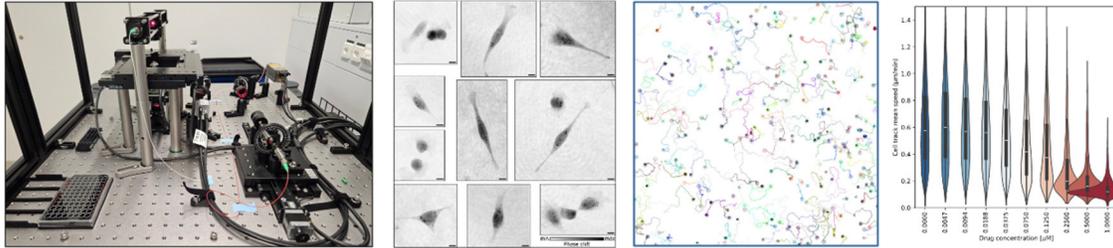


Master's Thesis Project: Label-Free Optical Microscopy and Machine Learning for Brain Cancer Research

We are seeking a highly motivated master's student with strong interests in interdisciplinary research to join our efforts in developing an experimental pipeline for label-free characterization of motile phenotype in medulloblastoma cell models.



Cell motility, *i.e.* the ability of cells to move, is closely associated with tumour metastasis and represents a key hallmark of cancer. In vitro methods have been developed to study cell motility in response to genetic or chemical perturbations, helping to elucidate the underlying molecular mechanisms. However, most existing approaches rely on fluorescence labelling, which is invasive and labour-intensive. With our research, we aim to overcome these limitations by developing a label-free optical microscopy platform capable of imaging cells without fluorescence, combined with advanced image analysis and deep learning-based tools to reconstruct and quantify cell migration dynamics.

If you are excited about cancer biology, optics, and machine learning, this project offers a unique opportunity to gain interdisciplinary skills while contributing to impactful research in paediatric brain cancer.

Project Objectives

- Establish a reliable and reproducible sample preparation protocol for label-free imaging of model cell lines and patient-derived cells
- Develop an image analysis pipeline for cell tracking from label-free microscopy data by adapting and extending existing computational tools
- Perform extensive imaging and data analysis using machine learning to characterize medulloblastoma cell responses to chemical perturbations

Requirements

- Background in biology, physics, computer science, or a related field
- Strong motivation to learn skills outside your primary discipline (e.g., cell culture for computational/physical scientists, or programming and data analysis for experimental biologists)
- Good proficiency in written and spoken English

Hosting and supervision

The project will be hosted by the group of Prof. Martin Baumgartner at the University Children's Hospital of Zurich (wet lab) and Prof. Michael Krauthammer at UZH (dry lab). The student will be directly supervised by Dr. Bernard Ciraulo and Dr. Lea Bogensperger.