

Subject: Evaluation of Self-labelling Protein Tags for Quantitative Super-resolution Live-cell Imaging



Project type: BEP/MEP/Intern (3+ month)

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Start date: Summer/Fall 2024

Project background

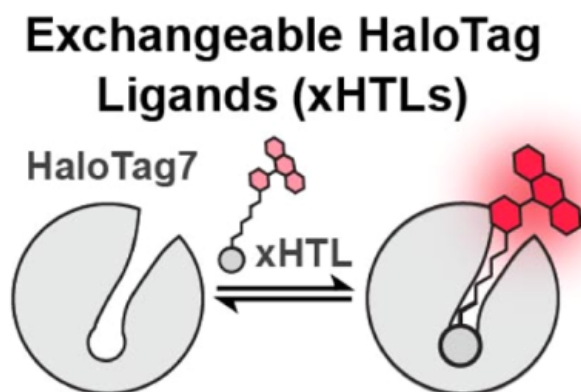
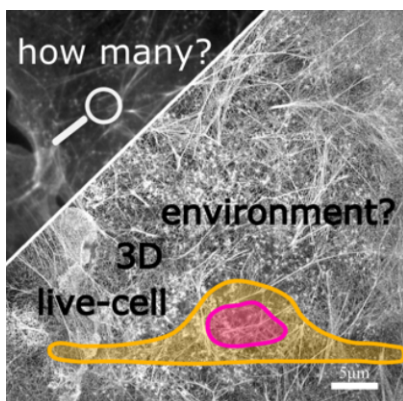
Live cell imaging at nanoscale gives us insight into the cellular organization and function during dynamic process in life sciences. Super-resolution optical fluctuation imaging (SOFI) as a gentle live cell imaging approach has the potential not only for enhancing the resolution beyond diffraction limit, but also for extracting quantitative information of molecular density, which could help us better understand protein structure-function relationships in, for example, protein aggregation underlying neurodegenerative diseases. To enable SOFI as a robust quantitative super-resolution imaging tool, it is important to set up both the experimental and analysis pipelines through a systematic approach.

Project goals and activities

As a post-processing imaging method, SOFI requires imaging data of fluctuating fluorescence signals that need to be tailored for optimal resolution, imaging speed, and quantitative readout. This project aims to evaluate and optimize novel classes of fluorescent probes and labeling techniques that are available at the Größmayer lab, mainly self-labeling HaloTags with exchangeable ligands (xHTLs) and self-blinking dyes, which also allows you to explore the possibility of multicolor live-cell imaging with SOFI.

For you?

You will learn about mammalian cell culture and fluorescent labeling techniques. You will get hands-on experience with our state-of-the-art super-resolution microscopes and advanced image analysis. You will work closely with the interdisciplinary team at Größmayer lab. Depending on your background and interests, you could either focus on optimization of data acquisition or data analysis. If you are a TU Nanobiology or Applied Physics master student, this could be a great fit for you!



Skemtics of xHTLs labeling HaloTag fused proteins.
Adapted from Johhsson et al. (2023)