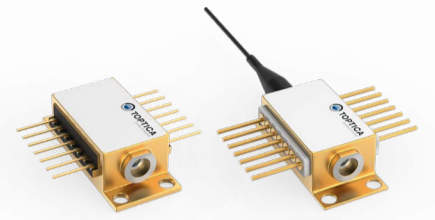


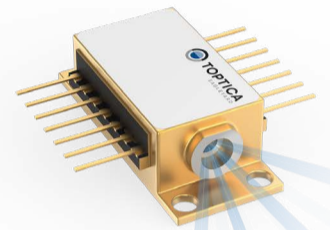
THE EAGLEYARD TIMES

JUST HYPE, OR IS IT THE FUTURE?



NEW WAVELENGTH *miniECL* & *miniTA*

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Everyone is talking about quantum technology (QT) – but what does this buzzword, with its origins in the photonics industry, actually mean in practice? As an experienced company in the QT sector, TOPTICA EAGLEYARD shares some key insight on its pivotal role in the industry in an interview, and reports on what QT has to do with “bread and butter”, the “valley of tears” and “coming home”.

In October 2023, Claus Heitmann (CEO), Michael Kneier (VP Sales & Marketing) and Dr. Björn Globisch (Head of Research & Development) spent six exciting days on the

“Quantum Berlin goes USA” delegation trip to Washington, organized by Berlin Partner for Business and Technology and accompanied by State Secretary, Michael Biel (Senate Department for Economics, Energy and Public Enterprises), which focused exclusively on quantum technology. As a management team, all three have gained a great deal of impressions in various areas of quantum technology during this trip and are faced with both application-specific challenges on the customer side and development-specific issues, as TOPTICA EAGLEYARD has been developing laser modules for innovative applications for

many years and is now successfully entering the QT segment. Under the motto “THINKING BEYOND”, the company works in partnership with innovation leaders to jointly realize visions in the QT field with highly integrated laser diodes and expert know-how.

In the interview, Claus Heitmann, Michael Kneier and Dr. Björn Globisch sum up their travel experiences and combine them with their personal experiences to get to the bottom of the question of how much tangible evidence there is behind the QT trend, and what the future of QT might look like.

Which visit did you find most surprising during the delegation trip? What impressed you the most?

Heitmann: “We had an extremely exciting delegation trip organized by Berlin Partner for Business and Technology, during which we visited NASA, IonQ, the Quantum World Congress, the Quantum Catalyzer, NIST (National Institute for Standards and Technology) and the German Embassy in Washington D.C. – there really were a lot of highlights and new impressions. The discussions with the managing director of the Representative of German Industry and Trade Dr. Christoph Schemionek and the Head of the DLR (German Aerospace Center) Office Washington Marc Jochemich are particularly memorable for me.”

Globisch: “What I found most surprising was my visit to the Quantum World Congress (QWC). There were a lot of overview presentations and only a few technical presentations. In my view, the QWC’s target group was primarily a political audience. That did surprise me a little. I would actually have expected more of a technical focus. What impressed me

most was the visit to IonQ and, in particular, the maturity of the trapped-ion quantum computers. IonQ has a very elaborate product and business strategy, although the applications are not yet clear."

Kneier: "That was actually what I found most surprising at the congress in connection with the visit to IonQ. They have a very tight timetable and are working on its technology roadmap under great pressure and, at the same time, are still looking for use cases and have approached the technology community very openly with that challenge. I am curious to see what success stories will develop from this "business-science clash" over the next few years. I also found it very impressive how many acquainted customers we are represented with under the heading of quantum technology. This was a welcome confirmation of how well we are already positioned in this market. Some customer visits, such as to NASA or NIST, which were organized as part of the delegation trip, felt a bit like "coming home!"

Has the trip changed how you think about the QT market and its future?

Heitmann: "Yes. For me, QT is a very oversized umbrella term that is still relatively "sticky". The desired and comprehensible granularity behind the term QT is still missing. However, I can see the enormous potential and the need to integrate into this QT market. We have this opportunity with our products and this was clearly demonstrated by the IonQ visit, for example – people are already talking about miniaturization and scaling and this fits in perfectly with the strategic direction of TOPTICA EAGLEYARD."

What is your favorite QT application and why?

Heitmann: "My favorite QT applications are applications where I can also see or recognize

Claus Heitmann
CEO



Michael Kneier
VP Sales & Marketing



Dr. Björn Globisch
Head of Research & Development



a 'world improvement effect', e.g. in the medical field – in other words, an application with real tangible added value. So yes, it could be a quantum computer, but it's less tangible for me. QT applications and applications in the field of QT sensing are the highlight for me – very valuable treatments on patients are made possible by QT sensing, which motivates me."

Kneier: "My favorite applications are those where our products are closest to the market or closest to the application: in the field of sensor technology, for example, these are particle sensors, exoskeleton control, magnetometers, where we are already the furthest along with our customers."

Which QT applications do you think will be first on the market?

Globisch: "I think the first application that already exists in principle today is QKD, i.e. quantum key distribution. It will be the first to make it, simply because there is a state security aspect behind it. In my view, this will be the first application to go to market, although the market is small."

Heitmann: "But of all the QT applications, this huge range of applications, sensing is simply the furthest along in my view."

Kneier: "Sensing is the most visible area for us, because this is where laser diodes can make the most of their advantages: small form factor, efficiency, precision."

What is the biggest challenge in the QT market at the moment?

Kneier: "This is currently mainly on our customer side. I heard this very clearly in the corridors at the Quantum World Congress. Many players are still looking for the real "major app" in some places. Who really benefits from this to such an extent that business cases can be derived from it? And we at EAGLEYARD are already pretty well prepared for this with our roadmap for the scalability of energy-efficient laser diode components."

Globisch: "I believe that the term quantum technology has created very high expectations, and we now have to show that we can fulfill them – at least in part. IonQ has also confirmed this with its strategy. It can (and must) now be shown that quantum computers can be built and that interested users can also use them. All QT companies that are close to the application must now work towards demonstrating a user benefit."

Kneier: "One major challenge, for example, is that the US government appears to have a clear expectation, particularly from the American QT community, that a clear application and benefit of quantum technology must be found within the next five years if funding on the current scale is to be provided in the longer term. I'm not sure if everyone has internalized this yet. It's a playing field where you have to show what it's good for in a commercially convincing way within a given time frame."

