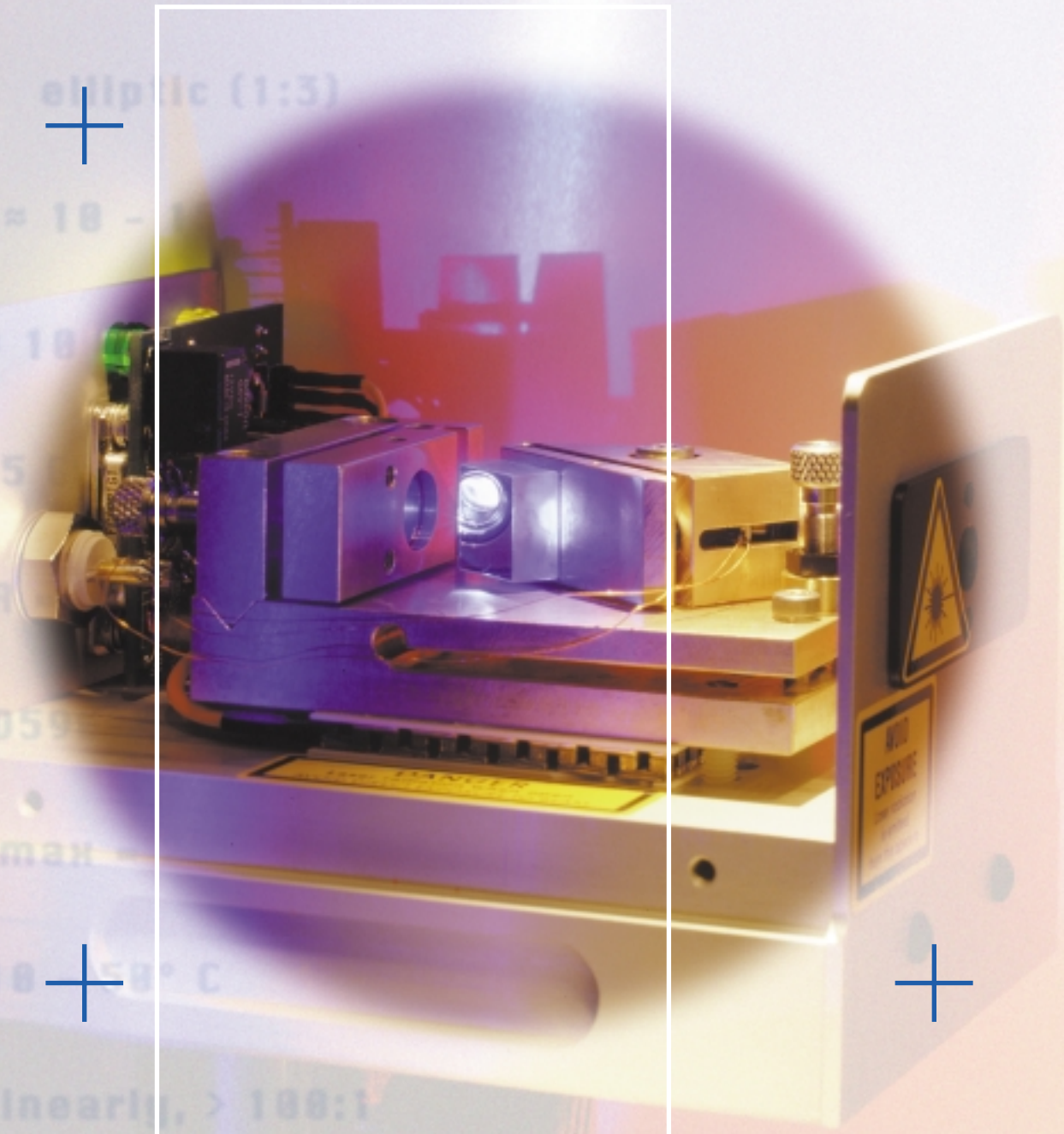
The world of diode lasers.

TOPTICA PHOTONICS



Diode Laser Series

DL 100

Tunable

Grating

Stabilized

"The workhorse for atomic physics"

Tunable
Grating
Stabilized

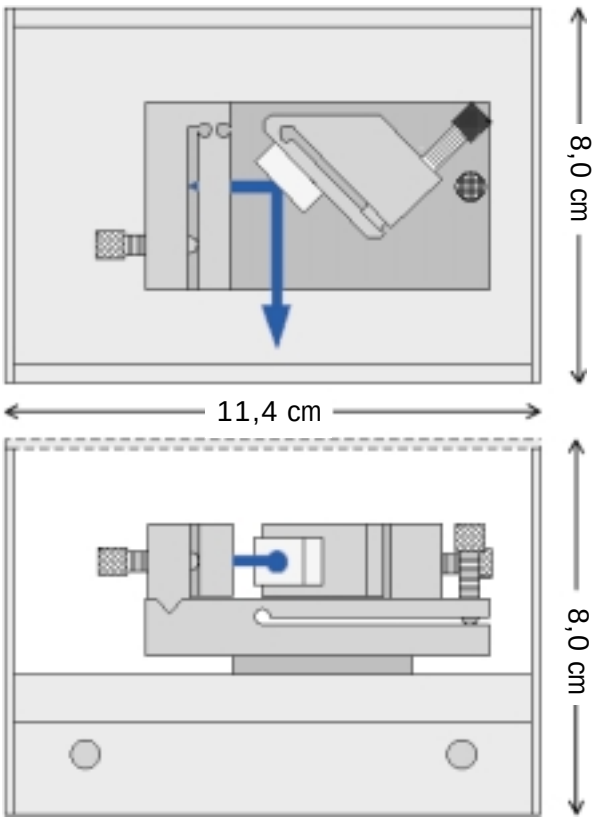
Diode Laser Series

DL 100

for spectroscopic applications in physics and chemistry

Taking out the pain of spectroscopy with laser diodes, featuring:

