VALO SERIES
LASER DATASHEET

VEXLUM

SINGLE-FREQUENCY LASER *for research*

Features

- High-power output
- Broad-wavelength selection
- Narrow-linewidth single frequency spectrum
- Excellent spatial quality

Applications

- Laser cooling
- Rydberg transitions
- Optical traps
- Raman gates
- Optical clock transitions

Vertical-external-cavity surface-emitting laser (VECSEL) a.k.a. Optically pumped semiconductor laser (OPSL)

Specification	VALO SF	VALO SHG
Architecture	Direct emitting VECSEL	Intracavity doubled VECSEL
Gain	Optically-pumped semiconductor gain mirror	
Target wavelength	700 – 2150 nm	350 – 800 nm
Free-space output power[1]	0.5 – 10 W with integrated pump laser	0.01 – 3 W with integrated pump laser
Coarse tuning[2]	Up to 5 – 100 nm	Up to 0.5 – 10 nm
Mode-hop free tuning range[3]	>1 GHz (fast), up to 10 GHz (slow)	>2 GHz (fast), up to 15 GHz (slow)
Free-running linewidth (typical)	< 100 Hz (instantaneous), < 10 kHz (RMS, 10 µs), < 100 kHz (RMS, 100 µs)	
Slow modulation (typical)	Piezoelectric element on cavity mirror, 10 kHz bandwidth, 50 MHz/V modulation depth	
Fast modulation (typical, optional)	Intra-cavity electro-optical modulator (EOM), 1 MHz bandwidth, 50 kHz/V modulation depth	
RMS RIN (typical, unlocked)	< 0.05 % (10 Hz – 3 MHz)	
Power stability (typical, unlocked)	< 0.5 % (RMS over 8 h)	
Optical signal-to-noise ratio (typical)	> 100 dB	
Beam quality[4]	$M^2 < 1.1$ TEM_{00}	
Beam diameter and divergence[4]	< 1.5 mm, < 5 mrad	< 1.5 mm, < 8 mrad
Polarization, linear	Horizontal, p-polarized	Vertical, s-polarized
Secondary output beam	Not applicable	Fundamental λ (horizontal, p-pol.)
Polarization extinction ratio (PER)	> 20 dB, linear polarization	
Laser head dimensions	320 mm x 190 mm x 101 mm (6.1 L; 3U height requirement, breadboard mountable)	
Control electronics[5,6]	Control Unit for CW operation, height 3U + 1U for ventilation	
Cooling[6]	Water-to-air chiller, height 4U. Water-to-water and other form factors optional	

[1] Output power is wavelength dependent. See the next page for typical power levels. Single-stage isolator is recommended for applications with back reflections.
[2] Coarse tuning range is wavelength and output power dependent. Maximum 10 THz tuning range corresponds to the typical gain bandwidth.
[3] Mode-hop free tuning range (Fast) corresponds to the laser cavity free-spectral range scanned with piezo voltage control. Extended MHFTR is reached with a piezo stack and by adjusting other tuning elements simultaneously.
[4] Typical values at the laser exit aperture. Beam diameter = full width at $1/e^2$ level of the beam. Divergence = full mean divergence angle. Values depend on the laser cavity configuration, i.e. the wavelength.
[5] The control unit includes a low noise laser diode driver for the pump laser, and up to 5 cavity element temperature controllers, which can be used for wavelength tuning and power optimization.
[6] The control unit and the standard water-cooling unit are 19" rack mountable.

