Sacher Lasertechnik Group

ServalPlus

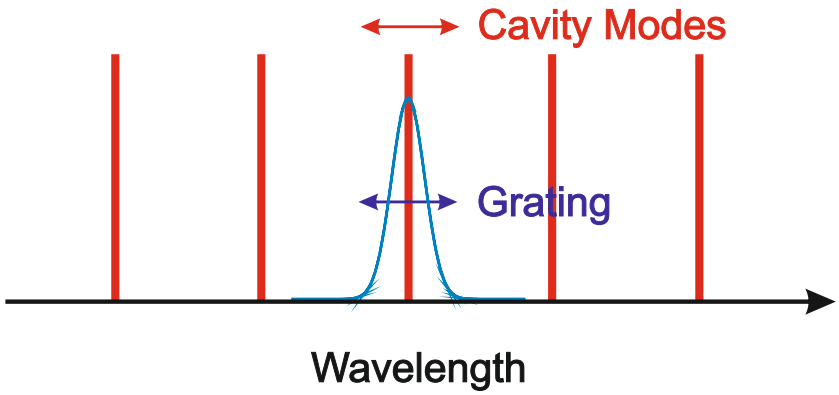
Master Laser Power Amplifier System
Littman/Metcalf Master Laser
Tapered Amplifier Technology

Scientific Lasers

TEC 420

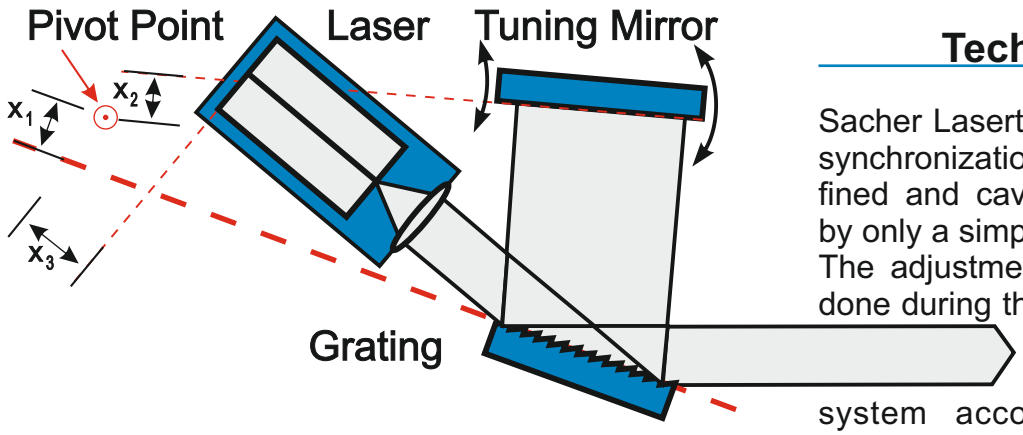
Vorsprung durch Innovation

How does our Laser
tune modehop-free ?



Physical Basics

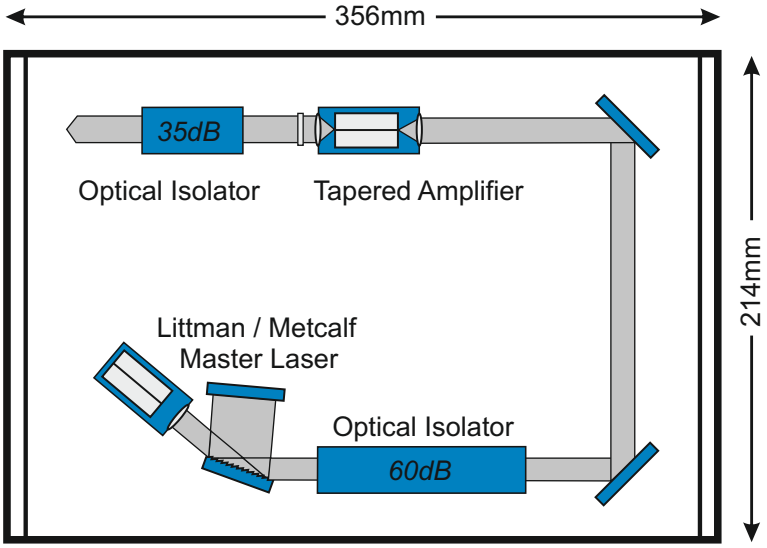
The emission wavelength of a laser is defined by two features. The first condition is the cavity mode. The second condition is the amplification range of the gain medium. Since diode lasers have an extremely wide gain region, it is necessary to put a wavelength selective medium inside of the cavity like a grating. In order to tune such a laser modehop-free, it is required to synchronize the grating defined wavelength with the cavity defined wavelength [1].



