

# AVUS SP

## Short-pulse Optical Parametric Amplifier

### Short-pulses for Microscopy & Spectroscopy

- With pulse durations below 70 femtoseconds, AVUS SP (Short Pulse) is available as high-power optical parametric amplifier (OPA) for Yb fiber laser systems.
- AVUS SP generates two independent output beams. The signal output ranges from 650 to 920 nm, and the idler output from 1150 to 2500 nm.
- The powerful short-pulse compression unit provides not only pulse compression but also dispersion compensation, and is therefore ideally suited for Multi-Photon Microscopy as well as Time-Resolved Spectroscopy.

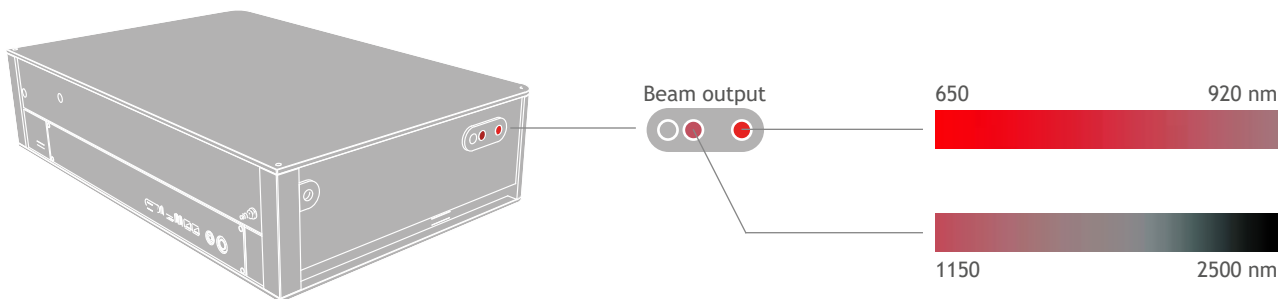


- OPA for 1  $\mu\text{m}$  pump laser
- Up to 50 W pumping power
- Pulse durations of 70 fs and below
- Pulse compression & dispersion compensation
- Completely automated and fully computer controlled
- Air-cooling and monolithic case for long-term stability
- 24/7 integrated performance monitoring of both laser system and AVUS
- TCP/IP remote control with standardized command set for easy programming

# AVUS SP Optical Parametric Amplifier

## Two Wavelength-Ranges - Independently

- APE's AVUS SP provides reliable short femtosecond pulses available in two independent beams: The signal output ranging from 650 ... 920 nm is ideally suited for 2-photon-experiments. The idler output ranging from 1150 ... 2500 nm opens the door for 3-photon-microscopy requiring high peak power.



### Two beams independently

Signal beam (650 ... 920 nm) and idler beam (1150 ... 2500 nm) are independently but also simultaneously available.

## Pulse Compression & Dispersion Compensation

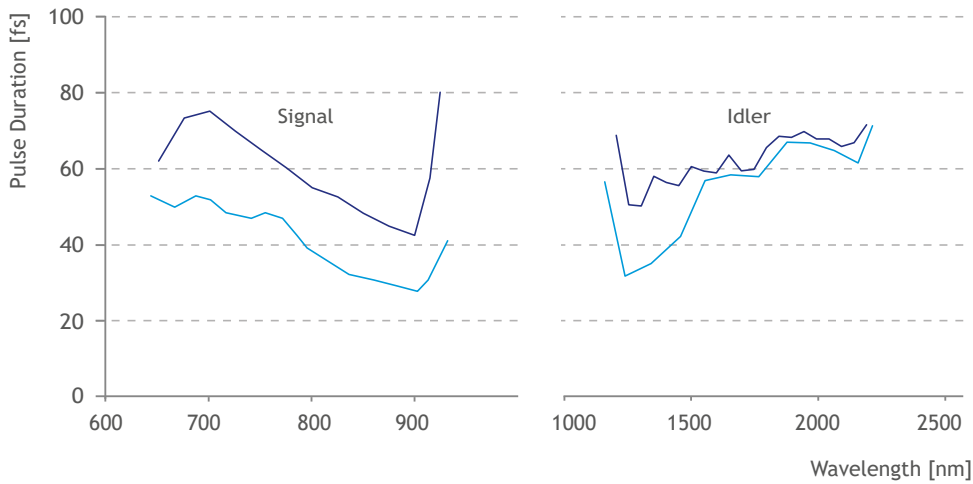
- Unlimited freedom: AVUS SP is delivered *with* or *without* pulse compression and dispersion compensation. Depending on your requirements, AVUS SP will be commissioned accordingly. Typical requirements may be, for example:
- Longer pulse durations in the range 150 - 200 fs (without pulse compression)
- Short pulse durations in the range of 40 - 70 fs, e.g. pump probe experiments
- Short pulse durations with full control over a larger dispersion range, e.g. for microscope setups

## Typical Applications

- Three-photon microscopy
- Two-photon microscopy
- Pump probe spectroscopy
- Time-resolved spectroscopy