Heitmann: "It's a bit like a race. This race is the challenge. Who is positioning themselves in this major QT event and who really has applications at the end and can also show that it is not just a research development, but that it really can be reproduced and manufactured. That's extremely important so that it doesn't end up becoming an umbrella term for something that everyone will remember as funny in ten years' time."

Let us take a little trip on a journey through time. Imagine it's the year 2033, what does the QT world look like then? And what about in 2043?

Kneier: "In ten years' time, we will see QT applications in some fields, I think so. Not in the breadth or to the extent that it is currently being hyped. But there will be segments where QT has its uses. I particularly believe in the field of sensor technology – QT can bring significant advantages for a wide range of measurement tasks and accuracies. We have just received confirmation during a customer visit to Harvard that our *miniECLs* and *miniTAs* will "dominate the Rydberg community" over the next five years."

logy. At this point, the applications that really have market potential will crystallize. The first real QT applications will certainly be available in 2033. In computing, it will be quantum computers that have a real advantage over classical computers for individual, relevant problems in practice, although quantum computers

will continue to be large and expensive. In 20 years, the "valley of tears" should be overcome, i.e. individual initial applications with higher quantities will be addressed, the technology will be further developed for these applications and miniaturized in such a way that the entry hurdle for new applications is low. And so, in 20 years, we should actually have a quantum business."

Heitmann: "You always think that there are parallels to the eras of Data and Telecommunications. That were also 20/30 years. Look at where we were 30 years ago in the Data and Telecoms world and everyone jumped on the bandwagon. Is the QT world also just a bandwagon that everyone jumps on and then you somehow realize in ten or 20 years that everything turned out differently than we thought? I hope not."

Which QT applications do you think will have the greatest impact on people's everyday lives?

Kneier: "At the moment, the control of exoskeletons is also supported by human-brain interface applications. So I can imagine a lot of potential in the field of prosthetics. If things continue to develop as they are at the moment, I expect this to be of great benefit to people's everyday lives."

Heitmann: "I see the area of sensor technology in the same way. I see the greatest tangible benefit for me in the medical sector. So if you think about hospital beds, where epileptic seizures, for example,

Heitmann: "In ten years' time, we will be anchored in the market with even more innovative products and greater scalability, especially in the field of QT sensing. It's difficult to predict in 20 years' time, but I can see that development cycles are getting shorter, and that genuine innovations are always a particular challenge."

Globisch: "I believe that we are going through the normal hype cycle with QT, as with all other technologies. We are currently experiencing an exponential rise, and I believe this will continue for another 3 to 5 years. This will certainly be followed by a noticeable cooling down. On the one hand, because state subsidies will decrease significantly and, on the other, because private investors will also invest much more conservatively in the techno-

can be diagnosed more quickly."

Kneier: "Stroke prevention, for example, as a "consumer good" on every ambulance for diagnostics."

Heitmann: "And we are working with many customers and start-up ideas that are already living these innovative approaches today."

Globisch: "Yes, I think it's more for applica-

tions in the medical field. Everything else doesn't have that much influence on our day-to-day lives."

Please complete the sentence EAGLEYARD and QT, it's like..

Heitmann: "Bread and butter."

Globisch: "Pot and lid." It fits well. It simply fits well into the QT roadmap that we have the opportunity to miniaturize things."

Kneier: "The hammer for the nail."

What is TOPTICA EAGLEYARD working on in the QT area, and what are the current challenges?

Globisch: "In principle, a laser with a small linewidth and high output power that is as miniaturized as possible is important for almost every QT application. And that is exactly what we are working on at EAGLEYARD. We also specifically select the attractive QT wavelengths and then develop lasers with a small linewidth and high output power, such as the *miniECL* in combination with a *miniTA* or a DFB laser with *miniTA* or, thinking a little further into the future: PIC lasers, which promise even smaller linewidths and can possibly even be combined with a TA, which then provides the necessary output power."

Kneier: "And all of this is based on an industrial platform for laser diode components that is scalable."

What is your biggest QT challenge personally in your role at EAGLEYARD?

Heitmann: "Developing the right roadmaps today that take into account and reflect this great decade in the best possible way. Focused on products that appeal to a wide range of applications. And to

ket, in order to help shape the resulting opportunities in the long term. The challenge for us is to distinguish at our customer base from successful start-ups from the others at an early stage."

Globisch: "For me, it's about finding the right partners who can support precisely this approach that Claus has just mentioned. So we can't do everything ourselves in technology. We are dependent on partners who do electronics development and passive chip development. You have to find those who really think in terms of industry and don't just want to take the research money with them, in order to stay alive. On our side, the

challenge is to develop the right platforms with which we are positioned modularly, in order to be able to cover the entire scope of diversity offered by quantum technology as efficiently as possible, so that we don't have to develop something new for every application."

Thank you very much for the interesting interview and the exciting insights!

find talented people who are able to develop and build such products not from a research perspective, but with an industrial approach, so that they can be reproduced and implemented in large quantities."

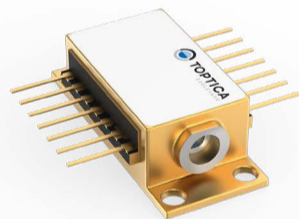
Kneier: "In our dynamic business environment, it is challenging in terms of sales to simultaneously serve an outstandingly innovative segment with QT in line with the mar-

NEW WAVELENGTH FOR THE *miniECL* AND *miniTA* FAMILY

It's finally here: 670 nm is the newest addition to the *miniTA* and *miniECL* families and is introduced to the world at the 2024 SPIE Photonics West.



The new 670 nm *miniTA* comes with the same characteristics as the other wavelengths such as integrated thermal management and beam collimation all in an optimized hermetically sealed butterfly package with 14 thicker pins for ideal power supply. The "plug and play" with fiber pigtail seed lasers are a true game-changer especially in applications such as spectroscopy, quantum technologies and atomic clocks. Measurements show the high optical single mode power up to 1 W and high ASE suppression, ideal for atomic clock, QT, life science and spectroscopy. The *miniTA* is available with 1 W @ 670 nm, 1.5 W @ 765 nm (covering 767 & 770 nm), 3 W @ 780 nm, 2 W @ 795 nm, 2 W @ 852 nm and 2.5 W @ 895 nm.



