

LS23-002 - Dynamic nanoscale reconstruction of endocytosis with high-throughput superresolution microscopy and machine-learning

Zusammenfassung

Endocytosis is the process by which cells take up various material like nutrients, messenger molecules, viruses, and drugs. Thousands of protein molecules self-organize into a highly complex machinery that pulls the cell membrane in and forms a vesicle. Endocytosis has been difficult to study because of its complexity, high speed, and small size below the resolution limit of optical microscopy.

Here, we will determine the organization of proteins during endocytosis with ‘superresolution microscopy’, which overcomes the resolution limit by a smart way of acquiring data. As this technology works only in immobilized (fixed) cells, we cannot directly measure protein rearrangements. Instead, we will take thousands of snapshots of endocytosis using an automated microscope that can measure around the clock and develop smart machine-learning techniques to assemble the snapshots into a multi-color movie. This approach can be in the future used to study many other cellular processes.

Wissenschaftliche Disziplinen:

Cell biology (40%) | Machine learning (40%) | Biophysics (20%)

Keywords:

superresolution microscopy, endocytosis, image analysis, deep learning, inverse modeling, simulation-based inference, molecular machines, high-throughput microscopy

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Status: Vertrag in Vorbereitung

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Weiterführende Links zu den beteiligten Personen und zum Projekt finden Sie unter

<https://wwtf.at/funding/programmes/ls/LS23-002/>