

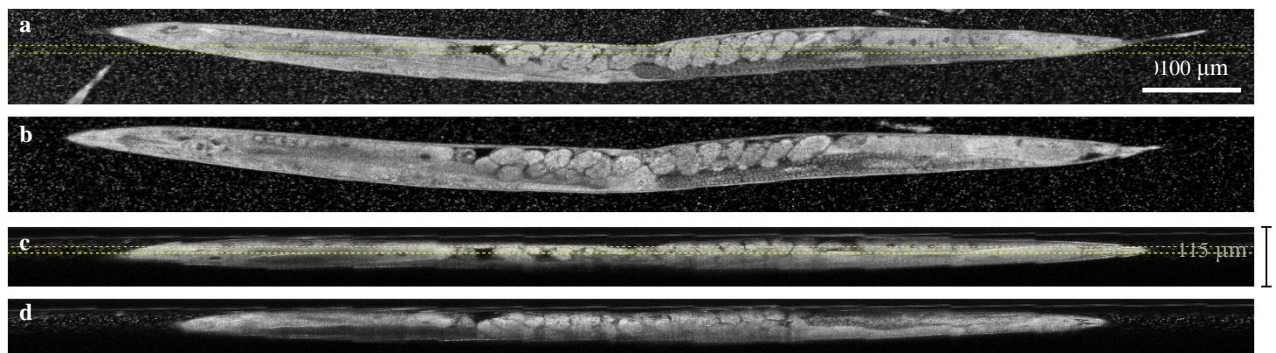
## OCM imaging of Alzheimer disease in *C. elegans*

The Laboratoire d'Optique Biomédicale (LOB) is offering a master project consisting in imaging *Caenorhabditis elegans* (*C. elegans*) nematodes with Optical Coherence Microscopy (OCM) for the study of Alzheimer disease.

OCM is an interferometric 3D imaging method with micrometer-range resolution. This technique is based on the coherent amplification of the back-scattered signal from the sample via interference with a much stronger reference beam. OCM exhibits high acquisition speed, high sensitivity and optical sectioning which allows imaging biological samples at depths inaccessible to conventional microscopic techniques. Moreover, due to its non-invasive and label-free nature, OCM enables long-term imaging experiments over hours or days.

The LOB team has recently developed a new OCM system in the visible range (visOCM). This setup exhibits very high NA and broad visible light illumination, achieving a 3D sub-micron resolution and allowing label-free subcellular tomographic imaging of multi-layer cell cultures or small organisms.

In this project, we are interested in using our visOCM platform for the study of aging and aging-related diseases in *C. elegans* worms. This simple model organism is extensively used in research because it is sufficiently complex to study many biological processes and diseases. We want to take advantage of the isotropic sub-micrometric resolution of our system to investigate the development of Alzheimer disease in *C. elegans*.



Orthogonal views of a visible OCM tomogram of a wild-type young adult *C. elegans* worm. a) and b) xy-views at a depth of 31 μm and 40 μm, respectively. c) and d) xz-views at the two lateral positions indicated by the yellow dashed lines.

The main tasks involved in this master project are (a) the alignment and preparation of the OCM setup for imaging, (b) the imaging of different *C. elegans* mutants at different ages, and (c) processing and analysis of the acquired data with ImageJ and MATLAB.

**Skills:** Basic knowledge in optical imaging, image processing and programming

**Recommended courses:** Biomicroscopy I & II, Advanced optics, Imaging optics

**Assistants:** Séverine Coquoz

**Supervisor:** Prof. Theo Lasser

If you are interested please contact Séverine Coquoz ([severine.coquoz@epfl.ch](mailto:severine.coquoz@epfl.ch)).