Sacher Lasertechnik Group

Lion (Motor)

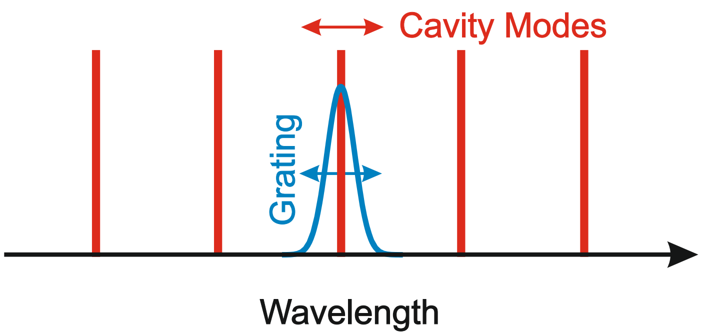
Tunable External Cavity Diode Laser
Littman/Metcalf Configuration
Automated Wavelength Scans

Scientific Lasers

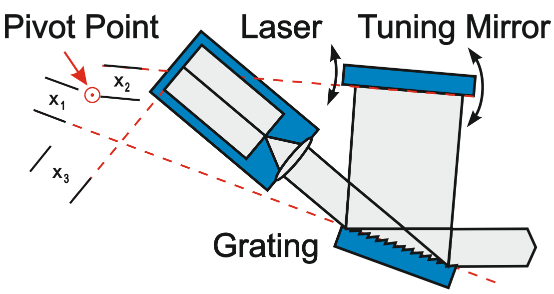
TEC 500 & **TEC** 520 Motorized

Vorsprung durch Innovation

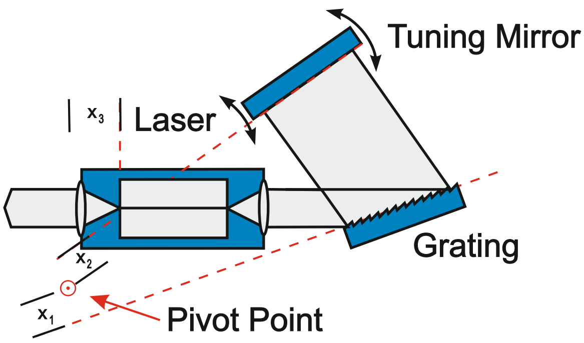
How does our Laser tune modehop-free ?



LION
TEC-500

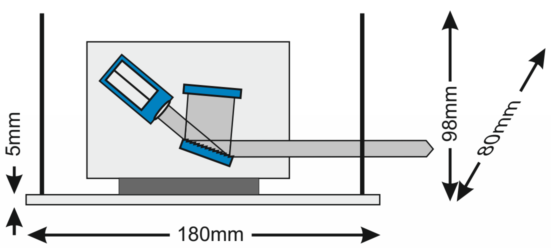


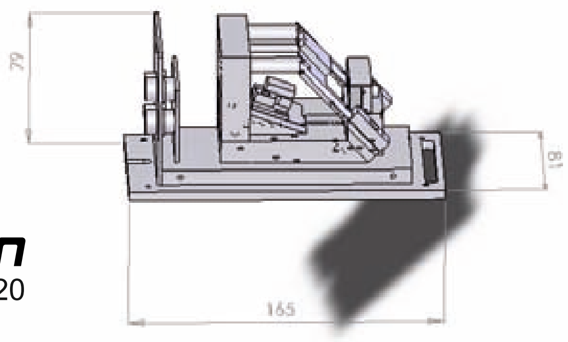
LION
TEC-520



Dimensions

LION
TEC-500





LION
TEC-520

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

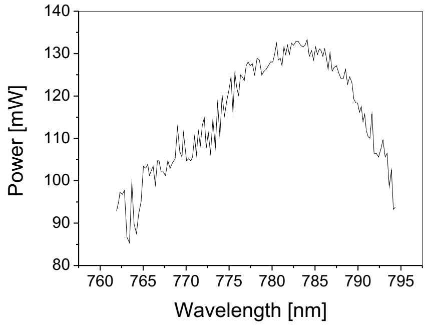
Sacher Lasertechnik has realized the synchronization between grating defined and cavity defined wavelength by only a simple rotation of the mirror. The adjustment of the pivot point is done during the wavelength scanning operation of our Littman/Metcalf laser system according to our patent no. 5,867,512. Due to this special method, we are able to ensure the best modehop free tuning behavior. An increase of the output power and the total performance of the Littman/Metcalf laser is achieved by using a high efficiency grating and outcoupling the light of the rear facet of the laser diode. With this approach, we are able to increase the output power to more than 100mW.

