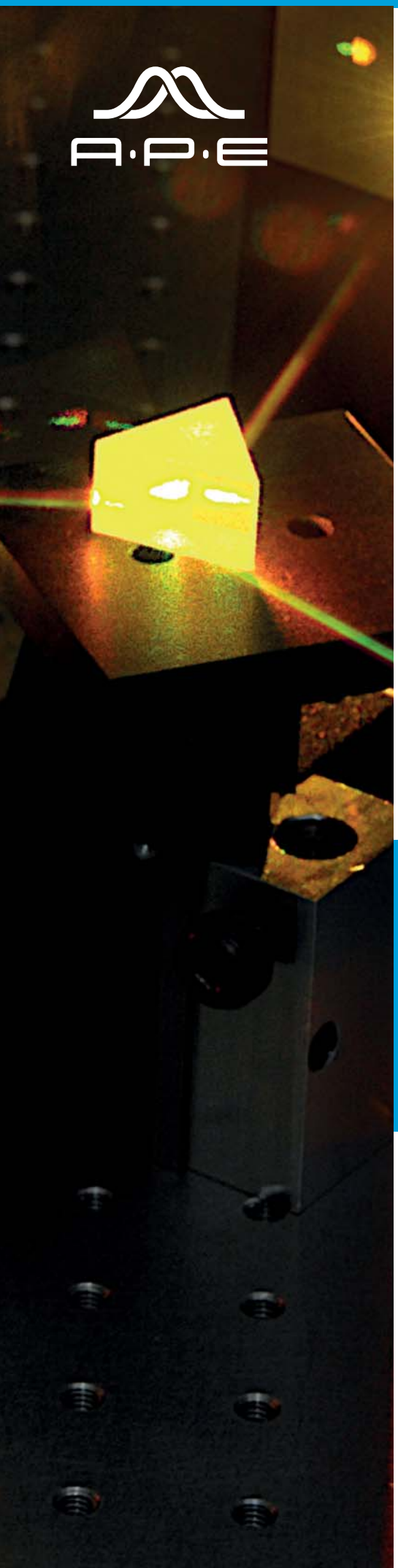


OPO (pump tuned)

An optical parametric oscillator (OPO) is a laser source which in a non-linear process splits a short wavelength pump photon into two photons with longer wavelengths (Signal and Idler).

The A·P·E 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. To reach the visible range in the Ring version the Signal wavelength is intracavity frequency doubled. 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.

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

- Very low threshold (< 0.5 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 version - optimized for Mira + 5 W pump

OPO
for fs or ps Ti:Sa pump

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[3]		1.6 ... 1.9 µm[3]
(with special Optics Set)	1400 ... 1700 nm[3]		1.7 ... 2.1 µm[3]

Output power | pumped @ 800 nm			
	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[4]
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[5]
Repetition rate	approx. 76 / 80 MHz
	according to and equal to the pump laser repetition rate
	(others on request)
Beam height	125 ... 140 mm

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

2) Optional

3) Signal and Idler not simultaneously accessible

4) Low power version - optimized for Mira + 5 W Verdi pump

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

Components and Dimensions (in mm)

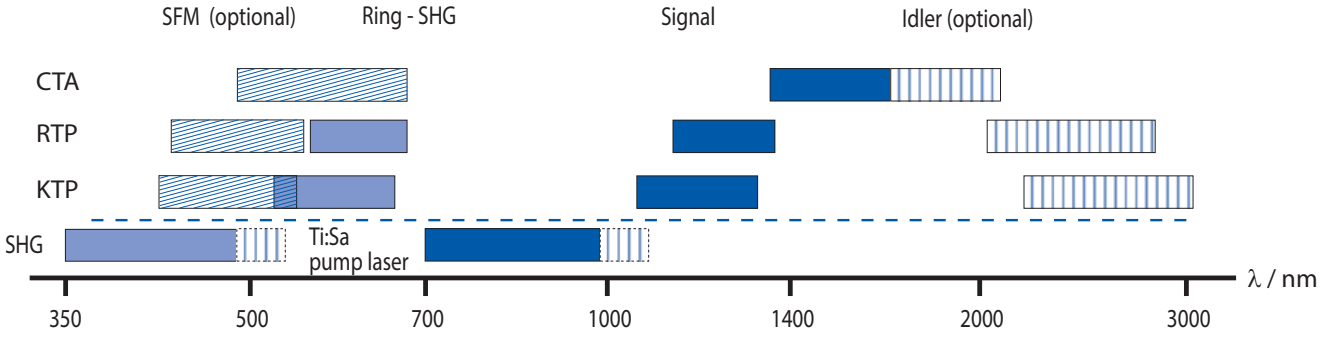
Control electronics: 267 x 180 x 312 (W x H x D)

Optical unit: 402 x 200 x 1139 (W x H x D)

OPO (pump tuned)

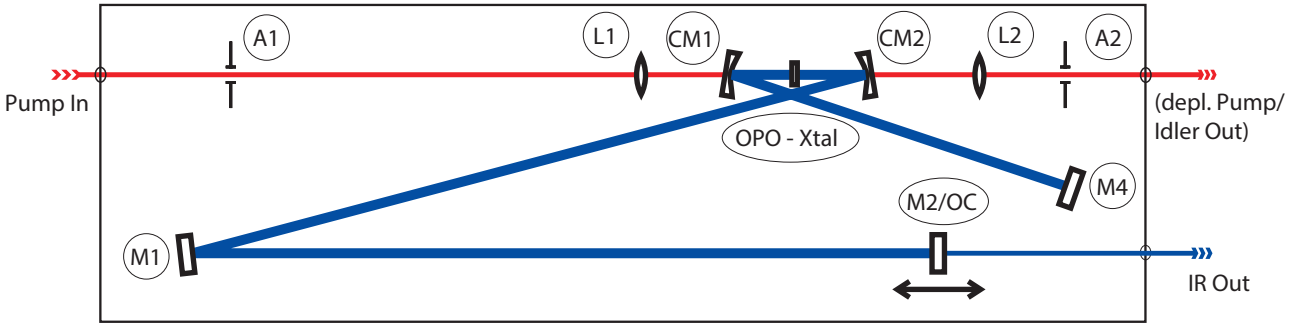
Synchronously Pumped Optical Parametric Oscillator