- **cw, narrow linewidth source for spectroscopy**
- **highest output power available**
- **exceptional long term stability**
- **no spectral gaps anymore**
- **high modulation rates**
- **adaptable to all standard laser diode wavelengths**
- **modular design with hands-on set-up**

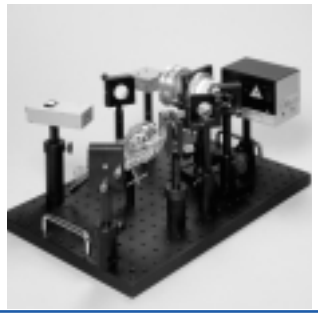


The basic design of the grating stabilized diode laser DL 100 was conceived in research laboratories for the purpose of laser cooling of atoms requiring a laser linewidth of 1 MHz, highest output power possible, scans without mode hops and high sweep rates. The scientists were looking for a simple modular design, reliable and yet inexpensive, in order to be able to employ multiple such diode laser systems in a single experiment. The principle of the Diode Laser DL 100 was born.

TOPTICA PHOTONICS

SYS DL 100 / 19"

Rubidium Saturation Spectroscopy Teaching System



Principle of operation

The excellent performance of the DL 100 results from an extended cavity laser set-up using a very rugged design. Optical feed back into the laser diode from the first order of a grating establishes a new "extended resonator" between the rear facet of the laser diode and the spectrally selective grating. Thus the linewidth is drastically reduced and the wavelength of the laser diode may be controlled by tilting the grating (within the gain profile of the particular laser diode chosen). While one part of the beam is fed back, the zero order reflection from the grating can be used for an experiment. Micrometer screws enable manual coarse tuning, while precise scans without mode hops are performed by a piezo actuator. Flexible full metal joints provide rigid and repeatable control of the laser beam collimation and the feed back level of the grating, and determine the coarse wavelength selection. Active temperature control with a Peltier cooler (TEC) connected to the DTC 100 Temperature Control minimizes slow thermal drifts of the diode laser resonator. For ultra low noise operation of the DL 100 the Current Control DCC 100 is recommended. In addition, ultralow drift versions of the DL 100 using Invar steel and Zerodur gratings are available.

Modular design

The set-up of the diode laser head DL 100 consists of a mounting base, which serves as a heat sink, a Peltier cooler for active temperature control, a diode laser base plate, a laser diode holder with collimator and a grating mount with a Piezo actuator for precise tuning. The laser diode itself can be changed easily by replacing the laser diode holder without dismantling the set-up. The control and supply units are designed as modular plug-ins which can be combined to meet any application requirement. Other modules like Scan Controls, HV-amplifiers, Lock-in, PDD and PID regulators complete the modular electronic set-up.

Hands-on set-up

The DL 100 evolved in research laboratories, and therefore offers multiple features and the necessary versatility for a daily changing environment. All important alignment parameters, for example, are easily accessible from the top and are adjustable by lockable micrometer screws.

Adaptable to all standard laser diodes

Today, single mode laser diodes are available in a nearly complete spectral band from the blue to the near infrared. Note, that in principal there is no need for expensive antireflection (AR) coatings of the front facet of the laser diode for many applications! However, we also incorporate AR coated diodes on customer request. Easy alignment prescriptions allow the user to adapt the DL 100 to the individual laser diode. Either the DL 100 is ordered prealigned to a given wavelength or the customer chooses to mount the laser diode himself. Suitable gratings and optional mounts correct outcoupling angle and angle walk for different wavelengths.

Reasonably Priced

The Diode Laser Series DL 100 with the Diode Control Unit DC 100, the Diode Current Control DCC 100 and the Diode Temperature Control DTC 100 is your complete step into the „World of Diode Lasers“. Due to the strong emphasis on passive mechanical stability, low thermal expansion and drifts already in the construction state, excellent performance of the DL 100 Series can be guaranteed at an affordable price.

Questions and Answers

about Tunable Diode Lasers in general and the TOPTICA Photonics Diode Laser DL 100 in particular

What is interesting about Extended or External-Cavity Diode Laser (ECDL)?

Laser diodes are efficient, compact and inexpensive light sources and are part of our modern life already. They are mass-produced for applications like bar code scanners, CD players or computer hard disks. However, their use for spectroscopy has been limited due to the intrinsic problems of controlling reliably the output frequency and output power. In applications where linewidth, stable or tunable narrow-band frequency output is required, free-running laser diodes are far from satisfactory. This problem can be overcome with External-Cavity-Diode Lasers (ECDL)! The Diode Laser DL 100 is the first commercially available tunable ECDL in Littrow scheme. TOPTICA Photonics has chosen the Littrow design since it offers highest power, exceptional frequency stability and simple change of wavelength.

Application Note:

Spectroscopy Cells

with optical quality windows, filled with various elements like Potassium, Rubidium, Cesium or Iodine. Specialties, like cells filled with isotopically pure ^{87}Rb or buffer gas, are also available.

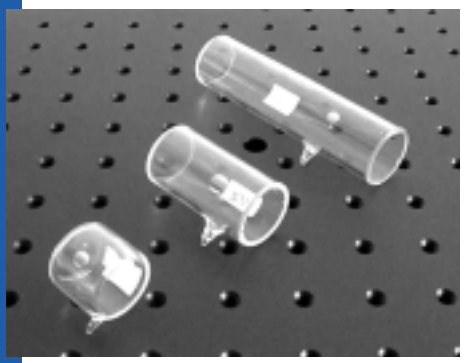


Figure 1

Figure 1: Standard cell types: short low optical grade, short and long optical quality cells (from the bottom).