Technical Solution

Sacher Lasertechnik has realized the synchronization between grating defined and cavity defined wavelength by only a simple rotation of the mirror. The adjustment of the pivot point is done during the wavelength scanning operation of our Littman/Metcalf laser system according to our patent 5,867,512 application. Due to this special method, we are able to ensure the best modehop-free tuning behavior of our laser system with the highest power available.

Outline

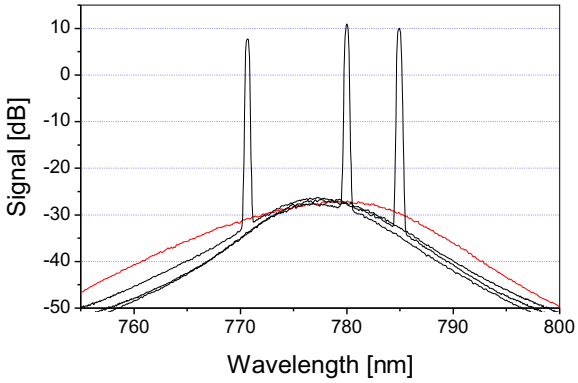


Technical Realization

Sacher Lasertechnik has combined its Littman/Metcalf tunable diode laser with a tapered amplifier. This results in a stable, narrow linewidth, wavelength tunable high power laser source for spectroscopy, optical cooling and trapping. The low linewidth below 500kHz of the Littman/Metcalf design together with the excellent beam stability results in a superior laser source.

