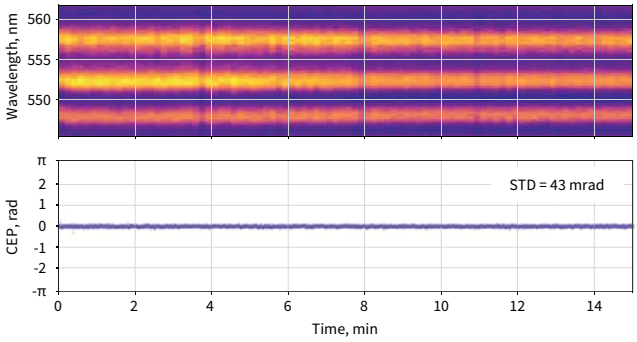
Example spectra of four models of ORPHEUS-OPCPA

STABILITY



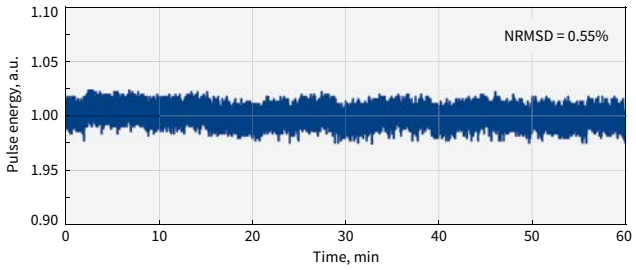
CEP stability of ORPHEUS-OPCPA (800 nm, 100 kHz)

All CEP values calculated from unaveraged, single-shot measurements!

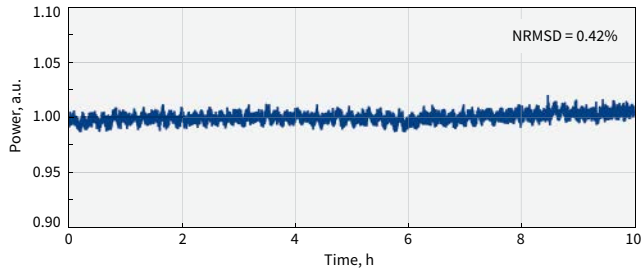


CEP stability of ORPHEUS-OPCPA (3 µm, 1 kHz)

All CEP values calculated from unaveraged, single-shot measurements!



Pulse-to-pulse energy stability of ORPHEUS-OPCPA at 800 nm



Long-term output stability of ORPHEUS-OPCPA at 800 nm