Figure 2: Upper trace: Saturation spectrum of Rb at 795 nm. From the level scheme all Doppler-free lines can be identified. Lower trace: Transmission from a Fabry Perot etalon for reference.

Figure 3 a): Upper trace: Saturation spectrum of Rb at 780 nm. The Doppler-free lines are identified from the level scheme. Lower trace: Transmission from a Fabry Perot etalon.
Figure 3 b): Details of the above spectrum.

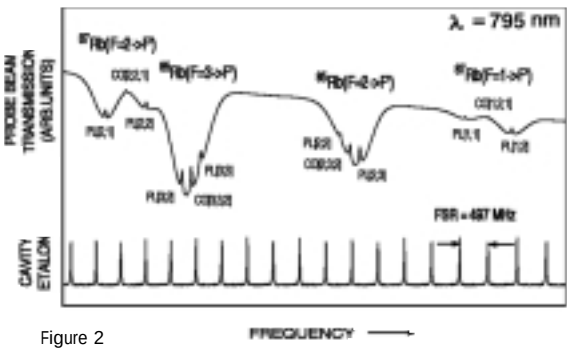


Figure 2

Spectra courtesy of U. v. Amsterdam, Group Prof. JTM Walraven.

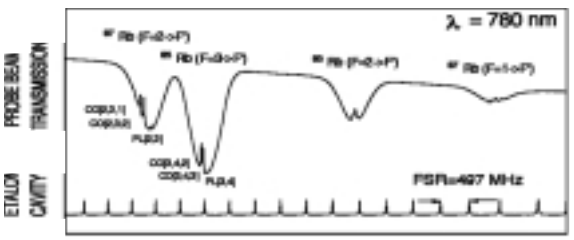


Figure 3 a

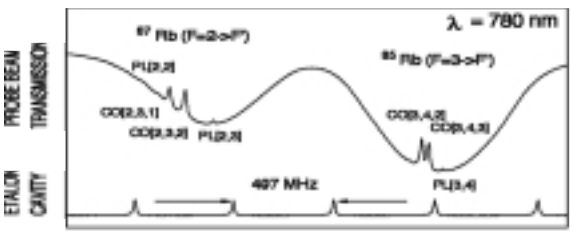


Figure 3 b

Application Note:

Scanning Fabry-Perot Interferometer

Figure 4

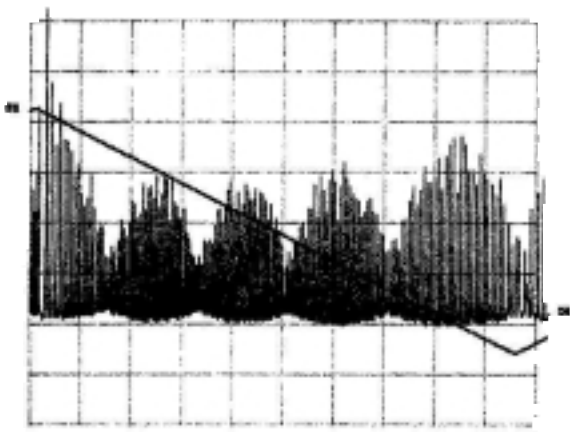


Figure 5

Figure 4: Fabry-Perot Interferometer FPI 100 for fast and simple mode analysis. Scanning and temperature stabilization of the FPI 100 are performed using the standard Scan Control module SC 100 and Temperature Control module DTC 100.

Figure 5: Spectral performance of a mode-hop free scanning DL 100 equipped with AR-coated laser diode. Shown is the light transmission through the FPI 100 (FSR 1 GHz) and the scan ramp from the SC 100.

TOPTICA PHOTONICS

TOPTICA Photonics Grating Tunable Diode Laser DL 100

- **highest output power available for tunable ECDLs**
- **adaptable to all standard laser diodes with and without AR coatings**
- **German craftsmanship, best quality, reasonably priced**
- **steadily expanding spectral and power range of laser diode media**
- **excellent passive thermal and acoustic stability**
- **modular and open design, hands-on set-up**
- **direct interaction with our engineers to adapt the instrument for your experiment**
- **cooperations and joint-ventures are welcome**

Application Note:

Rubidium Saturation Spectroscopy with Extended-Cavity-Diode Laser

The application of grating stabilized diode lasers is especially advantageous for spectroscopy with the alkalines since there are low price commercial laser diodes on the market offering the necessary wavelengths like 671 (Lithium), 766, 769 (Potassium), 780, 795 (Rubidium) or 852 and 895 nm (Cesium). Inquire also for our DL 100 Teaching Systems.

Research interests include:

- optical pump phenomena of alkaline metals, study of magnetic effects
- optical preparation of atomic coherences and dark resonances
- absolute stabilization to atomic resonances, time and frequency standards, Allan variance
- optical phase-locked coupling of diode lasers (OPLL)
- phase coherent experiments in gas cells
- Magneto-Optical Traps (MOT)
- optical frequency divider with diode lasers
- nonlinear optics with diode lasers: generation of blue light with optical crystals

Active Stabilization Schemes

For applications in atomic physics, in particular for laser cooling of atoms, ultra-stable laser output is required. This can only be achieved with active feedback mechanisms employing schemes such as locking the frequency to a high finesse resonator or an atomic line with a saturation spectroscopy set-up. TOPTICA Photonics offers the full range of control electronics (PID, PDD, Lock-In) as additional modules.