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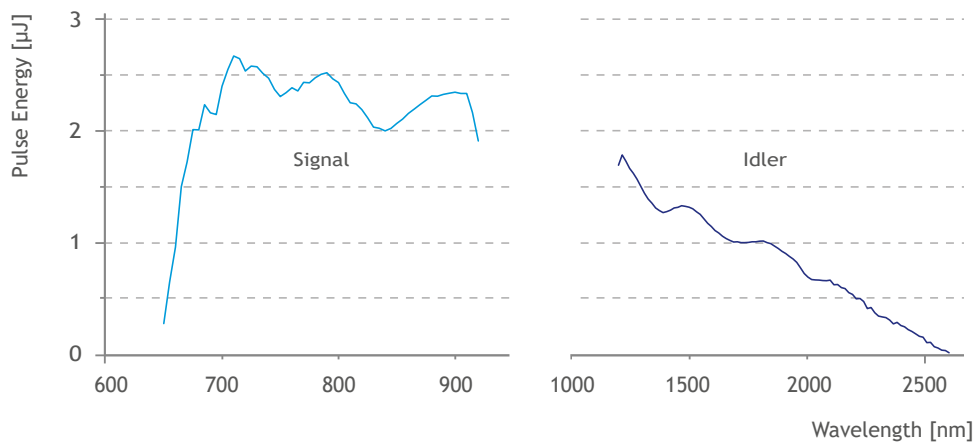
## Pulse Duration Signal & Idler Beam (Compressed)



Pulse width of signal and idler beam, both compressed, measured at 40  $\mu$ J pump energy.

— Pulse Duration  
— Transform Limit

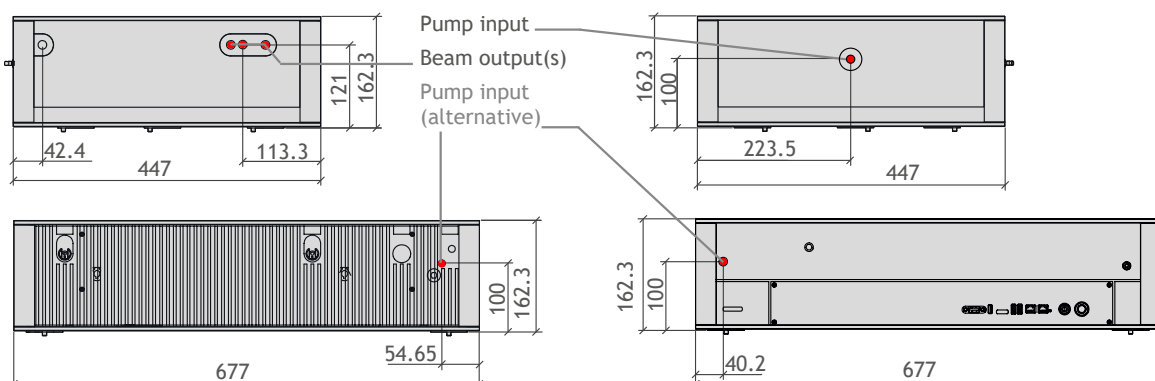
## Pulse Energy Signal & Idler Beam



Pulse energy of both signal and idler beam, measured at 40  $\mu$ J pump energy.

## Dimensions

All Dimensions in mm



# AVUS SP Specifications

## Pump Laser Parameters

Input Laser Type	fs based laser systems
Input Power   Input Energy	Up to 50 W   8 ... 200 $\mu$ J
Input Center Wavelength	1020 ... 1070 nm
Input Polarization	Any orientation, linear
Repetition Rate	Up to 1 MHz; others on request
Pulse Width	200 ... 400 fs, others on request

## Main Specifications

Conversion Efficiency at Peak	10 %, Signal + Idler; measured at 20 W input power
Pulse Width	< 70 fs for Signal beam (- 200 fs uncompressed) < 70 fs for Idler beam (- 150 fs uncompressed)
Tuning Range	650 ... 920 nm (Signal beam) 1150 ... 2500 nm (Idler beam)
Output Bandwidth	170 ... 300 $\text{cm}^{-1}$ (typical)
Polarization	Horizontal
Performance Monitoring	Integrated 24/7 monitoring and data logging of both pump laser and OPA condition (e.g. beam position / pointing, repetition rate, pulse energy)
Beam Routing and Separation	Integrated, fully automated
Mechanical Design; Cooling	Monolithic; Air-Cooled
Software, PC, and Automation	Included (Embedded PC)
Remote Control	Possible via TCP/IP (SCPI command set), Windows Remote Desktop

## Pulse Compression & Dispersion Compensation

Optionally Available	
Dispersion Range	Different configurations possible; negative or positive pre-compensation possible

## Additional Outputs (Option)

Output SHG Laser	- 515 nm (or SHG from fundamental wavelength of the laser)
Output Bypass Input Laser	- 1030 nm (or fundamental wavelength of the laser)

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