The A·P·E OPO covers a wide wavelength range and allows further wavelength extension using frequency mixing schemes. In the APE OPO (pump tuned) the OPO output wavelength is defined by the wavelength of the TI:Sapphire pump laser.

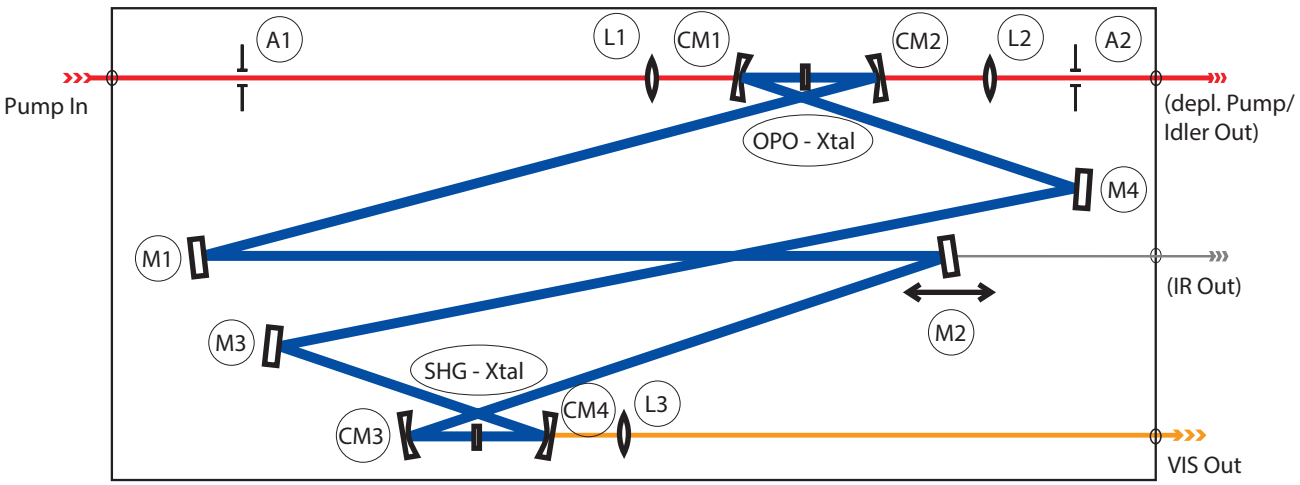


Cavity Configurations

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 (OPO crystal and cavity mirrors) 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 phase matched 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).



OPO
for fs or ps Ti:Sa pump

Options and Modifications

The A·P·E OPO can be provided with several options and modifications[1]:

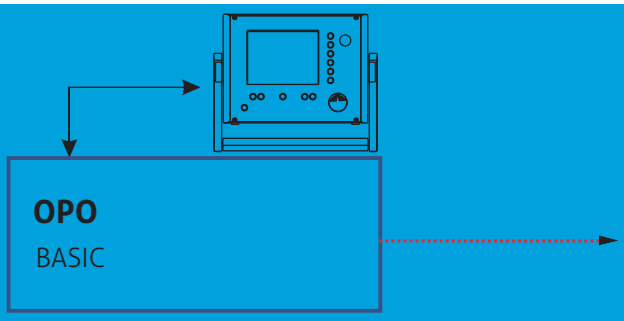
- Output of Idler beam (in addition to output of Signal beam)
- Depleted pump output (not in combination with Idler)
- Customized wavelength ranges
- Adaptation to various pump laser cavity lengths and pump pulse widths
- Synchronization of different output beams (internal delay line) for use in frequency mixing devices
- Frequency mixing devices (Sum Frequency Mixing for extension to blue range, Difference Frequency Generation for MIR generation)
- Simultaneous access to IR and VIS

1) Not included in standard model

System Configuration

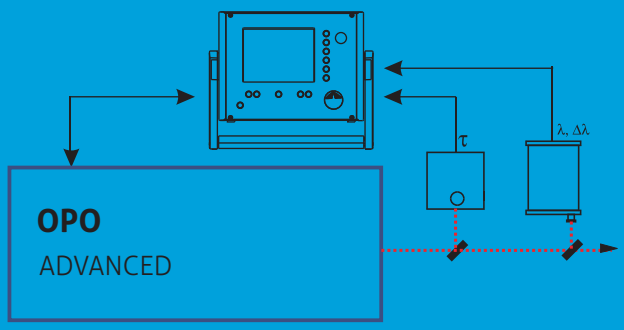
The BASIC configuration consists of:

- Covered optical unit
- Active cavity length stabilization electronics



The ADVANCED configuration consists of:

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



The ADVANCED version has the following additional features:

- Real time measurement of the parameters pulse width τ, wavelength λ, bandwidth Δλ and relative output power
- Extended stabilization features
- Simplified and automatic wavelength tuning
- Computer interface for parameter transfer and OPO control

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