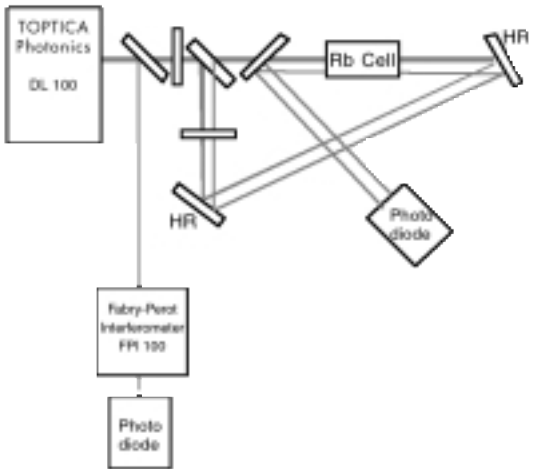


Figure 6:
Teaching System: Set-up for measuring saturation spectra.

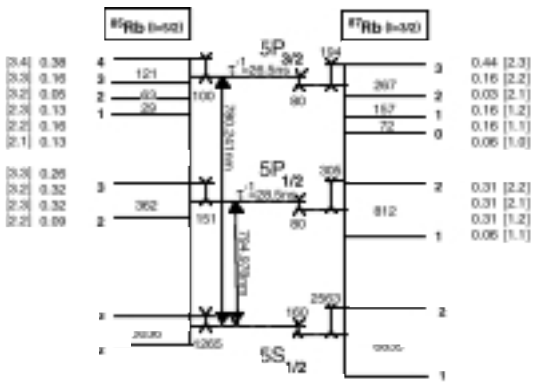


Figure 7:
Energy level diagram and relative intensities for the D-lines of the two Rubidium isotopes (line splittings in MHz).

Questions and Answers

Which system is the most suitable for industrial applications?

The Diode Laser DL 100 in its present set-up is geared towards research laboratories offering all options for research. Industrial applications demand simple, compact and reliable solutions with a long lifetime. The systems must be rugged and environmentally stable. The performance of the DL 100 is particular suitable for these applications because of its optimized design. TOPTICA Photonics will be happy to adapt the packaging to your needs. Please inquire about OEM solutions.

Can I base a product development on such a laser?

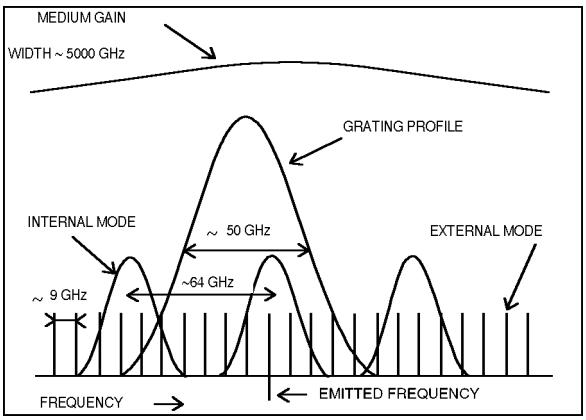
YES. The commitment of TOPTICA Photonics is to work with you to develop a product that will fit your specific application. Expect the pricing to change from that of a low-volume, high-dollar product to one that encourages higher volume markets. We like to get to know your problem and then work together with you to find the most suitable solution. We are constantly investigating the performance of new diode media, so the list of available diodes is expanding.

Application Note

Mode Competition within the Diode Laser DL 100

The interplay of various factors determines the emitted single mode laser frequency of the DL 100:

- laser diode gain profile (medium gain)
- internal resonator mode structure of the laser diode (will be suppressed with an AR coating)
- external resonator mode structure of the diode laser
- grating profile, angular dispersion and reflection curve

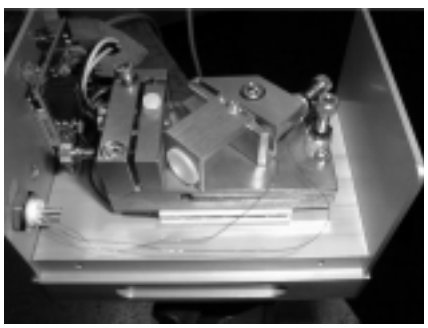


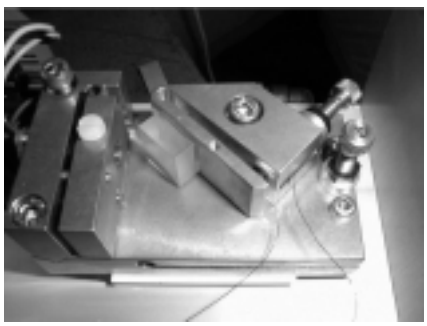
Careful attention to all these factors allows reliable tuning results.

Technical Note

Inside View of the DL 100

DL 100 with (top) and without (bottom) Correcting Mirror for Compensation of Beam Angle Walk.





Questions and Answers

How can the wavelength be changed?

TOPTICA Photonics takes pride in offering nearly the complete wavelength coverage between 390 and 1700 nm using different laser diodes and grating combinations. We offer six different standard gratings for the following spectral ranges: 3600 l/mm: 380 - 450 nm, 2400 l/mm: 600 to 650 nm, 1800 l/mm: 650 to 910 nm, 1400 l/mm: 910 to 1100 nm, 1200 l/mm: 1100 to 1400 nm, and 1000 l/mm for 1400 to 1600 nm. However, we would be happy to find your personal solution for your wavelength of interest.

TOPTICA Photonics can even change the laser diode in an existing laser, when the customer decides to go to another wavelength some time later after the initial purchase. The change procedure is described fully in the manual, but the DL 100 can also be shipped back to TOPTICA Photonics, where the necessary modifications can be made. In some cases, an additional replacement of the grating will also be required.

How important are the electronic drivers/controllers for the performance of the laser?

Free running laser diodes are tuned by current (a few GHz per mA) and temperature (a few 10 GHz per mK). The enormous spectral sensitivity demands low noise and ultra stable drivers. The external cavity set-up leads to a reduced sensitivity by a factor of 10 to 100 (the position of the grating then determines the wavelength, and the temperature sensitive laser diode is only a short part of the optical resonator). Nevertheless, our controller performs with the best noise figures currently available.