[1] M. G. Littman, H. J. Metcalf, Appl. Opt. 17, 2224, 1978

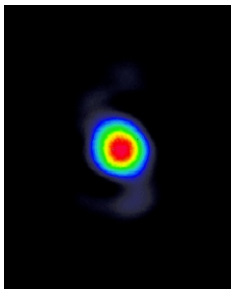
Spectral Quality



Red curve: TEC-420 without master

Black curve: Injected master laser at different wavelengths

Beam Quality



Typical Values
Power: 500 mW ... 2500mW
$M^2 < 1.7$

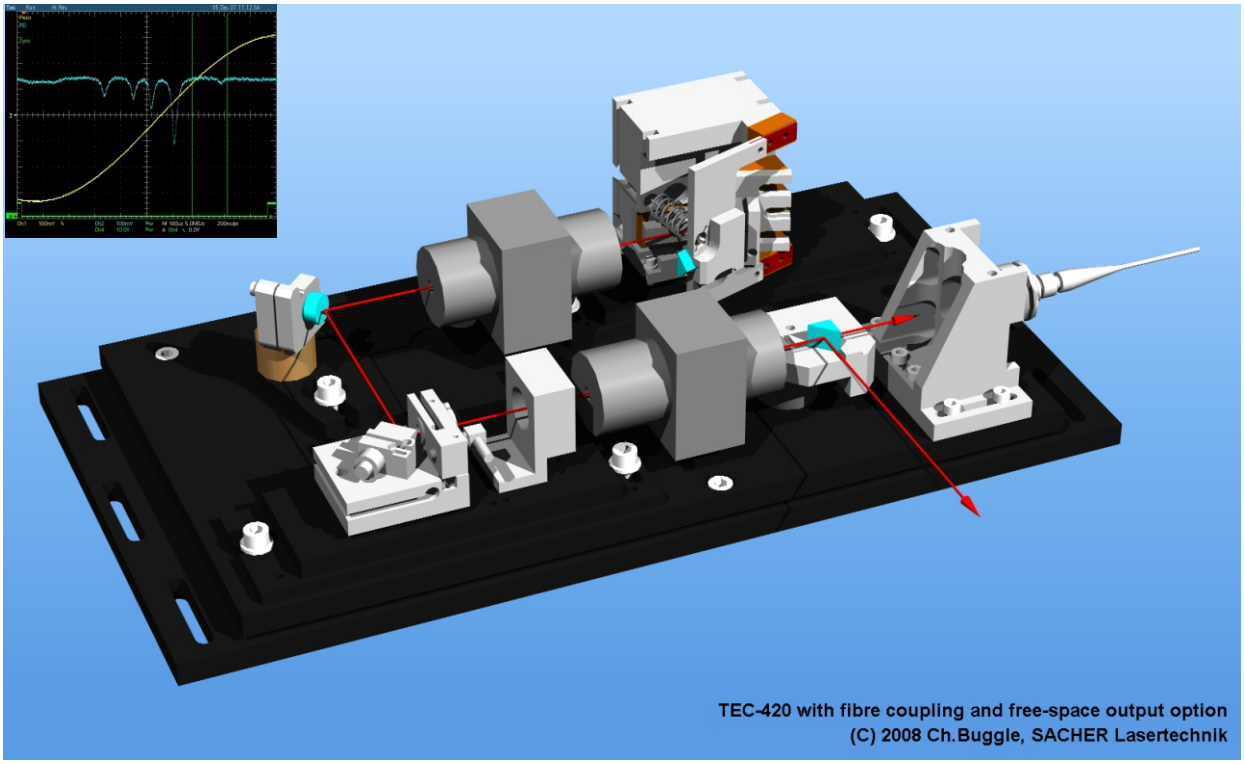
Specifications

Output Power	500 mW .. 2500mW (depending on wavelength)
Wavelength	650nm, 670nm 735nm, 765nm, 780 nm, 795nm, 830nm, 850nm
	935nm, 960nm, 1010nm, 1060 nm, 1080nm, or specified
Linewidth (50ms)	< 0.5MHz, typ. 0.3MHz
Linewidth (20s)	< 5MHz, typ. 2MHz
Long Term Drift (24h)	Typical < 300MHz
Side Mode Supression	> 40 dB for a normal ECDL
Beam Waist $(2\ w_0)$	2.5 mm x 2.5 mm (typ.)
Beam Divergence	< 2 mrad
Beam Quality M^2	$M^2 < 1.7$
Coarse Tuning Range	10nm .. 40nm
Fine Tuning / Mode-Hop free	250GHz / 30 GHz .. 100 GHz
Polarization	Linearly > 1000:1
Weight	Laser Head: 2.6 kg, Power Supply: 9.5 kg
Laser Head Dimension (W x L x H)	214 x 356 x 119 mm

Model Specific: *http://www.sacher.us/TALittmanData.php*

Application: *http://www.sacher.us/TechDocs.php*

Atom Cooling and Atom Trapping



TEC-420 with fibre coupling and free-space output option
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Application Example

Saturated Absorption Spectroscopy

High resolution spectroscopy requires laser features like narrow linewidth, high passive stability, exact adjustable wavelength as well as an excellent fine tuning ability. The schemaic shows a MOPA setup. It includes a Littman/Metcalf master laser, tapered amplifier, optical Isolators as well as fiber coupling. The oscilloscope trace on the left hand side shows the cross-over transition of the D_2-line of Rubidium.

About Sacher Lasertechnik

Company Profile

Sacher Lasertechnik is leading manufacturer of tunable external cavity diode lasers (ECDLs) with more than 10 years of experience. The product range includes anti-reflection coated diode lasers, ECDLs in Littrow and in Littman/Metcalf configuration as well as driver electronics for the LD and sophisticated measuring electronics. Please contact us with your measurement requirements. We would be proud to support you with our competence

Please contact us

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