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BM 2017, Station 17
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Master Project
Electrorotation for single-cell analysis of membrane damage induced by neurotoxic protein aggregate forms

For this project, we are looking for a highly motivated master student with an interdisciplinary background.

Background

Neurodegenerative diseases, such as Alzheimer's disease, belong to the most prevalent diseases on the globe. Due to the aging of the world population, its cases are expected to double within the next two decades. Even though neurodegenerative diseases have been extensively studied in the past years, the exact mechanisms of neurotoxicity are not fully understood. Protein aggregate forms such as the Amyloid beta (Aβ) are hypothesized to be the leading cause of Alzheimer's disease.

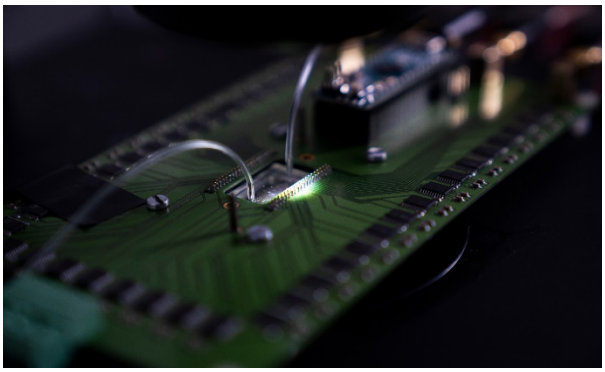

Figure 1: Electrorotation setup for single-cell analysis of neuronal cells

Aims of the project

In this project, we would like to evaluate the neurotoxic effect of amyloidogenic proteins on the cell membrane by single-cell analysis using the principle of electrorotation. In electrorotation, the torque of a cell inside a rotating electric field gives insight into various dielectric parameters of a eukaryotic cell. Those parameters can be linked to the membrane damage of amyloidogenic proteins on the cell membrane.

The student will learn how to independently plan and conduct experiments in a highly interdisciplinary field, combining biology, physics, and engineering. The student will be introduced to the essential biological lab practice and the field of microfluidics for single-cell analysis.

Advisor: Prof. Dr. Carlotta Guiducci **Supervisor:** Till Ryser
Type of work: 20% literature study, 40% measurements, 10% cell culture, 30% data analysis
Duration: 4-6 months **Start:** Flexible
Required background: Biomedical-engineering, biology, micro-engineering, physics, or similar
Contact: If you are interested in this semester project or have any questions, please send an email including a CV and a short motivation letter to carlotta.guiducci@epfl.ch with till.ryser@epfl.ch in CC.