The new 670 nm *miniECL* comes with 40 mW (Li D1 & D2 line) and is an important addition to all other available wavelengths at 80 mW @ 770 nm (K D1 line), @ 780 nm (Rb D2 line), @ 852 nm (Cs D2 line), @ 895 nm (Cs D1 line). This single frequency laser diode has a super fine linewidth of typical 100 kHz. Moreover, wavelengths between 650 - 1100 nm are customizable upon request, opening more freedom across the spectrum. The integrated beam collimation, thermoelectric cooler and thermistor enable an easy usage. Thanks to the hermetically sealed package, the *miniECL* is very robust and enables very small linewidth for precise results.

The *miniECL* is frequently used in spectroscopy, QT, metrology, atomic clock and life science.

Learn more about both products here:

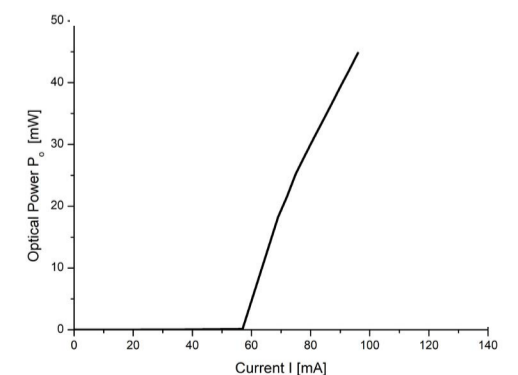
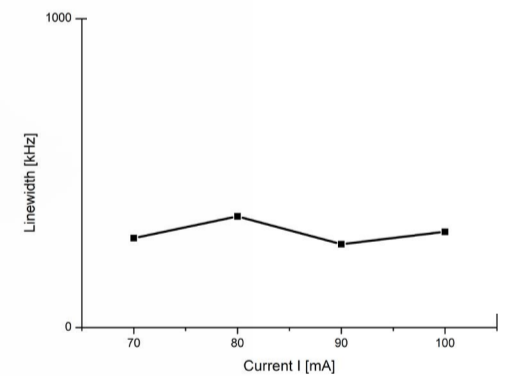
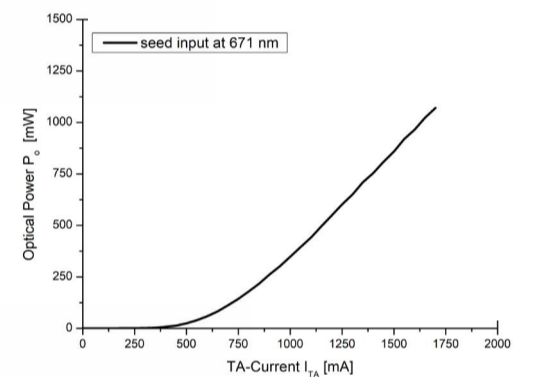
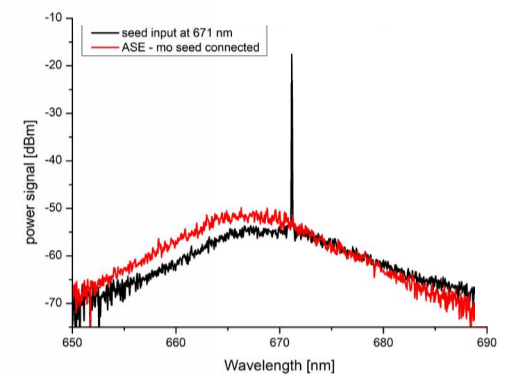


miniECL

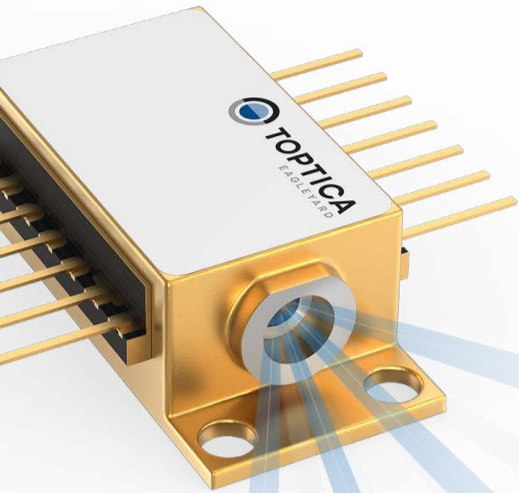


miniTA

NEW WAVELENGTH



LOVING RED, BUT FLIRTING WITH BLUE

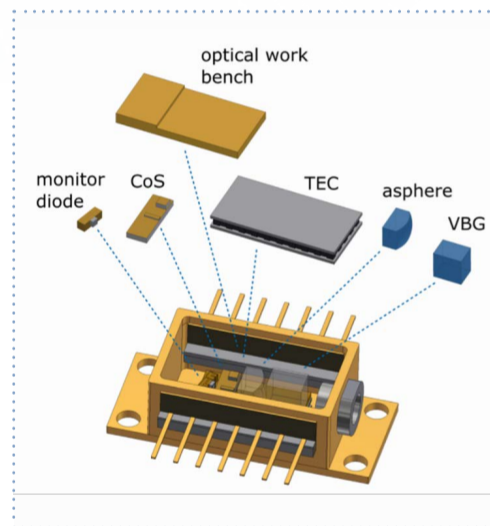


With the strong focus on QT applications that everybody in this industry is experiencing, blue and violet wavelengths become more relevant than ever. For quantum computing wavelength of 369 nm and 399 nm (Yb+), 422 nm (Ca+) and 461 nm (Sr, Sr+) are especially important. In addition, Sr is a very prominent atom for the analysis of quantum gases thus relevant for fundamental physical research.