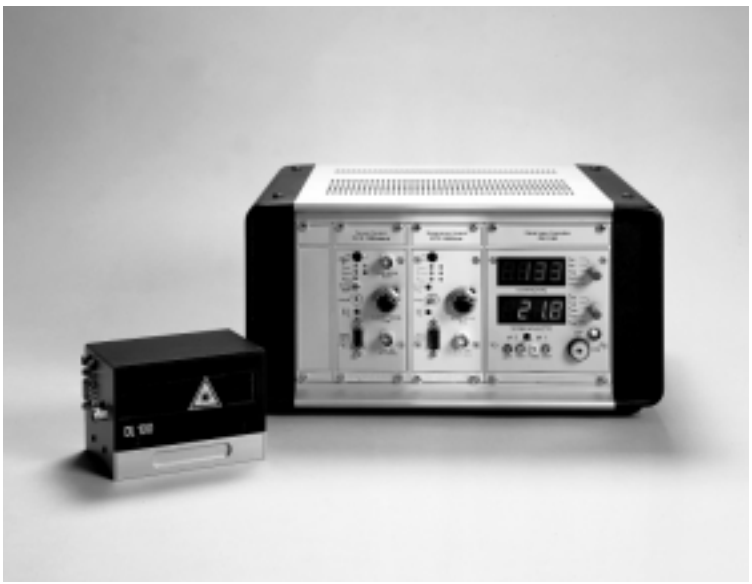
How do I get a specific wavelength or higher power?

Please inquire about your specific needs or a customer-designed solution. The list of laser diodes used in our set-up is steadily growing, including different wavelengths and output power requirements. We can match the output to nearly all atomic or molecular resonances of interest (see www.laser-diodes.com).

DL 100 Raman

Tunable Diode Laser Source for a Raman Spectrometer

Raman spectroscopy provides information about molecular vibrations that can be used for sample identification and quantitation.



SYS DL 100 / 10"
SYS DL 100 / RAMAN

The technique involves shining a monochromatic light source (i.e. laser) on a sample and detecting the scattered light. The majority of the scattered light is of the same frequency as the excitation source; this is known as Rayleigh or elastic scattering. A very small amount of the scattered light ($<10^{-5}$ of the incident light intensity) is shifted in energy from the laser frequency due to interactions between the incident electromagnetic waves and the vibrational energy levels of the molecules in the sample. Plotting the intensity of this "shifted" light versus frequency results in a Raman spectrum of the sample. Generally, Raman spectra are plotted with respect to the laser frequency such that the Rayleigh band lies at 0 cm^{-1}. On this scale, the band positions will lie at frequencies that correspond to the energy levels of different functional group vibrations. The Raman spectrum can thus be interpreted similar to an infrared absorption spectrum.

DL 100

Questions and Answers

Why and Where Should I Use Raman Technique?

Raman scattering is a spectroscopic technique that is complementary to infrared absorption spectroscopy. However, Raman spectroscopy offers several advantages over mid-IR and near-IR spectroscopy, including:

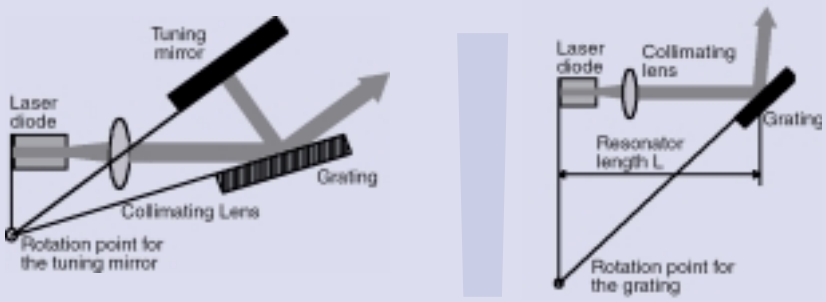
- little or no sample preparation
- water is a weak scatterer – no special accessories are needed for measuring aqueous solutions
- inexpensive glass sample holders are ideal in most cases
- optical fibers can be used for remote analyses
- since fundamental modes are measured, Raman bands can be easily related to chemical structure
- Raman spectra are "cleaner" than mid-IR spectra – Raman bands are narrower, and overtone and combination bands are generally weak
- the standard spectral range reaches well below 400 cm^{-1}, making the technique ideal for both organic and inorganic species
- Raman spectroscopy can be used to measure bands of symmetric linkages which are weak in an infrared spectrum (e.g. -S-S-, -C-S-, -C=C-)

Raman can be used for both, qualitative and quantitative applications. Raman spectra are very specific, and chemical identifications can be performed by using search algorithms against digital databases. As in infrared spectroscopy, band areas are proportional to concentration, making Raman amenable to quantitative analysis.

Questions and Answers

What is the difference between Littrow and Littman set-up?

While a Littman laser scheme uses an additional mirror in the external cavity to couple back the first order light reflection from the grating into the laser diode, the Littrow laser scheme uses the grating only for optical stabilization. In principal, both schemes allow similar tuning results. However, because the Littman set-up is more complex and sensitive to acoustic vibrations and thermal changes, TOPTICA Photonics decided to use the Littrow set-up for the DL 100. TOPTICA Photonics usually incorporates standard single-mode laser diodes without additional anti-reflection coating. This leads to higher output power, more frequency stability, lower costs, and more flexibility in changing to other wavelengths, with a mode-hop free tuning range of typically 15 GHz or more. Increased mode-hop free tuning is available on request with AR coated laser diodes, too. Thermal and mechanical drift are nearly completely compensated already by the design of the DL 100. In applications, where the customer chooses a certain, but fixed frequency with a tuning range of 15 to 30 GHz around this center frequency, there is no better solution than the Diode Laser DL 100.

