K2PHOTONICS

K2-ASOPS

High-power dual-comb laser system

60 MHz repetition rate
>1.5 W per beam
Ultrashort pulses
Sub-cycle relative timing jitter

- Compact solution to ASOPS
- High-power for nonlinear studies
- Ultra-low RIN and relative timing noise

DESCRIPTION

The system produces a pair of modelocked femtosecond lasers (optical frequency combs) with a slightly different pulse repetition rate. In the time domain, the optical delay is rapidly swept through a range of 16.6 nanoseconds at high speeds. In the frequency domain, beat notes between each pair of optical comb lines are generated via heterodyne detection. Through a novel shared-cavity architecture, our system is able to achieve ultra-low noise simply in free-running operation.

CUSTOM OPTIONS

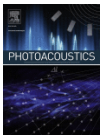
- Integrated second or third harmonic
- Passive (air) or active (water) cooling
- OEM version for integration
- Broadband configuration

APPLICATIONS

- Pump-probe sampling
- Thin film inspection
- Precision ranging
- Nonlinear microscopy

Related publications

Efficient pump-probe sampling with a single-cavity dual-comb laser: Application in ultrafast photoacoustics
*Pupeikis et al., Photoacoustics **29**, 100439 (2023)*

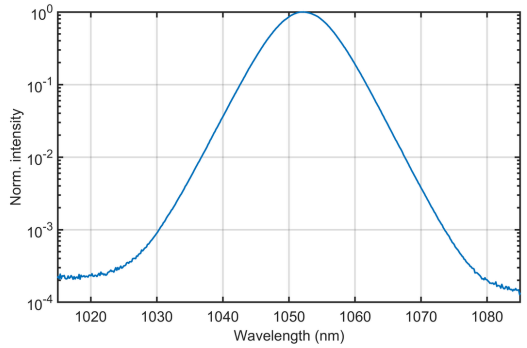


Rapid-Scan Nonlinear Time-Resolved Spectroscopy over Arbitrary Delay Intervals
*Flöry et al., Ultrafast Science **3**, 0027 (2023)*

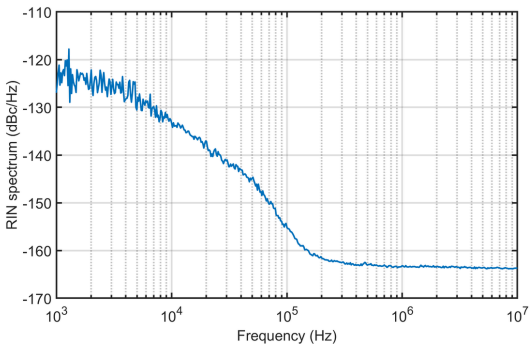
High-Sensitivity Pump-Probe Spectroscopy with a Dual-Comb Laser and a PM-ANDi Supercontinuum
*Gruber et al., Optics Letters **49**, 6445-6448 (2024)*

EXAMPLE CHARACTERIZATION

Laser pulse spectrum



Relative intensity noise measurement



LASER SPECIFICATIONS

Power per comb	>1.5 W
Pulse duration (FWHM)	<220 fs, clean sech^2 pulses
Repetition rate	60 MHz +/- 1 MHz
Pulse energy	>25 nJ
Center wavelength	1050 +/- 10 nm
Beam quality factor M^2	<1.1
Individual comb RIN	<-160 dBc/Hz for frequencies from 200 kHz

DUAL-COMB SPECIFICATIONS

Repetition rate difference	tunable between 0 - 1000 Hz
Relative timing noise	<10 fs [100 Hz, 100 kHz]

AVAILABLE OUTPUTS

Optical	Two spatially separated pulse trains
Cross-correlation signal	Trigger signal at the repetition rate difference
Digital signals	Δf_{rep} and f_{rep} values, logging and remote control via K2-Link

CONTROLS

Repetition rate difference	Active $\Delta f_{rep}/f_{rep}$ stabilization at Δf_{rep} rate
Power	Power allocation between fundamental and harmonic (if applicable)
Pump current	Pump diode current modulation capability for f_{CEO} locking

PHYSICAL DIMENSIONS

Laser head (L x W x H)	540 x 321 x 179 mm^3
Beam output height	75 mm on (W) side
K2-Link control unit	395 x 436 x 88.05 mm^3 (19" rack mountable, 2U)

REQUIREMENTS

Operating temperature	15 – 30 °C (Water or air options - hybrid design)
Relative humidity	Non-condensing enviroment
Rated power	300 W
Electrical requirements	100-120 VAC, 3 A, 50-60 Hz / 200-240 VAC, 1.5 A, 50-60 Hz

Product specifications and descriptions in this document are subject to change without notice.