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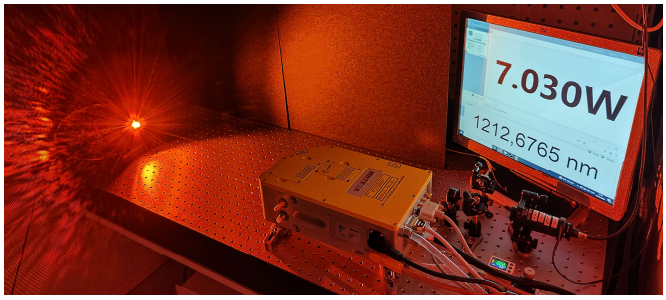
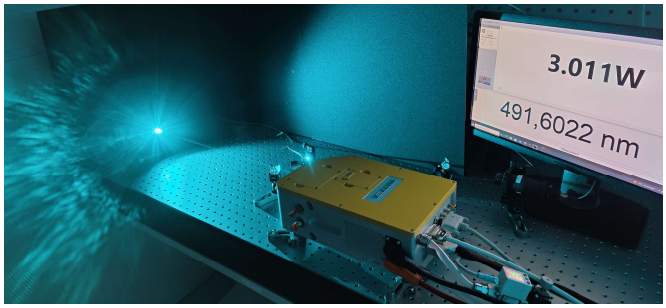
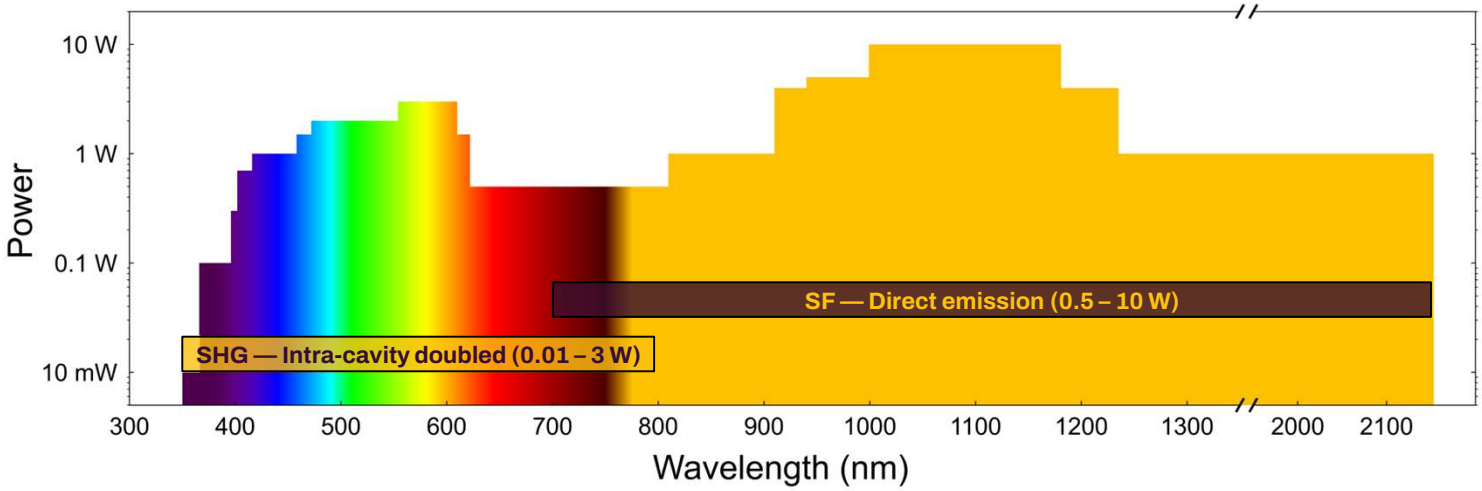
Turnkey single-frequency laser system for AMO research

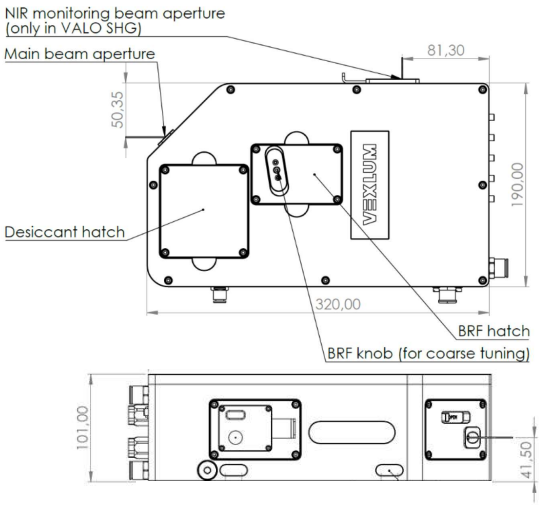


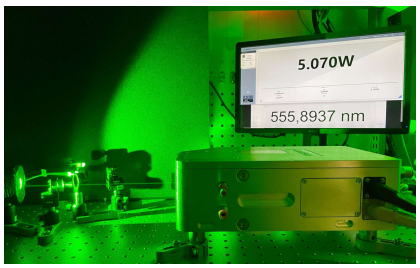


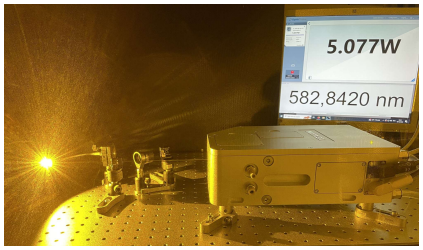
Versatile VECSEL platform

- Designed to meet the diverse needs of the atomic, molecular and optical (AMO) physics research community
- High output power with excellent beam quality, with small SWaP-C, thanks to simple disk laser geometry
- Efficient (”3-in-1”) seed, amplification, and intra-cavity second harmonic generation (SHG) for unparalleled power at visible wavelengths
- Proven sub-Hz linewidth using intracavity EOM
- Tunable output wavelenghts for spectroscopy









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Danger – Visible and/or invisible laser radiation
Avoid eye or skin exposure to direct of scattered radiation
Class 4 laser product

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