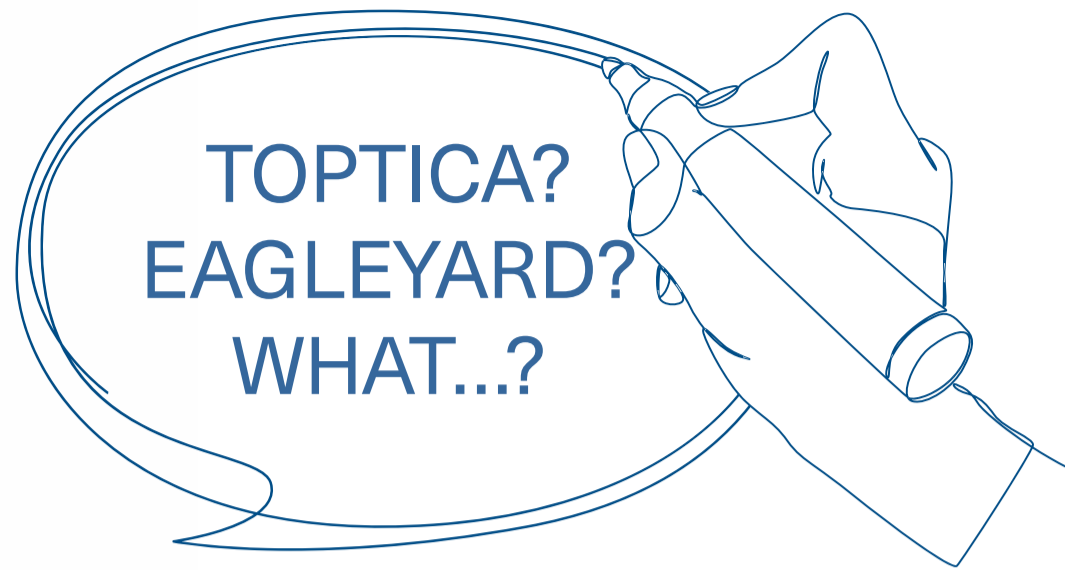
TOPTICA EAGLEYARD who has yet primarily focused on red wavelengths is now flirting with blue. They managed to demonstrate their expertise by further developing their established **miniECL** for 461 nm: a wavelength stabilized external cavity diode laser at 461 nm in hermetic 14-pin butterfly package. The **miniECL** is already available at 670 nm, 770 nm, 780 nm, 852 nm and 895 nm and its concept was now transferred to the challenging blue spectral range. As blue wavelengths have smaller tolerances than higher wavelengths the requirements for the precision in micro-assembly are tremendous. TOPTICA EAGLEYARD is a true expert in packaging of integrated circuits making them the ideal company for transferring research-based blue laser diodes based on GaN chips into the **miniECL**.

The 461 nm **miniECL** emits up to 35 mW at a maximum drive current of 125 mA and the emission wavelength can be tuned between 460.74 nm and 460.97 nm. The linewidth is expected to be < 1 MHz. The mode-hop-free tuning range measures 26 GHz. Behind the lens, a volume Bragg grating (VBG) stabilizes

the laser emission to the target wavelength of around 460.8 nm, which can therefore be used for laser cooling or trapping of Strontium without the need for frequency-doubling. Inside the butterfly package, the laser diode is soldered on a ceramic submount and mounted on an optical work bench together with the aspheric lens and the VBG. The optical work bench is temperature stabilized by a thermoelectric cooler (TEC) in combination with a thermistor.



This development paves the way for compact, blue laser diodes with a narrow linewidth for quantum technology, spectroscopy and sensing.



Find answers to the top questions TOPTICA EAGLEYARD gets asked on a trade show booth:

Who actually is TOPTICA EAGLEYARD?

TOPTICA EAGLEYARD is a global leading provider of high power laser diodes with wavelengths from 630 nm – 1120 nm based on GaAs (Gallium Arsenide). The products combine maximum power, great durability and excellent beam quality – a perfect match for high-end applications. The company transforms research-based know-how into market-ready products with the highest degree of professionalism and a special focus on highly integrated components. TOPTICA EAGLEYARD is based in Berlin, Germany.

Why is it named TOPTICA EAGLEYARD?

TOPTICA EAGLEYARD is part of the TOPTICA group since 2013. TOPTICA develops and manufactures high-end laser systems for scientific and industrial applications and is based in Munich, Germany. In 2020 EAGLEYARD was renamed to TOPTICA EAGLEYARD implying the togetherness of both companies.

What is TOPTICA EAGLEYARD's vision?

TOPTICA EAGLEYARD's vision is reflected in the work of every employee each day: "We shape the future with our unique laser diodes: With our clients, we go beyond. Together we reach the unreachable." They know their customer also think beyond and want to be one step ahead. This is why they lay an emphasis on finding the right solution for every special application requirement. They consult, test, and work closely together with their customers to help them reach their targets. They're here to empower their customers' visions!

Why "THINKING BEYOND"?

TOPTICA EAGLEYARD does it and their custo-

mers do it, too. It is something that connects both and together they can empower so many visions that may even change the world. "THINKING BEYOND" is not only a claim, it is part of EAGLEYARD's DNA, they always want to be one step ahead and think outside the box. They want to enable future innovations by providing unique laser diodes to their customers.

What applications?

TOPTICA EAGLEYARD's laser diodes can be utilized in various applications to make a true difference for their customers. You can find all applications on their website:



What products?

TOPTICA EAGLEYARD's unique laser diodes are clustered into five different product families sorted by chip designs, differentiated by power and beam quality: Single Frequency Laser Diodes, Tapered Amplifiers, Single Mode Laser Diodes, Multimode Laser Diodes, Gain Chips.

Learn more about TOPTICA EAGLEYARD, its history, products, career opportunities and news here:

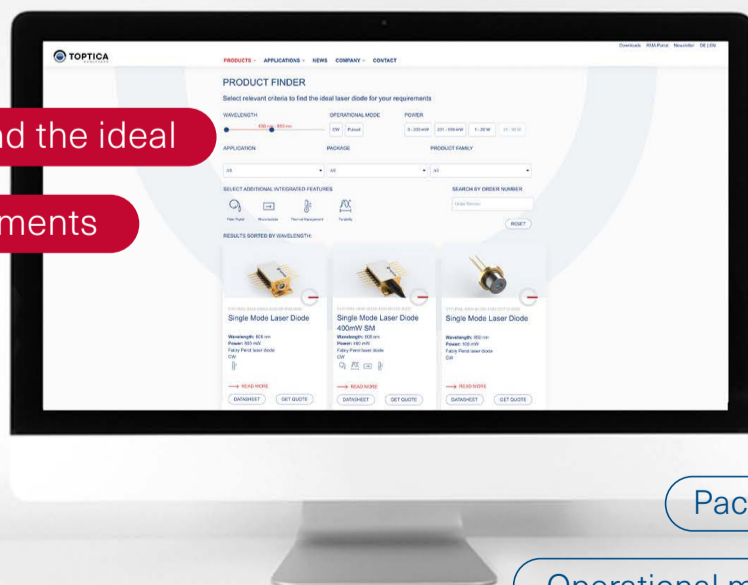


About us



Product families

Select relevant criteria to find the ideal laser diode for your requirements



Wavelength

Package type

Operational mode

Product family

Power

Application

Fiber-pigtail

You can select among the following criteria:

IT HAS NEVER BEEN THAT EASY – FIND YOUR LASER DIODE IN THE QUICKEST POSSIBLE WAY!