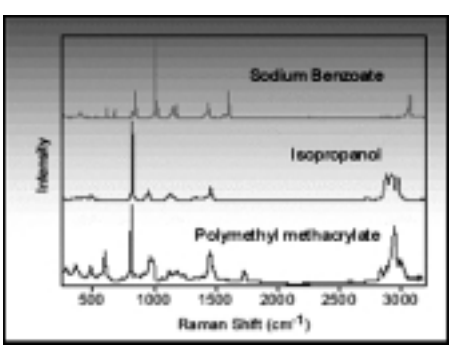


Tunable Diode Laser in Metcalf-Littman (left) and in Littrow Design (right).

Raman

The ideal excitation wavelength from the detector point of view is 785 nm, where the full sensitivity of standard silicon CCD detectors is available at very little costs. However, for some application a shorter or longer wavelength is favorable. TOPTICA Photonics offers a full range of standard Raman Laser Systems with interchangeable laser heads to allow the user to adapt to any analysis needs.

DL 100 versions for Raman spectroscopy	spectral range typically covered	typical tuning range / laser	max. power in the tuning range (single line, polarization better 100:1)
DL 100 / Raman (633)	633	3	7
DL 100 / Raman (665)	665	3	25
DL 100 / Raman (685)	685	3	30
DL 100 / Raman (785)	785	5	40
DL 100 / Raman (800)	800	14	50
DL 100 / Raman (830)	830	14	120
DL 100 / Raman (980)	980	20	150



Our diode laser systems for Raman spectroscopy feature important advantages compared to gas laser technology:

- more output power at 685 or 785 nm!
- single frequency operation
- focussing to micrometer spot
- smaller costs of ownership!

Selection of available standard models of cw Tunable Diode Lasers

DL 100 with collimated output beam:

(For update click to www.toptica.com)

min. / max. available wavelength (nm)	typical tuning range per laser diode (nm)	max. available power (mW)	application examples (most frequent ones)
390-400	3	3	Ca* spectroscopy
400-420	3	3	In spectroscopy
420-430	3	3	Rb spectroscopy
633-645	5	10	interferometry
630-645 AR	8	7	interferometry
645-665	7	5	Ca spectroscopy, optical data storage
665-685	7	25	Li spectroscopy
678-695	10	30	holography
710-720	7	3	spectroscopy
725-735 AR	8	3	spectroscopy
735-755	10	3	O_2 spectroscopy
755-765	12	10	O_2 spectroscopy
765-780	8	15	K spectroscopy, MOT
778-795	12	40	Rb (D_1 and D_2) spectroscopy, MOT
795-810	14	50	Raman spectroscopy
800-815	10	70	spectroscopy
810-825	15	120	Ar* spectroscopy
820-835	15	120	tunable RF source (optical beat)
840-855	15	15	Cs D_2 spectroscopy, MOT
835-855	15	70	Cs D_2 spectroscopy, MOT
835-860	15	120	Cs D_2 spectroscopy, MOT
855-870	15	70	frequency doubling (SHG with $KNbO_3$)
860-880	15	30	spectroscopy
895-915	15	15	Cs D_1 spectroscopy
900-920	15	40	spectroscopy
930-970	15	15	H_2O spectroscopy
970-1010	30	150	frequency doubling (SHG)
1000-1035	30	40	testing of active fibers
1050-1095	30	40	He* spectroscopy, Nd:YAG seeding
1250-1330 AR	40	3	telecommunication
1480-1580 AR	80	3	telecommunication

Note:
Systems are built to custom-order and are available with different power levels or with AR coatings also.
Use the following coding for your inquiry:
DL 100 / center wavelength minimum tuning range / minimum output power.

Plug-in Modules

PDD 100
Pound-Drever Detector
(1 or 2-channel)

LIR 100
Lock-in-Regulator

PID 100
Proportional-Integral-Differential Regulator

DCB 100
Diode Analog Computer Board Interface

Plug-in Modules

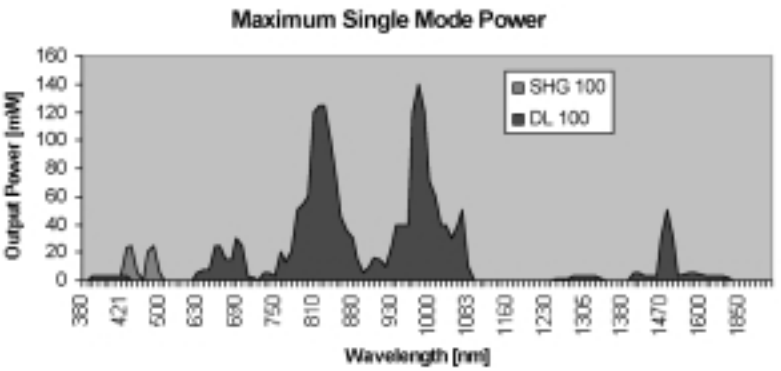
DC 100 Monitor Unit for two display channels

DCC 100
Current Control 500 mA/2A

DTC 100
Temperature Control, also special version for nonlinear crystals

SC 100
Scan Control

Spectral range covered currently* by the Tunable Diode Laser DL 100 offering highest single mode output power available



***For updates please inquire with us directly or go to www.toptica.com**

Questions and Answers

What is the output beam quality? Can the output be fiber-coupled?

The laser output is a nearly diffraction-limited elliptical beam. About 80% of the beam is a TEM_{00} mode and can therefore efficiently be fiber-coupled into a single-mode fiber. The output is vertically polarized with polarization ratio of better than 100:1.

How many lasers can be operated at one time?

The 19 inch supply rack allows simultaneous operation of two lasers (e.g. for heterodyne applications). In case only one diode laser is needed and no tunability is required, TOPTICA Photonics recommends the 10 inch rack.

