



Press Release

TRUMPF VCSELs to fly to space in quantum sensors

TRUMPF Photonic Components enters the QYRO project, funded by the Federal Government of Germany // Compact and robust VCSELs as light source for quantum sensors // TRUMPF develops VCSEL with ten times more laser power // The first satellite controlled by quantum technology is scheduled to be launched into space in 2027

Ulm, August 29, 2022 – TRUMPF Photonic Components, a global leader in VCSEL and photodiode solutions, develops a high-power, single-mode VCSEL to be implemented in an altitude gyroscope sensor suitable for use in space. In few years the satellite with the quantum-based gyroscope should fly into space to generate highly precise attitude determination. The core component of the sensor will be a VCSEL light source. As miniaturization and robustness are essential for the application, the very small and durable VCSELs are perfectly suited for the job. Compared to existing laser solutions, VCSELs can be supplied several orders of magnitude smaller and at significantly lower cost. The newly developed single-mode VCSEL will come with stable polarization and a very narrow bandwidth to address the high precision needed in the quantum sensor. “It’s great to be part of the subsidy project, and to combine various fields of expertise, push for innovations and strengthen Germany as photonics hub”, says Berthold Schmidt, CEO at TRUMPF Photonic Components. The sensors enable the satellites to be aligned with each other with high precision and thus enable a high-speed connection for data communication. “We can’t wait to see our VCSEL integrated into a mini satellite, to support worldwide high-quality data communication and to improve the availability of internet connections especially in remote regions”, Schmidt adds.

How VCSELs support quantum applications

Quantum technology guarantee long-term measurement stability, provide high performance in a small space, and reduce weight. This not only allows satellites to hold their position precisely for years, but also supports other spectroscopic applications and atomic clocks. TRUMPF is developing a single-mode VCSEL at 795 nm with 10 mW of output power. This is ten times higher than the laser

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power this technology was able to offer in the past. The VCSEL technology also delivers the required stability over a wide range of temperatures and robustness demanded by this space application. The breakthrough in compactness and cost enabled by the VCSEL technology will also open up more applications in mass markets. Highly precise gyroscopes can be used in industry, logistics or even in autonomously driving cars.

Combining forces within the subsidy project

The subsidy project QYRO has an overall development budget of around 28 million euros and is strongly supported by the Federal Ministry of Education and Research in Germany. TRUMPF Photonic Components is working closely with the Ferdinand Braun Institute, Leibniz Institute for High Frequency Technology, one of the world's most renowned research institutes for laser diodes. Together with this institute, TRUMPF is jointly developing the robust VCSELs with high spectral purity that also meet the demands of quantum technology and space. Another TRUMPF subsidiary based in Berlin will integrate the VCSEL component into a robust, miniaturized TO package with additional optics and temperature stabilization. TRUMPF brings to the table its innovative assembly and automation technology know-how. Overall, there are five project partners, each bringing their own specialization, such as Bosch, that is developing a miniaturized, space-compatible measuring cell. The German Aerospace Center (DLR) will ensure the suitability for space within in QYRO project and is responsible for transporting the satellite into space. The quantum technology start-up Q.ANT is leading the development partnership and assembling the various components of the sensor.

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The first satellite controlled by quantum technology is scheduled to be launched into space in 2027

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State-of-the-art clean room facility, TRUMPF Photonic Components

TRUMPF designs and manufacture its VCSEL solution at the state-of-the-art clean room facility in Ulm, Germany



Berthold Schmidt, CEO at TRUMPF Photonic Components

About TRUMPF Photonic Components

TRUMPF Photonic Components is a global technology leader, supplying VCSEL and photodiode solutions for consumer electronics, datacom, automotive, industrial sensing and heating markets. So far, more than two billion VCSEL chips and photodiodes have been shipped worldwide. The staff continues to drive its technological know-how, that has been established for over 20 years now, in order to maintain its leadership position. The long-established technology was acquired by TRUMPF in 2019. The company has its headquarters in Ulm, Germany, with further sales locations in the Netherlands, China, Korea and the US.

TRUMPF Photonic Components belongs to the TRUMPF Group, a high-technology company that offers production solutions in the machine tool and laser sectors.

TRUMPF is the world technological and market leader for machine tools used in flexible sheet metal processing, for industrial lasers and metal 3D printing. In the 2021/22 fiscal year, the company employed some 16,500 people and generated sales of about 4.2 billion euros (preliminary figures). With over 80 subsidiaries, the TRUMPF Group is represented in nearly every European country, in North America, South America and Asia. The company has production facilities in Germany, France, the United Kingdom, Italy, Austria, Switzerland, Poland, the Czech Republic, the United States, Mexico and China.

For more information about TRUMPF Photonic Components visit:

www.trumpf.com/s/VCSEL-solutions

Press contact:

Anne-Kathrin Hotz

Head of Marketing Communication



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+49 731 5501940

Anne-Kathrin.Hotz@trumpf.com

TRUMPF Photonic Components GmbH, Lise-Meitner-Straße 13, 89081 Ulm, Germany.