Say goodbye to endless scrolling, clicking back and forth and searching through long lists: Use EAGLEYARD's PRODUCT FINDER and immediately find what you need. With the product finder you can easily select the criteria most important for you and get the ideal product matches for your requirements.

What's on top? If you have a special request, contact TOPTICA EAGLEYARD any time, customized modules are available as well!



MEET THE SALES AND MARKETING TEAM

Daniel Brauda

Position: Sales Manager, at EAGLEYARD since: 2019

My tasks: I provide technical expertise and support. I work closely with other departments within the company, such as product development and marketing, to ensure that the company's products and services meet the needs of customers. My favorite tasks include working with customers to understand their technical requirements and developing solutions that meet their needs. It's so great to experience the positive impact these solutions have on customers' businesses.

My favorite EAGLEYARD product:

One of my favorite products is the **miniECL**, which I was responsible for the development during my time as a development engineer at EAGLEYARD (from 2019–2023). I take great pride in seeing how this product developed from scratch to a game changing solution for our customers.

Describe yourself: Hold on to your laser goggles because you're about to meet an engineer who just made the jump from the sacred halls of Research and Development to the untamed universe of sales. Yes, that's me! I've traded in my lab coat for a snazzy sales suit (not really, but I guess this is the perception of a typical sales manager). As a development engineer, I gained a deep understanding of our products and the opportunities they offer our customers, which I believe will be valuable assets in my new role. I have always been passionate about our products, and I am excited to share my knowledge and enthusiasm with you.

What characteristic makes you unique in the SAM team?

As not only the newest but also the youngest member of the sales department, I enjoy listening to Herwig and Michael's tales from the past (I'm not saying ancient ;)). Although I consider myself a moderate exerciser, rumor has it that I am happy in any hotel on a business trip as long as it has a fitness center.

Fun Fact about you: I created several Youtube videos as a kid that have several million clicks.

Michael Kneier

Position: VP Sales and Marketing, at EAGLEYARD since: 2006

My tasks: Maintaining and developing further the excellent relationships with our worldwide customer base leveraging EYP's future-proof laser diode roadmap.

My favorite EAGLEYARD product: The space qualified DFB-butterfly product family. It delivers quite some value to the space community efficiently utilizing our heritage.

Describe yourself: I was born June 26, exactly when John F. Kennedy delivered his famous speech from the balcony of our city hall stating: "Ich bin ein Berliner". This somehow became a motto for my life. Funnily enough, our townsfolk – me included – are probably the toughest critic of our hometown (and there are plenty reasons to be :-)), but simultaneously it became my personal mission to proudly bring to our clients all over the world outstanding technology and engineering, developed and manufactured at my birthplace Berlin. I never lost my passion to do so, and I am grateful being involved in the Photonics industry which was, and much more is, an innovative driver in multiple application segments. I enjoy participating in business while the seed sprouting, like it does in metrology, magnetometers, LIDAR, spectroscopy and many sensing tasks. I consider it as one of the most satisfactory rewards if a client confirms that our service is unique. Worth to mention that in some fields our customers are the market leaders. Before this happens, I occasionally tend to be pedantic, first and foremost internally of course.

What characteristic makes you unique in the SAM team?

I believe my sense of humor is pretty unique in my team. Though my teammates may suffer from time to time being the target of some jokes, I think in principle we all are benefitting when the tremendous pressure of our daily business disappears in a sudden laughter here and there. I am convinced having fun at work yields in better results.

Fun Fact about you: Evil voices claim that IR laser diodes featuring an invisible output beam are the favorable portfolio for me to sell, because actually I am color blind.

Stephanie Hannibal

Position: Senior Marketing Manager, at EAGLEYARD since: 2021

My tasks: I am responsible for all of EAGLEYARD's marketing – starting with the corporate design based on our vision, introducing a claim, organizing all trade shows, creating our website, making ads, newsletter, social media and PR. I love these diverse tasks and jumping between strategic decisions and operational



front: Julia Gall, Stephanie Hannibal (from left to right)

back: Dr. Herwig Stange, Daniel Brauda, Claus Heitmann (CEO), Michael Kneier (left to right)

needs. As our marketing is global, I work closely together with our sales partners in different regions to position EAGLEYARD there in the best way possible.

My favorite EAGLEYARD product: From a marketing standpoint I love the **miniECL** and **miniTA** products – both have a very strong personality and a strong radiance showing EAGLEYARD's focus for innovation in a perfect way.

Describe yourself: I am a hands-on person with a strong desire to create and optimize things – professionally and in private. I emotionally bond with the brands/corporations I work with, treating them as my "babies" and making sure they have the freedom to grow. Seeing them develop along the life cycle makes me happy and proud. As a mom of two my spare time is very limited but if I find some time, you can almost be sure that I'm making or researching some travel plans since seeing the world and showing it to my kids is another true passion.

What characteristic makes you unique in the SAM team?:

I remember having been called "the efficiency-queen" not only once. ;) I am quick, push decision-making (but in a nice way, hopefully) and am very result driven. Sometimes this is surely challenging (or should I say a bit annoying?) for my colleagues but as long as they still make fun of it, I assume I haven't crossed a line so that we can all benefit from my impatient behavior. ;)

Fun Fact about you: When I do something, I do it with all of my heart – that's been true since I was a teenager, so that hat I have seen my favorite band play live for approximately 30–40 times in more than five countries – and I can't wait for more to come.

Julia Gall

Position: Inside sales, at EAGLEYARD since: September 2022

My tasks: Preparation of quotations, order

confirmations and invoicing. The girl for everything to do with organizing the office.

My favorite EAGLEYARD product: All butterfly models

Describe yourself: I'm originally from Göttingen, a small town in Lower Saxony, Germany. There, the world is still in order and the kerbs are raised at 8 pm.

Now I live practically right in front of the Union Berlin football stadium and am always in competition with Micha [Michael Kneier] when it comes to football/soccer. He's a fan of Hertha Berlin. But Union is definitely the better team ;)

What characteristic makes you unique in the SAM team?:

The girl who tries to put a smile on every one of her colleagues' faces and always fulfils customers' wishes.

