

Master Thesis Project

03.04.2017

Multiphoton Fluorescence Lightsheet Microscopy

Supervisors

Peter E. Andersen, Senior Researcher, DTU Fotonik, +4546774555, peta@fotonik.dtu.dk

Dominik Marti, Postdoc, DTU Fotonik, +4546774568, domar@fotonik.dtu.dk

Kishan Dholakia, Professor, School of Physics & Astronomy, +441334463184, kd1@st-andrews.ac.uk

Project description

Lightsheet Microscopy is a technique where a sample is illuminated with a sheet of light perpendicularly to the direction of observation. A whole slice of the sample can be recorded with a camera chip, enabling fast optical sectioning. At the same time, photostress or photodamage dealt to the sample are reduced, since out of focus parts of the samples are not illuminated.

Multiphoton Fluorescence Microscopy uses two or more photons in the infrared part of the spectrum to excite a fluorophore. This enables larger imaging depths in scattering media, due to reduced scattering and, in biological tissue, less absorption. It also facilitates separation of excitation and emission light, due to their large difference in wavelength.

Together with the University of St. Andrews, we aim to further advance the combination of the two, multiphoton lightsheet microscopy. St. Andrews has a system in place. We want to add and test our diode based laser source to that system, and bring back the knowledge to DTU and build a similar system ourselves.

Part of this project is conducted at the University of St. Andrews, where the student gets trained in lightsheet microscopy. The student will bring one of our laser sources to St. Andrews and implement it into the existing setup. The student will then bring back the knowledge about the setup and build a multiphoton lightsheet microscope in our own labs.

Prerequisites

- Hands-on experimental experience
- Knowledge on optics

Practical details

The lab is located at Risø Campus. Part of this project is conducted at the University of St. Andrews.

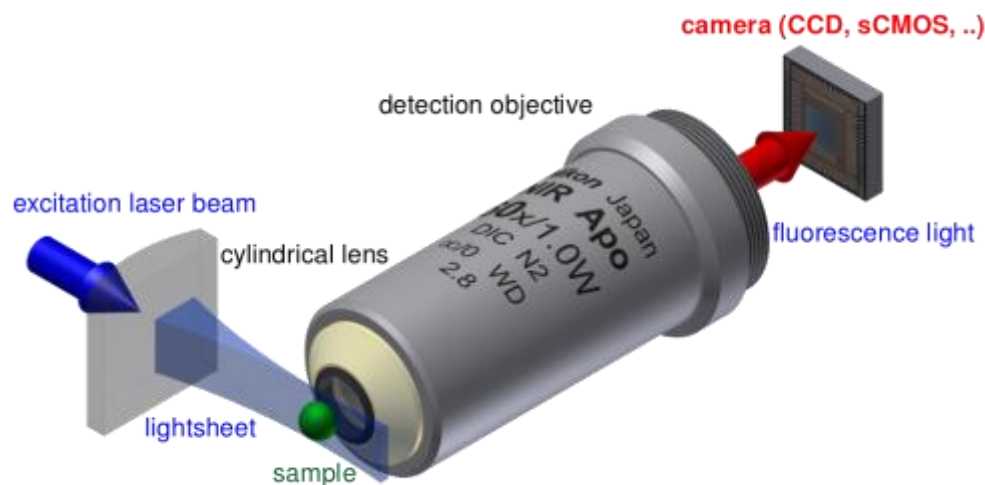


Image by Jan Krieger