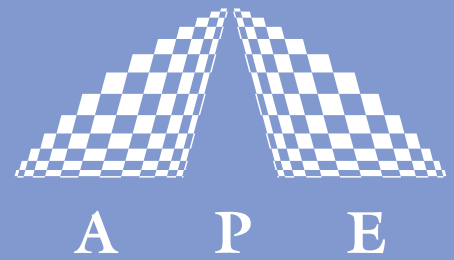


OPO



PUMP TUNED ULTRAFAST OPTICAL PARAMETRIC OSCILLATOR

An optical parametric oscillator (OPO) is a laser source which splits a pump photon into two photons with longer wavelengths (Signal and Idler). Optionally, the Signal wavelength can be intra cavity frequency doubled.

The APE **OPO** is a synchronously pumped OPO with a mode-locked Ti:Sapphire laser as pump source. The **OPO** is designed for highly efficient wavelength conversion and it covers a wavelength range spanning from the visible to the mid infrared. Depending on the pulse width of the input pulses, it can be operated in fs or ps mode. Since the conversion process from the pump wavelength to the Signal and Idler is jitter free, the **OPO** is the ideal light source for two color experiments such as pump-probe measurements.



Very low threshold ($< 0.5 \text{ W}^1$)

High conversion efficiency

Wavelength independent pulse width

Easy to install and user friendly operation

Jitter free generation of synchronized pulses (pump-Signal-Idler)

