



HAL
open science

3D tracking of endocytic and exocytic events using lattice light sheet microscopy

Cesar Augusto Valades Cruz, Ludovic Leconte, Christian Wunder, Charles
Kervrann, Ludger Johannes, Jean Salamero

► **To cite this version:**

Cesar Augusto Valades Cruz, Ludovic Leconte, Christian Wunder, Charles Kervrann, Ludger Johannes, et al.. 3D tracking of endocytic and exocytic events using lattice light sheet microscopy. QBI 2020 - Quantitative BioImaging Conference, Jan 2020, Oxford, United Kingdom. pp.1. hal-03087217

HAL Id: hal-03087217

<https://inria.hal.science/hal-03087217>

Submitted on 23 Dec 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

3D tracking of endocytic and exocytic events using lattice light sheet microscopy

Cesar Augusto VALADES-CRUZ^{1,2}, Ludovic LECONTE¹, Christian WUNDER³, Charles KERVRANN²,
Ludger JOHANNES³, Jean SALAMERO¹

¹UMR 144-Institut Curie, 26 rue d'Ulm 75248 Paris, FR

²INRIA Centre Rennes - Bretagne Atlantique, 35042 Rennes, FR

³UMR 3666-Institut Curie, 26 rue d'Ulm 75248 Paris, FR

Email: cesar-augusto.valades-cruz@curie.fr

The study of the whole cell dynamics of endocytic/exocytic-recycling events has proven difficult until recently because of lack of sensitivity, limited speed, photobleaching and phototoxicity associated with conventional imaging modalities. The Lattice Light Sheet Microscope (LLSM) [1] allows overcoming these difficulties, yet reaching high spatial resolution. This allows 3D images to be captured over long time at a high acquisition frequency, and enables the study of signalling, transport, and stochastic self-assembly in complex environments.

In addition, this imaging technique and 3D-tracking will allow to look at molecular machinery throughout the full sequence of events that lead to exocytic fusion event or endocytic carrier formation, from initial membrane recruitment and budding and intracellular trafficking throughout the entire endocytic membrane system. Using 3D segmentation maps will permit to quantify different intracellular distribution pathways from the plasma membrane to a particular cellular destination and *vice et versa*.

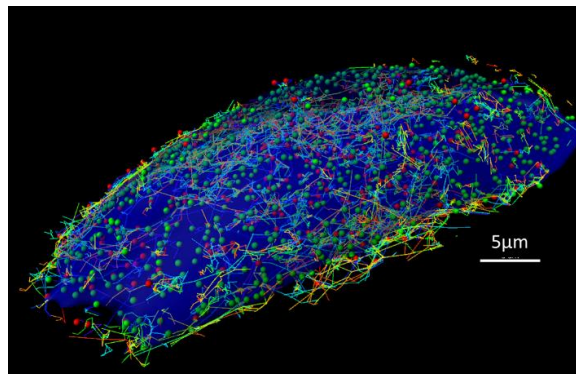


Figure 1. 3D tracking of Gal3-Atto647n (red) vs AP2-eGFP (green) adaptor protein in SUM159 cell.

We present preliminary results of the coordination of vesicle recycling from the endosomal recycling compartment up to the plasma membrane using LLSM imaging and 3D tracking. In addition, we introduce a quantitative analysis of endocytosis dynamics of AP2 adaptor complex, Galectin-3 (Figure 1) and Transferrin using single particle tracking analysis of 3D+time data. These examples demonstrate the advantage of lattice light sheet microscopy for imaging endocytic/exocytic events in single cells.

[1] Chen, B.C. et al. Science. 346 (6208): 1257998–1257998. (2014)