Fun Fact about you: I have worked in other companies before, but I have never had as much fun in any of them as I have here. I like to call EAGLEYARD my pony farm, where everything is beautiful, peaceful and like a fairy tale.

Dr. Herwig Stange

Position: Business Development Manager, at EAGLEYARD since: 2005

My tasks: Business development and sales – especially for our single frequency lasers and Fabry-Perot laser (DFB, DBR, RWS, RWL).

My favorite EAGLEYARD product: These are our so-called RWS lasers that are the ideal solution for interferometric applications. This laser type enables us to provide a high coherence laser at low cost.

Describe yourself: I was born in the north of Germany. People from the north are said to be very silent. Add that to the fact that I am a man and a physicist and you can imagine how talkative I am. ;)

What characteristic makes you unique in the SAM team?:

I am sparing with words.

Fun Fact about you: In school I was the boy who wrote the shortest essays.



LASER DIODES IN PRACTISE

A SPECIAL APPLICATION VIEW THAT WILL MAKE YOU SMILE

LASER COOLING IS JUST SO COOL

"I feel like the whole field of cold atoms will be dominated by your lasers in the next 5 years."

Harvard project leader,
October 2023

Laser cooling is a cool way (pun intended!) to slow down and control the movement of tiny particles called atoms. Imagine it as a high-tech method that helps scientists chill atoms to extremely low temperatures. This article is all about how this technique works, especially when it comes to a type of atom called lithium.

So, why lithium? Well, lithium is a special kind of metal that has simple characteristics, making it perfect for cooling experiments. By using lasers, scientists can cool lithium atoms down to super low temperatures, allowing them to create unique quantum states and measure things with incredible precision. This wasn't possible before laser cooling came along in the 1980s

Here's the basic idea: Laser cooling works like a gentle breeze for atoms. Just as a breeze can slow you down, lasers slow down atoms by making them absorb and then release light particles (photons). This process lowers the atoms' energy and makes them really, really cold. For lithium, scientists use a laser with a specific color, like 671 nm, to cool it efficiently. Now, why is this cool (pun intended again)? Well, when we cool down lithium atoms using lasers, they become great candidates for something called quantum computing. It's like they become tiny, super-efficient processors for futuristic computers that can process information really, really quickly.

As scientists keep exploring laser cooling and playing around with lithium atoms, they're discovering new things in areas like fancy optics, the tiniest bits of matter, and super cool technologies. So, laser cooling is not just a cool trick; it's a whole area of exciting research that's helping us understand and use atoms in amazing ways.

Daniel Brauda, Sales Manager at
TOPTICA EAGLEYARD

INTERFEROMETRY AND A COMPARISON YOU'LL NEVER FORGET

Do you know what the blood flow in the brain of a baby and the motion of stars in our galaxy have in common?

We would like to "see" it because it gives us a deeper insight. In the first case we want to get an image of the blood perfusion for diagnostic reasons – in order to detect potential diseases and to find and to monitor proper treatments. In the latter case it is pure academic curiosity that drives us. The knowledge of the exact position and velocity of stars enables us to detect new kind of black holes and gives us a better understanding of the origin of our world. Interferometry plays a major role in metrology

– be it the measurement of blood flow or the mapping of stars. Laser speckle contrast analysis is the imaging technique for measuring and displaying the blood perfusion which is used in many hospitals for diagnostics. By contrast the number of instruments measuring the positions of stars is fairly low. One of the most sophisticated instruments is the GAIA satellite launched in 2013 and mapping billions of stars since then. An interferometer controls the angle between the two telescope which are on board of the satellite. All in all, the measurements reach an accuracy of a few microarc seconds which is comparable to measuring the diameter of a hair at a distance of 1000 km. In all these instruments TOPTICA EAGLEYARD's single frequency lasers are the light source. These lasers provide the high coherence which is needed for high resolution interferometry in various applications. Our DFB and the less costly RWS lasers are in laser velocimeters that are used in steel mills to control the rolling process of metals. They measure the exact lay length of twisted pairs in telecommunication cables enabling higher data transmission rates. Distance, thickness, the geometry of surfaces as well as the velocity and the vibration of various objects can be detected by interferometric measurements with these high coherence lasers. The applications are comprehensive – ranging from the head of a baby to the universe.

Dr. Herwig Stange, Business Development
Manager at TOPTICA EAGLEYARD

A TOOLBOX FOR SPACE APPLICATIONS

One of the founders of EAGLEYARD loved to say: "Because working in SPACE makes us a better company on the GROUND". Saying it for the first time in 2007

when we have got initially involved in ESA's GAIA satellite mission of mapping stars, it sounded like an ambitious marketing statement of a young company. 17 years later, while our DFB laser diodes still operate flawlessly on that mission since its launch in 2013, it has proven to be the attitude of an ambitious team. Using these programs primarily as technology and quality driver, we always adopted know how and achievements of such projects for our industrial products and processes. The knowledge we gained from, and the expertise we brought into the multifaceted discussions throughout the whole customer chain – from the instrument integrator, via the payload responsible party, or the launcher company and up to the mission executive, like ESA or NASA – helped us to focus on the important objectives and thriving our roadmap to excellence in 2024.

As a result, more and more laser diodes are replacing other types of lasers – by the way, not just in space – because they are small, robust, and reliable. A semiconductor laser diode is the ideal candidate for harsh operating conditions. Compact and robust as they are they withstand even extreme environmental conditions. And all this coming with much less weight than all the bulky approaches of external cavity or solid state lasers. Having achieved space heritage from multiple programs until today, we could establish a "tool

"Working in SPACE makes us a better company on the GROUND."

box" of laser diode building blocks which allows us to combine these quite flexible and thus effectively enter new programs with a need for varying laser diodes, and all this without starting ESCC 2320x, Telcordia or MIL qualification efforts from scratch.

If you have limited budgets and an "unscheduled rapid disassembly" is not really considered to be a success for your mission, EAGLEYARD's high power laser diodes could become an interesting option to be evaluated, no matter if you are looking for an interferometer, a spectroscopic or calibration instrument, a LIDAR solution, or a rather controlled separation by means of Optopyro techniques.

Michael Kneier, VP Marketing & Sales
at TOPTICA EAGLEYARD

RAMAN SPECTROSCOPY FOR DUMMIES

How a bottle of whisky helps us to understand Raman spectroscopy: Have you ever had issues explaining an application to somebody not working in photonics? The best and easiest way to do so is to use examples people cannot forget. We often use a whisky bottle to explain it – of course without drinking any of it. ;)

Raman spectroscopy is a non-contact, non-destructive way to examine e.g. if the whisky in a perfectly sealed bottle is really that old and unique – an important fact to justify the expensive price on the price tag.

