TRACKING OF TRANSPORT DYNAMICS IN LIVING CELLS

Ralf Bausinger[#], Christian T. Jüngst[*], Christelle Rosazza[*], Andreas Zumbusch[*]
[*]Department Chemie, Universität Konstanz, Germany
[#*]Department Physik, Universität Konstanz, Germany
andreas.zumbusch@uni-konstanz.de

During the last decade, ultrasensitive microscopy has become one of the most important tools in biophysics. With fluorescence excitation, sensitivities down to the single molecule detection limit can be achieved. As an example of single molecule sensitive microscopy in live cells, single particle tracking of individual nanocarriers will be shown.
Polyethyleneimine (PEI) based gene carriers are among the most efficient synthetic vectors for the delivery of DNA into the cell nucleus. We use highly sensitive fluorescence microscopy and single particle tracking methods for the investigation of the particles' paths from the plasma membrane to the nucleus. Active actin polymerization around the particle supports its cell entry and Rab protein accumulation initiates the fast vesicular transport on microtubules. It will be shown how trajectories of this bidirectional transport process are segmented by a numerical algorithm separating different modes of motion. Diffusion analysis of these segments then allows retrieving the distribution of the intracellular transport velocities.
Further we will present new data on the modulation of the intracellular transport behaviour of single particles depending on their enzymatic functionalization.