Technical Realization

The drawings on the left hand side show the technical realization and the dimensions of the TEC-500 and the TEC-520 external cavity diode laser systems. Due to using a alignment insensitive cavity design and a flex-mount concept, our Littman/Metcalf laser diode systems are excellent turn-key devices.

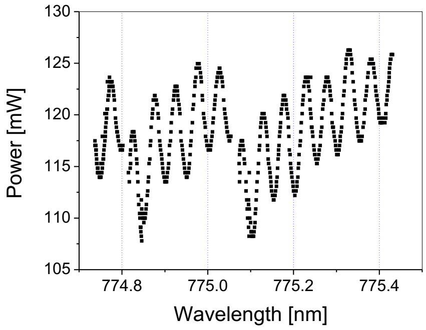
[1] M. G. Littman, H. J. Metcalf, Appl. Opt. 17, 2224, 1978

Automized Wavelength Scans via remote Software!



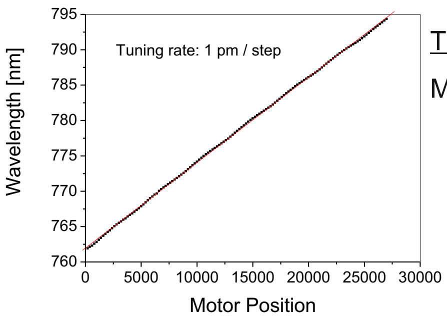
Coarse Tuning Range:

Wavelength vs. Output power



Fine Tuning Range:

Wavelength vs. Output power



Tuning accuracy:

Motor step vs. Wavelength

Physical Basis

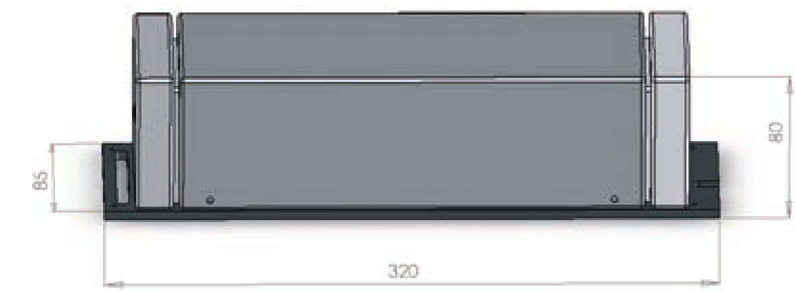
Since the introduction of Therahertz Generation, Differerence Frequency Generation and broadband high resolution spectroscopy, the enhancement of tunable Laser with high as well as automized tunability is required.

Technical Solution

Sacher Lasertechnik has realized a motorized Littman/Metcalf laser system wich provides automated wavelength scans via remote software. An increase of the output power and coarse tuning is achieved by using a high efficiency grating and outcoupling the light of the rear facet of the laser diode. With this approach, we are able to increase the output power to more than 100mW. Available wavelength are currently 760nm... 1080nm. Further wavelength are under preparation..

Lion & **Tiger**

TEC-520 TEC-320

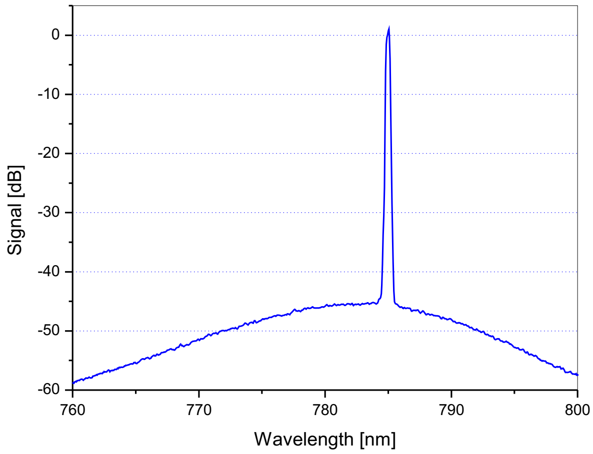


Technical Realization

The picture on the left hand side show the technical realization and the dimensions of the motorized Littman/Metcalf external cavity diode laser systems. Due to an alignment insensitive cavity design and a high precesily intelligent laser controller, our Littman/Metcalf laser diode systems is perfomred to your special requirements.