Are the diode laser heads and controller interchangeable?

YES! The modular design was developed, keeping the demand of a typical research lab in mind. The laser heads are interchangeable; even the laser diode itself can be interchanged. After exchanging diode laser head or laser diode, care must be taken to set the drivers to the appropriate safety settings suitable to the individual laser diode to protect the laser, for example, of damaging currents or voltage spikes.

How stable is the laser frequency?

The Diode Laser Controllers are built completely in low noise analog technology (no digital switching noise), which in combination with the design (using unique flexure mounts) leads to excellent short term stability. After the warm-up time (less than 15 minutes) there is only a very small jitter of the laser output frequency. The soft start/stop feature of the driving electronics allows continuation the next day from exactly where the spectral measurement was stopped.
Additional active stabilization using atomic reference cells is possible also leading to long-term stabilities of better than 10^{-8}.
Please inquire for an individual solution!

TOPTICA PHOTONICS

Questions and Answers

Why does the Diode Laser DL 100 have the highest output power available?

By using laser diodes without antireflection coatings, the DL 100 can be much more powerful than other tunable ECDL. The achievable output power is typically more than 50% of the free-running laser power of the laser diode implemented.

How stable is the optical output power?

Passively, the optical output power stability shows more than a 10-fold improvement using the Automatic Current Control Mode (ACC) of our driver. In addition, active stabilization is possible in the Automatic Power Control Mode (APC) of the DCC 100.

What is a mode-hop and how can one avoid it?

While tilting the grating for tuning, it is important to simultaneously change the laser resonator cavity length or the laser current, otherwise a so-called mode-hop will occur, which means that the laser jumps suddenly from the n-th to (n+1)-th mode of the cavity. For the DL 100, TOPTICA Photonics has decided on a rigid mechanical design (flexure mounts), that is compensated to the first order, exactly matched to the fine tuning range of the piezo actuator. Further, manual coarse scanning of the laser diode gain profile up to 100 nm is possible.

With a high quality antireflection coating on the front facet of the laser diode, one can suppress the internal laser diode cavity, using the laser diode as gain medium only. This not only increases the price, but one of the most important features, namely the option to use standard laser diodes right off the shelf, is lost, and the output power is reduced. However, a coating should be considered, when for a particular application a wider mode-hop-free tuning range (> 50 GHz) is required.

DC 100 supply system suggestions

DC 100/10" stacked with DTC and DCC 100 as in the SYS DL 100/10"

DC 100/DS stacked to drive two scanning DL 100 laser heads independently

DC 100/19" with DCC, DTC and SC 100 modules as in the SYS DL 100/19"

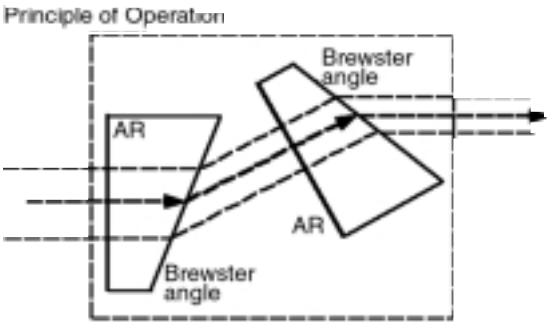
DC 100/DS with additional stacked regulator modules

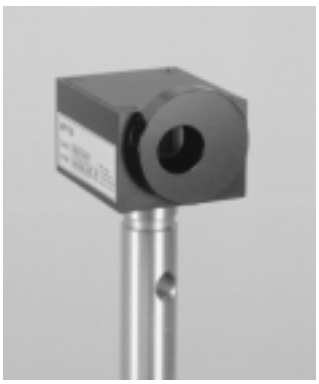
Application Note:

Anamorphic Prism Pair APP 100 for Beam Shaping

The arrangement of two prisms compresses or expands only one beam axis of the elliptical beam profile of a laser diode by a factor of 3.

It is designed to correct the elliptical beam shape of laser diodes, e.g. for improvement of single mode fiber coupling efficiency or the mode-matching to an external resonator.





APP 100

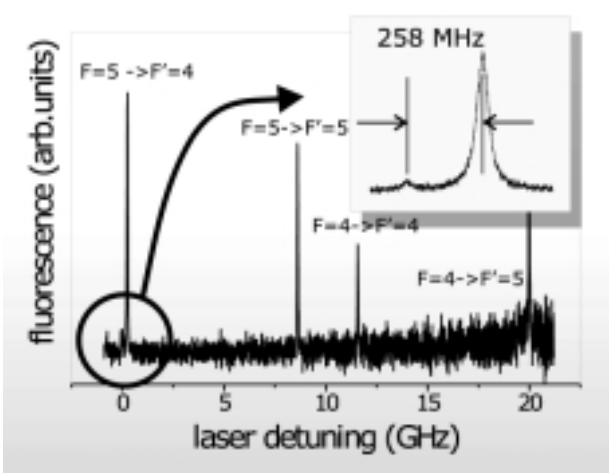
The Anamorphic Prism Pair is mounted in a black-anodized, rectangular box, where one side is machined round for direct mounting in a standard 1 inch mirror holder (outer dimensions 39 x 24 x 30 mm). In the base, a M6 thread allows also mounting on a standard optical lab post.
Note: For compression, the polarization axis of the incoming laser light should be aligned parallel to the long axis of the laser beam for maximum transmission by the prism pair (Brewster angle).

Unmounted anamorphic prism pairs are also available.
Material: SF11, grade A, polish λ/8 @ 830 nm, broad band AR coating (< 0.5%) on the surfaces normal to the incoming beam with 4 different coating types: 400 - 450 nm (Type 400), 600 - 690 nm (Type 633), 635 - 860 nm (Type 735), or 700 - 1000 nm (Type 830).