1) Low power systems - optimized for Mira + 5 W Verdi pump

Wavelength Conversion

Ultrafast Pulse Diagnostics

Pulse Management

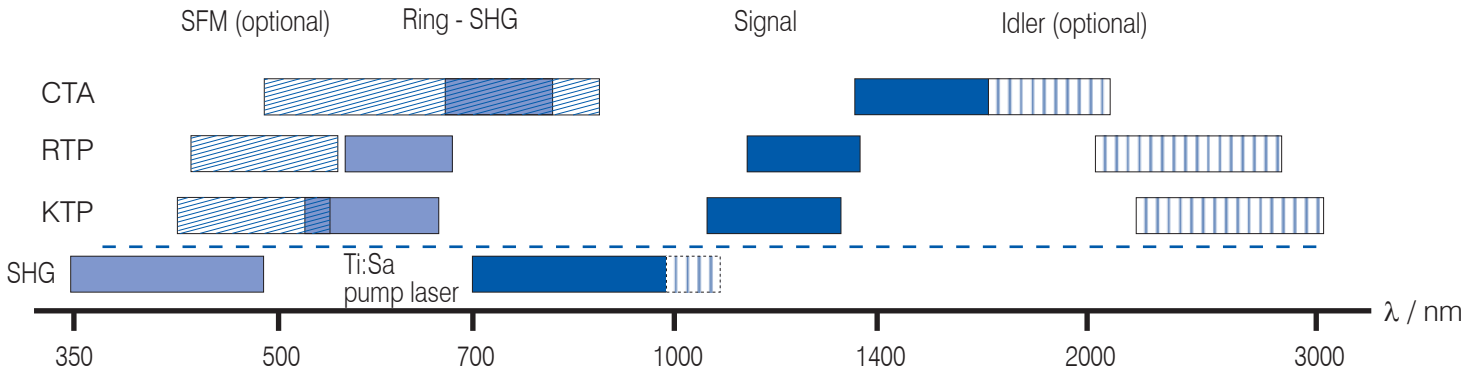
Acoustooptics

Your Partner in Ultrafast

OPO

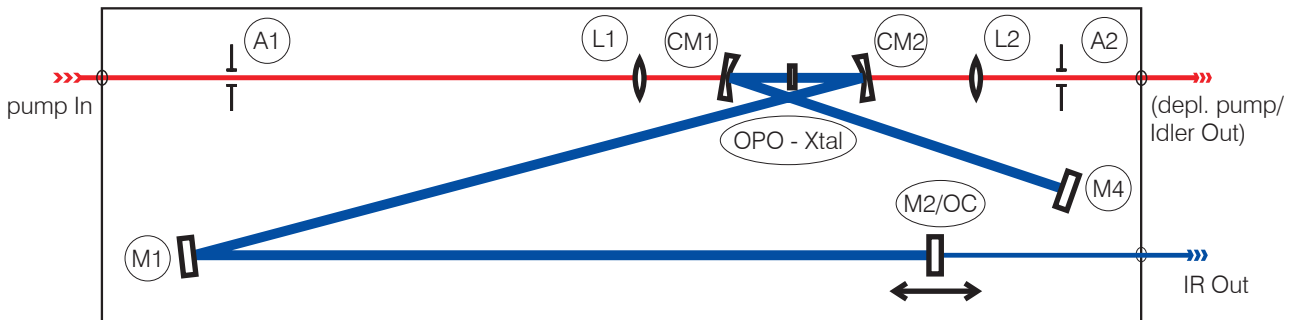
SYNCHRONOUSLY PUMPED OPTICAL PARAMETRIC OSCILLATOR

The APE **OPO** system covers a wide wavelength range and allows for further wavelength extension using frequency mixing schemes.

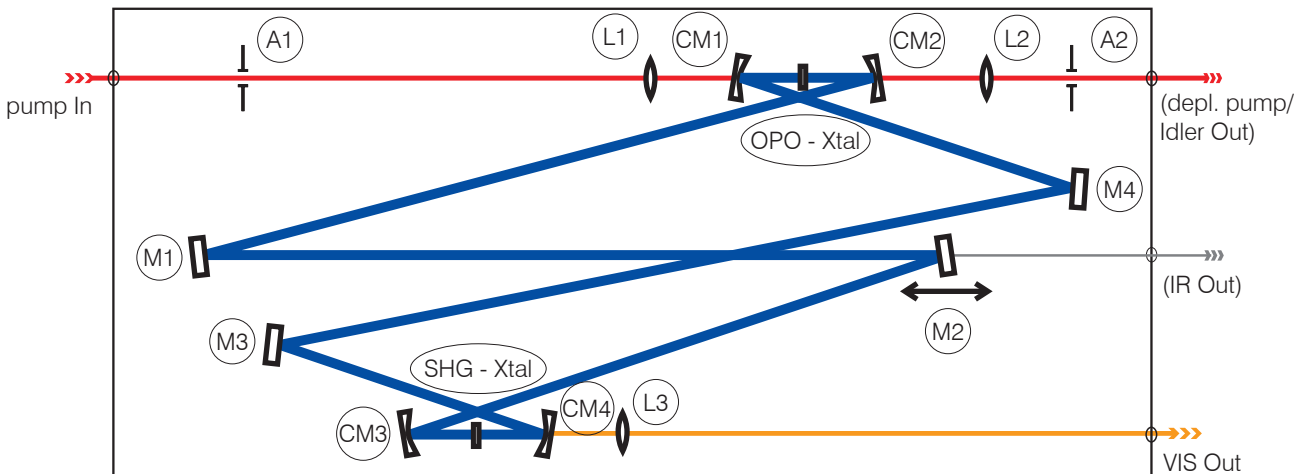


CAVITY CONFIGURATIONS

The linear OPO is a Signal resonant system with a 5-mirror standing wave cavity. It is used for highly efficient IR-generation and covers the 1.05 ... 1.6 μm wavelength range with two optics sets and up to 3 μm with the non-resonant Idler branch (optional).



The Ring OPO is a Signal resonant system with an additional intracavity SHG module in an 8-mirror Ring cavity. This unit, which is based on temperature tuned non-critically phasematched SHG, is used for highly efficient visible output generation. It covers the 525 ... 660 nm wavelength range which fills the gap between the Ti:Sapphire fundamental beam and its frequency doubled signal (SHG).



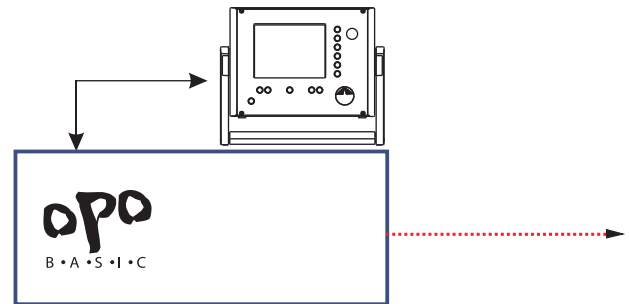
PULSE DURATION

All versions of the **OPO** system can be operated in both femto- and picosecond mode depending on the pump pulse duration.