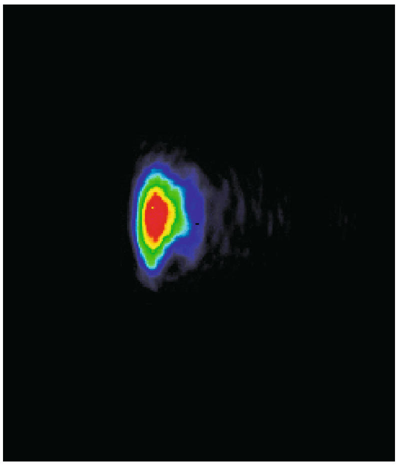
Key Features of our Littman/Metcalf Laser System

Side Mode Supression



Example:
Power: > 150 mW at 780nm
M^2 = 1.5 in both directions

Beam Quality



In-house manufacturing of AR-coatings, Patent 6,297,066

In house manufacturing of anti-reflection coatings for diode lasers guarantees the best performance for the complete laser system. for each type of application.

High passive stability

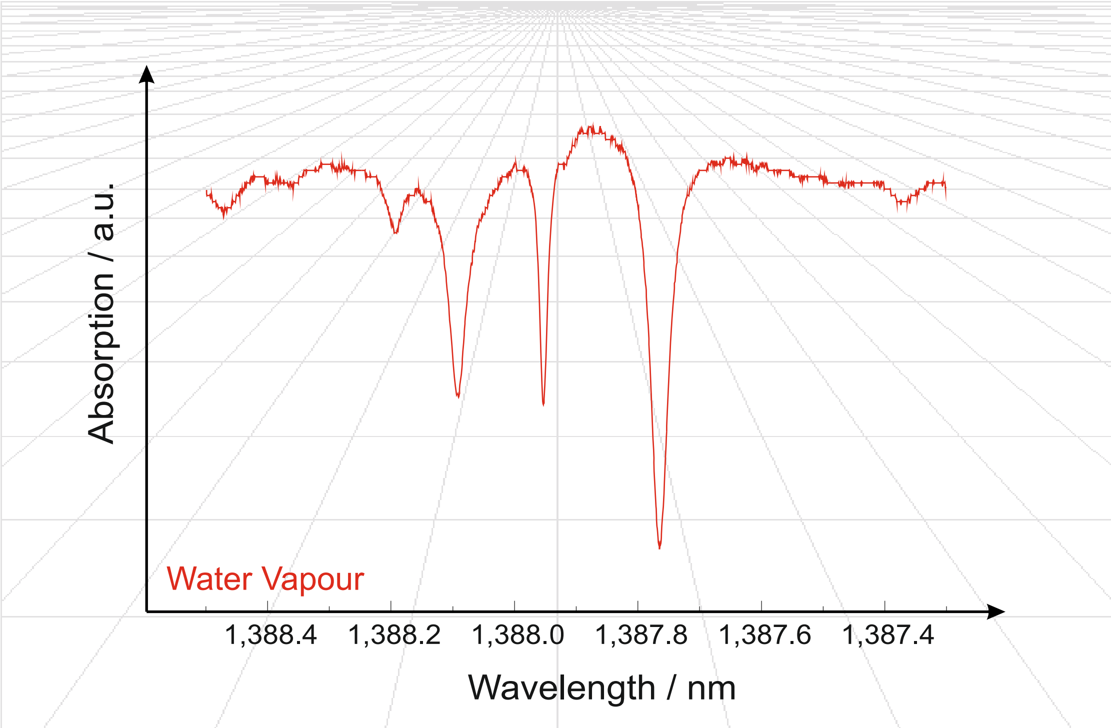
Realizing the pivot axis of the tuning grating and the cavity adjustement via flex-mounts ensures the highest passive stability of our Littrow laser system. As a result, we achieve a robust and highly stable external cavity diode laser system with excellent values for the long term laser linewidth.

Option: Single-mode fiber coupling

Due to the excellent mechanical stability of our Littrow laser system, we are able to perform high efficiency fiber coupling with coupling efficiencies between 40% and 70% into single-mode polarization maintaning optical fibers. Optical isolators and angled fiber connectors (FC/APC couplers) are available upon request.

Specifications: http://www.sacher-laser.com/lmnspecs.php

Output Power	10 .. 150 mW (depending on wavelength)
Wavelength	635, 655, 675, 685, 765, 780, 795, 810, 850, 895, 935,1060,
	1260, 1310, 1380, 1450, 1550, 1630, 1700 nm or customized
Wavelength Tuning	10 nm .. 120 nm (depending on wavelength)
Linewidth	500 kHz @ 20ms
Mode-hop Free Tuning	> 30 GHz, typically > 100GHz
Side Mode Supression	> 50 dB
Beam Quality M^2	< 1.5
	specifications are subject to change without further notice



Application Example

Water Vapor Spectroscopy

High resolution spectroscopy requires laser features like narrow linewidth, high passive stability, exact adjustable wavelength as well as an excellent modehop free fine tuning ability. The figure summarizes experimental data which have been determined with our Littman/Metcalf laser system. The trace shows an absorption signal of an optical water vapor concentration measurement in ambient air. The total tuning range is 1nm with 1388nm as center wavelength of the scan.

