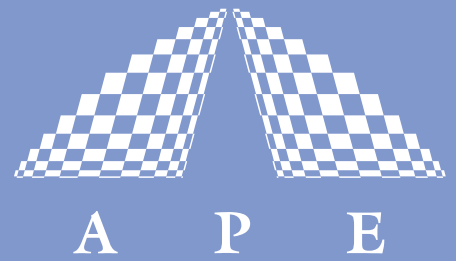


# OPO



## PUMP TUNED ULTRAFAST OPTICAL PARAMETRIC OSCILLATOR

APE features a series of synchronously pumped Optical Parametric Oscillators providing pico- and femtosecond pulses in a wide spectral range. As one of them the pumped tuned **OPO** is designed for operation with modelocked Ti:Sapphire lasers. It is based on non-critical phasematched interaction in KTP and its isomorphs offering high conversion efficiency and wide tuning ranges.

Optical Parametric Oscillation is the nonlinear process of converting a short wavelength pump beam into two tuneable beams (Signal + Idler) of longer wavelengths. The APE **OPO** is supplied in different versions which are convertible and upgradable.



Wide wavelength range

Femto- and picosecond mode

Low threshold

High conversion efficiency

Wavelength independent pulse duration

Low jitter - high stability

Ease of alignment

Wavelength Conversion

Ultrafast Pulse Diagnostics

Pulse Management

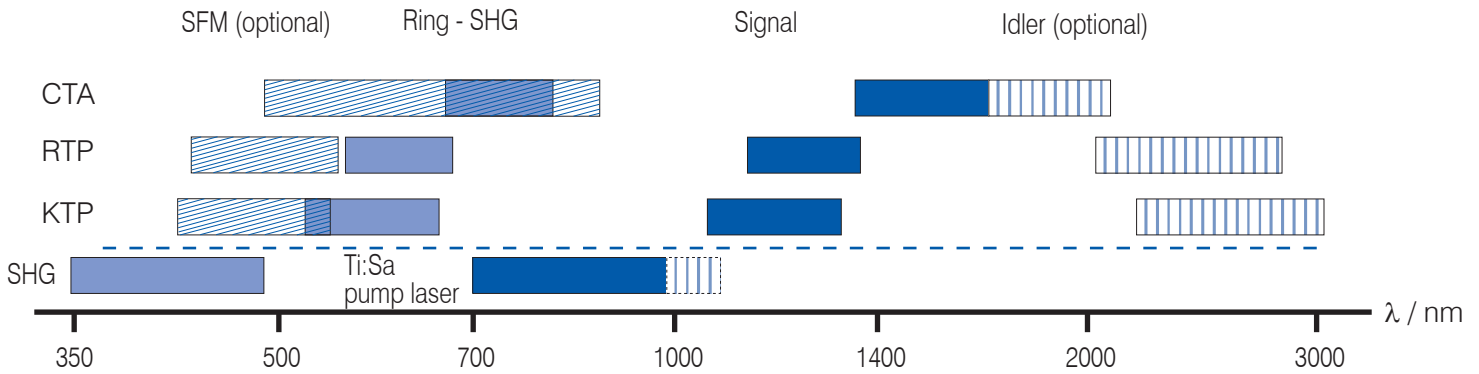
Acoustooptics

### Your Partner in Ultrafast

# OPO

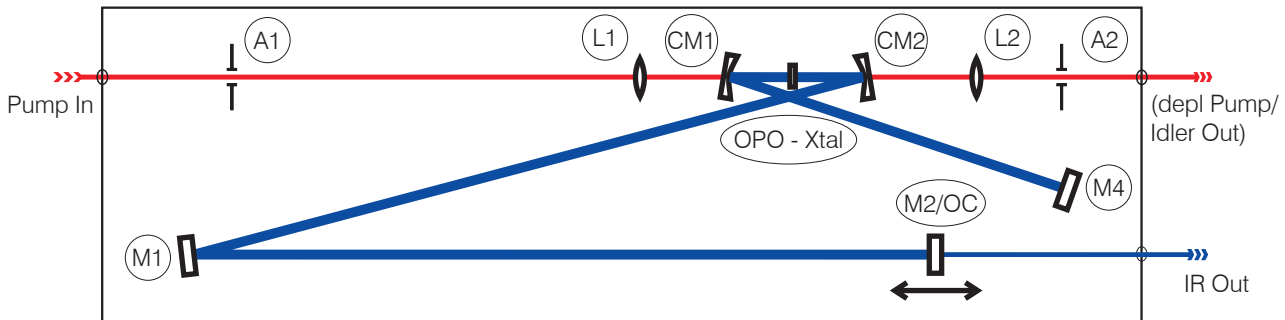
## SYNCHRONOUSLY PUMPED OPTICAL PARAMETRIC OSCILLATOR

