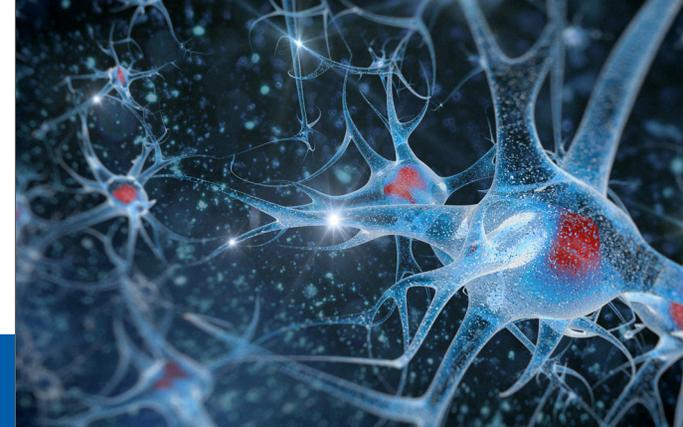


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Tunable Ultrafast Lasers Power Neuroscience Imaging Applications



The Challenge

Funded by the legacy of industrialist/financier António de Sommer Champalimaud, the Champalimaud Centre for the Unknown opened in Lisbon, Portugal in 2010 with a mission to develop programs of advanced biomedical research and provide clinical care of excellence, with a focus on translating pioneering scientific discoveries into solutions which can improve the quality of life of individuals around the world. This state-of-the-art facility combines three units: neuroscience research, oncology research, and an oncology hospital. Dr. Pedro Garcia da Silva is the scientific coordinator responsible for the lasers in the neuroscience division. He explains, “We have a diverse research program directed by 15 permanent faculty members. Experimental model subjects include rodents, zebrafish and drosophila.” In brief, the research is targeted at understanding how activity in groups of neurons generates behavior: both learned and unlearned behavior. This work includes multispectral imaging with three-dimensional spatial resolution in order to map structure and function using a broad range of fluorophores including traditional dyes and activity (e.g., Ca²⁺) indicators as well as transgenically expressed fluorescent proteins, genetically expressed calcium indicators (GECI), and optogenetic proteins. He adds, “We make heavy use of multiphoton microscopes. To maximize lab productivity each microscope requires an ultrafast laser source with wide tunability, operational simplicity and high reliability, backed by fast dependable service.”

The Solution

Champalimaud uses seven Chameleon lasers from Coherent and recently added a next generation Discovery laser to enable experiments with dual excitation wavelengths as well as deeper (>600 microns) penetration thanks to its longer wavelength range. Their latest ultrafast laser is a Monaco amplified laser used for optogenetic photostimulation of multiple neurons using a spatial light modulator, and photoablation to selectively destroy neurons. All the lasers are supported by a Premium Service Contract.

The Result

These lasers have proved to be high reliability workhorses according to Dr. Garcia da Silva, “Plus the built in GVD precompensation is a real advantage for structural imaging where it significantly increases the signal to noise. But what is really impressive is that all the lasers continues to deliver great performance; some of them are 6 to 8 years old. We rarely experience downtime and when we do, we never wait more than 3 or 4 days before we are shipped a replacement laser. This high reliability has enabled several of our research groups to make important landmark discoveries advancing our understanding of neuroscience.”

“The Chameleon has proved itself to be an ideal laser source for our multiphoton microscopes, delivering a wealth of publishable data. We are excited to now get the latest Discovery lasers with dual wavelength output.”

—Dr. Pedro Garcia da Silva
Champalimaud Centre for the Unknown, Lisbon