It's a light scattering technique whereby a molecule scatters light from a high intensity laser light source. Most of the scattered light is of the same frequency as the laser light, but a very small amount is scattered in different wavelengths thus making it possible to identify chemicals as they all have their own spectral fingerprint. In case of our whisky example, the outcome answers the question if a whisky is really that valuable. Raman spectroscopy is used in various fields, from airport security, research (esp. in the medical area for the identification of pathogens, blood disorders, cancer) and for material inspection e.g. in the pharmaceutical industry or for incoming goods. In order to make Raman spectroscopy work, a very small linewidth is needed at high power since you need to be able to identify and analyze the scattered light in a different wavelength than the laser has itself.

We recommend our DFB single frequency lasers especially the 785 nm with 40 – 100 mW and our μ MOPA at 1064 nm with 2 W. Depending on customer needs, free beam or fiber coupling can be chosen in different packages types (TO5, butterfly packages).

Stephanie Hannibal, Senior Marketing
Manager at TOPTICA EAGLEYARD

RESEARCH PROJECTS SHAPING THE FUTURE

SIM Q-Pla, September 2024

Overall target

The SIM Q-Pla research project aims to develop low cost, quick and reliable mobile detection methods for microplastics in water. Microplastic particles can be identified by their spectroscopic fingerprints in the mid-IR (3.2µm – 3.6µm). However, MIR sources and detectors range are expensive and bulky. In SIMQPla, a quantum imaging technique based on spontaneous parametric down conversion (SPDC) is used to perform spectroscopy in the MID while detecting in the NIR, where cameras with high resolution are available.

EAGLEYARD's main task

TOPTICA EAGLEYARD will develop a hermetically sealed laser module at 720 nm that will enable a mobile usage so that microplastics can be detected on site instead of using expensive lab equipment. The main challenge for TOPTICA EAGLEYARD is the development of a stable high power fiber coupling with an optical isolator in miniature format – and all of that in one module.

PolyChrome, August 2025

Overall target

The PolyChrome Berlin project will develop a hybrid photonic integration platform based for various sensing and analytical applications

that demand for a compact and cost-efficient solution. Key is the development of a polymer-based integration platform that covers a wavelength range from 400 nm – 1650 nm.

EAGLEYARD's main task

TOPTICA EAGLEYARD will develop multi-wavelength laser sources both for the RGB (red, green, blue) and the NIR region. Target applications for these developments are microscopy and flow cytometry. TOPTICA EAGLEYARD's biggest challenge in PolyChrome Berlin is the development of fiber-coupled hermetic modules that cover extremely large wavelength ranges. In addition, TOPTICA EAGLEYARD also develops miniaturized frequency-stabilized lasers around 780 nm.

QD Sense, December 2024

Overall target

The goal of the joint Berlin-Polish project is to develop an innovative, low-cost, high-precision and high-reliability spectroscopic system capable of in-situ detection of low water vapor concentrations for industrial applications.

EAGLEYARD's main task

TOPTICA EAGLEYARD will develop a hermetically sealed package for a 4 channel VCSEL array with collimated output beam. The target wavelengths range is 935 nm and 955 nm.

CONGRATULATIONS TO 20 YEARS AT EAGLEYARD!

Wow, what a special anniversary! This winter, TOPTICA EAGLEYARD honored five of their employees for their 20th company anniversary. Congratulations to the very loyal employees Beate, Jörg, Ronald, Daniel and Martin!



They all started working for EAGLEYARD shortly after its foundation and have experienced all of EAGLEYARD's development firsthand – what an exciting journey! TOPTICA EAGLEYARD is very grateful to have them – and thanks them for THINKING BEYOND and making a change for EAGLEYARD every day for 20 years now!

WHAT IS THE CEO LIKE?

Name and age: Claus Heitmann, 52
My job as film title: The Accountant (with Ben Affleck; Scene [...] "I'm not finished"), but sometimes also "Kindergarten Cop" ;)
My favorite tasks: getting things done (and driving a much faster car on the weekends)
EAGLEYARD and me, that is like...: the missing wrench that is needed most – right now!



Claus Heitmann
CEO

"THINKING BEYOND means to me to be grateful for the opportunity to think beyond a lot of things instead of always just saying what isn't possible"

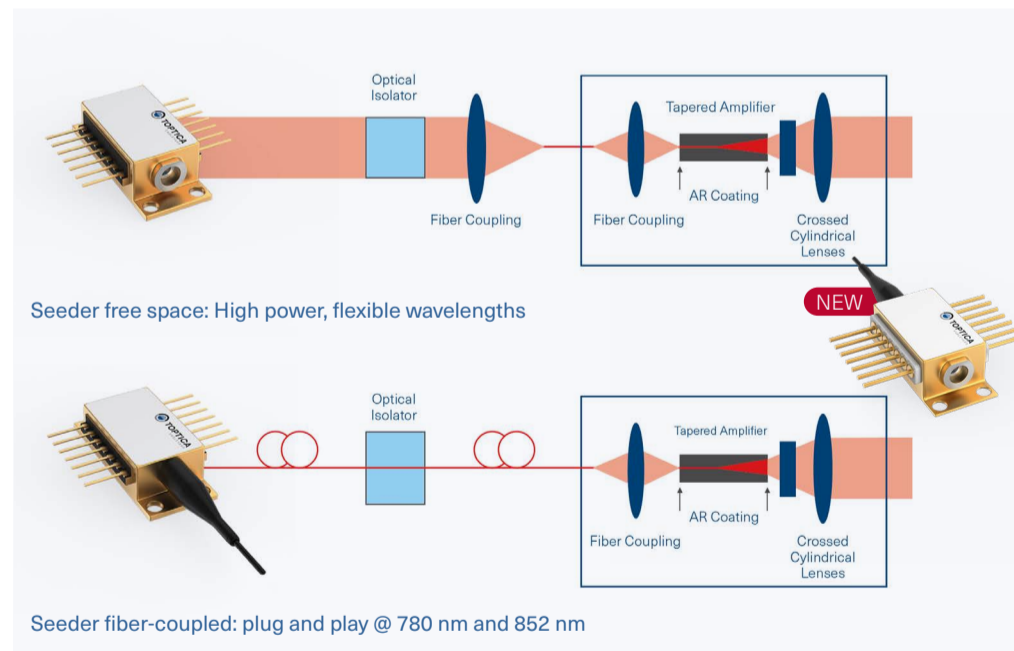
THINKING BEYOND means to me...: to be grateful for the opportunity to think beyond a lot of things instead of always just saying what isn't possible
In ten years, EAGLEYARD will be...: XXL
Describe a typical EAGLEYARD employee: inspired
If my daughters would describe me, they would say I am...: funny, crazy, perfectionist
This song always puts me in a great mood: there are too many great songs and artists (e.g. Buddy Guy, Chris Botti, Till Brönner)
I am afraid of...: nothing, but maybe of too much decoration
I would love to read this book again for the first time: "Charly, bitte kommen!" (a book my father-in-law wrote about my two girls with a lot of smiling moments – great!)
I am really good at: oh dear – seriously?
This makes me proud: my 2+1 women [2 daughters, one wife] at home keeping up with me; seeing the success of EAGLEYARD within the last years.
My three favorite places in the world: Hickory (NC), Potsdam and Bali
Something crazy I did (and feel okay sharing): sold all my stuff and moved to the US with just two bags of clothes to start all over again
If I was invisible, I would...: sit in the cafeteria and listen to my employees talking about their boss ;)