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

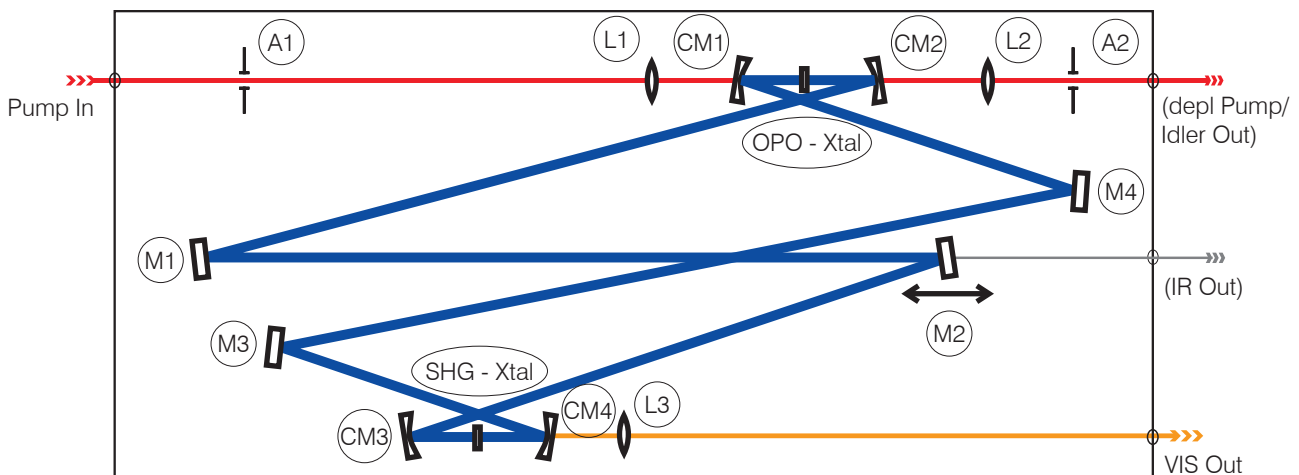


## CAVITY CONFIGURATIONS

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.

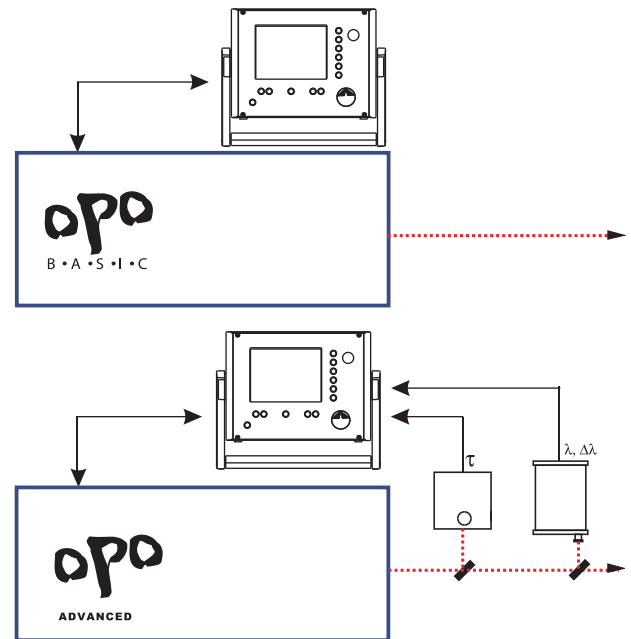
## SYSTEM CONFIGURATION

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 duration  $\tau$ , wavelength  $\lambda$ , 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 durations
- 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 Automatic**

## SPECIFICATIONS

Tuning range	Signal (resonant)	Signal SHG <sup>1)</sup>	Idler (non-resonant, optional)
KTP	1050 ... 1320 nm	525 ... 660 nm	2.2 ... 3.0 $\mu\text{m}$
RTP	1120 ... >1350 nm	560 ... 680 nm	2.05 ... 2.8 $\mu\text{m}$
CTA linear	1350 ... 1600 nm		1.6 ... 1.9 $\mu\text{m}$
(with special optics set)	1400 ... 1700 nm		1.7 ... 2.1 $\mu\text{m}$

### 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
Pulse duration	typ. 200 fs @ 125 fs pump pulse typ. 1.6 ps @ 1.4 ps pump pulse
Time-bandwidth product	femto: typ. 0.6 pico: typ. 0.5
Spatial mode	TEM <sub>00</sub>
Polarization	horizontal for Signal, vertical for Idler
Noise	< 0.5% RMS <sup>2)</sup>
Repetition rate	approx. 76 / 80 MHz subject to pump laser repetition rate (others on request)
Beam height	125 ... 140 mm

SIZE (W*H*L in mm)	Optical unit	402*200*1139
	Control electronics	267*312*180

- 1) Ring-OPO with intracavity - SHG also including IR-Signal range  
2) RMS noise measured in 10 Hz to 1 MHz bandwidth

Distributors  
see APE website [www.ape-berlin.com](http://www.ape-berlin.com)

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APE follows a policy of continued product improvement. Therefore, specifications are subject to change without notice.