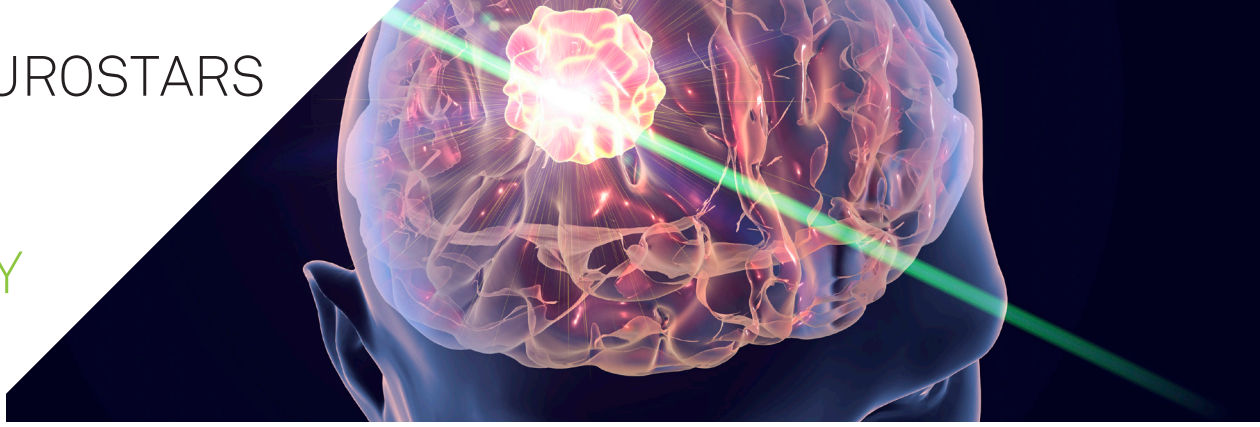
EUREKA EUROSTARS PROJECT 10 324 FEMSCOPY



THE HEART OF THE GREY MATTER

Lithuanian and German engineers have designed a laser to make brain research cheaper and easier

Key research into what causes brain disease and conditions like depression should be cheaper and easier after German and Lithuanian scientists developed a new laser and a microscope for looking at neural circuits. Germany's LaVision BioTec, which manufactures microscopy systems, teamed with Lithuania's Light Conversion, which makes ultrashort pulse lasers for them to develop a high-speed two-photon microscopy tool.

Developed with neuroscientists as a Eurostars project, the novel microscope and laser system could be on the market in about a year's time, estimate the partners, and doing the job of two ultrashort pulse lasers that currently cost about €200,000 each. "Very few labs can afford the current price," says neuroscientist Albrecht Stroh whose Medical Center at the Johannes Gutenberg University also worked on the project along with researchers at the Leibniz Institute of Photonic Technology.

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"This will help scientists looking for cause and effect in neural circuits, and therefore will be particularly useful for the study of what causes brain disease," says Stroh.

Mapping the mind

Some brain research involves stimulating neurons with one laser and recording the image of the activity in the brain with another. The partners wanted to combine the lasers without incurring "cross talk" on the electromagnetic spectrum. Light Conversion developed an innovative new light source – a compact box with two independently tunable wavelength outputs. "This approach assures that the stimulation pulse doesn't interfere with the output reading (of the brain image)," says Ignas Stasevicius, design engineer at Light Conversion.

The engineers headed to Stroh's laboratory to see current lasers in action, to see how the scientists used them and to test theirs. The partners think that hands-on cooperation between the companies and the academics made the development particularly effective. "LaVision BioTec were absolutely crucial because they knew the requirements and applications needed for the light source," says Stasevicius. "Typically we scientists just get the end product so it was great to be involved in shaping this one from the start," says Stroh.

"This system is less bulky than those on the market and will take up less space on an optical table. I think there'll be between 50 and 60 labs in Germany alone that could want one."

Light Conversion estimates the new laser could bring it a 5-10 percent growth in its revenue.

The prototype developed has already been used on mice in research into multiple sclerosis. Stroh is due to publish a paper, along with 17 other European scientists, in Nature Neuroscience, on "Maladaptive cortical hyperactivity upon recovery from experimental autoimmune encephalomyelitis".

It's just one example of the kind of experimental research that could help develop treatments for diseases like Parkinson's and dementia and other conditions where neural networks break down. "If we can find out more about how neurons communicate when there is breakdown, we may have a better idea of where to start therapies," says Stroh.

This project has received funding from the Eurostars-2 joint programme with co-funding from the European Union Horizon 2020 research and innovation programme

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TOTAL R&D INVESTMENT

€ 1.1 million

DURATION

June 2016 to October 2018

COUNTRIES AND NATIONAL FUNDING BODIES INVOLVED

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Agency for Science, Innovation and Technology (MITA)

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