Application Note:

World's First Spectroscopy with Tunable Diode Lasers in the Blue Spectral Range

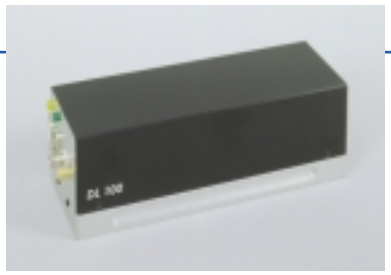
DL 100 absorption spectroscopy using an Indium hollow cathode discharge lamp*.



* Spectrum courtesy of IAP Uni Bonn, Group Prof. D. Meschede.

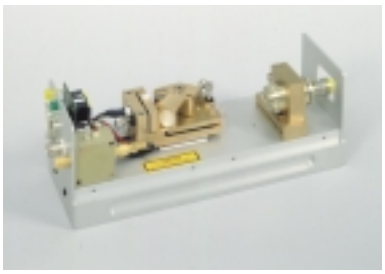
TOPTICA PHOTONICS

DL 100
versions available



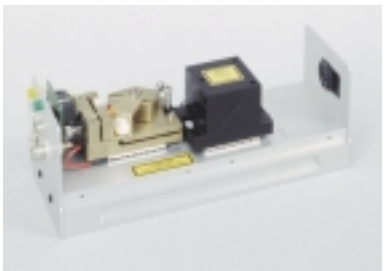
DL 100 L

DL 100, inside view



DL 100 L with FC/APC SM fiber coupler and Bias-T

DL 100, with closed cover



DL 100 L with integrated LaserScope for mode monitoring and control

Questions and Answers

How does an External-Cavity Diode Laser work?

A Fabry-Perot type laser diode has a very short resonator (about 300 µm, being formed by the cleaved facets of the semiconductor material) with poor reflectivities of typically below 30% from the facette resonator cavity, leading to a free spectral range of typically 100 GHz. Although the internal structure of the laser diode is designed to achieve single transverse and longitudinal mode behavior, the linewidth of the free-running laser diode is poor (some 10 MHz). The output frequency and amplitude are a complicated function of driving current and temperature at the p-n junction. In an ECDL however, one takes advantage of the high sensitivity of laser diodes to stray light by feeding back part of the emitted laser light spectrally filtered into the laser diode. In most ECDLs today an external grating situated in front of the diode laser is used for this purpose. While the first order from the grating is back-reflected into the laser diode, the zeroth order is coupled out for the experiment.

What is the linewidth and the coherence length of the diode laser?

The extended cavity leads to a spectral narrowing of the laser output to below 1 MHz. The coherence length can be calculated accordingly, as a function of the short-term linewidth. For the DL 100, the corresponding coherence length is more than 300 m.

Options for the DL 100

- implemented Bias-T for fast modulation for more than 500 MHz.
- anamorphic prism pair APP 100 for circular beam shape, different coatings available
- spectroscopy cells (K, Rb, Cs, Iodine, Acetylene, etc.)
- mode monitor and mode control with Fabry-Perot Interferometer (FPI 100) or LaserScope
- fiber-coupled version using FC/APC couplers for minimum feedback
- ultra-low drift version with Invar Resonator and Zerodur grating

Modular Diode Laser Driver System

- Diode Laser Supply and Monitor Unit
  DC 100 (10 or 19 inch rack, also double stack racks available, high voltage version)
- Diode Laser Current Control
  DCC 100/500 mA or DCC 100/2A (plug-ins)
- Diode Laser Temperature Control
  DTC 100/30 W (plug-in)
- special DTC 100 version for temperature control of nonlinear crystals available
- Scan Control SC 100 (plug-in), also as HV version for extended mode-hop-free scanning (up to 30 GHz)
- Proportional-Integral Regulator PID 100 (plug-in), side-of-fringe stabilization
- Lock-in Regulator LIR 100 (plug-in), top-of-fringe stabilization
- Pound-Drever-Detector PDD 100 (plug-in)
- Diode Analog Computer Interface Board DCB 100 (plug-in)

SPECIFICATIONS of Diode Laser DL 100*:

line width (5 ms)	≈ 1 to 5 MHz, depending on laser diode
typical long term drift (12 h)	≈ 300 MHz
ultra-low drift version available	≈ 100 MHz / °C
output laser power	up to 150 mW
output beam characteristics	collimated fundamental mode, elliptic (1:3)
polarization	linearly polarized (s-wave), > 100 : 1
coarse tuning range of grating	≈ 10 - 100 nm
fine tuning range without mode hop	≈ 15 GHz or 30 GHz (with HV model)
tuning rate	> 5 GHz / ms
collimator	NA ≈ 0.5
temperature sensor	thermistor, optional AD 590
Peltier cooler (TEC)	Q_{max} = 28 W
temperature range for laser diode	10 - 50° C

* Typical specifications; obtained with TOPTICA Photonics' control units DCC 100 and DTC 100 in the DC 100 supply rack. Actual data depending on the laser diode implemented. Data

We offer full assistance in finding the suitable laser diode for your application! Since we constantly investigate the performance of new diode media, the list of available diodes is steadily expanding. No extra charge for implementation of the laser diode of your choice. Standard center wavelength include currently 633, 650, 671, 690, 766, 780, 795, 811, 830, 852, 894, 980, 1060, 1300, 1550 nm etc. with highest output power currently available in the world.

TOPTICA Photonics follows a policy of continuous product improvement. Specifications are believed to be reliable, but are subject to changes without notice.

DL 100

Before ordering, please discuss your application with TOPTICA Photonics or our local distributor. We then try to ideally match the diode laser frequency, output power and tuning range with your application.

TOPTICA PHOTONICS

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