SYSTEM CONFIGURATION

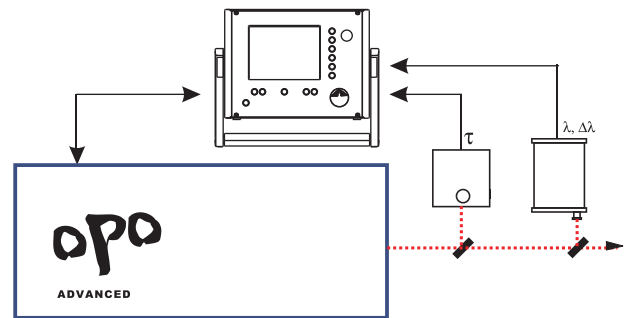
The **BASIC** configuration consists of:

- Covered optical unit
- Active cavity length stabilization electronics



The **ADVANCED** configuration consists of:

- Covered optical unit
- Diagnostics modules for pulse duration, wavelength, bandwidth and relative output power
- Active cavity length stabilization and display electronics



The **ADVANCED** version has the following advantages over the **BASIC** version:

- Online measurement of the parameters pulse width τ , wavelength λ , bandwidth $\Delta\lambda$ and relative output power.
- Extended stabilization features
- Simplified and automatic wavelength tuning
- Computer interface for parameter transfer and OPO control

OPTIONS AND MODIFICATIONS

The APE **OPO** can be provided with several options and modifications:

- Idler output (in addition to Signal output)
- Depleted pump output
- Customized wavelength ranges
- Adaptation to various pump laser cavity lengths and pump pulse widths
- Synchronization of different output beams (internal delay line) for use in frequency mixing devices
- Frequency doubling and mixing devices (Sum Frequency Mixing for extension to blue range, Difference Frequency Generation for Mid-IR generation)
- Also available at APE: **OPO PP Auto FAN**

SPECIFICATIONS

Tuning range	Signal (resonant)	Signal SHG ¹⁾	Idler (non-resonant) ²⁾
KTP	1050 ... 1320 nm	525 ... 660 nm	2.2 ... 3.0 μm
RTP	1120 ... >1350 nm	560 ... 680 nm	2.05 ... 2.8 μm
CTA linear	1350 ... 1600 nm		1.6 ... 1.9 μm
(with special optics set)	1400 ... 1700 nm		1.7 ... 2.1 μm

Output power @ \approx 800 nm pump

	Mira + Verdi 5W	Mira + Verdi 10W	Mira HP + Verdi 18W
KTP linear @ 1140 nm	80 mW	240 mW	750 mW
CTA linear @ 1570 nm	60 mW	200 mW	750 mW
RTP linear @ 1180 nm	80 mW	240 mW	750 mW
KTP Ring @ 570 nm	60 mW	200 mW	750 mW
RTP Ring @ 590 nm	60 mW	200 mW	750 mW

Pump threshold	< 0.5 W ³⁾
Pulse width	typ. 200 fs @125 fs pump pulse width typ. 1.6 ps @1.4 ps pump pulse width
Time bandwidth product	typ. 0.6 @125 fs pump pulse width typ. 0.5 @1.4 ps pump pulse width
Spatial mode	TEM ₀₀
Polarization	horizontal for Signal, vertical for Idler
Noise	< 0.5% RMS ⁴⁾
Repetition rate	approx. 76 / 80 MHz according to pump laser repetition rate (others on request)
Beam height	125 ... 140 mm

DIMENSIONS (W x H x D in mm)

Optical unit	402 x 200 x 1139
Control electronics	267 x 180 x 312

1) Ring-OPO with intracavity - SHG also including IR-Signal range

2) optional

3) Low power systems - optimized for Mira + 5 W Verdi pump

4) RMS noise measured in 10 Hz to 1 MHz bandwidth

Distributors

see APE website www.ape-berlin.com