About Sacher Lasertechnik

Company Profile

Sacher Lasertechnik is leading manufacturer of tunable external cavity diode lasers (ECDLs) with more than 13 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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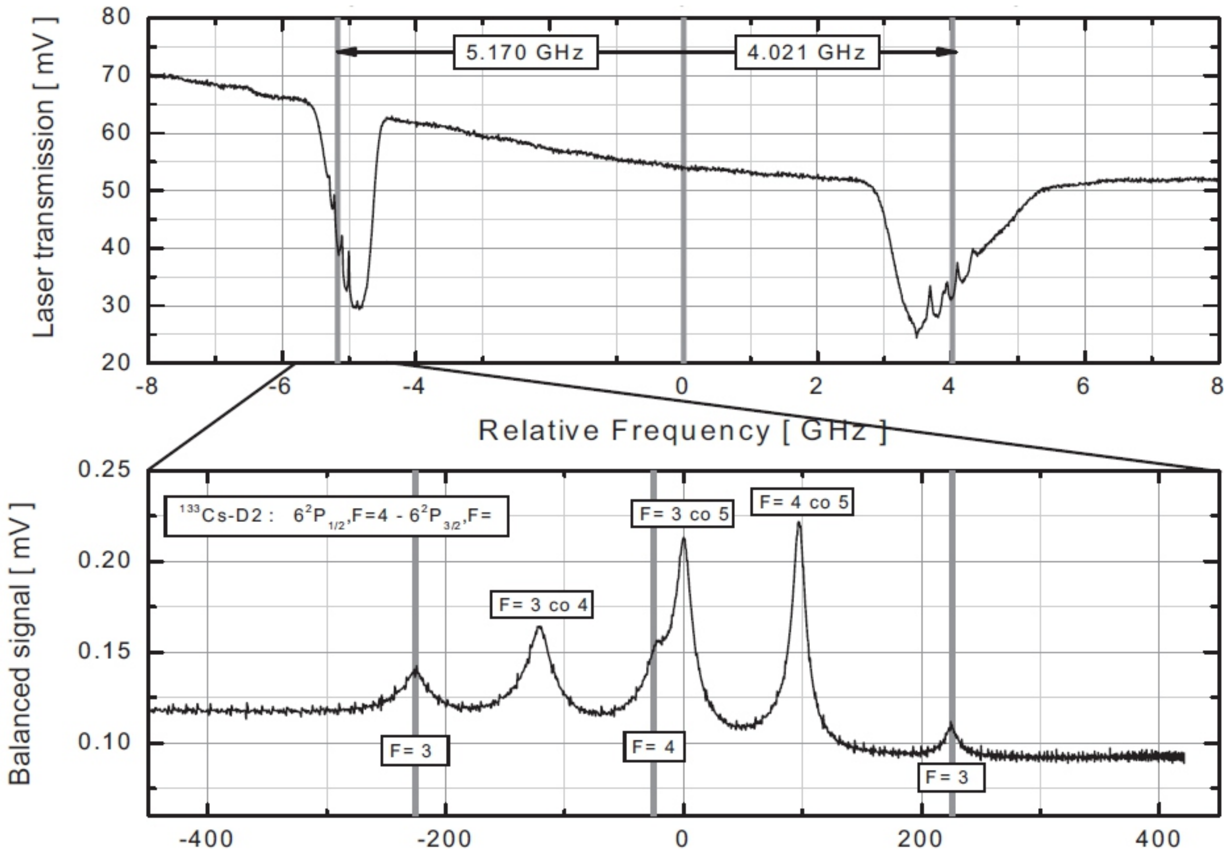

Application Example

Caesium Spectroscopy

High resolution spectroscopy requires laser features like narrow linewidth, high passive stability, exact adjustable wavelength as well as an excellent modehop free fine tuning ability. The figure summarizes experimental data which have been determined with our Littman/Metcalf laser system. The lines shows an absorption signal of the D_2-line of Caesium. More demanding is the Doppler-free detection of the Lamb dips (Demtröder Laser Spectroscopy, Springer 1998). The enlargement shows the Doppler-free measurement of the Lamb -dip of the D_2-line of Caesium.

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Please contact us

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