MAKING YOUR WORK MORE EFFICIENT!

MOPA Set up

Making your work efficient, rewarding and easy are key elements TOPTICA EAGLEYARD thinks of when creating a new product or tool.

The **miniTA** family (670/780/795/852/895 nm) promises a really convenient MOPA set-up with either fiber-coupled or free-beam seed lasers. Less complex alignment procedures enable easier coupling and more stability thus not only reducing your initial amount of work but also causing a significant advantage for your daily work routines.



Which evaluation board do I need?

The evaluation board is a tool that will help you with faster testing and preparation and is intuitive to use to optimize your work.

Check out the table (on the right) to find out which evaluation board you need – it depends on the product and driver you use.

	Order Code: ...-9001	...-9002	...-9003
miniTA	✓	✓	✓
BFYx2	✓	✓	✓
µMOPA			✓

IT'S CROSSWORD TIME

1 2 3 4 K 6 7 8 9 10 11 12 13 D

Send the solution with your contact details to info@toptica-eagleyard.com until February 29th, 2024. The first prize – Apple's AirPods (3rd generation) – will be drawn among all participants.

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MEET US WORLDWIDE

TOPTICA EAGLEYARD has a worldwide distribution network and collaborates with a highly skilled sales force around the globe. You can meet them or one of their great sales partners here this winter & spring:

- Odense/Denmark:** February 27th–28th, 2024
- Shanghai/China,** LASER World of PHOTONICS CHINA, March 20th-22nd, 2024
- Singapore:** Asia Photonics Expo 2024, March 6th–8th, 2024
- National Harbor, MD/USA:** SPIE Defense + Commercial Sensing, April 23rd–25th, 2024
- Yokohama/Japan:** OPIE, April 24th–26th, 2024
- Osaka/Japan:** Photonix, May 8th–10th, 2024
- Helsinki/Finland:** Finnish Optics and Photonic Days, May 28th–30th, 2024
- Ciba/Japan:** JASIS, June 4th–6th, 2024
- Tokyo/Japan:** COMNEXT, June 26th–28th, 2024



Check out their partner site to find the right contact person for your region or just contact them directly at info@toptica-eagleyard.com



1. Hometown of EAGLEYARD
2. Name of newest tapered amplifier
3. Surname of one of EAGLEYARD's CEOs
4. Package type
5. Number of pins of the butterfly package
6. Product Family
7. Number of members of the the BAL-670m product family
8. Alkali metal that is laser cooled at around 671 nm
9. What do you need between the seed source and the tapered amplifier in a MOPA setup
10. What characteristic of tapered amplifier diodes results in the dependence of the output beam shape on the injection current
11. Degradet planet
12. Which physical quantity is described by the unit Hz/pt ;)
13. For the first time helium was observed in the spectrum of the...
14. On the satellite of this space mission EAGLEYARD's lasers measure the exact angle between two telescopes in order to create a precise map of our Milky Way

IMPRINT

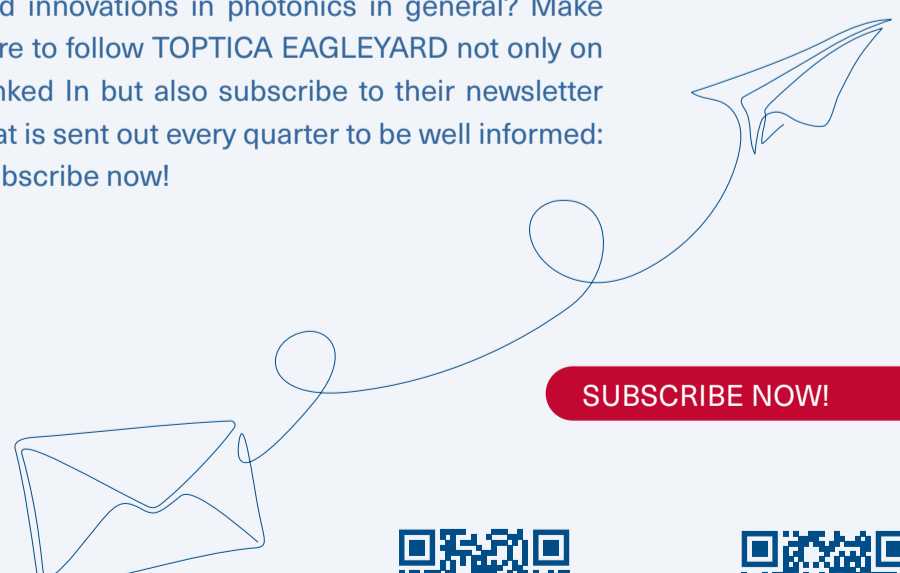
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TOPTICA EAGLEYARD is part of the TOPTICA group.



MAKE SURE TO BE ONE OF THE FIRST TO KNOW!

New technologies, new products, new applications, new wavelengths, new research projects ... – you're interested in news about laser diodes and innovations in photonics in general? Make sure to follow TOPTICA EAGLEYARD not only on Linked In but also subscribe to their newsletter that is sent out every quarter to be well informed: Subscribe now!



SUBSCRIBE NOW!

